SSHCP South Sacramento Habitat Conservation Plan

FINAL ENVIRONMENTAL IMPACT STATEMENT/ENVIRONMENTAL IMPACT REPORT

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

VOLUME II
APPENDICES

U.S. Fish and Wildlife Service

Sacramento Fish and Wildlife Office

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Sacramento, CA 95825

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County Control Number: 2003-0637

State Clearinghouse Number: 2008062030

February 2018

EIS/EIR APPENDIX A

Summary of Cumulative Impacts to Waters of the United States in the Planning Area

Appendix A-1. Transmittal Letter from USACE

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Appendix A-3. Higher-Resolution Dataset; Projects from 1999 to 2013

Appendix A-4. Lower-Resolution Dataset; Projects from Beginning of Records to 1998

EIS/EIR APPENDIX A-1

Transmittal Letter from USACE

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

September 8, 2014

Regulatory Division SPK-1995-00386

Richard Radmacher, Senior Planner
County of Sacramento,
Department of Water Resources
827 7th Street, Room 230
Sacramento, CA 95814

Dear Mr. Radmacher:

Please find enclosed copies (both hardcopy and e-copy) of our Memorandum for Record (MFR) titled *Cumulative Impact Analysis for the South Sacramento Habitat Plan Area* (dated September 4, 2014).

The MFR provides a summary of the U.S. Army Corps of Engineers, Sacramento District's evaluation of cumulative impacts to waters of the United States within the South Sacramento Habitat Conservation Plan (SSHCP) Area, as determined by our office's review of past, present and reasonably foreseeable Regulatory Program actions. Information from this study is recommended to be utilized as a component of the cumulative impacts section under development as part of the SSHCP's Environmental Impact Statement/Environmental Impact Report (EIS/EIR).

Please refer to identification number SPK-1995-00386 in any correspondence concerning this project. If you have any questions, please contact Mary Pakenham-Walsh at the U.S. Army Corps of Engineers, Regulatory Division, California South Branch, 1325 J Street, Room 1350, Sacramento, California 95814-2922, by email at *Mary.R.Pakenham-Walsh@usace.army.mil*, or telephone at 916-557-7718. For more information regarding our program, please visit our website at *www.spk.usace.army.mil/Missions/Regulatory.aspx*.

Sincerely,

Kathleen A. Dadey, Ph.D
Chief, CA South Branch
Regulatory Division

Enclosure

cc: (w/ encl):

Mr. Paul Jones, U.S. Environmental Protection Agency, jones.paul@epamail.epa.gov
Ms. Nina Bicknese, U.S. Fish and Wildlife Service, Sacramento Office, Nina_Bicknese@fws.gov
Ms. Elizabeth Lee, California Regional Water Quality Control Board, Central Valley Region, Elizabeth.Lee@waterboards.ca.gov
Mr. Todd Gardner, California Department of Fish and Game, Region 2, Todd.Gardner@wildlife.ca.gov
Mr. Paul Junker, Mr. Paul Junker, Planning Director, City of Rancho Cordova, pjunker@cityofranchocordova.org
Mr. Taro Echiburu, Planning Director, City of Elk Grove, techiburu@elkgrovecity.org

EIS/EIR APPENDIX A-2

USACE Memorandum on Cumulative Impacts in the SSHCP Plan Area (9/4/2014)

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

MEMORANDUM FOR RECORD

SUBJECT: Cumulative Impact Analysis for the South Sacramento Habitat Conservation Plan Area (SPK-1995-00386)

1. **Introduction:** This document provides a summary of the U.S. Army Corps of Engineers, Sacramento District's evaluation of cumulative impacts to waters of the United States (WOUS) within the South Sacramento Habitat Conservation Plan (SSHCP) Area (also known as Plan or Plan Area; hereafter also referred to as "study area"), as determined by our review of past, present and reasonably foreseeable Regulatory Program actions (hereafter, "Regulatory actions").

   An evaluation of cumulative impacts of a proposed activity on the human environment is required under the National Environmental Policy Act (NEPA), and is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

   Please note that this analysis (hereafter called "study) considers cumulative impacts solely for aquatic resources, including impacts attributable to the collective effect of a number of individual discharges of dredged or fill material associated with authorized and unauthorized activities (UA) known to the Corps. This study is intended to be utilized as a component of a comprehensive cumulative impact analysis under development for the SSHCP's Environmental Impact Statement/Environmental Impact Report (EIS/EIR), which is intended to evaluate the full range of potential cumulative effects of the proposed SSHCP (for additional information about the EIS/EIR, see Section 3).

2. **Location:** The study area encompasses approximately 374,000 acres within southern Sacramento County, and includes unincorporated Sacramento County, and the cities of Galt and Rancho Cordova. The geographical boundaries of the Plan Area are U.S. Highway 50 to the north, the Sacramento River east levee and County Road J11 to the west, and the Sacramento County line to the east and south. The study

area excludes the cities of Sacramento, Elk Grove[1], Folsom, the lands of the Miwok tribe, and the Sacramento County community of Rancho Murieta (see **Figure 1, Appendix A**).

3. Activity Description: The proposed activity is the SSHCP, a habitat conservation plan (HCP) that would cover the 374,000-acre study area described above. The SSHCP is currently under preparation by a group of six local jurisdictions, who, with the addition of an HCP implementing entity (not yet formed), will be the "Plan Permittees" in coordination with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW). The "Plan Permittees" consist of: the County of Sacramento, City of Rancho Cordova, City of Galt, Capital Southeast Connector Joint Powers Authority, Sacramento Regional County Sanitation District, Sacramento County Water Agency, and a (to be formed) SSHCP Implementing Entity.

The Plan would include a conservation strategy developed to benefit 30 plant and animal species, referred to as "covered species." In addition, the Plan would serve as part of the Plan Partners' application for a 30- or 50-year incidental take permit (ITP) under section 10(a)(1)(B) of the federal Endangered Species Act (ESA). If issued, the ITP would authorize the incidental take of seven covered federally-listed plant and animal species. A separate ITP, if issued, would cover six state-listed species under the authority of the California Endangered Species Act[2] (CESA, administered by the CDFW). Due to overlapping state/federal designations, there are a total of 10 species that are federal- and/or state-listed. If issued, both ITPs would provide take coverage for "covered activities" implemented by the Plan Partners. Examples of "covered activities" include, but are not limited to, private development projects, transportation facilities, utility and public works projects, recreation facilities, and future habitat management activities.

The covered activities proposed by the Plan Partners in the SSHCP would directly affect a maximum total of approximately 42,243 acres of land (overall) within the study area[3]. Most of these direct effects (an estimated 40,000 acres) would occur within the 123,000-acre urban development area (UDA). Additionally, in the SSHCP, the Plan Partners propose to preserve or restore 49,930 acres of land within the study area. In combination with existing preserve lands, this would result in a larger, interconnected habitat preserve system of approximately 113,623 acres[3].

Independent of this study, the most recent, comprehensive data available to-date describing the SSHCP's proposed impacts to WOUS is represented in *Chapter 6.0,*

[1] The SSHCP Plan Area boundaries were updated nearly 1 ½ years into the Corps' cumulative impact analysis study (in late April, 2014). The Corps was in final data processing stages for the study at this time. Therefore, project data within the City of Elk Grove is included in this analysis. As a region of rapid-paced development in Sacramento County, inclusion of data from the City of Elk Grove serves to inform cumulative impacts in the northwestern portion of the study area. Additionally, the end-users of this study have the ability to query the electronic geodatabase (Appendix C) to estimate cumulative impacts without the inclusion of project data from within the City of Elk Grove. The revised Plan Area boundary is shown on Figure 1, in addition to the pre-April, 2014 study area boundary used for this analysis.

[2] California Fish and Game Code, Section 2050 et seq.

[3] According to the Notice of Intent to prepare a joint EIS/Environmental Impact Report (EIR), published in the Federal Register (Nov. 3, 2013) by the USFWS. As the SSHCP continues to progress toward finalization, it is noted that these acreages may be revised.

Effects of the July 2013 administrative draft SSHCP. Table 6-2, *Direct Effects to Native and Naturalized Land Cover Types Within and Outside the UDA* summarizes the Plan's anticipated direct effects to each of the "land cover types," including aquatic resources (e.g. seasonal wetlands and vernal pools).

Table 6-2 of the administrative draft SSHCP estimates that a maximum of approximately 5,477 acres of potential waters would be directly affected. Of these direct effects, up to 1,163 acres would be to wetland "land cover types" (consistent with the terms used in *Table 6-2*, "Freshwater Marsh," "Seasonal Wetland," "Vernal Pool," and "Swale"), up to 3,674 acres would be to potential wetland cover type ("Irrigated Pasture-Grassland") for a total of 4,837 acres of wetland/potential wetland cover types, and up to 643 acres would be to stream and open water cover types ("Ephemeral Streams," "Streams/Creeks," and "Open Water").

It is noted here that the maximum estimated direct effects identified in Table 6-2 of the administrative draft SSHCP include both temporary and permanent effects to aquatic resources. In addition, this table does not identify whether the aquatic resources are WOUS subject to Corps' jurisdiction, nor does it identify the extent to which the direct effects would result in a "loss" of WOUS. See Section 4(a) of this document for clarification of the usage of the term "loss" (of WOUS) in this document.

The SSHCP requires evaluation under NEPA. The USFWS is serving as the lead agency for the EIS component of an EIS/EIR that would describe, in accordance with NEPA requirements, the underlying purposes, needs, and objectives for developing, approving and implementing the SSHCP, including identifying alternatives to the proposed plan, describing the existing environment, and analyzing the potential effects of each alternative on the environment.

One of the SSHCP's goals is to streamline the existing development-permitting process with regard to, at minimum, reviews associated with federally-listed plant and animal species. In addition, the SSHCP is proposing to include an Aquatic Resources Program (ARP) that would describe actions expected to avoid, minimize and compensate for impacts of "covered activities" to WOUS. The proposed ARP would facilitate the Corps' development of a permitting strategy for the SSHCP, under Section 404 of the Clean Water Act. The Corps' role in the EIS as a cooperating agency includes meetings and document review to provide input on the Corps' jurisdiction, authorities, and other applicable Regulatory Program guidance, such as procedural considerations for future regulatory reviews of projects.

4. **Purpose of this Cumulative Impact Analysis:** This study has been conducted to assess, to the extent reasonable and practical, the cumulative impact to the aquatic ecosystem[4] within the study area attributable to the collective effect of individual discharges of dredged or fill material associated with authorized and unauthorized actions. To accomplish this, the Corps:

[4] This description of cumulative impacts to the aquatic ecosystem is similar to that found in Section 404(b)(1) [40 CFR 230.11(a)].

a. Determined the approximate extent (i.e., acreage) of loss[5] of WOUS from past, present and reasonably foreseeable future Regulatory actions within the study area;

b. Determined the approximate extent of compensatory mitigation of WOUS associated with past, present and reasonably foreseeable Regulatory actions in the study area; and,

c. Determined the general extent to which loss and/or compensatory mitigation of WOUS attributable to past, present and reasonably foreseeable Regulatory actions in the study area exhibited geographic association relative to the UDA.

From the above data, several sub-categories of data were analyzed to inform general patterns and trends in Regulatory actions relevant to the cumulative impact analysis. For example, one of the data queries resulted in a frequency distribution of relative levels of permanent impact to waters resulting from past and present Regulatory actions. Another data query addressed geographic patterns of impacts to waters resulting from Regulatory actions, relative to the UDA.

5. Geographic and Temporal Scopes of Analysis: The geographic (review area) and temporal scopes considered in this cumulative impact analysis (CIA) are described in this section.

a. Geographic Scope: The geographic scope for this CIA consists of the SSHCP Plan Area, as described in Sections 1 and 2 of this document. The study area is depicted in **Figure 1** (**Appendix A**), and includes all or portions of ten 10-digit Hydrologic Unit Code (HUC) watersheds within the study area (see **Figure 2**, **Appendix A**). For purposes of this study, it was determined to be appropriate to utilize portions of the 10-digit HUC watersheds that conformed to the boundaries of the SSHCP's Plan Area, rather than entire watersheds or larger (e.g., 8-digit) HUCs, based on the following rationale:

(1) Utilizing entire 10-digit HUCs that extend outside of the SSHCP Plan Area would have increased the review area from 374,000 acres to 866,922 acres, and the number of Regulatory actions to review from 1627 to an estimated 3,286[6]. To balance study resources (e.g., time and cost) with accomplishing the study's purpose at an appropriate level of detail, it was determined that use of entire 10-digit HUCs that extended beyond the Plan Area was not practicable. Following on this logic, utilizing 8-digit HUCs (which would result in a substantially larger review area and greater number of Regulatory actions than utilizing entire 10-digit HUCs) would exacerbate limitations on study resources.

[5] "Loss" of WOUS in this document follows the definition provided in the 2012 Nationwide Permits effective March 19, 2012 (FR Vo. 77, No. 34, p. 10289).

[6] This estimate was obtained by querying the ORM2 database; the query was conducted by the Corps' Institute for Water Resources (IWR), which provides nationwide ORM2 database support for the Regulatory Division.

(2) In addition to resource limitations, the Council of Environmental Quality's (CEQ) handbook *Considering Cumulative Effects Under the National Environmental Policy Act*, published in January 1997, suggests that for water impacts, that "watershed boundaries are useful for cumulative effects analysis" and that one way to determine the geographic boundary is to "consider the distance an effect can travel." Extending the study area for up to 23[7] miles outside of the SSHCP Plan Area for the 10-digit HUCs and an even greater distance for the 8-digit HUCs, would result in consideration of impacts to waters that are often off-stream (e.g., vernal pools) in the study region, and while likely resulting in cumulative effects to downstream waters, quantifying the magnitude of such impacts is, we believe, likely too speculative to be meaningful in the context of this analysis.

It was further determined that the study area boundary should be adjusted to exclude projects within the primary channels of the Sacramento River and Mokelumne River. The majority of projects on these rivers include those that primarily affect fish species (e.g. dock installation, levee repair), which are not covered in the SSHCP. While levee repair projects could potentially affect some HCP-covered species, the "loss of waters" is often minimal as a result of typical levee work, such as rip-rap placement.

b. Temporal Scope: The temporal scope for this analysis extends from approximately 35 years in the past (to the beginning of the Corps' Regulatory action documented file history in the study area, which was 1979) to the "reasonably foreseeable" future.

Reasonably foreseeable actions were not explicitly defined in terms of years (e.g., 5, 10 or 20), since time frames cannot be predicted. As an example, the Sacramento District has to-date been involved in re-authorizing several projects that had been previously authorized before or during the economic downturn in the latter part of the 2000-2010 decade. For purposes of this analysis, reasonably foreseeable projects were considered to be those that:

- Have applications that are currently being evaluated by the Corps;
- Have applications that have been withdrawn from Corps evaluation, but based on available information, may be reactivated within the reasonably foreseeable future;
- The Corps has received information that an application is anticipated to be submitted in the reasonably foreseeable future. This may include, for example, a scheduled or completed pre-application meeting for the project, a request for comments from the Corps on a project's EIR.

[7] Boundaries of some HUC-10 watersheds would extend as much as 23 miles toward the southwest, and approximately 20 miles toward the east.

6. Methodology: This section describes the procedures followed in conducting this study. The first step of the CIA involved identifying Regulatory actions and data categories of relevance to the analysis.

a. Data Setup and Acquisition

(1) Relevant data categories to populate from Regulatory actions were identified, taking into consideration the level of resolution available in files and/or database history for actions. A master spreadsheet was created in Microsoft Excel reflecting data structure and categories.

(2) The appropriate temporal scale for data collection, and project status (past, present, reasonably foreseeable) was confirmed (see also Section 5.b, above). The decision was made to combine "past " and "present" projects, interpreted as all projects the Corps has finalized, due to the size of the study area and number of actions. Separating these categories would have involved researching the status of projects previously finalized. This would have involved substantial resources to accomplish, and was not relevant to the key questions to be addressed by this CIA.

(3) Study area base mapping was set up in ArcGIS 10.0 Desktop geographic information system (GIS) software by importing externally-sourced geographic features including the study area boundary, UDA, and 10-digit HUC watershed boundaries.

(4) Utilizing ArcGIS, Regulatory actions within the ORM2 database were compared against the study area boundary, and actions located inside the study area boundary were identified. This generated a raw, comprehensive list of Regulatory actions. The ORM2 database contains actions originating from both ORM2 (post-July 2007), and the previous database, RAMS.

(5) A geodatabase was constructed from the raw list of Regulatory actions resulting from the step above, that summarized Regulatory actions by identification number, unique geometry type (polygon, line, point), type of action (e.g., permit, UA, mitigation bank), impact/mitigation acreage, and status (e.g., pending, finalized). This resulted in an initial data set consisting of 1627 Regulatory actions, which were in turn related to 713 (unique) project numbers[8].

(6) Refinement of the initial data was conducted, including:

(a) River-based projects such as docks were eliminated from the database by adjusting the study area boundary inward to the east and north

[8] Many Regulatory project numbers have several associated actions, for example, SPK-2000-00010 may have a permit action, a permit modification action, and a UA action. All of these actions generate a separate "row" in the dataset, with relevant baseline, impact and/or mitigation data.

banks of the Sacramento and Mokelumne Rivers, respectively (see Section 5.b).

(b) A number of projects were identified where the associated project location (confirmed by file research) differed from what was recorded in the Corps database. If a project location was determined to be located outside of the study area, it was removed.

(c) Projects having no potential[9] for impact losses or mitigation gains were identified and removed.

These steps resulted in a final data set of 540 unique project numbers and 1400 associated Regulatory actions.

b. Data Review and Compilation

(1) After the steps described in Section 6.a were completed, the final set of 540 unique project numbers and associated 1400 Regulatory actions, populated with the "raw" database-generated data (see Section 6.a[5]), was exported to Excel.

(2) For each of the 540 Regulatory project numbers, the associated Regulatory project file was located and researched, either in hardcopy or digital (older file actions have been converted to PDF format for archiving). Because of the high potential for inconsistency of data resolution and clarity in database records, in order to get the most accurate estimates of impacts and mitigation, every file associated with the 540 Regulatory projects was reviewed.

For each Regulatory action, raw data populating the Excel spreadsheet (derived from the ArcGIS table export described above in 6.b[1]) was updated, as necessary, with information acquired from the associated project file.

File review included reviewing available data from in prior cumulative impact studies conducted by the Corps within the study area[10]. A substantial effort was made to evaluate all available electronic and hardcopy data for Regulatory actions within the study area, at the most efficient level of effort necessary to accomplish the study's objectives.

[9] "No potential" for purposes of this study means that the database record for the project met both of the following two criteria: 1) There was no impact or mitigation record associated with the project, and 2) All actions associated with the project were of a type that would not be associated with impacts (e.g., pre-application, no permit required). This two-criteria test did not remove any projects for which an ORM2 impact or mitigation entry existed, even if the recorded impact values were 0. Any project having an ORM2 impact or mitigation entry was included in the final geodatabase, and was reviewed individually to confirm impact and/or mitigation values.

[10] *Residences of Murieta Hills (*SPK-2005-00305*), Glenborough at Easton and Easton Place (*SPK-2004-00515*, Florin-Vineyard Specific Plan Area (*SPK-2004-00244 & SPK-2009-00080*), and Sunridge Properties (*SPK-2009-00511*).*

All data were input directly into Excel spreadsheets. As file review was conducted, data gaps (resulting when the initial file review failed to provide sufficient information regarding impacts and/or mitigation) were "flagged" on the spreadsheets to address during a final data QA/QC stage.

(3) Based on an overview of both database- and file-generated data in terms of relative raw data quality, it was determined appropriate to create two separate datasets from the refined (see Section 6.a[6]) raw dataset of 1400 Regulatory actions, representing 540 unique project numbers. During file review, it became apparent that the information regarding impacts and mitigation in older projects was not as specific as the information available for projects completed more recently (e.g. a project authorized in 1996 may not specify the type impact, the type of aquatic resource impacted, or the type of mitigation required, whereas a project from 2011 would contain that information). Because of the discrepancy in the quality of data, an accurate comparison could not be made. Therefore, the data were divided according to the following criteria:

(a) The first dataset (hereafter, "higher-resolution" dataset), consists primarily of projects from 1999 to January 2013. The higher-resolution dataset contains the highest level of data available that is relevant to this study, an achievable standard based on the higher quality of the generally more recent file and database documentation. This dataset identifies the amount of each type of waters impacted (e.g., wetlands vs. streams), includes project-related mitigation required by both the Corps and associated with USFWS Sec. 7 ESA consultations, and includes the location of required mitigation relative to the UDA. This dataset also includes several reasonably foreseeable projects. Data categories in the higher-resolution dataset are summarized in **Table 1** (**Appendix B**).

(b) The second dataset (hereafter, "lower-resolution" dataset), consists primarily of projects from the beginning of the Corps' record to 1998. This dataset contains substantially less data than that obtained for the higher-resolution data set. This dataset does not identify the amount of each type of waters impacted, does not include project-related USFWS mitigation, and does not provide the location of mitigation. The dataset does include the total amount of waters impacted and mitigation required by the Corps. In addition to older Regulatory actions, this dataset also includes several reasonably foreseeable projects. Reasonably foreseeable projects exhibit varying levels of project description detail, and all related data is, at best, pre-decisional. Data categories in the higher-resolution dataset are summarized in **Table 2**, **Appendix B**.

(4) In the final stages of data collection, the lower-resolution dataset was combined with a copy of the higher-resolution dataset to create a single,

"complete lower-resolution" (CLR) dataset that exhibits the same categories used by the lower-resolution dataset. Therefore, two datasets were analyzed for the purposes of this study, the higher-resolution dataset (as described above), and the CLR dataset. The CLR dataset was created in order to compare "apples to apples" across the full temporal scope of the study. Higher-resolution data could be combined into broader categories, but lower-resolution data was not able to consistently be made more precise. Thus the CLR dataset is able to meaningfully describe broader categories of data.

c. Decision Rules and Assumptions for the Higher-resolution Dataset

As described in Section 6.b(3), data for this study is contained within two datasets, higher-resolution and CLR. The following section describes decision rules and assumptions for the higher-resolution dataset, which contains the higher quality data. Please see Section 6.d for decision rules and assumptions for the CLR dataset.

(1) Excel table structure: In the higher-resolution dataset, some Regulatory file numbers have multiple rows associated with them. This may be because a single Regulatory file number has multiple related Regulatory actions (e.g., one file number had one action resulting in a Nationwide [NWP] verification, and several years later, an individual permit [IP] was issued for a different action associated with the same project), or because data needed to be kept separated during review for the sake of clarity (e.g., USFWS requirements associated with ESA Section 7 consultation). After the initial data set-up, hardcopy or electronic files of those Regulatory file numbers with multiple actions were reviewed, and the tables were updated appropriately. In some cases, information was consolidated into a single row (e.g., permit modification actions that did not introduce changes to impact/mitigation acreages).

(2) Recording Delineated Acres: To simplify the analysis as much as possible but utilize relevant categories, Delineated Acres consisted of four aquatic resource types: Wetlands, Streams, Other, and Unknown. The acreage of an aquatic resource type was only included in one of these categories if: a) it was determined jurisdictional, AND (b) a Regulatory action on the site resulted in a permanent or temporary impact. Only one set of delineated acreage figures was recorded per Regulatory project number, so the Excel spreadsheets contain many rows without delineation acreage/figures. An additional category was created to record acreage of any features that were determined to be non-jurisdictional (e.g., isolated). This category was not broken down by aquatic resource type; it is an undifferentiated summation of acreage determined to be non-jurisdictional waters.

(a) "Wetlands" included all types of wetlands, for example, vernal pools, seeps, seasonal wetlands, freshwater marsh, and swales. Further

subdivision of the wetland category was determined to be unreasonably resource-consuming, and in some cased impossible due to the lack of documentation (particularly in older files). Given that the entire data set could not be consistently differentiated by wetland type, the decision was to not address just a portion of it.

(b) "Streams" included ephemeral, intermittent and perennial streams, creeks, and rivers. Ditches (if determined to be jurisdictional) were also included in the stream category. While some ditches may have wetland characteristics in addition to (or instead of) stream characteristics, separating ditches that are categorized as wetlands from ditches categorized as streams was determined to be unreasonably resource-consuming, and in some cases impossible due to the lack of documentation (particularly in older files).

(c) "Other" included ponds, retention/detention basins (if determined to be jurisdictional), and open water (if not obviously in one of the two categories of [a] or [b], above).

(d) "Unknown" included delineated acreage that was determined to be jurisdictional, but for which the specific aquatic resource type (e.g., seasonal wetland) was unknown based on the lack of specificity available in file documentation.

(e) If a JD was verified and a Corps action resulted in temporary and/or permanent impacts to WOUS, but the amount of delineated acres could not be determined, then an estimate of delineated acres was assumed to equal the sum of impacts (temporary and permanent) and, if applicable, any identified on-site preservation requirements.

(f) If delineated acreage was known and any of the above aquatic resource types were specified, but it was unknown exactly how many acres of each aquatic resource type was delineated, the known delineated acreage was divided evenly between the four aquatic resource types.

(3) Recording Impacts to WOUS:

(a) This study focused on permanent impacts that resulted in a "loss of" WOUS[11]. Permanent impacts were recorded for each of the four aquatic resource types identified in Section 6.c(2).

(b) Temporary impacts to waters were not recorded as part of this analysis, since once restored, temporary impacts do not result in a loss of WOUS.

[11] As defined in the Corps' 2012 Reissuance of Nationwide Permit (FR Vol. 77, No. 34, p. 10289, February 21, 2012).

(c) Impacts to waters recorded as "permanent" in Regulatory actions were typically assumed to result in a loss of WOUS. In more obvious cases in which permanent impacts appeared to not result in a loss of WOUS, the data were recorded in a separate category of "permanent impact, not loss of WOUS." Examples include outfall replacements within approximately the same footprint as an existing outfall, rip-rap installation, impacts associated with certain types of maintenance, and dredging. The Corps' ORM2 database only recently (in 2011) included a waters impact data field that specified "permanent impact, not a loss of WOUS." Regulatory actions prior to this time were flagged, then individually reviewed to determine if an associated impact belonged in this particular data category.

(d) Regulatory actions involving stream realignments were assumed to have resulted in permanent impact (loss of WOUS); an equal accompanying acreage of stream establishment was entered in the dataset to offset the loss resulting from the realignment, unless the record indicated differently (e.g., establishment of the same, less, or more waters in the new stream alignment.

(4) Recording Mitigation and Activities Increasing and/or Preserving WOUS:

(a) This study focused on compensatory mitigation required by special condition of DA authorizations, and other forms of "gain" in WOUS acreage within the study area (e.g., wetland re-establishment done under the authorization of NWP 27). It also acknowledges preservation (which does not result in a gain of WOUS acreage, however does afford more protection against future potential impacts) that was required in association with Regulatory actions[12]. A "gain" in WOUS involves establishment and/or re-establishment (i.e., restoration) of waters, most typically wetlands. In the higher-resolution dataset, mitigation also includes establishment/re-establishment and preservation of waters required by the USFWS as an outcome of Section 7 consultation under the ESA (a key distinction from the CLR dataset; see Section 6.b(3)(a). Compensatory mitigation requirements were recorded for each aquatic resource type category, or as "unknown" if file information failed to yield sufficient information regarding the type of waters involved in mitigation. Other types of mitigation not resulting in new acreage of WOUS were also recorded, as described below.

(b) If permanent impacts were identified for a Regulatory action, and file information indicated that compensatory mitigation was required, but

[12] Typically, preservation requirements associated with Regulatory actions include preservation acreage required by the USFWS as a condition of compliance with the ESA vis-à-vis Section 7 consultation. Another typical example of preservation requirements is permittee-responsible on-site preserves that include "avoided" waters and associated uplands (e.g., demarcated as an outlot, drainage corridor, etc. of a subdivision).

the acreage of the compensatory mitigation was unknown, the assumption was made that compensatory mitigation consisted of establishment of an in-kind aquatic resource type at a 1:1 ratio (e.g., if permanent impacts to 1 acre of wetlands was authorized, it was assumed that the compensatory mitigation requirement was for the establishment/re-establishment of 1 acre of wetlands). This assumption was not applied to UAs (finalized, or pending resolution), due to the less predictable nature of enforcement cases. If mitigation was not indicated in the database and/or Regulatory action for a UA, then its mitigation fields were left blank.

(c) Mitigation location was recorded relative to the UDA (inside UDA, outside UDA, or outside of study area). If the mitigation location could not be determined based on available information, it was recorded as "unknown."

(d) For Regulatory actions for which compensatory mitigation was required in the form of payment into an in-lieu fee program (ILF), the type of ILF was recorded as either "Wetland" or "Stream," based on file information. If the type of ILF mitigation was unknown based on file information, an assumption was made that the ILF payment was for in-kind mitigation (i.e., the same as the type of waters impacted). During the Regulatory permitting process, ILF requirements are often calculated by applying a ratio (determined on a project-specific basis) to an established cost-per-acre of resource type. For example, a project impacting 0.10-acre of wetlands may have been mitigated for at a 3:1 ratio, such that the required ILF fee was equivalent to purchasing 0.30-acre of wetlands. Due to historical challenges in determining the certainty, type and location of projects actually constructed using the ILF funds, the decision was made to conservatively document the amount of compensatory mitigation for projects that required payment into an ILF, as being equal to the acreage of authorized impact. Using the example above, the figure recorded for this study would have been 0.10-acre. It was also assumed that mitigation location for compensatory mitigation required through the payment into an ILF fund was best characterized as "unknown."

(e) For Regulatory actions in which the requirement of the DA authorization provided a choice that required compensatory mitigation be done in the form of *either* purchase of bank credits *or* payment into an ILF, when the outcome of that decision was unknown based on file information, the assumption was made that bank credits had been purchased. Consistent with Section 6.c(4)(c), mitigation location was recorded as "unknown."

(f) Other types of compensatory mitigation (e.g., enhancement) were recorded in an "other mitigation" category with associated acreage.

(g) Incorporation of mitigation required by the USFWS as a result of Section 7 ESA consultation (as noted above, this assessment was only made for this [higher-resolution] dataset, not for the CLR dataset), when:

(i) In general, if a Regulatory action had an associated Section 7 ESA BO, it was reviewed for potential mitigation requirements (specifically, involving aquatic habitats) that may either have overlapped with, or have been in addition to, Corps Regulatory-required mitigation. If a Regulatory action had an associated letter of concurrence (instead of a BO) as a result of a determination that the action was not likely to adversely affect Federally-listed threatened and/or endangered species, no further review was conducted (as an informal consultation letter of concurrence does not require compensatory mitigation).

(ii) If preservation was recorded as a mitigation requirement, this was often (but not always) in association with a USFWS Sec. 7 ESA consultation action. This study recognizes that USFWS-required preservation may address indirect as well as direct impacts to aquatic habitats for species. Our analysis did not commit resources to parsing out indirect vs. direct impacts as a basis for requiring preservation; the resulting outcome of preserved acres was determined to be the most relevant metric.

(iii) Mitigation for the federally-threatened giant garter snake (*Thamnophis gigas*) was considered when a Regulatory action contained a BO that required it. Wetland establishment was generally estimated to be one-third of the acreage requirement expressed in the project's BO (e.g., if the BO required 9 acres of giant garter snake habitat establishment, the recorded acreage of freshwater marsh establishment was 3 acres). This is based on the habitat ratios outlined in the *Programmatic Formal Consultation for U.S. Army Corps of Engineers 404 Permitted Projects with Relatively Small Effects on the Giant Garter Snake within Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo Counties, California*[13]. If the BO specified an aquatic acreage requirement that differed from the one-third estimate, the acreage required by the BO was entered into this data category.

(h) If a Regulatory action contained "as-built" drawings for compensatory mitigation, the acreage of WOUS reported on the as-builts was

[13] Sacramento Fish and Wildlife Office, USFWS, dated November 13, 1997, which requires that for every 1 acre of aquatic habitat established for giant garter snake, 2 acres of surrounding upland habitat for giant garter snake are also included.

recorded for mitigation, rather than the acreage required by the action's authorization. The as-builts were assumed to provide the most accurate record of compensatory mitigation, if available.

(i) All mitigation was assumed to have been completed and to be functioning successfully (e.g., constructed, or mitigation bank credits purchased). Resource limitations prevented confirming the compliance status of mitigation across the data set (see also Section 9 of this document).

(5) Treatment of mitigation sites including mitigation banks and permittee-responsible mitigation sites:

(a) Mitigation sites were individually reviewed to determine whether any on-site established/re-established aquatic resource acreage was documented as having been utilized as compensatory mitigation for other projects. If this was determined to be the case, all established/re-established aquatic resource acreage was removed from the mitigation site record in the database, unless that acreage was associated with a "self-mitigating" activity (i.e., an impact from the mitigation project itself, that was mitigated by the project's own establishment/re-establishment acreage). All other data categories were left unchanged. If a mitigation site had no acreage being utilized as compensatory mitigation for other projects, its record was left unchanged. Rationale for these decisions is as follows:

(i) A general analysis using the above-identified records in an unmodified state would result in "double-counting" establishment/re-establishment acreage alongside mitigation acreage that was reported for the projects "using" the establishment/re-establishment acreage for their own required compensatory mitigation. In a sense, these other projects "debit" acreage available at the mitigation sites.

(ii) Calculating the exact amount of "debited" and remaining acres for each mitigation site was beyond the scope of this study. A decision was made to conservatively estimate the overall mitigation acreage by removing all established/re-established acres from the records of mitigation sites *confirmed as* having been utilized (in full, or in part) as compensatory mitigation by other projects (excepting self-mitigating acreage, as described above).

(b) Unaltered records for all mitigation banks and permittee-responsible mitigation sites located within the study area have been placed in separate tables for review if needed.

(6) Treatment of linear projects: The dataset was scanned for linear projects (e.g., transportation projects), which were recognized to have the potential to span the study area boundary. Geometry and database information was reviewed for linear projects with permanent impacts of more than 0.5 acre. This resulted in confirming that no linear projects exceeding 0.5 acre of impacts were contained in the dataset. No further action was necessary given that confirmation.

(7) Treatment of Related Regulatory actions. In cases in which a Regulatory action became merged with another action, an attempt was made to not double-count associated information, by summarizing data from the merged actions as appropriate. An example of this scenario includes several unique Regulatory actions falling under a larger "Specific Plan Area" or other master planning area (e.g., Suncreek). In such cases, data were typically merged into one row/master project number, with annotations in the datasheet's "notes" field, as appropriate.

d. Decision Rules and Assumptions for the CLR Dataset:

As described in Section 6.b(3), data for this study are contained within two datasets, higher-resolution and CLR. The following section describes decision rules and assumptions for the CLR dataset, which exhibits the lower degree of resolution. Please see Section 6.c for decision rules and assumptions for the higher-resolution dataset.

(1) Excel table structure: As described in Section 6.c(1) for the higher-resolution dataset, in the CLR dataset, some Regulatory file numbers have multiple rows associated with them. Please refer to Section 6.c(1) for explanation.

(2) Recording Delineated Acres: For the CLR data set, delineated acres is a catch-all category, and is not broken into individual aquatic resource types (e.g., wetlands, streams) due to inconsistent data availability. Similar to the higher-resolution dataset, delineated acres of aquatic resources were only recorded if: (a) it was determined jurisdictional, AND (b) a Regulatory action on the site resulted in a permanent or temporary impact. Only one set of delineated acreage figures was recorded per Regulatory file. A separate catch-all aquatic resources category was created to record acreage of any features that were determined to be non-jurisdictional (e.g., isolated).

(3) Recording Impacts to WOUS:

(a) Permanent impacts were recorded in one catch-all category of waters.

(b) Temporary impacts to waters were not recorded as part of this analysis, since once restored, temporary impacts do not result in a loss of WOUS.

(c) Impacts to waters recorded as “permanent” in Regulatory actions were assumed to result in a loss of WOUS.

(d) Regulatory actions involving stream realignments were assumed to have resulted in a permanent impact (loss of WOUS); an equal accompanying acreage of stream establishment was entered in the dataset to offset the loss resulting from the realignment, unless the record indicated differently (e.g., establishment of the same, less, or more waters in the new stream alignment.

(4) Recording Mitigation and Activities Increasing and/or Preserving WOUS:

(a) This study focused on compensatory mitigation required by special condition of DA authorizations and other forms of “gain” in WOUS acreage within the study area. It also includes an acknowledgement of preservation (which does not result in a gain of WOUS acreage, however does afford more protection against future potential impacts) that was required in association with Regulatory actions. A “gain” in WOUS involves establishment and/or re-establishment of waters, most typically wetlands. For this dataset, compensatory mitigation requirements were recorded in catch-all waters categories for establishment/re-establishment or preservation types of mitigation. Other types of mitigation not resulting in new acreage of WOUS were also recorded, as described below.

(b) If permanent project impacts were known for a Regulatory action, and compensatory mitigation was obviously required, but the acreage of the compensatory mitigation was unknown, the assumption was made that compensatory mitigation consisted of establishment of an in-kind aquatic resource type at a 1:1 ratio (e.g., if permanent impacts to 1 acre of wetlands was authorized, it was assumed that the compensatory mitigation requirement was for the establishment/re-establishment of 1 acre of wetlands).

(c) The CLR dataset did not include the location of compensatory mitigation, thus no assumptions were made about mitigation location.

(d) Other types of compensatory mitigation (e.g., enhancement) were recorded in an “other mitigation” category, including associated acreage.

(e) As a combination of the higher-resolution and lower-resolution datasets, the CLR dataset is mixed in terms of documenting mitigation

required by the USFWS. Records associated with the higher-resolution dataset were reviewed for applicable USFWS-related mitigation. Records associated with the lower-resolution dataset (as described in Section 6.b[3][b]) were not reviewed for applicable USFWS-related mitigation. As a result of the mixture of both types of records in the CLR dataset, any query done for purposes of this study on that dataset would under represent USFWS-related mitigation.

(f) If a Regulatory action contained "as-built" drawings for compensatory mitigation, the acreage of WOUS reported on the as-builts was recorded for mitigation, rather than the mitigation acreage required by the action's authorization. The as-builts were assumed to provide the most accurate record of mitigation results, if available.

(g) All mitigation was assumed to have been completed and to be functioning successfully (e.g., constructed, or mitigation bank credits purchased). Resource limitations prevented confirming the compliance status of mitigation across the data set (see also Section 9 of this document).

(5) Treatment of mitigation sites including mitigation banks and permittee-responsible mitigation sites: Please see Section 6.c(5).

(6) Treatment of linear projects: Please see Section 6.c(6).

(7) Treatment of Related Regulatory actions: Please see Section 6.c(7).

7. Cumulative Impact Results: From the beginning of the Corps' record (1979) to 2013, 1627 Regulatory actions were reviewed for this analysis. After the initial data culling procedures described in Section 6.a, the number of actions eligible for inclusion in the study dropped to 1400. These actions are in turn related to 540 unique project numbers. The majority of these were permit actions. Other fairly common actions included pre-application, UAs, and mitigation bank development.

In accordance with the study's two datasets, higher-resolution and CLR, results are presented separately for each. Results for past and present projects are presented for each dataset (the CLR dataset serves as the most comprehensive summary; results are not additive between the two datasets). Results for reasonably foreseeable projects are presented in the format of just the CLR dataset (again, as the most complete summary). An acknowledgment of limited impacts and mitigation documented in the record using alternative quantifications (e.g., cubic yards, dollars) or types of activity (e.g., enhancement of WOUS) are also presented in the format of just the CLR dataset.

A summary of the types (e.g., NWPs) of past and present, and reasonably foreseeable Regulatory actions resulting in a loss of WOUS is provided just for the CLR dataset, since it is the most comprehensive of the two datasets.

a. Past and Present Projects - Higher-resolution Dataset:

(1) Summary of delineated acres: Delineated acres for past and present projects in the higher-resolution dataset includes approximately 1,190 acres of wetlands, 309 acres of streams, 124 acres of other types of waters, and 5 acres of "unknown" (total of 1627 acres) (**Table 3, Appendix B**).

(2) Summary of loss of WOUS: For past and present projects in the study area, the Corps has authorized the placement of fill material (resulting in permanent loss of WOUS) into approximately 218 acres of WOUS (**see Table 3**). This includes approximately 152 acres of wetlands, 46 acres of streams, 18 acres of other types of waters, and 2 acres of "unknown." Loss of WOUS in and out of the UDA is summarized in **Table 3**; approximately 89% (193 acres) of loss of WOUS as a result of Regulatory projects occurred within the UDA, and 11% (25 acres) of loss of WOUS occurred outside the UDA. As noted in the methods section, this analysis did not address temporary impacts that did not result in the loss of WOUS.

(3) Summary of Activities Increasing and/or Preserving WOUS for past and present projects: Information by aquatic resource types is summarized in **Table 3**.

(a) Acres of WOUS established/re-established ("gained" acreage): A total of 496 acres of WOUS (all types) were established/re-established, including: 97 acres inside the UDA, 275 acres outside of the UDA (but in the study area), 58 acres outside of the study area, and 66 acres in unknown locations. This represents all types of mitigation, including banks and other types of mitigation sites (see Section 6.c[5] and **Table 3**). The total of 496 acres of established/re-established WOUS associated with Regulatory projects is considered to be the most reliable minimum "gained" acreage of WOUS for purposes of this study, due to the consideration of double-counting discussed in Section 6.c(5).

Of establishment/re-establishment in known locations (430 acres; all types), 97 acres (22.6%) of WOUS were established/re-established within the UDA, and 333 acres (77.4%) of WOUS were established/re-established outside of the UDA either in, or out of the study area. Considering only wetlands (other types of waters are also shown on **Table 3**), of a total of 399 acres with known location information, 74 acres (18.7%) of wetlands were established/re-established within the UDA, and 324 acres (81.3%) of wetlands were established/re-established outside of the UDA, either in or out of the study area.

(b) Acres of WOUS preserved (no "gain"): A total of 422 acres of WOUS (all types) were preserved (219 acres in, and 130 acres outside of UDA) as a result of all types of mitigation, including banks (and other types of) mitigation sites (see Section 6.c[5]) (see **Table 3**). In addition to the 130 acres preserved outside of the UDA, another 21 acres were preserved outside of the study area, and 52 acres were preserved in unknown locations (based on the extent of file information; this includes the potential to be located outside of the study area). The total of 422 acres of preserved WOUS associated with Regulatory projects is considered to be the most reliable minimum preserved acreage of WOUS, due to the consideration of double-counting discussed in Section 6.c(5). Some additional insights into this data include:

Of WOUS preservation in known locations (370 acres; all types), 219 acres (59.3%) of WOUS were preserved in the UDA, and 151 acres (40.7%) of WOUS were preserved outside of the UDA and either in, or out of the study area. Considering only wetlands (other types of waters are also shown on **Table 3**), of a total of 315 acres with known location information, 172 acres (54.8%) of wetlands were preserved within the UDA, and 142 acres (45.2%) of wetlands were preserved outside of the UDA, either in or out of the study area.

(4) Net gain/loss of WOUS as a result of past and present projects within the study area associated with Regulatory projects[14]: Considering the above-described results, as summarized in **Table 3**, there has been approximately 218 acres of loss of (all types of) WOUS, and 496 acres of gain (establishment/re-establishment) of (all types of) WOUS. Therefore, there has been a net gain of approximately 278 acres of WOUS within the study area associated with past and present Regulatory projects (**Table 3**).

Specific to types of WOUS, wetlands exhibited a net gain of 313 acres, streams a net loss of 18 acres, other types of waters a net loss of 16 acres, and "unknown" types of waters, zero net loss. The data show a distinct pattern of net loss within the UDA, and in the case of wetlands, net gain outside of the UDA (both in and out of the study area). Within the UDA, there was a net loss of 59 acres of wetlands. Outside of the UDA (both in and out of the study area), there was a net gain of 307 acres of wetlands. Loss of streams and other types of waters within the UDA does not appear to be offset by gains in these types of waters outside of the UDA. Implications may include the relative difficulty of creating/restoring streams and other waters to offset permanent loss.

[14] Note: The net gain/loss assessment is limited to Regulatory actions, not a study-area wide analysis of baseline WOUS conditions (for example, based on remote sensing using National Wetland Inventory maps, and/or a series of historical aerial images. The assessment is limited in applicability to the Regulatory actions reviewed for this study. See also Section 8 of this document (Limitations).

b. Past and Present Projects - CLR Dataset

(1) Summary of delineated acres: Delineated acres for past and present projects in the CLR dataset includes approximately 2766 acres of WOUS (per Section 6.d[2][a], WOUS are not separated into aquatic resource types). Please see the CLR dataset results summary in **Table 4** (**Appendix B**).

(2) Summary of loss of WOUS: For past and present projects in the study area, the Corps has authorized the placement of fill material (resulting in permanent loss of WOUS) into approximately 772 acres of WOUS (all types; per Section 6.d[2], WOUS are not separated into aquatic resource types). Loss of WOUS within and outside of the UDA is summarized in **Table 4**; approximately 82.4% (636 acres) of loss of WOUS as a result of Regulatory projects occurred within the UDA, and 17.7% (137 acres) of loss occurred outside of the UDA. **Figure 3** (**Appendix A**) shows the "impact intensity" within the study area. This is a GIS-generated visualization, combining the geographic "density" of Regulatory projects and relative level of impact to WOUS associated with the projects.

Due the size of this study, and the fact that one project number may contain several Regulatory actions, it is not practicable to accurately report results in terms of the number of permits or other applicable actions. However, a summary of the types (e.g., NWPs) of past and present Regulatory actions, and the relative contribution of the type of Regulatory action to loss of WOUS, can be accurately described. For past and present projects, of the 772[15] acres of loss of the WOUS:

(a) SP actions resulted in 607 acres of loss of WOUS;

(b) Letter of Permission (LOP) actions resulted in 17 acres of loss of WOUS;

(c) NWP actions resulted in 147 acres of loss of WOUS;

(d) UA actions resulted in 2 acres of loss of WOUS.

Table 5 (**Appendix B**) summarizes some alternative quantifications of impacts to WOUS (e.g., reported in linear feet or cubic yards) associated with Regulatory projects. This information is provided for completeness as it was documented during review of Regulatory actions.

(3) Summary of Activities Increasing and/or Preserving WOUS for past and present projects:

[15] Due to rounding, the below acreages when added, total 773 acres; this is noted as a rounding issue, not a mathematical error.

(a) Acres of WOUS established/re-established ("gained" acreage): A total of 1,137 acres of WOUS (all types) were established/re-established as a result of all types of mitigation, including banks and other types of mitigation sites (see Section 6.d[4]). This is considered to be the most reliable minimum "gained" acreage of WOUS, due to the consideration of double-counting discussed in Section 6.c(5). Please note that as described in Section 6.d(4)(c), the CLR dataset did not include georeferencing of mitigation location, thus mitigation-related WOUS acreage gains are not described relative to being in/out of the UDA.

(b) Acres of WOUS preserved (no "gain"): A total of 996 acres of WOUS (all types) were preserved as a result of all types of mitigation, including banks and other types of mitigation sites (see Section 6.d[4]). This is considered to be the most reliable minimum preserved acreage of WOUS, due to the consideration of double-counting discussed in Section 6.d(5). Please note that as described above, the CLR dataset did not include georeferencing of mitigation location, thus mitigation-related WOUS acreage preservation is not described relative to being in/out of the UDA.

Table 5 summarizes some other forms of compensatory mitigation for impacts to WOUS associated with Regulatory projects. This information is provided for completeness as it was documented during review of Regulatory actions.

(4) Net gain/loss of WOUS as a result of past and present projects associated with Regulatory projects: Considering the above-described results, approximately 773 acres of loss of WOUS and 1,137 acres of gain (establishment/re-establishment; preserved acreage of waters does not contribute to gain, thus is not considered), there has been a net gain of approximately 365 acres of WOUS as a result of past and present Regulatory projects (**Table 4**). Geographic patterns associated with net gain/loss were not assessed for the CLR dataset (assessment was only conducted for loss, as noted above).

c. Reasonably Foreseeable Projects - CLR Dataset

(1) Preliminary review was conducted for approximately 44 projects obtained from the ORM2 database as potentially reasonably foreseeable projects. As a result of the review, 36 projects were determined to indeed be reasonably foreseeable. The remaining 8 projects were determined to be too speculative, not meeting one or more of the parameters for reasonably foreseeable projects summarized in Section 5.b; these 8 projects were thus determined not to be reasonably foreseeable.

(2) Summary of loss of WOUS: The results of reviewing the reasonably foreseeable projects are presented in **Table 6** (**Appendix B**). If all of the reasonably foreseeable projects are implemented, available file information

indicates that there would be a loss of up to 349 acres of WOUS (all types), consisting of 193 acres (55%) inside the UDA, and 156 acres (45%) outside the UDA.

Due the size of this study, and the fact that one project number may contain several Regulatory actions, it is not practicable to accurately report results in terms of the number of permits or other applicable actions. However, a summary of the types (e.g., NWPs) of reasonably foreseeable Regulatory actions, and the relative contribution of the type of Regulatory action to loss of WOUS, can be accurately described. For reasonably foreseeable projects, of the up to 349 acres of projected loss of the WOUS:

(a) SP actions, if all projects are implemented, would result in up to 203 acres of loss of WOUS;

(b) Pre-application actions, if all projects are implemented, would result in up to 128 acres of loss of WOUS;

(c) UA actions, if resolved with the documented loss of WOUS available in the project records, would be confirmed as resulting in up to 17 acres of loss of WOUS.

(3) Summary of "gain" and preservation of WOUS: Available file information indicates that to offset the loss of WOUS described above, 398 acres of WOUS (all types) would be established/re-established, and 248 acres of WOUS (all types) would be preserved (**Table 6**).

(4) Net gain/loss of WOUS attributable to reasonably foreseeable Regulatory projects: As shown in **Table 6**, available file information indicates that there would be 47 acres of net gain of WOUS (all types) if all 36 reasonably foreseeable projects were implemented. Geographic patterns associated with net gain/loss were not assessed for the CLR dataset (assessment was only conducted for loss, as noted above).

(5) There were 18 reasonably foreseeable projects with at least 1 acre of projected[16] loss of waters (range = 1 to 128 acres; average = 22 acres, median = 10 acres), as summarized in **Table 7** (**Appendix B**). If all 18 of these reasonably foreseeable projects are implemented in the future, approximately 350 acres of WOUS may be permanently lost.

(6) In addition to available file information that was reviewed in order to project anticipated "gain" and preservation of WOUS associated with reasonably foreseeable projects, an assumption is made that based on the requirements of mitigation-related regulations found in 33 CFR 332, and the EPA's Section 404(b)(1) Guidelines (40 CFR 230), future projects authorized by the Corps would require avoidance and minimization of

[16] Based on current design; future modifications of project design could alter impact estimates.

WOUS to the maximum extent practicable. For unavoidable discharges of fill material into WOUS, it is expected that compensatory mitigation for the loss of the functions of WOUS within the study area would be required. Commensurate with guidance found in the Corps' mitigation regulations, the required mitigation ratio would generally be at least 1:1.

(7) In addition to the projects already known and reviewed for this study, the Regulatory Program receives permit applications for projects (of various sizes) without having any prior knowledge regarding the project's planning. Thus, it is anticipated that an as-of-yet unknown variety of actions (e.g., residential, commercial and infrastructure) will be proposed in the future within the study area, resulting in additional impacts to WOUS that have not been projected as part of this study.

8. Limitations of this Cumulative Impact Analysis: This study was conducted to estimate the "loss of WOUS" in the study area resulting from Regulatory actions in the past, present and reasonably foreseeable future. The following limitations apply to this study:

a. This analysis covers actions identified within the Corps' database, and does not include impacts that occurred without a permit (or associated investigation of a potential unauthorized activity), or other activities that occurred within the knowledge of the Corps', impacts that occurred as a result of exempt activities in accordance with 33 CFR 323.4 (i.e. normal farming practices), impacts that occurred prior to the enactment of the Clean Water Act, or impacts that occurred after the passage of the Clean Water Act, but before information was documented in the Corps' database (see Section 5.b).

b. The data set for this analysis was queried in January 2013. As such, it represents a recent "snapshot" of past and present actions, but would not account for every project that was authorized from 2013 to present, particularly if the action was a new (i.e., 2013 or 2014) action rather than a pending action present in our database when the query was completed in 2013.

c. To the best of our knowledge, reasonably foreseeable projects that meet the inclusion criteria for the CIA have been included in this analysis. The Regulatory Program conducts pre-application meetings and receives new permit applications on nearly a weekly basis, therefore there will inevitably be certain projects that are "in the pipeline" that are not included within this study.

d. This analysis did not take into account relative functions or services of either lost or mitigation WOUS, only acreages. Nor did it take into account potential adverse impacts to functions/services of waters that were temporarily impacted or otherwise not "lost." Related, due to limitations in wetland nomenclature (see Sections 6.c[2][a] and 6.d[2]), impact/mitigation distinctions were not made between seasonal wetlands and "vernal pool" types of seasonal wetlands. Although non-vernal pool seasonal wetlands often provide potential habitat for

vernal pool plant and animal species, not all seasonal wetlands provide these habitats.

e. This analysis assumes that compensatory mitigation has been completed and is successfully functioning, inclusive of mitigation banks from which credits have been purchased, mitigation by purchase of ILF credits, and/or permittee-responsible mitigation. The breadth of this analysis did not offer the ability to confirm mitigation compliance status on a case-by-case basis. However, part of the Corps' Regulatory Program involves mitigation compliance, and it is known that at any given time, there are projects that have been authorized whose associated mitigation has not yet met full compliance. See also Sections 6.c(4)(i) and 6.d(4)(g).

f. This analysis only looks at Corps Regulatory projects, and only evaluates cumulative impacts to WOUS. It does not evaluate any other factors (e.g. air quality, traffic, etc) which may have cumulative impacts, nor does it take into consideration the actions of other agencies.

g. Since this analysis looks only at Corps Regulatory projects (i.e., not inclusive of Corps Civil Works projects), involving an extensive effort due to the study area's size and level of activity in the Sacramento area, it does not include a full baseline assessment of inventoried waters, for example, the USFWS's National Wetland Inventory (NWI) (www.http://www.fws.gov/wetlands/) and/or the (regionally-based) Six County Aquatic Resources Inventory (SCARI) (www.http://mapping.sacog.org/scari/). The Corps assumes that future users of this analysis can incorporate a remote sensing baseline inventory and draw relevant comparisons.

9. Appendices:

a. **Appendix A:** Figures

b. **Appendix B:** Tables

c. **Appendix C:** Geodataset (Electronic Appendix)

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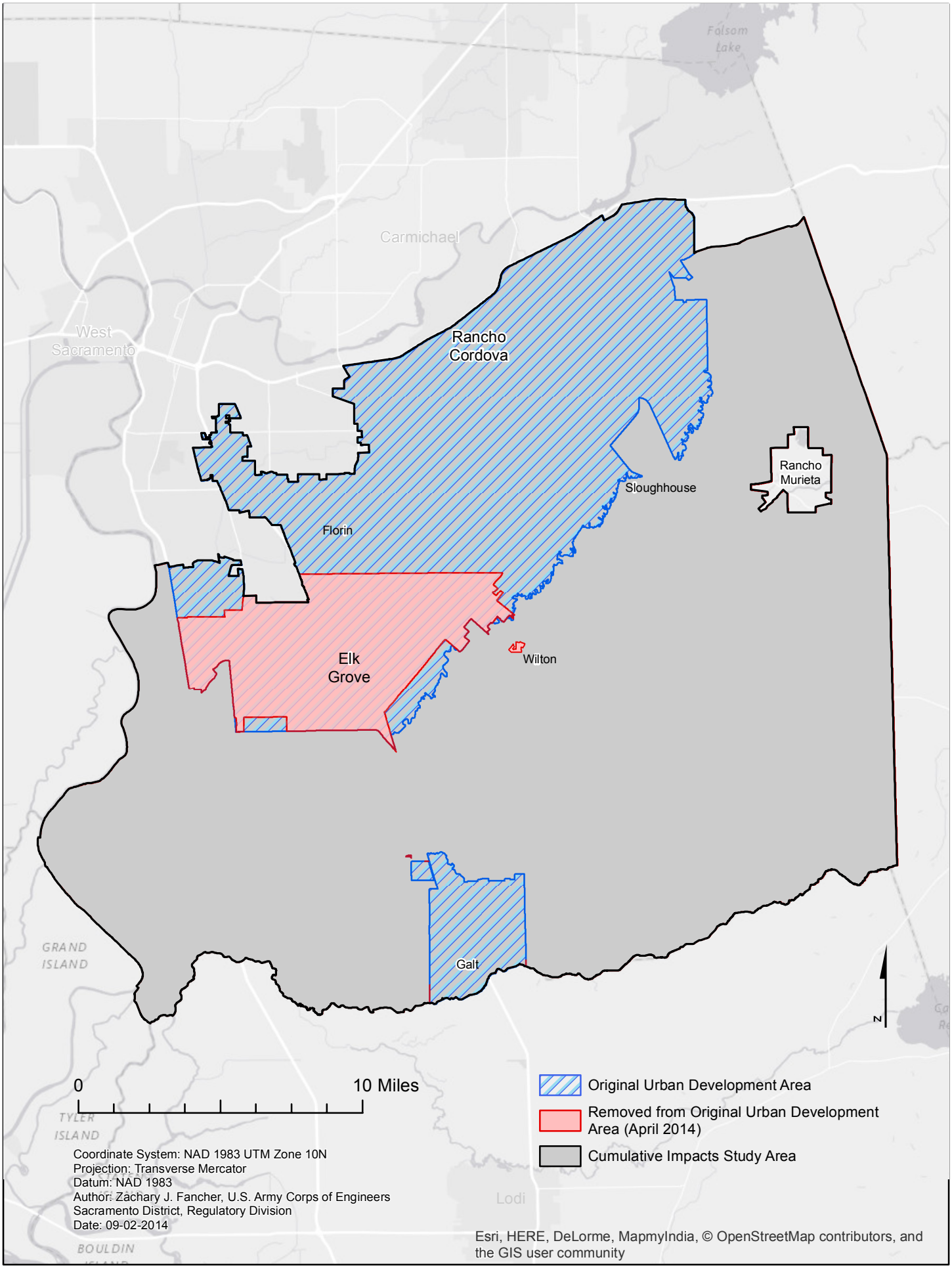
APPENDIX A

FIGURES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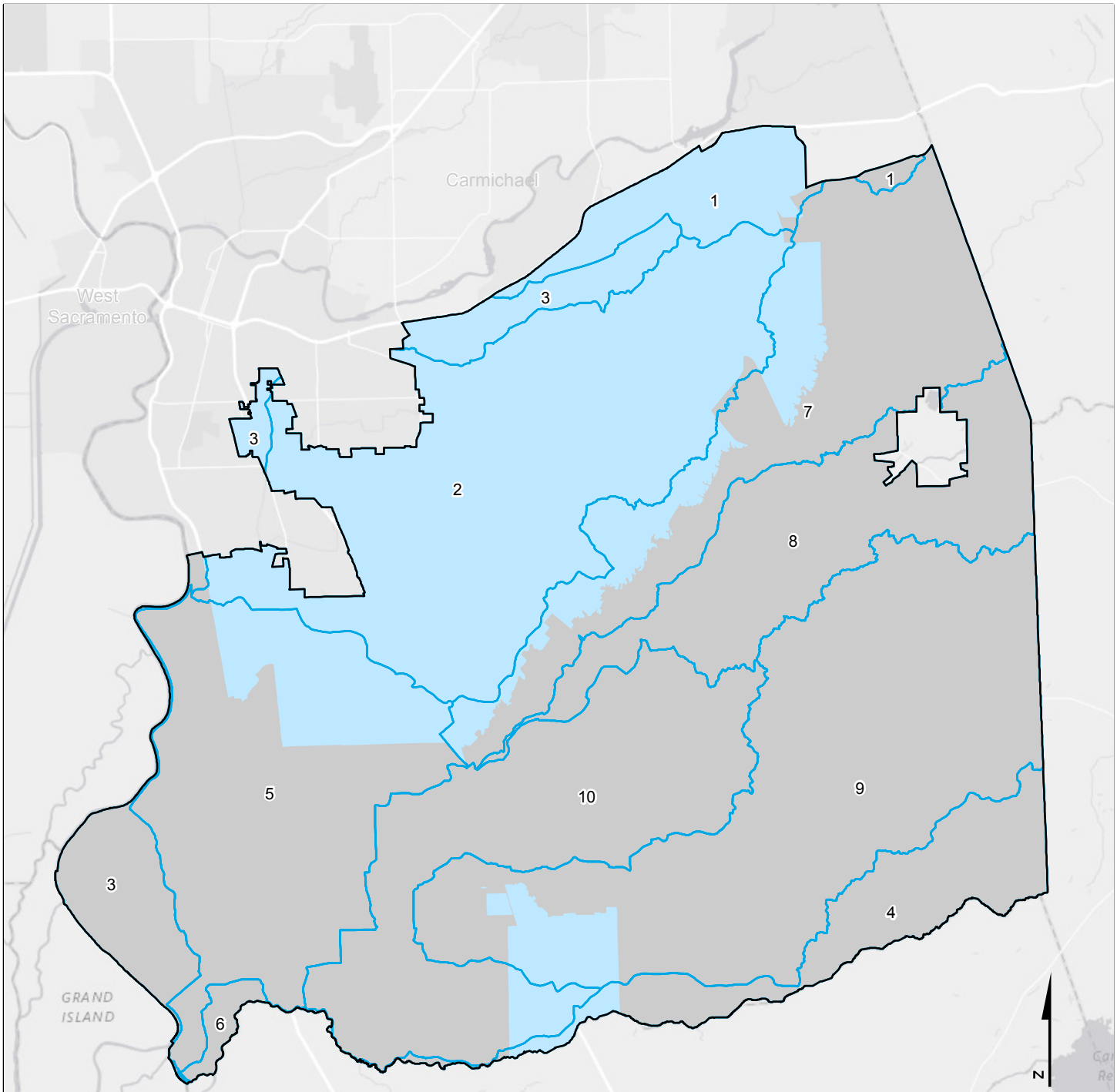
Carmichael
West Sacramento
Rancho Cordova
Rancho Murieta
Sloughhouse
Florin
Elk Grove
Wilton
Galt
GRAND ISLAND
TYLER ISLAND
BOULDIN
Lodi
N
0
10 Miles
Original Urban Development Area
Removed from Original Urban Development Area (April 2014)
Cumulative Impacts Study Area
Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: NAD 1983
Author: Zachary J. Fancher, U.S. Army Corps of Engineers
Sacramento District, Regulatory Division
Date: 09-02-2014
Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community



ID	HUC 10 CODE	HUC 10 NAME
1	1802011102	American River
2	1802016304	Morrison Creek
3	1802016307	Sherman Lake-Sacramento River
4	1804001209	Low er Dry Creek
5	1804001210	Snodgrass Slough
6	1804001211	Low er Mokelumne River
7	1804001305	Deer Creek
8	1804001306	Upper Cosumnes River
9	1804001307	Laguna
10	1804001308	Low er Cosumnes River

Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: NAD 1983
Author: Zachary J. Fancher, U.S. Army Corps of Engineers
Sacramento District, Regulatory Division
Date: 09-02-2014

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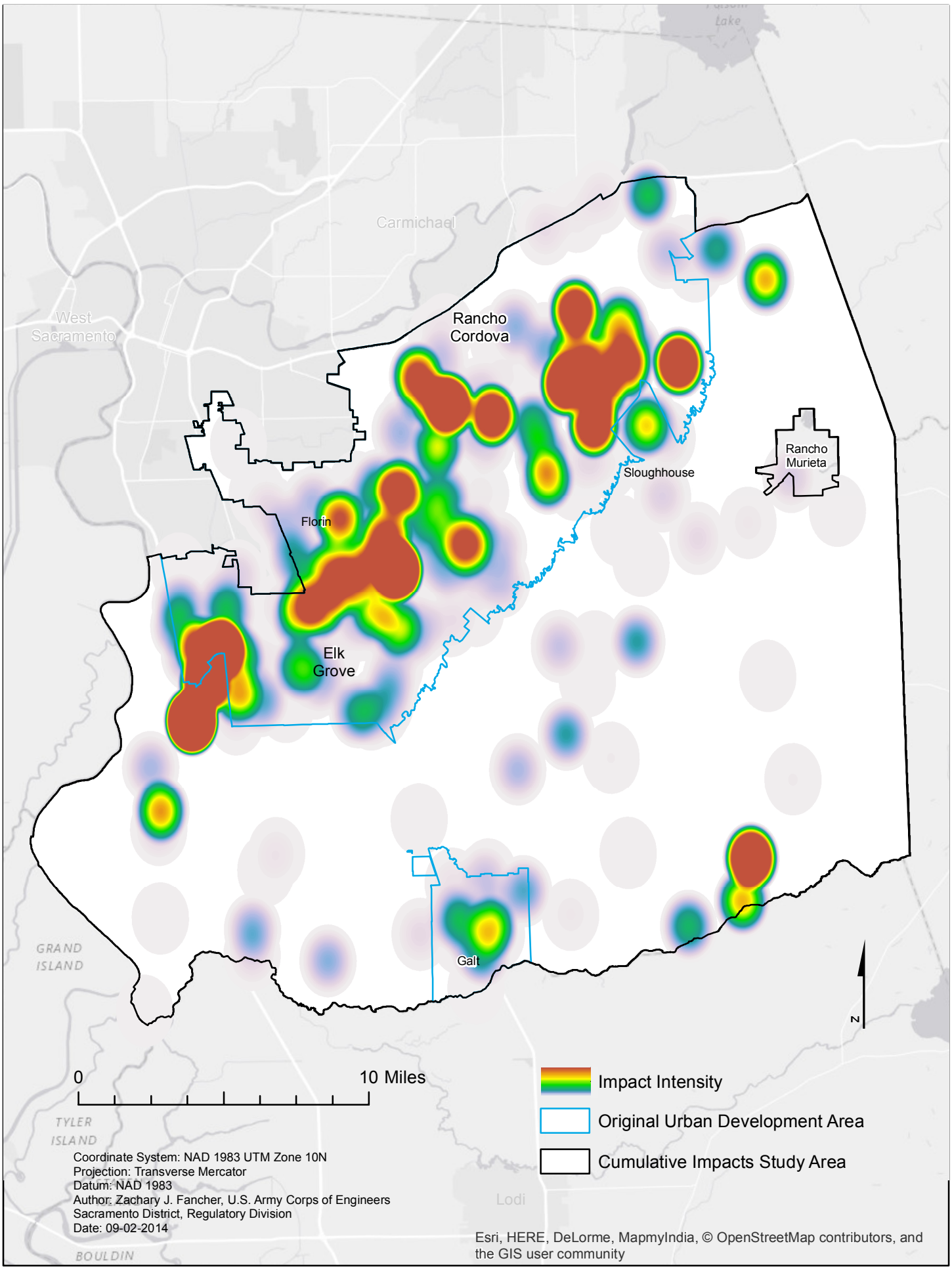
Carmichael
West Sacramento
Rancho Cordova
Rancho Murieta
Sloughhouse
Florin
Elk Grove
Galt
GRAND ISLAND
TYLER ISLAND
BOULDIN
Lodi
N
0
10 Miles
Impact Intensity
Original Urban Development Area
Cumulative Impacts Study Area
Coordinate System: NAD 1983 UTM Zone 10N
Projection: Transverse Mercator
Datum: NAD 1983
Author: Zachary J. Fancher, U.S. Army Corps of Engineers
Sacramento District, Regulatory Division
Date: 09-02-2014
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APPENDIX B

TABLES

Table 1: Higher-Resolution Dataset Data Categories

Category (As Termed in Database)	Description
DA Number	Dept. of the Army File number associated with action
Past and Present or Reasonably Foreseeable	Appropriate time category for action
Action Status - Finalized, Pending or Withdrawn	Status of action in Regulatory Program
Permit or Action Type	Type of action, e.g., NWP, LOP
Project Name	Project name that is associated with the action
Isolated or Non-Jurisdictional Waters Present (Y/N)	Y/N on isolated or other non-jurisdictional waters associated with the action (all water types)
Isolated or Non-Jurisdictional Waters Total Acres	If isolated or other non-jurisdictional waters present, the acreage
Delineated Acres Stream Linear	Acreage of delineated stream features, including ditches
Delineated Acres Wetland	Acreage of delineated wetlands (including vernal pools)
Delineated Acres Other	Acreage of delineated other types of waters, including but not limited to ponds
Delineated Acres Unknown Resource (Water) Type	Acreage of delineated waters of an unknown type
Permanent Impact Not a Loss Present (Y/N)	Y/N if action involved a permanent impact that did not result in a loss of WOUS
Permanent Impact Not a Loss Total Acres	If a permanent impact did not result in a loss of WOUS, the impact acreage was reported here (all water types)
Loss Acres Stream Linear	Acreage of loss of stream (including ditches) types of WOUS
Loss Acres Wetland	Acreage of loss of wetland types of WOUS
Loss Acres Other	Acreage of loss of other types of WOUS
Loss Acres Unknown Resource Type	Acreage of loss of unknown types of WOUS
ILF Compensation Acres Stream Linear	Acreage of ILF compensation in the form of stream types of WOUS
ILF Compensation Acres Wetland	Acreage of ILF compensation in the form of wetland types of WOUS
Creation Mitigation Acres Stream Linear	Acreage of establishment (creation) and/or re-establishment (restoration) of stream types of WOUS
Creation Mitigation Acres Wetland	Acreage of establishment (creation) and/or re-establishment (restoration) of wetland types of WOUS
Creation Mitigation Acres Other	Acreage of establishment (creation) and/or re-establishment (restoration) of other types of WOUS
Creation Mitigation Acres Unknown Resource (Water) Type	Acreage of establishment (creation) and/or re-establishment (restoration) of unknown types of WOUS
Creation Relative to UDA (In/Out/Unknown)	Acreage of establishment (creation) and/or re-establishment (restoration) in/out/unknown location relative to UDA

Table 1: Higher-Resolution Dataset Data Categories

Category (As Termed in Database)	Description
Preservation Mitigation Acres Stream Linear	Acreage of preservation of stream types of WOUS
Preservation Mitigation Acres Wetland	Acreage of preservation of wetland types of WOUS
Preservation Mitigation Acres Other	Acreage of preservation of other types of WOUS
Preservation Mitigation Acres Unknown Resource Type	Acreage of preservation of unknown types of WOUS
Preservation Relative to UDA (In/Out/Unknown)	Acreage of preservation in/out/unknown location relative to UDA
Specifics for Mitigation Not in Other Categories	Notes field for mitigation not in other categories

Table 2: Complete Lower-Resolution (CLR) Dataset Data Categories

Category (As Termed in Database)	Description
DA Number	Dept. of the Army File number associated with action
Past and Present or Reasonably Foreseeable	Appropriate time category for action
Action Status - Finalized, Pending or Withdrawn	Status of action in Regulatory Program
Permit or Action Type	Type of action, e.g., NWP, LOP
Project Name	Project name that is associated with the action
Isolated or Non-Jurisdictional Waters Present (Y/N)	Y/N on isolated or other non-jurisdictional waters associated with the action (all water types)
Isolated or Non-Jurisdictional Waters Total Acres	If isolated or other non-jurisdictional waters present, acreage (all water types)
Delineated Acres WOUS	Acreage of delineated WOUS (all water types)
Permanent Impact Not a Loss Present (Y/N)	Y/N if action involved a permanent impact that did not result in a loss of WOUS
Permanent Impact Not a Loss Total Acres	If a permanent impact did not result in a loss of WOUS, the impact acreage was reported here (all water types)
Loss Acres WOUS	Acreage of loss of WOUS (all types)
Creation Mitigation Acres WOUS	Acreage of establishment (creation) and/or re-establishment (restoration) of WOUS (all water types)
Preservation Mitigation Acres WOUS	Acreage of preservation of WOUS (all water types)
Specifics for Mitigation Not in Other Categories	Notes field for mitigation not in other categories
Alternative Impact Quantifications	Recorded alternative impact quantifications (e.g., reporting in cubic yards instead of acreage)

Table 3: Higher-Resolution Dataset Results Summary (Past and Present Projects)

Data Category	Type of Water				
	Wetlands	Streams (Acres)	Other Types of Waters	Unknown (UK)	Total: All Water Types
Delineated Acres					
In UDA:	405.38	153.46	64.02	0.10	622.95
Out UDA:	783.51	155.38	60.28	4.50	1003.68
Total:	1188.89	308.84	124.30	4.60	1626.63
Acres of Loss					
In UDA:	133.74	41.16	18.26	0.01	193.16
Out UDA:	17.98	4.89	0.01	1.80	24.68
Total:	151.72	46.05	18.27	1.81	217.84
Acres of Impact (Not a Loss)					
In UDA:	N/A	N/A	N/A	N/A	0.96
Out UDA:	N/A	N/A	N/A	N/A	6.85
Total:	N/A	N/A	N/A	N/A	7.81
Acres Loss Isolated/Non-Jurisdictional Waters					
In UDA:	N/A	N/A	N/A	N/A	35.30
Out UDA:	N/A	N/A	N/A	N/A	0.96
Total :	N/A	N/A	N/A	N/A	36.26
Mitigation					
Acres Restoration/Creation					
In UDA:	74.66	20.21	2.17	0.00	97.04
Out UDA:	272.04	1.37	0.00	1.80	275.21
Out of Study Area:	52.51	5.20	0.10	0.00	57.80
Location Unknown:	65.08	1.13	0.00	0.00	66.21
Total:	464.28	27.91	2.27	1.80	496.26
Mitigation					
Acres Preservation					
In UDA:	172.40	38.85	8.06	0.00	219.30
Out UDA:	121.44	3.34	4.89	0.00	129.67
Out of Study Area:	20.90	0.00	0.00	0.00	20.90
Location Unknown:	52.33	0.00	0.00	0.00	52.33
Total:	367.08	42.19	12.95	0.00	422.21
Acres ILF Mitigation					
Total:	7.64	0.27	0.00	0.00	7.91
Acres Net Gain/Loss					
In UDA:	-59.08	-20.95	-16.09	-0.01	-96.12
Out UDA (In Study Area):	254.06	-3.52	-0.01	0.00	250.53
Out UDA (In + Out of Study Area):	306.57	1.68	0.09	0.00	308.34
***Total (All Locations):**	320.21	-17.86	-16.01	-0.01	286.33

*** These figures are not location-dependent. "Total" equals all restoration/creation whether location is known or unknown, plus ILF mitigation, minus all loss whether in or out of the UDA.**

Table 4: Complete Lower-Resolution (CLR) Dataset Results Summary (Past and Present Projects)

Data Category	All Types of Waters (ac)
Delineated Acres	
In UDA:	1396.93
Out UDA:	1368.92
Total:	2765.85
Acres of Loss	
In UDA:	635.83
Out UDA:	136.66
Total:	772.49
Acres of Impact (Not a Loss)	
In UDA:	0.97
Out UDA:	7.13
Total :	8.10
Acres Loss Isolated/Non-Jurisdictional Waters	
In UDA:	75.27
Out UDA:	0.96
Total:	76.23
Mitigation	
Total Acres Restoration/Creation:	1137.22
Total Acres Preservation:	996.00
Acres Net Gain (Total acres Restoration/Creation) - (Total acres loss jurisdictional waters):	364.73

Table 5: Complete Lower-Resolution (CLR) Dataset Alternative Impact Quantifications and "Other" Types of Mitigation (Past and Present Projects)

Alternative Impact Quantifications*		
Amount	**Unit**	**Type**
6000	Linear Feet	Dredge/Excavation in Stream
1940	Linear Feet	Impact Not Loss (Rip-Rap/Bulkhead) to Stream
2652	Cubic Yards	Dredge/Excavation in Stream
915	Cubic Yards	Fill in Stream
55,000	Cubic Yards	Fill in Unknown Water Type
997	Tons	Rip-Rap in Stream
"Other" Types of Mitigation Quantifications*		
Amount	**Unit**	**Type**
$2,100	U.S. Dollars	Stone Lakes Wildlife Fund for GGS Habitat Creation
2.248	**	Fund for Creating Wetland
0.834	**	Fund for Preserving Wetland
0.387	**	Credits OR Fund for Creating Wetland
0.592	**	Credits OR Fund for Preserving Wetland
1.321	Acres	Rehabilitate Wetland Out of UDA
1.113	Acres	Rehabilitate Stream Out of UDA
4.74	Acres	Enhance Wetland In UDA
430.65	Acres	Enhance Wetland Out UDA
0.473	Acres	Enhance Stream In UDA
16.91	Acres	Enhance Stream Out UDA
2.708	Acres	Riparian Habitat Out UDA
1.38	Acres	Splittail Shallow Water Habitat Out of UDA

* Each row is a separate and distinct impact, unrelated to any other row.

** Unit is assumed to be representative of acres mitigation.

Table 6: Reasonably Foreseeable Projects Summary (Complete Lower-Resolution [CLR] Dataset)

Data Category	All Types of Waters (ac)
Estimated Acres Loss of WOUS	
In UDA:	192.96
Out UDA:	155.63
Total:	348.59
Proposed Mitigation	
Total Acres Restoration/Creation:	395.32
Total Acres Preservation:	255.04
Acres Net Gain:	46.73

Table 7: Reasonably Foreseeable Projects with Projected Loss of At Least One Acre

Project Name	Estimated Impacts (Loss) - Waters of the U.S. (ac)
Capital Southeast Connector	127.60
Mather Specific Plan (Multiple Projects)	48.28
Cordova Hills	39.63
Arboretum	30.13
Excelsior Estates	28.77
Suncreek EIS	19.13
The Ranch at Sunridge	10.48
Stoneridge Quarry	10.42
Calosso Property - UA	10.29
Teichert - Aspen VIII & IX	4.95
East Sacramento Ranch	4.48
Clay Station Properties, LLC - UA	4.00
Vineyard Investors Associates - UA	3.33
Teichert Aggregates Quarry	3.15
Douglas Jaeger Widening	1.51
Emerald Estates	1.06
Total:	**347.22**

APPENDIX C

GEODATABASE

EIS/EIR APPENDIX A-3

Higher-Resolution Dataset;
Projects from 1999 to 2013

DA NUMBER	PAST AND PRESENT OR REASONABLY FORESEEABLE	ACTION STATUS - FINALIZED PENDING OR WITHDRAWN	PERMIT OR ACTION TYPE	PROJECT NAME	RESEARCH NOTES	ISOLATED OR NON JURISDICTIONAL WATERS PRESENT (Y/N)	ISOLATED OR NON JURISDICTIONAL WATERS TOTAL ACRES	DELINEATED ACRES STREAM LINEAR	DELINEATED ACRES WETLAND	DELINEATED ACRES OTHER	DELINEATEDA CRES UNKNOWN RESOURCE TYPE	PERMANENT IMPACT NOT A LOSS PRESENT (Y/N)	PERMANENT IMPACT NOT A LOSS TOTAL ACRES	LOSS ACRES STREAM LINEAR	LOSS ACRES WETLAND	LOSS ACRES OTHER	LOSS ACRES UNKNOWN RESOURCE TYPE	ILF COMPENSATION ACRES STREAM LINEAR	ILF COMPENSATION ACRES WETLAND	CREATION MITIGATION ACRES STREAM LINEAR	CREATION MITIGATION ACRES WETLAND	CREATION MITIGATION ACRES OTHER	CREATION MITIGATION ACRES UNKNOWN RESOURCE TYPE	CREATION RELATIVE TO UDA (IN/OUT/UK)	PRESERVATION MITIGATION ACRES STREAM LINEAR	PRESERVATION MITIGATION ACRES WETLAND	PRESERVATION MITIGATION ACRES OTHER	PRESERVATION MITIGATION ACRES UNKNOWN RESOURCE TYPE	PRESERVATION RELATIVE TO UDA (IN/OUT/UK)	SPECIFICS FOR MITIGATION NOT IN OTHER CATEGORIES
199000244		Finalized	NWP 26	HACKARD-MULLANEY LAND INVESTMENTS	Same as Shadowbrook (1999-110, 2003-105). Delineation for all of these is included here only.			0.42	0.57					0.42	0.32					0.42	0.47			IN						
199000244		Finalized	NWP 26 Inclusion	HACKARD-MULLANEY LAND INVESTMENTS	Row for addl off site mit.			0	0	0	0										0.4			UK						
199900060		Finalized	LOP	FRANKLIN BLVD/THORNTON RD BRIDGE REPLACE	Approx half of project is in study area. Affects wetlands. Mokolumne, south side of study area. 0.74 "riparian habitat" credits and 1.38 shallow water hab credits for splittail both OUT STUDY AREA.			2.23	1.27					0.22	0.34															0.74 "riparian habitat" credits and 1.38 "shallow water habitat" credits for splittail both OUT STUDY AREA
199900069		Finalized	NWP 26	REMINGTON ESTATES	Records Holding 1037120. There is a BO.			0.75	0.13					0.75	0.13						0.75			UK						
199900069		Finalized	NWP 26 Inclusion	REMINGTON ESTATES	Row for FWS reqd mit			0	0	0	0										0.13			UK		0.26			UK	
199900110		Finalized	NWP 26	SHADOWBROOK SUBDIVISION	See 199000244. This is the same project, delineated acres are included in 199000244, not here. FWS mitigation was the only mitigation. All contents of this file have been transferred to 200700602.			0	0	0	0				0.257						0.257			OUT		0.514			IN	
199900110		Finalized	NWP 26 Inclusion	SHADOWBROOK SUBDIVISION	Row for GGS amendment (33% used). Fund.			0	0	0	0																			0.09 (Create wet) GGS FUND
199900118		Finalized	NWP 26	HARRIS RANCH	This project is the same as 1999-00312. Data is recorded here, but 99-00312 is likely the current file number (all it contains is a modification). There is an indication that applicant wanted to put remainder of wetland on-site into a preserve, but there is no record of vehicle to do so, therefore no on-site preservation was recorded here. Records Holding 1037122				13.33						0.96						0.63			OUT						
199900118		Finalized	NWP 26 Inclusion	HARRIS RANCH	Row for FWS reqd mit			0	0	0	0										0.33			OUT		1.82			OUT	
199900195		Finalized	PREAPPCONS	COSUMNES CORRECTIONAL FACILITY FENCE	No action in record.			0	0	0	0																			
199900200		Finalized	NWP 14	MATHER SANITARY SEWER SYSTEM REHAB	No physical records. Sec 7 consult was initiated, for 0.06 permanent and 4.6 indirect, to (wet). No response or further info in record. Conservative estimate of FWS reqd mit was logged, but is actually uk.				4.66						0.06															
199900200		Finalized	NWP 14 Inclusion	MATHER SANITARY SEWER SYSTEM REHAB	Row for assumed 1:1, 2:1 FWS reqd mit.			0	0	0	0										0.06			UK		0.12			UK	
199900212		Finalized	NWP 12	LAGUNA CREEK WATERLINE CROSSING - AKT	Temp impacts only.			0.3																						
199900299		Finalized	SP	GRANT LINE ROAD/SR 99 INTERCHANGE IMPROV	See 200701064. Impact and delineation info is confusing. Best estimates made from conflicting sources.			0.073	1.547					0.073	1.3512					0.09	2.54			OUT STUDY AREA						
199900299		Finalized	SP Inclusion	GRANT LINE ROAD/SR 99 INTERCHANGE IMPROV	Row for FWS reqd mit.			0	0	0	0										0.89			UK		1.78			UK	
199900299		Finalized	SP PERMITMOD	GRANT LINE ROAD/SR 99 INTERCHANGE IMPROV	Delineated a combo of temp and permanent impacts.			0.046						0.033							0.04			OUT STUDY AREA						
199900312		Finalized	NWP 26	HARRIS RANCH	Same project as 1999-00118. Data is recorded there, though this number is likely the current file number. Records Holding 1037128			0	0	0	0																			
199900412		Finalized	NWP 26, 7	BOND ROAD FAMILY FITNESS CENTER OUTFALL	Records Holding 1037130. FWS mit is only mit. 0.04 perm imp (wet) not a loss.				0.04			Y	0.04								0.01			UK		0.02			UK	
199900412		Finalized	NWP 26, 7 Inclusion	BOND ROAD FAMILY FITNESS CENTER OUTFALL	Row for GGS mit (33.3% used), but was to be paid into PRES fund.			0	0	0	0																			0.03 (Preserve Wet) paid into GGS FUND
199900436		Finalized	NWP 7	LIVE OAK NORTH DRAINAGE IMPROVEMENT	Records Holding 1037132			0.94						0.94						1.01				IN						
199900437		Finalized	NWP 26	SUMMERGATE PROPERTY NWP 26 REQUEST	Records Holding 1037132. FWS mit was only mit.				0.31						0.31						0.31			UK		0.62			UK	
199900439		Finalized	NWP 26	OAK BROOK APARTMENT COMPLEX-SPANOS,FOLSO	Delineation is estimated, from impacts.				0.02						0.02															
199900449		Finalized	UNAUTHACT	HOBDAY ROAD AND WOODS ROAD HOUSE CONSTRU	No Further action. Records Holding 1037132				4.242						0.112															
199900459		Finalized	NWP 26	RIO CONSUMES CORRECTIONAL PERIMETER	Records Holding 1037133. FWS mit was only mit reqd.				0.72						0.26						0.046			UK		0.092			UK	

DA NUMBER	PAST AND PRESENT OR REASONABLY FORESEEABLE	ACTION STATUS - FINALIZED PENDING OR WITHDRAWN	PERMIT OR ACTION TYPE	PROJECT NAME	RESEARCH NOTES	ISOLATED OR NON JURISDICTIONAL WATERS PRESENT (Y/N)	ISOLATED OR NON JURISDICTIONAL WATERS TOTAL ACRES	DELINEATED ACRES STREAM LINEAR	DELINEATED ACRES WETLAND	DELINEATED ACRES OTHER	DELINEATEDA CRES UNKNOWN RESOURCE TYPE	PERMANENT IMPACT NOT A LOSS PRESENT (Y/N)	PERMANENT IMPACT NOT A LOSS TOTAL ACRES	LOSS ACRES STREAM LINEAR	LOSS ACRES WETLAND	LOSS ACRES OTHER	LOSS ACRES UNKNOWN RESOURCE TYPE	ILF COMPENSATION ACRES STREAM LINEAR	ILF COMPENSATION ACRES WETLAND	CREATION MITIGATION ACRES STREAM LINEAR	CREATION MITIGATION ACRES WETLAND	CREATION MITIGATION ACRES OTHER	CREATION MITIGATION ACRES UNKNOWN RESOURCE TYPE	CREATION RELATIVE TO UDA (IN/OUT/UK)	PRESERVATION MITIGATION ACRES STREAM LINEAR	PRESERVATION MITIGATION ACRES WETLAND	PRESERVATION MITIGATION ACRES OTHER	PRESERVATION MITIGATION ACRES UNKNOWN RESOURCE TYPE	PRESERVATION RELATIVE TO UDA (IN/OUT/UK)	SPECIFICS FOR MITIGATION NOT IN OTHER CATEGORIES
199900501		Finalized	NPR	RANCHO SECO PHOTOVOLTAIC EXPANSION	X			0	0	0	0																			
199900516		Finalized	SP	ELK GROVE CREEK DRAINAGE	File on shelf.			6.8	0.43					0.81	0.044					1				IN		3.07			IN	
199900516		Finalized	SP Inclusion	ELK GROVE CREEK DRAINAGE	Row for FWS reqd mit, for SP.			0	0	0	0										0.044			UK		0.202			UK	
199900534		Finalized	NWP 26	SHELDON POINTE, UNIT #2 - SACRAMENTO CO	X				0.18						0.18															
199900590		Finalized	SP	Rio Del Oro - EIS	Addl 12.224 wet, and 0.721 other, isolated. All filled.	Y	12.945	5.145	47.947	3.54				3.3	21.7	2.9					13.288			IN	10.88	58.14	7.13		IN	2.98 (wet) enhance IN
199900590		Finalized	SP Inclusion	Rio Del Oro - EIS	Row for addl Corps Reqd mit.			0	0	0	0										13			OUT						
199900618		Finalized	NWP 7	SHADOWBROOK OUTFALL, SACRAMENTO CO	Records Holding 1037169. No info in electronic files. Outfall considered 0.002 perm impact (str), not a loss.			0.002				Y	0.002																	
199900653		Finalized	SP	FRANKLIN MEADOWS PROPERTY	Records Holding 1037170.			0.06	0.03	0.98				0.06	0.03	0.98					1.04			OUT						
199900653		Finalized	SP Inclusion	FRANKLIN MEADOWS PROPERTY	Row for FWS reqd mit.			0	0	0	0										0.03			OUT		0.06			OUT	
199900712		Finalized	SP	SILVER SPRINGS EAST (LOT P)	This project appears completed in ORM, but I believe was actually denied (confusion here). 2005-00325 is the "new" version of this file, but all actions currently withdrawn. Check to make sure no data is double counted between these two. Also, 2000-00780 is the mitigation property on which the creation mit would be performed for Lot P. There were previously existing wetlands onsite - check if these should be included as pres mit, and that they are not double counted.				10.78						10.78						10.78			OUT STUDY AREA		20			OUT STUDY AREA	
200000006		Finalized	NWP 26	MATHER AIRPORT CARGO EXPANSION	Records Holding 1037174. KATE SAID IGNORE. FWS mit was only mit. Note, delineated acreage includes all of 1997-00650. DO NOT put delineated acres in 1997-650.			0.62	1.11						1.01						1.01			OUT		2.1			IN	
200000025		Finalized	SP	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	See 2003--00550. JD record unclear. Record extremely convoluted. Best available info. Non jurisdictional acreage AT LEAST 0.91 acres (wet). Portions of the delineated and impact figures may be outside SSHCP boundary, but isolating those figures is too difficult.	Y	0.91	19.467	64.717					1.894	11.761					1.408	8.407			OUT STUDY AREA						
200000025		Finalized	SP Inclusion	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	Row for addl. Corps mit.			0	0	0	0										0.972			IN						
200000025		Finalized	SP Inclusion	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	Row for addl. FWS mit.			0	0	0	0									2.75				OUT STUDY AREA						
200000025		Finalized	SP Inclusion	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	Row for addl. Corps mit.			0	0	0	0									1.13	10.1135			UK						
200000055		Finalized	UNAUTHACT	KOSCHNER PROPERTY	No significant discharge. Closed.			0	0	0	0																			
200000085		Finalized	NWP 14, 3	UNION PACIFIC RAILROAD GALT TO NEED	Records Holding 1037177. Only mitigation was FWS mit.			1.47	0.6					1.25	0.222						1.72			OUT		3.44			OUT	
200000085		Finalized	NWP 14, 3 Inclusion	UNION PACIFIC RAILROAD GALT TO NEED	Row for GGS mit (30% used)			0	0	0	0										0.51			OUT STUDY AREA						
200000147		Finalized	NWP 26	BEAZER-MCGEE PROPERTY	Data is estimated based on applicant proposal. BO unavailable. Corps did not require mit in addition to FWS requirements.				0.067						0.067						0.067			UK		0.134			UK	
200000163		Finalized	NWP 14	FOLSOM BLVD. WIDENING	Records Holding 1037179			0.013	0.081						0.035						0.06			UK						
200000163		Finalized	NWP 14 Inclusion	FOLSOM BLVD. WIDENING	Row for acreage increase via culvert construction.			0	0	0	0										0.009			IN						
200000203		Finalized	LOP	SHELDON ESTATES PROJECT	File Loc UK, no regulator assigned. A BO exists, but no copy available., Reqmts UK. Logged data from best available info. Conservative estimate of 1:1, 2:1 FWS reqd mit used.			0.732	0.576						0.576										0.732				IN	
200000203		Finalized	LOP Inclusion	SHELDON ESTATES PROJECT	Row for FWS reqd mit. Conservative estimate of 1:1, 2:1 FWS reqd mit used.			0	0	0	0										0.576			UK		1.152			UK	

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200000227		Finalized	NWP 39	SADDLE CREEK AND PRINGLE AVENUE	File Loc UK, no regulator assigned. There is a BO, reqmts UK. Logged data from best available info.			0.47						0.47						0.47										
200000232		Finalized	NWP 14	KNUTSON ROAD	Records Holding 1037193.				0.095						0.095						0.095			UK		0.19			UK	
200000244		Finalized	UNAUTHACT	ABEID PROPERTY	Vountary Restoration. Temp impact only. Records Holding 1037194. Delineated acres estimated from temp impact.				0.01												0.01			UK						
200000251		Finalized	PREAPPCONS	SUNRIDGE 530 (fka SUNRIDGE VILLAGE & PEERY-ARRILLAGA)	Same as 2004-00707. FRC box 077-2013-0772_6_of_10. Confusing because one SP was supposedly complete, yet everything else including all 2004-00707 have been withdrawn.			0	0	0	0																			
200000260				STRAWBERRY CREEK REALIGNMENT AT CALVINE	DA Number not found, File Loc UK.			0	0	0	0																			
200000298		Finalized	NWP 27	CONSUMNES RIVER SALMONID BARRIER PROJECT	FRC box 077-2013-0772_7_of_10. Temp impacts only. No mit in record. Unable to determine delineated area (no figure for temp impacts. Zeroed, as data unavailable.			0	0	0	0																			
200000332		Finalized	PREAPPCONS	WAEGELL FAMILY RANCH - TRAXLER'S HILL	X			0	0	0	0																			
200000403		Finalized	NWP 3, 33	LAGUNA CREEK PIPELINE	Records Holding 1037198. Appears all impacts temporary, no special conditions.			0.03																						
200000426		Finalized	NWP 13	MAHON LEVEE STABILIZATION	Records Holding 1037199. Str impacts only, 225 linear feet rip-rap is only info. 0.0268 perm impact (str) considered not a loss. Reveg is only mitigation. Delineated figure 225 x 160 (channel width), converted to acres. Impacts figure comes from assumed 1 cy per linear foot (1x5.197x5.197), so surface area is 5.197x225= 1169 sq ft.			0.83				Y	0.0268																	
200000445		Finalized	NWP 39	KAPALUA ESTATES	On-site str acres is net increase via widened channel. Newly widened channel is preserved also, total of 2.56 acres.			0.98	0.22						0.22					1.58				IN	0.98				IN	
200000445		Finalized	NWP 39 Inclusion	KAPALUA ESTATES	Row for Corps reqd off site mit.			0	0	0	0										0.47			OUT STUDY AREA						
200000470	RF	Pending	DEVMBA	NICOLAUS RANCH-W.FLINT MITIGATION AREA	Addl 1.6 acre pond, and 0.04 acre ditch non-jurisdictional. Creation acres are still proposed at time of this recording.	Y	1.64	1.93													36.75			OUT						
200000501		Finalized	NWP 3, 33	COSUMNES RIVER PIPELINE	Records Holding 1037202. Temp impacts only, to 200 linear feet of (str). Multiplied by channel width at location (85ft) to get rough acreage.			0.39																						
200000523		Finalized	PREAPPCONS	SUNRISE COMMUNITY PLAN/WETLANDS PRESERVE	No Records			0	0	0	0																			
200000634		Finalized	NWP 23	HWY. 16 GAP CLOSURE PROJECT	In study area. Records Holding 1037205.				0.364	0.014					0.088	0.014					0.18			OUT						
200000635		Finalized	SP	WRIGHT PARK (FKA TRIBUTARY POINTE)	Creation component likely satisfied both FWS and Corps reqs (VP creation).				1.49						0.42						0.42			UK		1.07			IN	
200000635		Finalized	SP Inclusion	WRIGHT PARK (FKA TRIBUTARY POINTE)	Row for FWS reqd mit.			0	0	0	0															3.22			UK	
200000636		Finalized	NWP 39, 7	ELK GROVE UNIFIED SCHOOL DISTRICT/ALBIAN	Unclear how much of onsite preserve is what resource type. It is known that there are wet and str features in preserve, so total acres resources were divided by 2.			0.3	0.3					0.01	0.08				0.09							0.16	0.16			IN	
200000636		Finalized	NWP 39, 7 Inclusion	ELK GROVE UNIFIED SCHOOL DISTRICT/ALBIAN	Row for FWS reqd mit.			0	0	0	0										0.08			UK						0.16 (Preserve Wet) via CNLM Fund.
200000644		Finalized	NWP 39	KYLE'S READY MIX	FWS mit requirements only.			0.04	0.36						0.06						0.112			OUT		1.264			IN	
200100007		Finalized	SP	BRADSHAW 6 INTERCEPTOR	Only 2.13 temp impacts (Corps), but significant habitat impacts and mit (FWS). 0.4 (wet) Corps creation mit was covered by FWS mit.			3.39	4.23																					0.473 enhanc (str) in Morrison Creek Watershed (in/out?)
200100007		Finalized	SP Inclusion	BRADSHAW 6 INTERCEPTOR	Row for FWS reqd mit.			0	0	0	0										3.012			OUT		9.405			OUT	
200100007		Finalized	SP Inclusion	BRADSHAW 6 INTERCEPTOR	Row for FWS reqd GGS habitat. (33.3% used)			0	0	0	0										5.34			OUT						

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200100008		Finalized	UNAUTHACT	SILVA PROPERTY	Likely a violation that needs investigation. However, this action has been "temporarily closed due to no time or resources". 5 year limit has passed. Zeros logged, as there is no info to record.			0	0	0	0																			
200100012		Finalized	NWP 3	FLORES DAM REPAIR	File loc UK. Dam repair. For retention of fill, originally Unauth. Figures come from best available data.			0.16						0.16							0.16				UK						
200100041		Finalized	LOP	COSUMNES PRESERVE PARKING LOT & TRAIL	File Loc UK. There was compensatory mitigation, though unclear how much. Assumption made of 1:1 creation on Cosumnes Preserve lands. Potential FWS mit (if any) was not considered.						4.503						1.8						1.8	OUT						
200100046		Finalized	NPR	MEISS ROAD BRIDGE REMOVAL	X			0	0	0	0																			
200100048		Finalized	NWP 39, 7	PARKLAND/BUSTED FLAT RANCH-SACRAMENTO CO	Records Holding 1037210.				0.242						0.242						0.23			OUT						0.39 Riparian habitat OUT. Riparian habitat (not aquatic resource) was in lieu of buffers.
200100048		Finalized	NWP 39, 7 Inclusion	PARKLAND/BUSTED FLAT RANCH-SACRAMENTO CO	Row for FWS reqd mit.			0	0	0	0										0.01			OUT		0.02			IN	
200100062		Finalized	SP	POWELL PROPERTY / ROBBINS VILLAGE UNIT 4	File loc UK.				1.044	0.46					1.044	0.46					1.024			UK						
200100062		Finalized	SP Inclusion	POWELL PROPERTY / ROBBINS VILLAGE UNIT 4	Row for FWS and Corps Reqd mit.			0	0	0	0										0.004			UK		0.008			UK	
200100101		Finalized	SP	SUNRISE DOUGLAS 2 MASTER FILE	Appears this file is just a JD, impacts probably in other projects.			0	0	0	0																			
200100114		Finalized	SP	ZINFANDEL VILLAGES-SACRAMENTO CO	File loc UK.			0.82	1.21					0.29	1.21					0.09				IN	0.82				IN	
200100114		Finalized	SP Inclusion	ZINFANDEL VILLAGES-SACRAMENTO CO	Row for Corps reqd mit.			0	0	0	0										0.45			OUT						
200100114		Finalized	SP Inclusion	ZINFANDEL VILLAGES-SACRAMENTO CO	Row for Corps and FWS reqd mit.			0	0	0	0										4.84			UK		1.21			UK	
200100134		Finalized	NPR	EAST FRANKLIN SPECIFIC PLAN-SACRAMENTO	X			0	0	0	0																			
200100151		Finalized	NWP 39, 13	TAMARINDO SUBDIVISION	Records Holding 1037249.			1.83	0.137					0.028	0.103															0.748 riparian habitat OUT of STUDY AREA. Riparian habitat (not a wet resource) was in lieu of buffers.
200100151		Finalized	NWP 39, 13 Inclusion	TAMARINDO SUBDIVISION	Row for FWS reqd mit.			0	0	0	0										0.137			UK		0.274			UK	
200100154		Finalized	SP	TRIBUTARY POINT VILLAGE 4B, ROAD X'ING	RH 1037249. Delineated figure from impacts, since no other info is available.			0.07						0.07							0.07			OUT STUDY AREA						
200100177		Finalized	NWP 14	FOLSOM SRA-GRANITE BAY RECREATIONAL	File loc UK, Will? Electronic record sparse.						0.099						0.006													
200100184				KIEFER LANDFILL BUFFER LANDS	No ORM, electronic or paper record. Extensive research cannot find evidence of this Project # or file.			0	0	0	0																			
200100195		Finalized	SP	WILDHAWK/DUNMORE PROPERTY	File Loc UK. FWS mit served as Corps reqd mit.				1.83						1.83						1.83			UK		3.66			UK	
200100223		Finalized	PREAPPCONS	SACRAMENTO STORMWATER MAINTENANCE	File Loc UK. No electronic or ORM data.			0	0	0	0																			
200100230		Finalized	SP	Sunridge Specific Plan Properties EIS - SUNRIDGE VILLAGE	FWS mit served as Corps reqd mit.			0.22	1.88	0.89				0.22	1.88	0.89					3.38			OUT		9.18			IN	
200100252		Finalized	SP	SUNRIDGE PARK (AKA RONENBERG PROPERTY)	FWS mit served as Corps reqd mit.			0.42	1.58					0.28	1.53						3.39			OUT	0.12	0.07			IN	
200100252		Finalized	SP Inclusion	SUNRIDGE PARK (AKA RONENBERG PROPERTY)	Row for addl Corps reqd mit.			0	0	0	0															10.4			IN	
200100263		Finalized	NWP 29	MCNAIR PROPERTY	Records Holding 1037252. Data is currently best of available electronic info.				2.3						0.01						0.01			OUT						
200100307		Finalized	NWP 5	DELTA CROSS CHANNEL FLOW MONITORING STA	Records Holding 1037253. No impacts, no delineation record.			0	0	0	0																			
200100403		Finalized	NWP 39	MEADOWS RANCHETTES	ATF			0.795	0.736					0.066	0.144						0.32			OUT STUDY AREA	0.702	0.588			IN	
200100403		Finalized	NWP 39 Inclusion	MEADOWS RANCHETTES	Row for FWS reqd mit. (GGS 33.3%)			0	0	0	0																			0.171 (create wet) FUND. GGS 33.3%
200100407		Finalized	NWP 7	EMERALD PARK COMPANY UNIT 22	0.03 perm imp (str) not a loss.			0.03				Y	0.03																	
200100434		Finalized	SP	R&B ELK GROVE GILLIAM GAP CHANNEL DEVEL.	5.38 (wet) isolated, will be filled. File location UK, Finan? Delineation not available. Delineation figures are estimated from impacts figures.	Y	5.38	4.76	4.42	0.69				4.76	4.42	0.69					11.67			UK						
200100434		Finalized	SP Inclusion	R&B ELK GROVE GILLIAM GAP CHANNEL DEVEL.	Row for FWS reqd mit.			0	0	0	0										3.58			UK		7.16			UK	
200100435		Finalized	SP	QUAIL RIDGE / FORMERLY BILBY 105	0.03 (wet) isolated. File location UK. Best info available.	Y	0.03	0.82	1.37					0.82	1.37						1.75			UK						

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200100435		Finalized	SP Inclusion	QUAIL RIDGE / FORMERLY BILBY 105	Row for addl FWS reqd mit.			0	0	0	0										0.44			UK		0.88			UK	
200100441		Finalized	NWP 39	MATHER EAST	X			0.25	2.82					0.06	0.33						0.13			UK	0.19	2.49			IN	
200100441		Finalized	NWP 39 Inclusion	MATHER EAST	Row for corps and FWS reqd mit.			0	0	0	0										0.2			UK		1.6			UK	
200100447		Finalized	NWP 39	MOHAMED ACRES	Corps and FWS reqd mit were unified.				0.14						0.14						0.14			UK		0.28			UK	
200100448		Finalized	SP	MONTELENA DJ ENTERPRISES SUNRIDGE	1.23 acre non-jurisdictional (other) - will be filled. Includes previous project numbers 1994-00212, 1994-00211, 1994-00159, 1994-00158, 1994-00157, 1993-00406.	Y	1.23	0.02	15.28	1.17				0.019	10.047	1.167					19.31			OUT		9.12			IN	
200100491		Finalized	NPR	BONACCI PROPERTY	JD only			0	0	0	0																			
200100531		Finalized	NWP 3	COSUMNES RIVER FLASHBOARD DAM REPAIR	0.227 perm imp (str) not a loss. Earlier NWP 3 exists, unable to determine from file what impacts were.			2.631				Y	0.227																
200100559		Finalized	SP	GALT RIVER OAKS	X			2.32	0.26					0.41	0.25						0.11			UK	1.94	0.01			IN	
200100559		Finalized	SP Inclusion	GALT RIVER OAKS	Row for the channel reroute creation acreage.			0	0	0	0									0.43				IN						
200100559		Finalized	SP Inclusion	GALT RIVER OAKS	Row for addl FWS and Corps reqd mit.			0	0	0	0										0.25			OUT		0.5			UK	
200100562		Finalized	SP	EAST FRANKLIN NORTH DRAINAGE	X			7.8						0.51						1.78				IN						
200100562		Finalized	SP Inclusion	EAST FRANKLIN NORTH DRAINAGE	Row for addl Corps reqd mit.			0	0	0	0										3.4			OUT						
200100562		Finalized	SP Inclusion	EAST FRANKLIN NORTH DRAINAGE	Row for FWS reqd mit. (0.51 GGS creation was fully aquatic)			0	0	0	0										0.51			UK						
200100584		Pending	SP	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Rows for this project are really SP MOD for a previously authorized SP. Figures are the most likely outcome. Since project was already authorized, considered complete, not RF. Modification is not yet completed. Figures deviate slightly from originally permitted SP.			0.4	11.41	14.64				0.03	6.17	1.88					5.05			OUT STUDY AREA	0.37	5.23			IN	
200100584		Pending	SP Inclusion	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Row for addl creation (increase in pond area). Proposed, not required.			0	0	0	0											2.08		IN						
200100584		Pending	SP Inclusion	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Row for addl Corps reqd mit.			0	0	0	0										8.57			OUT						
200100584		Pending	SP Inclusion	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Row for addl FWS reqd pres mit. Creation was covered via Corps create requirement.			0	0	0	0															12.54			OUT	
200100605		Finalized	NPR	GREGG RETAINING WALL	X			0	0	0	0																			
200100624		Finalized	PREAPPCONS	WILDLANDS SNODGRASS SLOUGH MITIGATION	Records Holding 1037258. No electronic records. ORM has no useful data. Preapp only.			0	0	0	0																			
200100633		Finalized	SP	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Addl perm imp 0.54 (wet) isolated	Y	0.54	1.6	8.58					1.6	4.24						4.33			OUT STUDY AREA		4.34			IN	
200100633		Finalized	SP Inclusion	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Row for addl Corps reqd mit.			0	0	0	0								2.59					IN		5.32			IN	
200100633		Finalized	SP Inclusion	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Addl row for addl Corps reqd mit.			0	0	0	0														4.13	1.4			IN	
200100633		Finalized	SP Inclusion	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Addl row for FWS reqd mit.			0	0	0	0															0.9			OUT STUDY AREA	0.45 Create wet (VP Conservation Fund)
200100641		Finalized	NWP 39	BACKER PROPERTY-LENNAR COMMUNITIIES	On-site preservation acreage is assumed to be remainder of resources after impact. No specific info in file.			0.34						0.13							0.13			OUT	0.21				IN	0.83 (Riparian Habitat) credit, OUT uda
200100708		Finalized	NWP 39	BISHOP RANCH SUBDIVISION	X			0.26	0.04						0.04										0.26				IN	
200100708		Finalized	NWP 39 Inclusion	BISHOP RANCH SUBDIVISION	FWS mit served as Corps reqd mit.			0	0	0	0										0.04			OUT		0.08			IN	
200100710		Finalized	SP	SMUD COSUMNES POWER PLANT	X			18.097	20.863	8.12				0.352	0.955						1.95			OUT STUDY AREA						
200100710		Finalized	SP Inclusion	SMUD COSUMNES POWER PLANT	Addl row for FWS reqd mit, including GGS creation mit. (33.3% rule used).			0	0	0	0										13.833			OUT		19.7			OUT	
200100710		Finalized	SP Inclusion	SMUD COSUMNES POWER PLANT	For addl Corps and FWS reqd mit. Note creation component satified both Corps and FWS vp mit requirements.			0	0	0	0										3			OUT STUDY AREA						
200100710		Finalized	SP Inclusion	SMUD COSUMNES POWER PLANT	Addl row for FWS reqd mit as per amended BO.			0	0	0	0										0.291			UK		0.196			UK	
200100744		Finalized	SP	GALAXIDAS/BILBY RANCH PROPERTY	X				0.39						0.39						0.39			OUT						
200100763		Finalized	NWP 32	Chester Drive Property	Creation mit component (on this line) satisfied both Corps and FWS requirements.				1.06	0.95					0.313	0.539					0.653			OUT STUDY AREA		0.747	0.411		IN	
200100763		Finalized	NWP 32 Inclusion	Chester Drive Property	Row for addl FWS reqd mit.			0	0	0	0										0.626			IN						
200200094		Finalized	NWP 14, 7	CHANCELLOR ESTATES	X			1.23						0.045						0.12				OUT STUDY AREA						

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200200236		Finalized	NWP 39	KINGSBRIDGE SUBDIVISION	X				4.48						0.43						1.07			OUT STUDY AREA		4.05			IN	1.76 (wet) enhanced IN
200200236		Finalized	NWP 39 Inclusion	KINGSBRIDGE SUBDIVISION	Row for FWS reqd mit.			0	0	0	0															4.25			IN	
200200402		Finalized	NWP 3	BLODGETT DAM REPAIR PROJECT	Impacts to (str), but how much is not clear. Also, no delineation. Logged as zeros, info not available.			0	0	0	0																			
200200410		Finalized	PREAPPCONS	NORTH VINEYARD STATION SPECIFIC PLAN	Pre-App only. Looking at projects 2003-00245, 2003-00251, 1993-00651.			0	0	0	0																			
200200487		Finalized	LOP	SUN RIVER PROPERTY / WETLAND RESTORATION				76.2	321.2						10.97					0.8	25.36			OUT					16.91 (str), and 319.15 (wet) enhanced OUT.
200200523		Finalized	NWP 39	R&B EAST MEADOW PROJECT	Creation mit credits satisfied both Corps and FWS requirements.				0.06						0.06						0.06			OUT STUDY AREA		0.12			IN	
200200527		Finalized	NWP 39	R&B ALBIANI PROPERTY	0.005 (wet) isolated. NFWF payment was accepted by FWS as suitable to meet their creation requirement. FWS preservation credits were put on this row.	Y	0.005		0.081						0.081				0.136							0.27			UK	
200200537		Withdrawn	SP	MORVAI PROPERTY-NORTH VINEYARD STATION	This permit appears to have been withdrawn for the time being. ORM does not reflect this. Delineation and impact info available.			0	0	0	0																			
200200538		Finalized	SP	SHELDON ROAD/STATE ROUTE 99 INTERCHANGE	X			0.307	2.423					0.17	0.5						1.14			OUT STUDY AREA						
200200538		Finalized	SP Inclusion	SHELDON ROAD/STATE ROUTE 99 INTERCHANGE	Row for addl Corps reqd mit.			0	0	0	0									0.19				IN						
200200538		Finalized	SP Inclusion	SHELDON ROAD/STATE ROUTE 99 INTERCHANGE	Row for addl FWS reqd mit.			0	0	0	0										1.101			UK		2.99			UK	
200200561	RF	Pending	EIS	MATHER FIELD MASTER EIS	See 200900880. Also, all permits withdrawn and are now part of 2009-00525 through 00530. Delineated waters for all of these projects is logged here.			10.14	80.5																					
200200568		Finalized	SP	Sunridge Specific Plan Properties EIS - DOUGLAS ROAD 98	X			0.08	3.83					0.08	3.83						3.91			OUT		7.82			OUT	
200200568		Finalized	SP Inclusion	Sunridge Specific Plan Properties EIS - DOUGLAS ROAD 98	Row for addl FWS reqd mit.			0	0	0	0															7.82			OUT	
200200577		Withdrawn	NWP	NGUYEN CHURCH	PM unable to contact applicant. Work (culvert through dry creek) likely completed without permit. No figures available to log.			0	0	0	0																			
200200589		Finalized	NWP 39	BRADSHAW VINEYARDS HOUSING	0.04 isolated (wet). Mary has file.	Y	0.04	0.255						0.001											0.254				IN	
200200589		Finalized	NWP 39 Inclusion	BRADSHAW VINEYARDS HOUSING	Row for FWS GGS mit (33.3% used) Paid into fund (how to log?			0	0	0	0																			0.212 (create wet) FUND. For GGS (33.3% used)
200200614		Finalized	UNAUTHACT	15-ACRE WOODS RD. PROJECT	Probably impacts, but closed as "no further action" in 2009. Delineation verified 1.23 acres (wet). include?? Decision NO.			0	0	0	0																			
200200634		Finalized	NWP 29	GARFOOT GREENS PROPERTY	FWS required additional mitigation, but Corps determined those areas of effect to be outside Corps project area. BO was not considered requisite to Corps verification. Addl FWS mit figures were not included.			2.07	0.004	0.13					0.004	0.13					0.134			OUT STUDY AREA						
200200637		Finalized	NWP 14, 39	VISTA CREEK VILLAGE PROJECT	Not clear what impacts were permanent. Defaulted to all permanent.				0.44						0.44						0.07			OUT STUDY AREA						
200200637		Finalized	NWP 14, 39 Inclusion	VISTA CREEK VILLAGE PROJECT	Row for FWS reqd mit.			0	0	0	0										0.37			UK		0.74			UK	
200200638	RF	Pending	SP	Emerald Estates	X				1.917						1.06						1.06			UK		0.85			IN	
200200638	RF	Pending	SP Inclusion	Emerald Estates	Row for addl Corps reqd mit. Note this figure was subtracted from FWS reqd preservation below. It appears Corps and FWS VP mits are not independent, but are part of same total.			0	0	0	0															2.12			UK	
200200638	RF	Pending	SP Inclusion	Emerald Estates	Row for FWS reqd mit. See note above for Corps reqd mit.			0	0	0	0															7.5			UK	
200200724		Finalized	NWP 39	BEAZER ELLIOTT RANCH EAST	X				0.26						0.26						0.26			OUT STUDY AREA						
200200727		Finalized	NWP 39	COVENTRY PROJECT	X			0.156	0.122						0.109				0.1											
200200727		Finalized	NWP 39 Inclusion	COVENTRY PROJECT	Row for FWS reqd mit.			0	0	0	0															0.06			IN	
200200728		Finalized	SP	WILDHAWK NORTH PROPERTY	0.65 isolated (other), 1.47 isolated (wet)	Y	2.12	4.56	2.8						2.38										4.56	0.42			IN	

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200200728		Finalized	SP Inclusion	WILDHAWK NORTH PROPERTY	Row for FWS reqd mit. Note creation component satisfies both Corp and FWS requirements.			0	0	0	0										4.41				UK		10			UK	
200200770		Finalized	NWP 39	CREEKSIDE UNIT NO. 4 PROPERTY	Preserve acreage approximate - no figure in record.				0.014						0.014				0.014							2.7				IN	
200200770		Finalized	NWP 39 Inclusion	CREEKSIDE UNIT NO. 4 PROPERTY	Row for FWS reqd mit.			0	0	0	0										0.014				UK		0.28			UK	
200200770		Finalized	NWP 39 Inclusion	CREEKSIDE UNIT NO. 4 PROPERTY	Row for FWS reqd mit (GGS) - 33.3% rule used.			0	0	0	0										0.25				UK						
200200773		Finalized	NWP 39	NEWTON RANCH 2	X				0.283						0.283						0.283				OUT STUDY AREA		0.566			IN	
200200782		Finalized	NWP 12, 33	LAGUNA INTERCEPTOR EXTENSION PROJECT	Large impact, all but 0.002 acre (wet) was temporary. Addl 5.67 acres temp impact to (wet).			1.28	55.52	19.14					0.002				5.67		0.22				IN						
200200782		Finalized	NWP 12, 33 Inclusion	LAGUNA INTERCEPTOR EXTENSION PROJECT	Row for FWS reqd mit. GGS habitat, 33.3% rule used.			0	0	0	0										1.502				UK						
200200788		Finalized	NWP 14, 33	BRADSHAW ROAD BRIDGE REPLACEMENT AT MORR	See 2003-00811. 0.373 acres of Morrison Creek was delineated as part of that project, but it was not included there (this project overlaps). Log that 0.373 here. Impacts to Morrison Creek (for this project) are supposedly 0.037 acres.			0.373						0.01																0.01 paid into Sac County Wetland Restoration Trust Fund (Create wet?)
200200808		Finalized	SP	SHELDON PLACE	Row for Sheridan portion of creation mit. Creation mit apparently met Corps and FWS requirements. FWS pres is also included in this row.				0.76						0.76						0.55				OUT STUDY AREA		1.52			OUT	
200200808		Finalized	SP Inclusion	SHELDON PLACE	Row for Clay Station portion of creation mit.			0	0	0	0										0.21				OUT						
200300048		Finalized	NWP 44	TEICHERT PRAIRIE CITY SITE	Creation mit apparently met Corps and FWS requirements. FWS pres is also included in this row.				0.22						0.22												0.8			IN	0.22 (create wet) Paid into CNLM fund.
200300105		Finalized	NWP 32	LAKEMONT DRIVE 8	See 1990-00244. Delineation figures are in that project. Also see 1999-00110. This project is just the violation impacts and resolution.			0	0	0	0				0.12				0.12												
200300111		Finalized	NWP 29	ALBIANI EXCELSIOR ROAD PROJECT	X				0.42						0.32						0.32				UK		0.1			IN	
200300111		Finalized	NWP 29 Inclusion	ALBIANI EXCELSIOR ROAD PROJECT	Row for FWS reqd mit.			0	0	0	0				0.32						0.32				IN		0.64			UK	
200300128		Finalized	NWP 14, 33	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Addl 0.456 acres (wet) non-jurisdictional. Also, Excavation (perm imp not loss) of 0.03 (str) and 0.04 (wet). Learned in another project (2005-01061) that THIS one inadvertently filled addl 0.05 acres wet. Only 0.02 of this was included in delineation for this project, so addl 0.03 wet was added to delineated field.	Y	0.456	0.15	0.33			Y	0.07	0.0008	0.138			0.015	0.209												
200300128		Finalized	NWP 14, 33 Inclusion	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Row for FWS reqd mit (vp)			0	0	0	0										0.076				OUT		0.042			IN	
200300128		Finalized	NWP 14, 33 Inclusion	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Row for FWS reqd mit (GGS) - 33.3% rule used.			0	0	0	0										0.969				OUT STUDY AREA						
200300128		Finalized	NWP 14, 33 PERMITMOD	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Row for inadvertant fill and acreage not included in original delineation.				0.03						0.05				0.05												
200300150		Finalized	UNAUTHACT	SACRAMENTO CONCRETE INC.	Appears resolved. No Corps documents in file...			0	0	0	0																				
200300164		Withdrawn	NWP	REC DIST NO. 800 COSUMNES RIVER MAINTNCE	Withdrawn because applicant decided mitigation not financially feasible. No new plan on record.			0	0	0	0																				
200300177		Finalized	UNAUTHACT	RICE PROPERTY	Resolved in 2000-00644			0	0	0	0																				
200300245		Pending	SP PERMITMOD	NORTH VINEYARD STATION DRAIN MASTER PLAN	Modification not complete. Adds addl delineated acres. A detention basin will be built, destroying waters. Since acreage of basin is unknown, creation figure comes from impacts.				1.19						0.086								0.086		IN						
200300245		Finalized	SP	NORTH VINEYARD STATION DRAIN MASTER PLAN				12.957	4.294	0.846				11.539	3.943	0.846				5.06	19.12				IN						
200300245		Finalized	SP Inclusion	NORTH VINEYARD STATION DRAIN MASTER PLAN	Row for Addl Corps and FWS reqd offsite mit			0	0	0	0										0.546				OUT						
200300245		Finalized	SP Inclusion	NORTH VINEYARD STATION DRAIN MASTER PLAN	Row for Addl Corps and FWS reqd offsite mit.			0	0	0	0										3.506				OUT STUDY AREA		1.815			IN	
200300251		Finalized	SP	VINEYARD CREEK	X			0.84	1.848					0.84	1.848						3.696				OUT						

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200300251		Finalized	SP Inclusion	VINEYARD CREEK	Row for FWS reqd mit. Creation component required by FWS appears to have been met with Corps reqd create component.			0	0	0	0															2.186			IN	
200300253		Finalized	PREAPPCONS	EAST ELK GROVE / TRIANGLE AREA	Info transferred to 1999-00516 Elk Grove Creek Drainage.			0	0	0	0																				
200300286		Finalized	NWP 29	FRANKLIN CROSSING (FKA SOUTH BILBY80	Authorization to fill remaining acres authorized by original NWP 39, work was not finished. No additional changes.			0	0	0	0																				
200300286		Finalized	NWP 39	FRANKLIN CROSSING (FKA SOUTH BILBY80	Addl 0.141 acre pond (other), and another 0.141 acre (str), delineated but non-jurisdictional.	Y	0.282	0.26						0.26								0.26			OUT STUDY AREA						
200300337		Finalized	SP	BRADSHAW ROAD WIDENING, FLORIN-CALVINE	See 2003-00626. Subtracted 0.0231 (wet) from this delineation as it was included in 2003-00626. Actual value delineated for (str) was not clear, so added temp and perm impacts to get figure. Addl 0.09 isolated (wet).	Y	0.09	0.494	1.6029					0.051	0.6081							0.659			UK						
200300337		Finalized	SP Inclusion	BRADSHAW ROAD WIDENING, FLORIN-CALVINE	Row for FWS reqd mit.			0	0	0	0											1.337			IN		3.524			OUT	
200300352		Finalized	UNAUTHACT	RISSLING PROPERTY VIOLATION	File not on shelf - Ness? No further action. No electronic records.			0	0	0	0																				
200300397		Finalized	RGP	ELK GROVE STREAM MAINT. GENERAL PERMIT	All impacts temporary. Previously permitted projects should include delineated waters for this area.			0	0	0	0																				
200300440		Finalized	PREAPPCONS	DOUGLAS BUISNESS PARK	No info in file.			0	0	0	0																				
200300550	RF	Pending	UNAUTHACT	VINEYARD INVESTORS ASSOCIATES VIOLATION	Settlement agreement not finalized. No mitigation figures. 1:1 creation mit assumption based on record. 2000-00025 impacted features on this site, but that project wasn't included in spreadsheet because of GIS geometry. If included later, remove SW4 (0.138), SW7 (2.271), and SWS1 (1.045) (all wet) from delineated figures HERE. Impacts to those features would be included in 2000-00025. THIS HAS BEEN DONE.			5.37	8.926	1.36				0.01	3.12	0.2				0.01	3.12	0.2		IN						
200300626		Finalized	LOP	TAYLOR PROPERTIES GERBER & BRADSHAW ROAD	See 2003-00337			0.082	0.9825						0.8787							0.8787			OUT						
200300626		Finalized	LOP Inclusion	TAYLOR PROPERTIES GERBER & BRADSHAW ROAD	Row for FWS reqd mit.			0	0	0	0											0.793			UK		0.9706			UK	
200300674		Finalized	NWP 14	NAVIGATOR MEMORIAL PHASE II @ MATHER	File missing, no electronic info. Not on shelf - Ness? (doesn't have it). Logged with zeros, as info was not retrievable.			0	0	0	0																				
200300675		Withdrawn	UNAUTHACT	HAGLER PROPERTY WETLANDS	No info in file			0	0	0	0																				
200300697		Withdrawn	NWP 14	SUNRIDGE SPECIFIC PLAN ROAD IMPROVEMENTS	Will believes this project would have been wrapped up into another Sunridge project(s). So, in a sense, not RF. Delineation and impact/project info available.			0	0	0	0																				
200300717		Finalized	NWP 12	MATHER GROUNDWATER SYSTEM	X			0.01						0.005								0.025			OUT STUDY AREA						
200300736		Finalized	NWP 13	MCCORMACK-WILLIAMSON TRACT EROSION REPAI	File not on shelf - Imamura does not have it. Impacts/delineated estimated. 0.2 acre (str) considered perm impact not loss.			0.2				Y	0.2																		
200300777		Finalized	NWP 39	SCHNITZER STEEL EXPANSION	X				0.17						0.167							0.167			OUT STUDY AREA						
200300796		Finalized	UNAUTHACT	AZIZ PROPERTY	May be violation, but never pursued. No additional info.			0	0	0	0																				

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200300811		Finalized	NWP 14, 33	BRADSHAW ROAD IMPROVEMENT JACKSON-FLORIN	Delineated does not include 0.373 acres of Morrison Creek (should get logged in 2002-00788). Mitigation includes restoration of 0.303 temp impacts (on-site) and off-site creation to mit for 0.101 acres perm impact. No data for off-site. Assumed in-kind, at Browns Creek VP preserve.			0.809	0.332					0.101						0.101				OUT						
200400012		Finalized	NWP 27	SOUTH STONE LAKE GGS MITIGATION PRESERVE	FWS required 4.4 acres GGS habitat (1.467 is 33.3%), which project self-mitigated. (ie, that acreage not available for other projects to use as mitigation).			1.33	0.73					1.33	0.01						1.467			OUT						
200400088		Finalized	NWP 39	EAST MEADOW III	X				0.016						0.016						0.016			OUT STUDY AREA						
200400091		Finalized	SP	WILDHAWK SOUTH PROPERTY	Addl 0.34 (wet) isolated. Feature filled.	Y	0.34		0.954						0.954						1.29			OUT STUDY AREA						
200400091		Finalized	SP Inclusion	WILDHAWK SOUTH PROPERTY	Row for FWS reqd mit. Creation component for GGS habitat (33.3% used), AND unclear if result is bank or fund.			0	0	0	0																			0.14 (create wet) Bank OR Fund. For GGS (33.3% used)
200400092		Finalized	NWP 39	BMD PROPERTIES EXPANSION PROJECT	No JD. Can only discern impacted waters.				0.03						0.03						0.1			OUT STUDY AREA						
200400126		Finalized	NWP 38	FRANKLIN FIELD LANDFILL CLOSURE	Note large difference between delineated and impacts.				71.38						0.042					0.042											
200400126		Finalized	NWP 38 Inclusion	FRANKLIN FIELD LANDFILL CLOSURE	Row for FWS reqd mit. Note: preservation acres probably paid into fund (known paid, but no record where).			0	0	0	0										0.022			OUT STUDY AREA						0.644 (Preserve wet), paid into FUND
200400181		Finalized	NWP 39	MERITAGE BRITSCHGI PROPERTY	Addl 0.061 (wet) non-jurisdictional. All filled.	Y	0.061	0.074	0.009					0.074	0.009						0.077			OUT						
200400182		Finalized	NWP 14, 33	BOND ROAD WIDENING	Note: NFWF req was in original permit, but not in modification. However, applicant had already paid into fund.			1.56	0.31					0.07	0.31			0.007		0.07	0.31			IN						
200400182		Finalized	NWP 14, 33 Inclusion	BOND ROAD WIDENING	Row for FWS reqd mit. Create component for GGS (33.3% used).			0	0	0	0										1.159			UK						
200400244		Withdrawn	SP	GAP SPECIFIC PLAN (AKA FLORIN-VINEYARD)	Inactive. Projects once part of this group have been reviewed separately.			0	0	0	0																			
200400254		Finalized	SP	LENT RANCH	0.042 (str) impacts occur off-site (but not on any other numbered project site). This figure has been included in impacts and delineated acres for this project.			1.624	2.066					1.533	1.482						3.015			OUT STUDY AREA		0.42			IN	
200400254		Finalized	SP Inclusion	LENT RANCH	Row for FWS reqd mit. Creation component for GGS habitat (33.3% used).			0	0	0	0										3			UK		0.908			IN	
200400255		Finalized	NWP 29	MORVAI NORTH					1.635						0.152						0.152			OUT STUDY AREA		1.483			IN	
200400255		Finalized	NWP 29 Inclusion	MORVAI NORTH	Row for FWS reqd mit. Note creation component identical to Corps requirement. Only recorded once above.			0	0	0	0															0.304			IN	
200400274		Withdrawn	NWP 39	NORTH VINEYARD GREENS UNIT #3	Inactive. This project # is wrapped up into 2006-00428.			0	0	0	0																			
200400281		Finalized	NWP 14, 33	LEWIS STEIN ROAD EXTENSION PROJECT	X			1.11	2.74					0.11	0.191			0.11	0.191											
200400281		Finalized	NWP 14, 33 Inclusion	LEWIS STEIN ROAD EXTENSION PROJECT	Row for FWS reqd mit. (GGS 33.3%)			0	0	0	0										3.06			OUT						
200400294		Finalized	UNAUTHACT	GRIMES PROPERTY	Closed, 5 years passed since Corps became aware of violation. The only info is 0.80 acres fill to wet and str.			0.4	0.4					0.4	0.4															
200400298		Finalized	NWP 7, 32	BELL SOUTH / SIERRA HOLDINGS	Incomplete ATF NWP. Note, data is taken from best info available. No Corps or FWS reqd mit could be recorded. Data in creation is on-site proposed. Project is probably complete, though no record of final permit exists.			2.442	0.358	1.538				0.22						1.04	1.31			IN						
200400303		Finalized	NWP 14	MATHER BIKE TRAIL	Delineation part of other projects. The only mitigation is FWS reqd preservation (wet).			0	0	0	0			0.004												0.112			UK	
200400339		Finalized	NWP 39	SYCAMORE GROVE	X				0.17						0.17				0.17										
200400350		Finalized	NWP 14	BRUCEVILLE WIDENING	ATF			0.02						0.02							0.02			OUT STUDY AREA						

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200400409		Finalized	NWP 39	BRADSHAW CHRISTIAN HIGH SCHOOL	Has not been constructed, mitigation has not been established. Applicant not content with permit conditions as of 2007. No file activity since then.			0.995	1.504						0.291						1.154			UK	0.995	1.213			IN	
200400431		Finalized	NWP 27	COSUMNES PRESERVE WETLAND ENHANCEMENT	1.65 acres (wet) impacts via movement of soil to create islands. Net gain of 0.5 (wet)				153.6						1.65						2.15			OUT						
200400435		Withdrawn	LOP	PANATTONI BUSINESS PARK	Only upland portion of project built. Applicant reapplied to fill wetlands, but never sent requested info. Corps withdrew.			0	0	0	0																			
200400458		Finalized	SP	Sunridge Specific Plan - Arista del Sol	Includes Grantline 220 proposed impacts and mitigation in figures. (See 2006-00604)			0.19	10.03	7.56				0.13	5.84	7.56				0.64				IN	0.05	3.71			IN	
200400458		Finalized	SP Inclusion	Sunridge Specific Plan - Arista del Sol	Row for Corps and FWS reqd mit. Mit was to be conducted in Mather Core Area if possible (IN).			0	0	0	0										10.1			IN		19.47			IN	
200400474		Finalized	LOP	VINEYARD MARKET SQUARE (BADELLA PROPERTY)	X			0.053	0.938					0.053	0.938						0.991			OUT						
200400474		Finalized	LOP Inclusion	VINEYARD MARKET SQUARE (BADELLA PROPERTY)	Inclusion for FWS required mit.			0	0	0	0										0.138			UK		0.276			UK	
200400515		Finalized	SP	Glenborough at Easton and Easton Place	Addl 2.111 (wet) and 2.594 (other) isolated. All isolated are permanently impacted. How to categorize? File contained no record of the actual used mit bank location. UK was added to field.	Y	4.705	11.843	10.743	0.575				2.161	2.265	0.057					5.283			UK	8.792	8.478	0.518		IN	
200400555		Finalized	SP	Bottimore Property	X			0.045	3.281					0.002	2.561						3.132			OUT						
200400555		Finalized	SP Inclusion	Bottimore Property	Row for FWS reqd mit.			0	0	0	0															0.882			OUT	
200400564		Withdrawn	NWP 39	STONE HOUSE ROAD ELEMENTARY SCHOOL	X			0	0	0	0																			
200400570		Finalized	NWP 39	Los Rios Community College District CRC Elk Grove Center Site	X				0.433						0.433						0.43			OUT						
200400629		Finalized	NWP 39	East Lawn Elk Grove Memorial Park Expansion Project	X			8.294	11.732						0.4						0.4			UK						
200400640		Finalized	NWP 27	LAGUNA TERRACE MITIGATION SITE	Creation/restoration figures extrapolated from existing waters vs explanation of acres created or restored. Unclear from documentation.			1.04	4.91					0.46																
200400640		Finalized	NWP 27 Inclusion	LAGUNA TERRACE MITIGATION SITE	Addl row for project activities.			0	0	0	0																			
200400640		Finalized	NWP 27 Inclusion	LAGUNA TERRACE MITIGATION SITE	Addl row for project activities.			0	0	0	0																			
200400763		Finalized	SP	CENTRAL GALT INTERCHANGE	0.124 acre (str) non jurisdictional.	Y	0.124	1.643	1.794					1.15	0.993					1.4				IN						
200400763		Finalized	SP Inclusion	CENTRAL GALT INTERCHANGE	Addl row for addl Corps reqd mit.			0	0	0	0										1.49			OUT						
200400782		Finalized	NWP 39	SECURITY PARK-GOLD FLAKE COURT	X				0.191						0.191				0.191											
200400782		Finalized	NWP 39 Inclusion	SECURITY PARK-GOLD FLAKE COURT	Row for FWS reqd mit.			0	0	0	0															0.786			IN	0.056 (Create wet) Fund OR credits
200400790		Finalized	NWP 29	HEDGE 22 PROPERTY (DEANE MCCOY ROAD)	Create component was called "VP habitat" by both FWS and Corps. No actual purchase records yet. FWS req was slightly greater but decision was made that FWS and Corps were asking for a single thing. Only the greater 0.291 acres was used for creation acres logged.				0.271						0.271						0.291			UK						
200400790		Finalized	NWP 29 Inclusion	HEDGE 22 PROPERTY (DEANE MCCOY ROAD)	See Above Note. Row for FWS reqd mit.			0	0	0	0															0.582			UK	
200400802		Finalized	NWP 27, 33	BROWNS CREEK MITIGATION SITE	X			2.2	12.23																					
200500137		Finalized	UNAUTHACT	LOW/OSTER PROPERTY	Voluntary Restoration, Though no record of post-restoration in file. 0.02 (wet) was filled. Use this proj as another example of "should we be counting delineated on projects with no impacts?"				0.02																					
200500221		Finalized	NWP 14, 33	FRANKLIN BOULEVARD WIDENING	Addl 0.12 isolated str.	Y	0.12	0.84	3.1					0.032				0.032												
200500221		Finalized	NWP 14, 33 Inclusion	FRANKLIN BOULEVARD WIDENING	Row for FWS reqd mit. Requirement for GGS was 0.6 preserve habitat, via fund OR preserve credit. Result uk. (33.3% is 0.2 wet)			0	0	0	0																			0.2 Preserve Wet via fund OR credit. (GGS, 33.3% rule used)
200500226		Finalized	NWP 14	GRANT LINE AND BOND ROAD INTERSECTION	X			0.35	0.105					0.35	0.04					0.56				IN						

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200500226		Finalized	NWP 14 Inclusion	GRANT LINE AND BOND ROAD INTERSECTION	Row for Corps reqd (wet) credits.			0	0	0	0										0.048									
200500226		Finalized	NWP 14 Inclusion	GRANT LINE AND BOND ROAD INTERSECTION	Row for FWS reqd pres (wet) credits.			0	0	0	0															0.52			UK	
200500227		Finalized	PREAPPCONS	SUNRISE DOUGLAS ELECTRIC DISTRIBUTION	X			0	0	0	0																			
200500325		Withdrawn	SP	SILVER SPRINGS EAST (LOT P)	See 1999-00712. Data logged there.			0	0	0	0																			
200500371		Finalized	SP	INACTIVE RANCHO CORDOVA TEST SITE	Note all waters on-site were delineated in other projects, so no data has been logged here. No Impacts.			0	0	0	0																			
200500398		Finalized	NWP 39	WULF/ALVAREZ PROPERTY	X			0.3	0.15					0.3	0.15				0.028		0.422				UK					
200500398		Finalized	NWP 39 Inclusion	WULF/ALVAREZ PROPERTY	Row for FWS reqd mit.			0	0	0	0															0.3			UK	0.15 (creat wet) Bank OR Fund
200500438		Finalized	UNAUTHACT	8090 VINEYARD ROAD PROPERTY	Closed, no further action. Also, County may have required landowner to remove fill.			0	0	0	0																			
200500461		Finalized	NWP 3	LOST SLOUGH BRIDGE MAINTENANCE	Bridge maintenance, no impact.			0.002	0.05																					
200500516		Finalized	NWP 39	JAS-LARSON PROPERTY	0.07 temp imp only.				0.07										0.07											
200500525		Finalized	NWP 39	TRIANGLE POINT	See 201100033 and 200601045. 0.6 str and 0.44 wet delineated have been added to account for other projects that impact this site. Impacts for those are logged in their respective rows.			0.74	0.8					0.07	0.33						0.4			OUT						
200500531		Finalized	NWP 39	AMERICA'S CHOICE HIGH SCHOOL SITE	0.026 acres (wet) isolated.	Y	0.026		0.149						0.149				0.149											
200500531		Finalized	NWP 39 Inclusion	AMERICA'S CHOICE HIGH SCHOOL SITE	Row for FWS reqd mit.			0	0	0	0																			0.175 (create wet) fund, FWS VP creation account. 0.35 (Preserve Wet) Bank or fund
200500536		Finalized	NWP 29, 39	JACKSON PROPERTY	Actual delineated acreage lower, but applicant revised impacts and no new jd was performed.			0.43	0.035					0.43	0.035					0.438	0.035			OUT STUDY AREA						
200500575		Withdrawn	UNAUTHACT	PRINGLE, CHARLES	X			0	0	0	0																			
200500576		Finalized	UNAUTHACT	PRUITT, LLOYD	Closed. No Fill. No further action.			0	0	0	0																			
200500577		Finalized	NWP 14	GREENE, SCOTT	X				0.001						0.001															
200500588		Finalized	NWP 23	STATE ROUTE 16 AND EXCELSIOR ROAD SAFETY	X				1.06	0.16					0.45	0.16					0.74			OUT						
200500588		Finalized	NWP 23 Inclusion	STATE ROUTE 16 AND EXCELSIOR ROAD SAFETY	Row for FWS reqd mit. Note creation component is fund, not credits!			0	0	0	0															1.48			IN	0.74 create wet FUND
200500594		Finalized	NWP 39	PARKSIDE PROJECT ON ORANGE AVENUE	X				0.091						0.091						0.07			IN						
200500594		Finalized	NWP 39 Inclusion	PARKSIDE PROJECT ON ORANGE AVENUE	Row for addl Corps reqd mit.			0	0	0	0										0.056			UK						
200500594		Finalized	NWP 39 Inclusion	PARKSIDE PROJECT ON ORANGE AVENUE	Row for addl FWS reqd mit. Note, creation AND preservation may be by fund OR credits, can't tell.			0	0	0	0																			0.021 creat wet fund or credit. 0.042 preserv wet, fund or credit.
200500649		Pending	PREAPPCONS	SILVA RANCH MITIGATION SITE	Mitigation site for Anatolia (1901-10021)			0	0	0	0																			
200500652		Finalized	NWP 39	JAS - NORTH VINEYARD 10 PROPERTY	X				0.18						0.18				0.18											
200500652		Finalized	NWP 39 Inclusion	JAS - NORTH VINEYARD 10 PROPERTY	Row for FWS reqd mit. Creation may be by fund or credits, can't tell.			0	0	0	0															0.04			UK	0.02 Wet Creat may be by fund or credits.
200500674		Withdrawn	NWP 39	FLORIN-BRADSHAW 43	X			0	0	0	0																			
200500698		Finalized	NWP 14, 33	WILTON ROAD CULVERT REPLACEMENT PROJECT	Delineated from temp + perm impact acreages. Unable to determine split of resource acreages, so split evenly between wet and str.			0.14	0.14					0.045	0.045			0.045	0.045											
200500734		Finalized	UNAUTHACT	BRADSHAW INTERCEPTOR, SECTION 7	See 2009-00525 through 00530. All features are a part of larger Mather project. Delineated acres can be found there.			0	0	0	0				0.002			0.008	0.114											
200500734		Finalized	UNAUTHACT Inclusion	BRADSHAW INTERCEPTOR, SECTION 7	Row for FWS required mit.			0	0	0	0															0.74			OUT	0.18 funds placed in FWS VP (wet) creation acct.
200500750		Finalized	PREAPPCONS	MATHER AIRPORT AREA	KATE SAID IGNORE.			0	0	0	0																			
200500852		Finalized	PREAPPCONS	WESTBOROUGH AT EASTON	JD and project/impact info available in paper file. Did not go further than JD stage, don't know why.			0	0	0	0																			
200500883		Finalized	NWP 29	MARTIN PROPERTY PROJECT	Permit was reverified to combine FWS and Corps requirements for creation credits.				0.048						0.048						0.048			UK		0.096			UK	

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200500888		Pending	EIS	Suncreek Specific Plan _ Master File	One of Big Five. File exists as 6 other SPs: 200000414, 200600602, 603, 604, 605, and 200800795. All withdrawn at present (06/12/13).			0	0	0	0																			
200500902		Finalized	NWP 7	CITY OF GALT WASTEWATER OUTFALL	0.007 perm imp (wet) not loss				0.007			Y	0.007						0.007										
200500906		Finalized	NWP 3, 33	ELK GROVE OUTFALL PIPE MAINTENANCE	22 locations/permits, rows removed for clarity. 0.076 (str) impacts are for sediment removal, not a loss.			0.076				Y	0.076																
200500956		Finalized	PREAPPCONS	SHELDON/BRADSHAW ROAD EXPANSION PROJECT	NPR. JD Available.			0	0	0	0																		
200500958		Finalized	NWP 12	Elk Grove Water Service Pipeline	0.003 temp impacts only.				1.28																				
200500977		Finalized	UNAUTHACT	SMUD EMERGENCY 12 KV REPAIR, ELK GROVE	Closed. Voluntary restoration.			0	0	0	0																		
200500978		Finalized	NWP 3	LINE SECTION 9 PIPELINE ANOMALY REPAIRS	Resources are 'riparian wetland'. Temp impacts only. 0.04 preservation was FWS reqd for GGS (33.3%).					0.104												0.1		OUT STUDY AREA		0.04			UK	
200500990	RF	Withdrawn	SP	Kwan Elder Creek Estates Property	New PJD in, probably reasonably foreseeable. JD info available.			0.1						0.1						0.1				UK					
200501045		Finalized	UNAUTHACT	COYOTE HILLS PROJECT	Closed. No Fill. No further action.			0	0	0	0																		
200501046		Withdrawn	SP	MATSUOKA PROPERTY	Project has been chaged to vinyards not impacting WOUS.			0	0	0	0																		
200501061		Finalized	NWP 39	GRAMMERCY PARK SUBDIVISION	X				0.064						0.064				0.064										
200501102		Finalized	NWP 39	PACIFIC WEST LAGUNA RIDGE PROPERTY	Addl 0.0208 acre isolated (wet). 0.01 acre isolated (wet) was filled. Note mit is seasonal wet credits, though with SSHCP rules, filled ditches considered (str).	Y	0.0208	0.0809	0.0374					0.05							0.05			OUT STUDY AREA						
200501102		Finalized	NWP 39 Inclusion	PACIFIC WEST LAGUNA RIDGE PROPERTY	Inclusion for FWS required mit.			0	0	0	0										0.013			OUT STUDY AREA						
200501116		Finalized	SP	TRIANGLE ROCK EXPANSION FLORIN RD SOUTH	2.58 isolated pond. Of onsite created acreage, cannot determine exact acreage of newly created channel. Defaulted to 0.99 (amount of channel filled/realigned). FWS mit requirements were met through Corps reqd 0.15 wet creation credits.	Y	2.58	0.99	10.04					0.99	9.1					0.99	23.71			IN		0.96			IN	
200501116		Finalized	SP Inclusion	TRIANGLE ROCK EXPANSION FLORIN RD SOUTH	Inclusion for Corps and FWS reqd off-site creation component.			0	0	0	0										0.15			OUT						
200501137		Finalized	NWP 3	SHED A EMERGENCY SEDIMENT REMOVAL	Sediment removal impacts 0.08 (str), not loss.			0.08				Y	0.08																
200600009		Finalized	NWP 18	CITY OF RANCHO CORDOVA FLOOD EMERGENCY	Construction of drainage ditches impact 0.009 acres (wet). Not loss.				0.009			Y	0.009																
200600194		Finalized	NWP 29	WATERMAN FAMILY APARTMENTS DEVELOPMENT	Note that PM specified via email that although creation components of equal acreage were required by Corps and FWS, a single purchase would meet requirements.				0.024						0.024						0.024			OUT STUDY AREA						
200600194		Finalized	NWP 29 Inclusion	WATERMAN FAMILY APARTMENTS DEVELOPMENT	Inclusion for addl Corps reqd mit for indirect impacts.			0	0	0	0																0.439			IN	
200600194		Finalized	NWP 29 Inclusion	WATERMAN FAMILY APARTMENTS DEVELOPMENT	Inclusion for addl FWS reqd preservation for direct impacts.			0	0	0	0																0.366			IN	
200600196		Finalized	NWP 39	Security Park	X				0.395						0.169						0.199			OUT						
200600196		Finalized	NWP 39 Inclusion	Security Park	Inclusion for FWS required mit.			0	0	0	0										0.169			UK		0.788			UK	
200600254		Finalized	NWP 12	PG&E LINE 108 REPLACEMENT PROJECT	Additional 0.61 temp impacts.			0	0	0	0																		
200600254		Finalized	SP	PG&E LINE 108 REPLACEMENT PROJECT	Line replacement project - Note delineated acres to impacts ratio. (8.4 acres temp imps only). Mit was required by FWS, and reiterated by Corps as the only mit required in permit.			10.417	88.067	29.894																2.47			OUT	
200600254		Finalized	SP Inclusion	PG&E LINE 108 REPLACEMENT PROJECT	SP Inclusion for additional FWS mitigation.			0	0	0	0																2.07			UK	
200600381		Finalized	NWP 14	ELK GROVE BLVD/SR 99 INTERCHANGE PROJECT	Addl temp imps to 0.001 str and 0.026 wet. Also see 2008-00128			0.007	0.11					0.004	0.007															
200600403		Finalized	NWP 14	EAST STOCKTON BLVD. BIKE LANE PROJECT	Note: Impacts were to drainage ditch (str for SSHCP), but mit credits were for seasonal wetland (wet).			0.03						0.03							0.03			OUT STUDY AREA						

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200600428		Finalized	SP	NORTH VINEYARD GREENS PROJECT	1.53 isolated (wet).	Y	1.53	2.195	1.97						1.6							2.796			IN					
200600428		Finalized	SP Inclusion	NORTH VINEYARD GREENS PROJECT	Row for FWS required mit			0	0	0	0										1.6			OUT		3.2			OUT	
200600438		Finalized	LOP	COURTLAND SEWER PROJECT	Horizontal drilling only, no impacts.			0	0	0	0																			
200600477		Finalized	PREAPPCONS	UPPER LAGUNA CREEK COLLABORATIVE PLAN	X			0	0	0	0																			
200600512		Withdrawn	SP	SIMMERHORN COMMERCIAL PROJECT SITE	Talked with Zach Simmons. No longer seems reasonably foreseeable. JD and project info available.			0	0	0	0																			
200600537		Finalized	NWP 39	SIENNA SUBDIVISION PROJECT	X				0.018						0.018							0.1			OUT STUDY AREA					
200600552		Finalized	PREAPPCONS	PILLIKEN RANCH (SLOUGHHOUSE) PROJECT	X			0	0	0	0																			
200600614		Finalized	NWP 14, 33	WEST STOCKTON BLVD./LAGUNA CREEK BRIDGE	0.13 acre detention basin logged in 'wet'. (Delineation had it under wetland category).			3.03	1.1					0.113						0.113				OUT STUDY AREA					
200600614		Finalized	NWP 14, 33 Inclusion	WEST STOCKTON BLVD./LAGUNA CREEK BRIDGE	FWS reqd preservation of 0.981 GGS habitat. 33.3% used in spreadsheet. Review fact that Corps impacts were to "Open Water" (str), but SSHCP rules log 33.3% as (wet).			0	0	0	0																0.327			UK	
200600615		Finalized	NWP 29	LAKEMONT 33 SUBDIVISION	Re-verification. Unknown location of wet mit. No purchase record yet.			0.17	0.14						0.14							0.14			UK					
200600622		Finalized	NWP 29	PARK PLACE	Note - resources are drainage ditch (str for purposes of this study), but mit credits were for seasonal wet.			0.022						0.022								0.022			OUT STUDY AREA					
200600648	RF	Withdrawn	SP	WHITELOCK PARKWAY CORRIDOR	Paul says probably will be built if mall project ever opens again - Talk to Lisa Gibson. JD and project/potential impact info available.			0.586	0.465					0.57	0.42							0.99			UK					Suggested FWS Preservation of at least 1.98 acres (wet) via FUND.
200600756		Finalized	NWP 39	ELK GROVE AUTO MALL PHASE III	0.057 acres isolated wet.	Y	0.057	0.155	0.035					0.073						0.22				OUT STUDY AREA					
200600764		Finalized	NWP 3, ,33	ELK GROVE STORMWATER MAINTENANCE PROJECT	0.059 perm imp (str) not a loss. Many permits. Rows removed for clarity.			0.059				Y	0.059																	
200600977		Finalized	PREAPPCONS	SOUTH EAST AREA SPECIFIC PLAN	X			0	0	0	0																			
200601045		Finalized	NWP 14	Grant Line Road / Waterman Road Intersection Improvement	Impacts are impacting portion of waters delineated (0.6 str, 0.44 wet) for project 2005-00525 (Pending). Only the newly delineated waters are included here. Additional non-jurisdictional features (0.60 str).	Y	0.6	1.37	0.904					0.19	0.103						0.29			OUT					
200700060		Finalized	NWP 27	Deer Creek Mitigation Bank	Delineation includes figures from both this project number, and Deer Creek South (2008-00721), as activities from this number affect both areas.			9.05	7.13	6.14				0.489	0.023						12.64			OUT					
200700095		Finalized	NWP 33	Twin Cities Wetland Preserve	0.037 Temp impacts (str) only. (NWP 33). Note: this project is functioning as a bank although no NWP 27 or DEVMBA associated. Make sure to review as part of mitigation areas list.			3.009	17.104	5.63																				
200700230		Finalized	UNAUTHACT	Gerber - Bradshaw Violation	Closed. No Fill.			0	0	0	0																			
200700602		Withdrawn	NWP	Shadowbrook	Duplicate number. Project is 2003-00105.			0	0	0	0																			
200701006		Finalized	NWP 13	Cosumnes River Levee Repair, RD 800	Four sites, four separate permits. Rows removed for clarity. Unable to quantify amount of loss vs "impacts to". Project was emergency levee repairs.			1.89				Y	1.89																	
200701006		Pending	UNAUTHACT	Cosumnes River Levee Repair, RD 800	Pending, but unauth will address only work done after permit expired. Work itself was within conditions of NWP.			0	0	0	0																			
200701014		Finalized	NWP 3	Grant Line Channel Restoration Project	0.68 acre temp impacts (str). 0.19 perm imp not loss to (wet)			1.241	0.335			Y	0.19																	
200701041		Finalized	NWP 27, 33	Bridge Over Laguna Creek - Safe Routes	Temporary impacts only.			0.26	0.28																					
200701062		Finalized	LOP	Walnut Grove Marine Dock Modernization	LOP for retention, modernization. Original permit was 9467. Inclusion subject to final boundary. Probably IN. Note Impacts are BAI from old documentation. Delineated acres assumed from impacts.			0.013						0.013																

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200701064		Finalized	NWP 39	Reynolds & Brown CMD Court Property	Delineated acres were already part of 199900299, so not included here. Feature impacted in this NWP was already mitigated for in that project.			0	0	0	0				0.04															
200701147		Finalized	DEVMBA	Van Vleck Property Mitigation Bank	X			5.94	23.58	7.16																				
200701357		Finalized	NWP 12	PG&E's Mather Gas Line Project	Temp impacts only.			1.91	0.719	1.641																				
200701357		Finalized	NWP 12 PERMITMOD	PG&E's Mather Gas Line Project	Modification to delineation and increased temp impacts.			0.171																						
200701465		Finalized	NWP 12	Walnut Grove Sewer Project	0.44 perm imp wet, not loss			0.62	5.04			Y	0.44																	
200701887		Withdrawn	NWP 14	Florin Road Improvement Project	Withdrawn by applicant, March 2009. No further action. Original delineation and impact information is available in file.			0	0	0	0																			
200701932		Withdrawn	NWP	SMUD Hedge Training Facility Expansion	Withdrawn by applicant. Last action was AJD in 2009. Not considered reasonably foreseeable at this point.			0	0	0	0																			
200702046		Finalized	NWP 3, 33	E.G. Storm Water Maintenance	Sites A through O. Impacts 0.16 (str) via sediment and beaver dam removal.			7.48				Y	0.16																	
200702104		Finalized	NWP 27	SMUD Nature Preserve Mitigation Bank	DEVMBA pending			3.386	47.386	4.888					0.114							24.96			OUT	3.34	44.35	4.89		OUT	
200702123		Finalized	PREAPPCONS	Pacific Grove Estates	No Permit Required.			0	0	0	0																			
200702210		Finalized	NWP 27	Cosumnes Floodplain Mitigation Bank (aka New Hope)	Data placed in reverification			0	0	0	0																			
200702210		Finalized	NWP 27	Cosumnes Floodplain Mitigation Bank (aka New Hope)	Reverification. No change from original permit. Temp impacts only. Additional 0.023 acres str not in orig delin added to logged delin.			0.454	0.811																					
200702227	RF	Withdrawn	UNAUTHACT	Hardesty Sand and Gravel	Unresolved. Mitigation is estimated from available documents.			0.172						0.172						0.344				UK						
200800061		Finalized	UNAUTHACT	Heatherpace Lane, Gerber Road Violation	Closed. No further action.			0	0	0	0																			
200800062		Finalized	NWP 14	Gerber Road Violation	ATF permit.				0.0026						0.0026				0.002											
200800062		Finalized	UNAUTHACT	Gerber Road Violation	ATF initiated			0	0	0	0																			
200800114		Finalized	NWP 12	Fresno Bridge 58.10 UPRR	In addition to logged impacts, removal of piles results in 0.0032 net increase in (wet). Did not log as wet creation as this would not have been considered fill in the first place. FWS mit was the only mit. 0.15 GGS habitat, Corps required 0.093 of that to be aquatic. Did NOT use 33.3% rule in this case.				0.07						0.031											0.093			OUT	
200800128		Finalized	NWP 39	Plaza III	Note: Although verification states that previous delineation (2006-00381) was used for this project, review shows that the impact area of THIS project was actually not included in that JD. Therefore there are "delineated" entries for both projects.			0.033						0.033					0.033											
200800181		Withdrawn	NWP 14	Bruceville Road/Poppy Ridge Road Improvement Project	Withdrawn due to NPR.			0	0	0	0																			
200800402		Finalized	NWP 27	Consumnes River Gravel Augmentation Project	Talking point: Impact vs improvement of function... 1.45 temp imp str.			2.2						0.75																
200800444	RF	Pending	SP	Stoneridge Quarry	Confirmed correct documents to use for delin/proposed impacts with Marc. Conceptual Mit Plan is 1:1 create at Corps approved mit bank... No Preserv, just avaoidance. No FWS Mit.			22.042	16.884	3.97				2.832	7.587					2.832				OUT						
200800444	RF	Pending	SP Inclusion	Stoneridge Quarry	Row for conceptual create wet component.			0	0	0	0										7.587			OUT						
200800475		Finalized	NWP 39	Prairie City State Vehicular Recreation Area	Addl 0.38 isolated wet, 0.42 isolated pond (other). Mitigation: 1.434 acres restore existing resources - logged as rehabilitate Other.	Y	0.8	3.72	0.11	3.61				0.198																0.321 rehab wet OUT uda
200800475		Finalized	NWP 39 Inclusion	Prairie City State Vehicular Recreation Area	X			0	0	0	0																			1.113 rehab str OUT uda

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200800499		Finalized	UNAUTHACT	Dillard/Meiss Road Parcels	File not on shelf - Dadey? (check for location of mit purchases). Settlement agreement finalized, however, as of 2010, applicant still has not purchased required credits. Conservative delineated figure taken from impacts. Will process a NWP 32 after conditions are met.				0.666						0.666						0.146			UK						
200800499		Finalized	UNAUTHACT Inclusion	Dillard/Meiss Road Parcels	Row for FWS reqd mit.			0	0	0	0											0.374			UK		0.748			UK	
200800936		Finalized	PREAPPCONS	Bottimore Property	See 2008-001348 - should be same project under new number. No electronic records. JD only. Applicant withdrew request for verification. Permit Required, but no impact info.			0	0	0	0																			
200800937		Finalized	NWP 27	Snake Marsh Habitat Improvement Project	Good Talking Point: Restoration of 1 acre wet by removal of water primrose. Restore normally lumped with creation (?), but is it in this case? I put it in Other as rehabilitation.				1			Y	1																1 rehab wet out UDA
200800950		Finalized	NWP 27	Wong Wetland Restoration Project	Good Talking Point: impacts are excavation involved in restoration of original 3 acres (potential impact not loss).			0.25	2.75			Y	3									102			OUT					
200800974		Finalized	PREAPPCONS	Quail Lakes North	JD only. Resources on-site. No impact/project info yet.			0	0	0	0																			
200801214		Finalized	NWP 7	City of Galt Effluent Pipeline Project	0.03 Temp imp str			0.04	0.08																					
200801317		Finalized	NWP 7	Cosumnes River Elementary School Addition Project	0.004 perm imp (str) not a loss. Additional 0.16 isolated wet (AJD)	Y	0.16	3.52		0.35		Y	0.004																	
200801348		Finalized	PREAPPCONS	Bottimore Site	JD only. Appears this project number was unneccessarily created, should be with 2004-00555			0	0	0	0																			
200801349		Finalized	PREAPPCONS	Mahon Ranch	JD only. Significant amount of resources on-site. No impact/project info yet.			0	0	0	0																			
200801362		Finalized	NWP 12	CSA Potable Water T-Main and Florin Road Sewer Project - WRDA Sacramento County	Temp imp 0.434 str, perm imp 0.001 str			2.501	9.576					0.001																
200801384	RF	Pending	DEVMBA	Apple Road Property	JD only. Significant amount of resources on-site. No impact info yet.			0	0	0	0																			
200801664		Finalized	NWP 12	SMUD Twin Cities Road Pole Replacement	ATF - no JD, less than 0.001 acre temp impact to (wet).				0.001																					
200801797		Finalized	NWP 14	UPRR Bridge Milepost 56.73 Fresno Subdivision	Temp imp 0.25 wet				0.38																					
200900172		Finalized	NWP 33	Elk Grove Creek Pedestrian Overcrossing	0.47 temp imp str			4.53	0.03																					
200900172		Finalized	NWP 42	Elk Grove Creek Pedestrian Overcrossing	See Inclusions			0	0	0	0			0.06	0.03						0.03			OUT					
200900172		Finalized	NWP 42 Inclusion	Elk Grove Creek Pedestrian Overcrossing	Corps mit requirement, str.			0	0	0	0									0.06				OUT STUDY AREA					
200900172		Finalized	NWP 42 Inclusion	Elk Grove Creek Pedestrian Overcrossing	Revised BO required 0.24 aquatic (GGS) habitat credits (33% NOT used, full amount instead), FWS apprv cons bank, loc uk.			0	0	0	0										0.24			UK					
200900199		Finalized	UNAUTHACT	SMUD power pole placement in Anatolia preserve	No Further Action. No data. File not on shelf, so unsure of actual impacts, if any. Ness does not know location of file.			0	0	0	0																			
200900291		Pending	NPR	Six County Aquatic Resources Inventory	X			0	0	0	0																			
200900369		Withdrawn	NWP 14	Grant Line Road/ Waterman Road Intersection Improvement	Withdrawn. Exists as 2006-01045.			0	0	0	0																			
200900477		Finalized	NWP 27	Cosumnes River Preserve Corral Ponds	Enhancement of exising wetland plus net increase of 0.8 wet				11.5													0.8			OUT					11.5 Enh Wet out UDA
200900511		Finalized	EIS	Sunridge Properties - Sunrise Douglas Litigation	X			0	0	0	0																			
200900576		Finalized	PREAPPCONS	North Vineyard Station Off-site Road improvements	File not on shelf. No electronic records.			0	0	0	0																			
200900731		Finalized	NWP 27	Rooney Dam Repair and Fish Passage Improvement Project	X			0	0	0	0			0.08																

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200900731		Finalized	NWP 3	Rooney Dam Repair and Fish Passage Improvement Project	0.06 perm imp (str) not loss. 0.26 temp imp str.			0.4				Y	0.06																	
200900880		Finalized	NWP 14	Zinfandel Drive Extension Project - WRDA Sac County	No JD. Waters are part of larger Mather proj, which is logged in 2002-00561.			0	0	0	0				0.052						0.025			OUT						
200900880		Finalized	NWP 14 Inclusion	Zinfandel Drive Extension Project - WRDA Sac County	NOTE: addendum to Corps Dec Doc showed reliance on FWS creation component to meet mit requirements. FWS preserv requirements were not tabulated into any mit ratio, nor was mentioned in verification, but were incuded in mitigation summary addendum. Additional mit reqd by FWS: 0.06 vp (wet) creation credits and 2.06 vp (wet) pres credits at FWS apprv Cons Bank.			0	0	0	0										0.06			OUT		2.06			OUT	
200900974		Finalized	NWP 33	Elk Grove Fiber Optic Cable Repair	0.003 temp imp wet				0.0124																					
200901345		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Site A-Elk Grove Creek)	0.005 temp imp str, and 0.005 perm imp (str) not a loss.			0.01				Y	0.005																	
200901430		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Sites B & F-Strawberry Creek)	0.04 temp imp str, and 0.04 perm imp (str) not a loss.			0.08				Y	0.04																	
200901435		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Site C-Whitehouse Creek)	0.025 temp imp (str) and 0.025 perm imp (str) not a loss.			0.05				Y	0.025																	
200901438		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Sites D and E-Laguna Creek)	0.155 temp imp str, and 0.155 perm imp (str) not a loss.			0.31				Y	0.155																	
200901599		Finalized	NWP 14	Schoeffler Road Improvement Project	X			0.012	0.012					0.012	0.012															
200901599		Finalized	UNAUTHACT	Schoeffler Road Improvement Project	After-the-fact permit initiated.			0	0	0	0																			
200901637		Finalized	UNAUTHACT	Laguna Creek Batch Plant	Closed. No Fill.			0	0	0	0																			
201000202		Finalized	NWP 12	Aerojet GET H Pipeline Extension	0.014 temp imp str.			0.023																						
201000268		Finalized	UNAUTHACT	Franzia Violation at Gill Ranch	Referred to EPA. JD is in 2004 00813. Massive site, should JD be included here? For now delineated taken from impacts. Delineation actually verified over 500 acres wous, so for data considerations/skewing, etc, we only included the impact as a conservative delineated figure.				0.05						0.05															
201000455		Finalized	NWP 14	Vineyard Road Bridge Replacement-WRDA Sacramento County	Addl 0.0014 acre (str) perm impact not loss from bridge piers.			0.13	0.0047			Y	0.0014	0.0102						0.05				IN					
201000491		Finalized	NWP 12	Sheldon Road & Highway 99 Overpass Gas Main Project	0.003 temp imp str			0.003																						
201000617		Finalized	NPR	Silverado Bank Lots 5 and 6	X			0	0	0	0																			
201000729		Finalized	NWP 29	Arbor Creek Affordable Housing	X				0.2896						0.2896						0.2896			OUT						
201000823		Finalized	NPR	Line 108 Pipeline Replacement Project - Phase 1	X			0	0	0	0																			
201000861		Finalized	NWP 14	Longleaf Drive Bridge	0.07 temp imp str. FWS reqd 0.63 GGS habitat (used 33.3%)			0.106						0.002							0.21			UK					
201000938		Finalized	NWP 12	X09 Communication Poles Replacement Project - WRDA Sac County	X			0.01	2						0.001															
201000961	RF	Withdrawn	SP	Mather Airport Layout Plan	Application not yet received. Still Pre-App phase (06/06/13)			0	0	0	0																			
201001133		Finalized	NWP 12	Line 108 Pipeline Replacement Project-Phase II	0.94 temp wet imps only.			1.173	1.462																					
201001462		Finalized	NWP 14	Twin Cities Road Interchange Project	Create 0.053 wet requirement was to be at both "FWS and Corps Approved" mit bank. 0.142 Preservation was only reqd by FWS. At "FWS approved Cons bank".			0.43	0.21						0.053						0.053			UK		0.142			UK	
201001462		Finalized	NWP 14 Inclusion	Twin Cities Road Interchange Project	This row for stream impacts/mit. Net gain in acreage.			0	0	0	0			0.25						0.352				IN					

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201001462		Finalized	NWP 14 Inclusion	Twin Cities Road Interchange Project	Addl 0.01 Create wet credits at "Corps Approved mit bank. Loc UK. Inclusion to reflect Corps only reqd mit.			0	0	0	0				0.01						0.01				UK						
201100033		Finalized	LOP	Grant Line Road Widening Project Phase 1, Additional Area	Impacts are affecting delineated waters on other delineated project sites. (2006-01045 + 2005-00525). Only delineation not included in those sites is logged here.			0.01	0.18					0.48	0.33						0.33				OUT						
201100033		Finalized	LOP Inclusion	Grant Line Road Widening Project Phase 1, Additional Area	X			0	0	0	0									0.96					IN						
201100034		Finalized	NWP 42	Laguna Creek Bike Trail Connector	0.02 temp imp str. AJD: In addition to delin values at right, another 0.015 drainage ditch (unregulated), and 0.120 isolated wetlands. FWS req 0.044 pres wet for indirect imps at FWS apprv MIT bank. FWS also req 1.86 GGS habitat at FWS apprv CONS bank. (33.3% used).	Y	0.135	0.588	0.022												0.619			UK		0.044			UK	
201100073		Finalized	PREAPPCONS	Arcade Creek Gas Line Relocation	Julie input data into ORM. Permit probably required for work, but there is no additional info in file. Not sure of current status.			0	0	0	0																				
201100197		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 1	No JD, 0.036 temp imp str			0.036																							
201100200		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 2	Reverification, same 0.007 temp imp str as previous permit.			0	0	0	0																				
201100200		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 2	No JD, 0.007 temp imp str			0.007																							
201100201		Finalized	NWP 3, 13	City of Elk Grove Routine Stormwater Maintenance Project - Sites 3 and 4	No JD, 0.355 temp imp str			0.355																							
201100202		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 5	No JD, 0.096 temp imp str			0.096																							
201100203		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 6	No JD, 0.002 temp imp str			0.002																							
201100276		Finalized	SP	White Rock Road Widening - WRDA Sacramento County	Corps req 0.096 pres wet at Bryte Ranch, but said that is an overlap with FWS required 2.661 pres vern habitat at Bryte. Only the 2.661 is recorded.			0.15	5.96					0.004	1.018											2.661			IN	
201100276		Finalized	SP Inclusion	White Rock Road Widening - WRDA Sacramento County	FWS req an addl 6.801 pres vern habitat at Service apprv CONS Bank.			0	0	0	0																	6.801			UK	
201100276		Finalized	SP PERMITMOD	White Rock Road Widening - WRDA Sacramento County	Modified location of Corps reqd mitigation from original SP - Two sites, both completely OUT of study area. Both sites are summed in creat wet field.			0	0	0	0										1.002			OUT STUDY AREA						
201100339		Finalized	NWP 14	Elk Grove Hazardous Waste Facility	Addl 0.01 perm imp stream, 0.01 temp imp str			0.02						0.01				0.01													
201100339		Finalized	NWP 14, 33	Elk Grove Hazardous Waste Facility	No JD, 0.004 Temp Imp str, 0.03 Perm imp str. AJD 0.97 ponded features determined not WOUS (unregulated)	Y	0.97	0.034						0.03																	
201100391		Finalized	NWP 7	SMUD East Campus - Operation Center Project	0.002 perm imp (str) not a loss. No JD			0.002				Y	0.002																	
201100585		Finalized	NWP 12	Digital 395 Barstow to Reno	Temp impacts only, no mitigation. Use delineated?? 10.433 delineated, unspec resource types. All 3 cats present. 0.541 temp imp. 191 permit actions removed for clarity. Multiple reverifications, increase in temp impacts, no other changes. Decision was to evenly split delineated acres through resource types.			3.478	3.478	3.478																					
201101017		Finalized	UNAUTHACT	Mohamed Violation	Resolved. Not a violation.			0	0	0	0																				
201101019		Finalized	NWP 7	Anatolia Overchute	0.01 perm imp (str) not a loss.			0.01				Y	0.01					0.01													
201200116	RF	Pending	UNAUTHACT	Clay Station Properties, LLC Violation	Data from Lisa G's best estimate.			2.7	12.5	3.3					4																

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201200195	RF	Pending	UNAUTHACT	Calosso Property Violation	Only PJD and impacts known.			5.984	16.017	22.566				0.093	9.573	0.625														
201200525		Finalized	NWP 12	Tracy-Hedge Optical Ground Wire (OPGW)	No JD, Overhead lines, no fill for all actions, 9 actions removed for clarity			0	0	0	0			0																
201200729		Finalized	NWP 6	Twin Cities Road Bridge Replacement Geotechnical Borings	Reverify work window			0	0	0	0																			
201200729		Finalized	NWP 6	Twin Cities Road Bridge Replacement Geotechnical Borings	No JD			0.00006						0.00006																
201200945		Finalized	NWP 14	Dwight Road Extension - WRDA Sacramento County	No mit required other than FWS GGS mit, so included on this line. (33.3% rule used).			1.28	2.29					0.07							0.82				UK					
201200969		Finalized	NWP 12	Jacobsen Water Development Project	No JD, Temp Imp 0.014 str			0.014																						

EIS/EIR APPENDIX A-4

Lower-Resolution Dataset;

Projects from Beginning of Records to 1998

DA NUMBER	PAST AND PRESENT OR REASONABLY FORESEEABLE	ACTION STATUS - FINALIZED PENDING OR WITHDRAWN	PERMIT OR ACTION TYPE	PROJECT NAME	RESEARCH NOTES	ISOLATED OR NON JURISDICTIONAL WATERS PRESENT (Y/N)	ISOLATED OR NON JURISDICTIONAL WATERS TOTAL ACRES	DELINEATED ACRES WOUS	PERMANENT IMPACT NOT A LOSS PRESENT (Y/N)	PERMANENT IMPACT NOT A LOSS TOTAL ACRES	LOSS ACRES WOUS	CREATION MITIGATION ACRES WOUS	PRESERVATION MITIGATION ACRES WOUS	SPECIFICS FOR MITIGATION NOT IN OTHER CATEGORIES	ALTERNATIVE IMPACT QUANTIFICATIONS
0		Finalized	SP	BORDEN RANCH (MISC)	See 1995-00428.			0			0	0	0		
190107036		Finalized	SP	R J SYSTEMS	Permit Expired, no work performed.			0			0	0	0		
190109312		Finalized	SP	MJ BROCK & SONS	Permit type is actually unknown, but judging from reqd creation, we are assuming it was an SP. 55,000cy fill.			11.7				2.6			55,000 cy fill
190109596		Finalized	SP	LAGUNA SOUTH CANAL/H.C. ELLIOT, INC.	Delineated taken from impact.			0.17			0.17	1			
190110021		Finalized	SP	ANATOLIA PHASES I - III				85.52			44.22	46.5	44		
190110079		Finalized	SP	DIXON, JIM				10.4			10.4	10.5			
190110119		Finalized	SP	NORTHEAST AREA - GALT PROJECT - SPINK				8.5			8.5	27.1			
190110156		Withdrawn	SP	SAC-YOLO MOSQUITO DIST.				0			0	0	0		
190110159		Finalized	SP	FALLBROOK	Delineated UK, used impact figure.			6.67			6.67	6.7			
191200302		Finalized	NWP	CHETCUTI, JEROME	No records.			0			0	0	0		
198800077		Finalized	NWP 26	QUAIL RANCH ESTATES - N26-262	Unable to locate records.			0			0	0	0		
198900050		Finalized	NWP 26	NEWTON SUBDIVISION	Delineated acres 1.05, no impact info found, but two NWP 26s. Mitigation UK. Should we consider all delineated impacted?			1.05			1.05				
198900074		Finalized	SP	TEICHERT ASPEN VI MINING PROJECT	Note: 65 acres of creation mitigation was required for this project and 1989-00076, but it appears only 25 acres is successful at this point. This is the figure that has been logged.			42.88			42.88	25			
198900076		Finalized	SP	GRANITE I MINING PROJECT	Mitigation acres are part of 1989-00074			16.16			16.16				
198900090		Finalized	SP	ELLIOTT RANCH	See 1998-00645. That project is a modification to this SP. Delineated acres are only recorded here. Addl 39.4 acre lake, probably considered non-jd, since it was not mentioned as a resource in permit. Include?	Y	39.4	93.2			66.2	113.04	24		
198900134		Finalized	NWP 26	POWERS HOUSE	Records Holding 0957928.			8.19			4.11	10.57	4.08		
198900179		Finalized	SP	FIRST BAPTIST CHURCH LAGUNA & WHITEHOUSE				2.662			0.59	0.59			
198900209		Finalized	NWP 26	LAGUNA CREEK RANCH UNIT 4				10.67			2.83	5.66	7.84		
198900230		Finalized	RGP	PRIVATE DOCK	Location incorrectly mapped. Actually in Sac River, mile 39.7, outside study area.			0			0	0	0		
198900253				CLAY STATION	No records. Maybe under a different number?			0			0	0	0		
198900284		Finalized	NWP	SHALAKO GOLF & COUNTRY CLUB	No Records except that it was a NWP (orm)			0			0	0	0		
199000001		Finalized	NWP 26	CALVINE MEADOWS PROJECT				2.4			0.89	2.2			
199000027		Finalized	NWP 26	N. FORK BADGER CREEK FILL	Only info is permitted for <1 acre. Delineated estimated from impact.			1			1				
199000126		Finalized	SP	CHURCHILL DOWNS				27.34			17.45	23.92	17.45		
199000152		Finalized	NWP 14	EAGLES NEST ROAD BRIDGE REPLACEMENT	See 1993-00152. Same project. Data is logged there.			0			0	0	0		
199000155		Finalized	SP	ELK GROVE BLVD EXTENSION	Delineated acres contained in 1989-00090. There are multiple permits associated with this project in ORM, though the record seems to indicate only one SP.			0			3	6			

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199000157		Finalized	NWP 26	ARTHUR C. BUTLER SCHOOL, CHURCHILL DOWNS				0.8665			0.8665	0	0		
199000211		Finalized	SP	KRAMER RANCH	See 1994-00017 (Newly Added NWP 26, no lat long in ORM). That project is on this site, so delineated is only included here.			25.61			7.83	13.42			
199000213		Finalized	NWP 26	CROCKER DEVELOPMENT, LEN HART CENTER				0.4591			0.4591	0	0		
199000244		Finalized	NWP 26	HACKARD-MULLANEY LAND INVESTMENTS	Same as Shadowbrook (1999-110, 2003-105). Delineation for all of these is included here only.			0.99			0.74	0.89	0		
199000244		Finalized	NWP 26 Inclusion	HACKARD-MULLANEY LAND INVESTMENTS	Row for addl off site mit.			0			0	0.4	0		
199000250		Finalized	SP	KIEFER LANDFILL EXPANSION				27.551			6.07	9.11	20.48		
199000294		Finalized	SP	STORAGE BUILDING	Only data is installation of 70 linear ft. bulkhead and 50 CY of fill. How to quantify? Unable to determine delineated from info.			0			0	0	0		70 linear ft. bulkhead and 50 cy of fill.
199000360		Finalized	NPR	SHELDON NORTH VILLAGE ONE				0			0	0	0		
199000393		Finalized	NWP 26	SHELDON PARK ESTATES	Appears was never processed, maybe wrapped into new #. Only record is that it did not qualify for NWPs, delineation requested.			0			0	0	0		
199000471		Finalized	NWP 12	COUNTRY CREEK ESTATES	X			1.9			0.58				
199000475		Finalized	NWP 26	FRANKLIN BOULEVARD WIDENING	Check inclusion. About half of project is IN study area, the other half right on the border. Impacts to Laguna Creek, which is crossed by project right at study area border. Limited info, delin taken from impacts.			0.7			0.7				
199000510		Finalized	NWP 26	ELK GROVE 82/SWEET PROPERTY	Addl 0.57 acre non-jd	Y	0.57	0.33			0.33				
199000531		Finalized	NWP 26	JACKSON GOLF SITE	Superseded by 199400119. all data is in that row.			0			0	0	0		
199000533		Withdrawn	SP	SHELDON NORTH II	ORM shows completed NWP and SP, though records show that this project was denied.			0			0	0	0		
199000579		Finalized	NWP 26	LA CHAUMIERE - GALT	Delineated taken from impact.			0.424			0.424				
199000590		Finalized	NPR	FISH FARM-GALT				0			0	0	0		
199000620		Finalized	NWP 26	CALVINE ROAD PROPERTY, NICHOLAS ESTATES				0.93			0.93	0	0		
199000780		Finalized	NWP 26	SHELDON PARK ESTATES, SACRAMENTO COUNTY				1.94			0.42		1.52		
199000787		Finalized	NWP 26	SILVER SPRINGS SUBDIVISION	Delineated taken from impact.			5.26			5.26	15.7			
199000818		Finalized	NWP 26	THE RANCH (FKA CLAY STATION 1200)	Appears only to be a permit for impacts, not NWP 27 or development of mit bank.			15.33			2.57		5.5		
199000923		Finalized	SP	SHELDON NORTH/SHELDON HIGHLANDS PROJECT				17.92			12.4	20.5	7.6		
199000925		Finalized	NWP 26	GORMAN PROPERTY, CHESTER DRIVE	Permit was for <1 acre, but impact unknown. Assumed delineated was all impacted.			0.28			0.28				
199000953		Finalized	NWP 26	PERRY RANCH MITIGATION SITE	Total created mit was 4.38, (1.83 was used by other projects). Needs to be grouped with DEVMIT/NWP 27 group.			2.4			1.49	2.55	0.91		

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199000969		Finalized	NWP 14	UNION PACIFIC RAILROAD BRIDGE 120.75	No Data in record. Nothing to log.			0			0	0	0		
199001001		Finalized	NWP 12	WAL-MART ELK GROVE OUTFALL STRUCTURES	No Data in record. Outfalls, so prob perm imp, not loss.			0	Y		0	0	0		
199001034		Finalized	NWP 26	ELLIOTT RANCH/I-5 INTERCHANGE				2.281			2.03	4.06			
199001042		Finalized	NWP 26	BLAWAT PROPERTY				21.6			3.36	4.57			
199001156		Finalized	NWP 26	ROBBINS MEADOWS I/MASHA/SACRAMENTO CO				0.28			0.28	0	0		
199001195		Finalized	NWP 26	WITT PROPERTY				0.99			0.99	0	0		
199001226		Finalized	PREAPPCONS	SHELDON FARMS-LAGUNA CREEK-SACRAMENTO CO	Delineation only.			0			0	0	0		
199001304		Finalized	NWP 26	JDS LAGUNA ESTATES				0.96			0.5				
199001307		Finalized	NWP 26	LAGUNA WEST VI	Delineated taken from impacts. SP in addition to NWP. May be a mistake, no records of SP in file.			1.5			1.5	2.25			
199001314		Finalized	NWP 26	MARENGO RANCH				6.13			2.13	10			
199001320		Finalized	NWP 26	SANTOS PROPERTY				2.84			0.084				
199001369		Finalized	NWP 14	DEER CREEK FILL - SLOUGHHOUSE - SACTO CO				0.024			0.024				
199100011		Finalized	NWP 26	BLM - SACRAMENTO COUNTY	Impact assumed - no data, permit for <1 acre fill			0.72			0.72				
199100013		Finalized	NWP 26	EXCELSIOR MEADOWS SUBDIVISION-SAC COUNTY				0.4			0.4				
199100041		Finalized	NWP 26	CONCRETE LINING ELDER CREEK-SAC COUNTY				0.8			0.8	0	0		
199100049		Finalized	NWP 26	ROBBINS MEADOWS II				0.98			0.98	0	0		
199100052		Finalized	NWP 26	QUAIL RANCH ESTATES	Impact assumed - no data, permit for <1 acre fill			0.8			0.8				
199100079		Finalized	NWP 3, 26	ELDER CREEK IMP.-ELK GROVE SCHOOL DIST.				0.56			0.56	0	0		
199100145		Finalized	NWP 26	MEADOWS SUBDIVISION, ROBBINS ROAD				0.003			0.003	0	0		
199100194		Finalized	NWP 12	WATER LINE BELOW LAGUNA CREEK- SAC CO.	Likely temp imp only, no change in bottom contours. No data in record.			0			0	0	0		
199100272		Finalized	NWP 26	SHELDON PASSAGE	Note: related to 1993-00197.			4.89			0.29	7.4			
199100281		Finalized	SP	SHELDON NORTH II				2.14			1.4	2.8			
199100315		Finalized	NWP 12	RANCHO MURIETA N12 - UNNAMED TRIBUTARY	Temp impact only, delineated from temp impact.			0.018			0	0	0		
199100337		Finalized	NWP 26	ELDER CREEK FILL-BTWN 99&STKN BLVD-SAC C				0.4936			0.4936	0	0		
199100387		Finalized	NWP 26	VINEYARD ESTATES				0.25			0.25				
199100495		Finalized	NPR	MOSQUITO ABATEMENT				0			0	0	0		
199100497		Finalized	NPR	BETTY BAPTISTA PARCEL				0			0	0	0		
199100605		Finalized	NWP 26	DI NAPOLI PROPERTY				2.15			0.96	0	0		
199100674		Finalized	NWP 26	PARKSIDE VILLAGE AT LAGUNA	Impacts and various permits difficult to decipher. Best try at values.			20.22			5.04	6.22			
199100761		Finalized	NWP 14	BRIDGE REPAIR	Roll 179 - Missing. Eileen says it was lost, not recoverable at this time..			0			0	0	0		
199100842		Finalized	NWP 12	GALT PLAZA OUTFALL - DRY CREEK	Impact and delineated area is estimated. Outfall would be 0.0018 perm impact not loss. Info scarce.			0.0018	Y	0.0018					
199100937		Finalized	NWP 26	JAMES PROPERTY/SACRAMENTO COUNTY	No record of actual impacts. All wous assumed impacted.			0.17			0.17				

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199101030		Finalized	NWP 26	STRAWBERRY CREEK REALIGNMENT AT CALVINE				0.66			0.66	0.66			
199101053		Finalized	NWP 26	STRAWBERRY CREEK REALIGNMENT EAST OF RR				10.38			6.36	5.99			
199101250		Finalized	NWP 26	STATE ROUTE 16 IMPROVEMENT - SAC CNTY	Delineated figure is from impacts.			0.12			0.12				
199200095		Finalized	NWP 26	ORCHARD-CALVINE PROPERTY/STRAWBERRY CR.				0.13			0.13	0	0		
199200152		Finalized	NWP 27	BEACH LAKE MITIGATION BANK	Possible impacts from an old NWP 12, 14, though no records listing figure. Nothing to log.			24.2							
199200171		Finalized	NWP 14	ROAD CROSSINGS-SKUNK CREEK-SACRAMENTO CO	Unable to determine any figures.			0			0	0	0		
199200196		Finalized	NWP 26	CHETCUTI/JACKSON ROAD/VIO/FILL: NW26-302				0.76			0.76	0	0		
199200525		Finalized	NWP 5	USGS ACOUSTIC VELOCITY METERS	5 locations, 3 in Sac River, 1 in Three Mile Slough, 1 in San Joaquin. Impacts so small as to be negligible			0			0	0	0		
199200544		Finalized	NWP 3	REPAIR BANK EROSION - RD 2110	628 linear feet revetment. 0.047 perm impact not loss. Partial OUT. 10 sites, 2 of which are in Mokolumne. Impacts calculated from one cy per linear ft, minus two of the 10 sites. Delineated is from impacts.			0.047	Y	0.047					
199200550		Finalized	SP	ELLIOTT RANCH SOUTH/LAGUNA STONELAKE DEV	Combination of SP and several modifications. A bit unclear as to actual figures, but these take into consideration actual acreage of constructed wetlands. Does not reflect any previously preserved acreage (some is associated with this site).			202.6			49	53.44	159.2		
199200663		Finalized	NWP 26	HWY 16, GRANTLINE TO RM, SACRAMENTO CO.				3.584			0.458				
199200760		Finalized	NWP 26, 12, 33	JAS PROPERTY, ELK GROVE AREA, SUGNET	Difficult to discern figures. Multiple NWPs, combined in this row. Potential preservation in addition to these figures, amount uk.			7.93			6.76	8.19			
199200775		Finalized	NWP 14	ELK GROVE - FLORIN ROAD WIDENING, SACTO	Perm impact not loss! 0.01 acre			0.01	Y	0.01	0	0	0		
199200817		Finalized	NPR	WINDSOR DOWNS PROPERTY				0			0	0	0		
199300078		Finalized	NWP 3	EMERGENCY BANK PROTECTION RD 2110	759 linear feet revetment. 0.071 perm impact not loss. Partial OUT. 23 sites, 5 of which are in Mokolumne. Impacts calculated from one cy per linear ft, minus five of the 23 sites. Delineated is from impacts.			0.071	Y	0.071					
199300139		Finalized	NPR	BRIDGE REPLACEMENT				0			0	0	0		

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199300152		Finalized	NWP 14	EAGLES NEST ROAD BRIDGE - LAGUNA CREEK	Same as 1990-00152 (newly added). Data is only logged here. Only data is 70 cy area impacted: 45 cy is perm excavation (imp not a loss?), 25 cy is backfilled (temp). Unable to determine delineated from info.			0	Y		0	0	0		
199300191		Finalized	NWP 3, 33	CALVINE ROAD BRIDGE REPLACEMENT, SAC CO	Temp impacts only.			0.013							
199300197		Finalized	NWP 12	SHELDON PASSAGE/WHITEHOUSE CR/UTILITY L	See 1991-00272. Additional work on Sheldon Passage Subdivision. Buried Utility lines, no perm impacts, no mit.			0			0	0	0		
199300239		Finalized	NPR	CARSON ENERGY SITE - NPR				0			0	0	0		
199300246		Finalized	NPR	ELDER CREEK WIDENING/FRENCH ROAD ESTATES				0			0	0	0		
199300283		Finalized	NWP 26	SMUD BIGHORN SUBSTATION -LAGUNA SPGS #3				0.007			0.007				
199300334		Finalized	NWP 14, 26	COSUMNES RIVER BLVD/CALVINE INTERCHANGE				2.24			2.24	2.24	0		
199300366		Finalized	NWP 26	RANCHO SECO/CALIFORNIA MUNI GOLF	Appears project not built, but mitigation was built. Delin 199.48 wous, (now within SMUD mit bank 2007-02104). Intended impacts 4.28 acres, intended mit 6.9 creation, actual creation was 3.4 acres. Did not log impacts and delineated acres in this case. Records Holding 0960602, 2 vols, 05 MIT box 1006897.							3.4			
199300367		Finalized	NWP 13	RD 2110, MCCORMACK-WILLIAMSON TRACT	498 linear feet revetment = 0.047 perm impact not loss. Partial OUT. 19 sites, 4 of which are in Mokolumne. Impacts calculated from one cy per linear ft, minus four of the 19 sites. Delineated is from impacts.			0.047	Y	0.047					
199300372		Finalized	NWP 26	SILVER SPRINGS SUBDIVISION	See 1999-00712, and 2005-00325. This project mandated Lot P (10.72 acres wetlands) be used as preserve site in perpetuity. However, Lot P was later proposed to be filled, and AKT 184 (2000-00780) used in it's place for mitigation, with an addl 10.72 acres created wetlands. The proposed fill of Lot P is still pending, so only foreseeable impacts should be used.			12.39			0.83	0.83			
199300379		Finalized	NWP 26	ARCADIAN VILLAGE II / SACRAMENTO COUNTY				0.83			0.83	0.83	0		
199300406		Finalized	NWP 26	JAEGER CORNER ENTERPRISES FKA SLAGLE	All data wrapped up into Montelena (2001-00448)			0			0	0	0		
199300440		Finalized	NWP 14, 33	ELK GROVE-FLORIN ROAD WIDENING,EG> BOND	Delineated is from impacts figure.			0.12			0.12	0.24			
199300450		Finalized	NWP 12	VINEYARD MEADOWS/UNIT 1/STRAWBERRY CREEK	Temp impacts only. Delineated from temp impacts figure.			0.49				0	0		
199300471		Finalized	NWP 12, 18	LAGUNA CREEK PIPE CROSSING SAC CO.	Temp impacts only.			0.0003			0				

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199300475		Finalized	NWP 26	PRICE CLUB/BEACON CREEK/STOCKTON BLVD				0.59			0.59	0	0		
199300605		Finalized	SP	BORDEN RANCH - SACRAMENTO COUNTY PORTION	See 1995-00428. All data is included there.			0			0	0	0		
199300610		Finalized	NWP 14	US 50/FOLSOM BLVD INTERCHANGE IMPROVEMEN				2.19			0.34	0.686	0		
199300651		Finalized	SP	VINEYARD POINTE				6.036			6.036	14.97	0		
199300658		Finalized	NWP 26	METHODIST RETAIL CENTER				0.4			0.26	0	0		
199300670		Finalized	SP	MATHER EAST	Records Holding 0960609. Impacts and mitigation were revised from figures listed in ORM.			3.64			0.61	0.61	0.32		
199400017		Finalized	NWP 7, 26	PARK MEADOWS	See 1990-00211. Delineated acres are included there. This project has different impacts, though on the same physical site. Record of actual mit is not clear, though it shows a property was to be donated to Stone Lakes, and that Stone Lakes was to construct compensatory wetlands. Conservative figure taken from impacts...			0			3.78	3.78			
199400102		Finalized	SP	GRANITE VINEYARD MINING				19.83			17.22	17.22			
199400119		Finalized	NWP 26	EAGLES NEST GOLF LINKS/SACRAMENTO CO/CA				5.15			0.78	3.45	0.9		
199400157		Finalized	SP	SLAGLE PROPERTY--SUNRISE DOUGLAS SPEC.PL	Records Holding 1023301. All data wrapped up into Montelena (2001-00448).			0			0	0	0		
199400158		Finalized	SP	LAUSEVIC PROPERTY--SUNRISE-DOUGLAS	Records Holding 1023301. All data wrapped up into Montelena (2001-00448).			0			0	0	0		
199400159		Finalized	SP	RINGEN PROPERTY--SUNRISE DOUGLAS	Records Holding 1023301. All data wrapped up into Montelena (2001-00448).			0			0	0	0		
199400210		Finalized	SP	Sunridge Specific Plan Properites EIS - ANATOLIA IV				1.36			1.36	1.36	2.72		
199400211		Finalized	SP	DAVIS PROPERTY---SUNRISE DOUGLAS AREA	Records Holding 1023302. All data wrapped up into Montelena (2001-00448).			0			0	0	0		
199400212		Finalized	SP	WHITE PROPERTY--SUNRISE DOUGLAS AREA	Records Holding 1023302. All data wrapped up into Montelena (2001-00448).			0			0	0	0		
199400218		Finalized	SP	NORTH DOUGLAS (FKA WEIDINGER AND MATZ)				6.15			6.15	6.15	7.64		
199400312		Finalized	PREAPPCONS	COLONY RANCH ESTATES	Delineation and preapp only. Applicant decided to avoid wetlands.			0			0	0	0		
199400314		Finalized	NWP 26	LAGUNA VINEYARDS/SACRAMENTO CO/GIBSON				0.35			0.35				
199400316		Finalized	NWP 26	NEW DAWN II				0.1996			0.1996				
199400365		Finalized	SP	Sunridge Specific Plan Properties EIS - GRANTLINE 208				11.12			5.67	6.15	12.3		
199400383		Finalized	NWP 26	VINTAGE PARK EAST #4				0.43			0.42	0	0		

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199400504		Finalized	SP	TEICHERT - ASPEN IV SOUTH	Aspen IV and Aspen V (1994-00693) are related and should be looked at as a group. All figures together reflect permit modification that combines them.			3.81			1.35	5.292	2.51		
199400529		Finalized	SP	NORTH DOUGLAS (FKA CUPP PROPERTY)	Available info poor. This is the best of available info. Mitigation unknown, Flagged because of large impact with uk mit. Assumtion of Corps reqd 1:1 creat mit made.			3.47			3.335	3.335			
199400572		Finalized	NWP 23	MCKENZIE ROAD BRIDGE REPLACEMENT	Temp impacts to 0.03 acre. Perm impact not loss 0.023 acre, from dredging. Net increase of 0.023 acre. Net zero.			0.03	Y	0.023					
199400693		Finalized	SP	ASPEN V SOUTH AGGREGATE - SACRAMENTO CO.	Aspen V and Aspen IV (1994-00504) are related and should be looked at as a group. All figures together reflect permit modification that combines them.			8.47			3.42	0.864	1.03		
199400771		Finalized	NWP 12	SACRAMENTO COUNTY LANDFILL	RH 1023310 (2 vols). Outfall structure, delineated waters likely included in 1990-00250. No recorded impact/mit. No useful info in electronic record.			0			0	0	0		
199400891		Finalized	NWP 14, 33	LEE SCHOOL CROSS ROADS BRIDGE PASTURE CK	Project was never actually built, though it was permitted.			0			0	0	0		
199401002		Finalized	NWP 26	BISHOP OF CALIFORNIA JAS ELK GROVE				0.8			0.8				
199401097		Finalized	NWP 14, 33	BRUCEVILLE RD, LAGUNA CRK	payment of $9800 into FWS GGS fund stipulated in permit.. Delineated taken from impacts.			0.28			0.28				
199500043		Finalized	NWP 26	ROBBINS MEADOWS II				0.8			0.8	0.8			
199500044		Finalized	NWP 26	ROBBINS MEADOWS I				1.74			1.74	1.97			
199500100		Finalized	NWP 3	UNION PACIFIC BRIDGE REPLACE COSUMNES R.	Temp impacts only, 0.6 acre.			1.78							
199500113		Finalized	NWP 26	SOUTHGATE MUNICIPAL GOLF COURSE				1.21			1.21	1.573			
199500115		Finalized	NWP 14, 33	LAMBERT ROAD BRIDGE REPLACEMENT	Permit specified that $2100 be placed in Stone Lakes Wildlife Fund, to be used for GGS mit. How to quantify? Include at all? Records Holding 1023357			0.1			0.6			$2100 placed in Stone Lakes Wildlife Fund for GGS habitat creation.	
199500293		Finalized	NWP 26	FAA MATHER AFB				0.16			0.16	0	0		
199500313		Finalized	SP	LOWER LAGUNA CREEK, SAC CO FLOOD PROJECT				83.99			12.39	23.75	71.6		
199500386		Pending	DEVRPSS	SOUTH SACRAMENTO COUNTY HCP				0			0	0	0		
199500428		Finalized	SP	BORDEN RANCH VINEYARDS, SECTIONS 4,7,8,9	See 1993-00605. These are related projects. All data for both is logged in this row. These projects compose only the Sac County portion of Borden Ranch. (Within study area). EXTREMELY convoluted record. Data is best interpretation. An additional NWP 26 project with an uk #, authorized in 1994 is included in these figures. This may actually be 1993-00605.			53.1			49.1	8.03	85.75		
199500450		Finalized	PREAPPCONS	COUNTRY CLUB ESTATES, SACRAMENTO COUNTY	Pre-app only, no records.			0			0	0	0		

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199500512		Finalized	SP	LAGUNA WEST, NORTH PRESERVE, CV	There is mitigation, not specified in record… Assumption Corps reqd 1:1 creation.			2.4			2.4	2.4			
199500603		Finalized	NPR	WILLOW SLOUGH BOARDWALK, CONSUMNES RIVER	Never built under original NWP 14. New design had no impacts.			0			0	0	0		
199500605		Finalized	SP	LAGUNA ESTATES (AKA VALLEY HI)				5.71			5.71	5.71			
199500694		Finalized	NWP 3	MCCORMACK-WILLIAMSON TRACT	945 linear feet rip rap. No other info. Perm impact not a loss? Unable to determine delineated from info.			0	Y		0	0	0		945 linear feet rip rap in (str).
199600171		Finalized	NWP 26	KWOK PROPERTY GALT INDUSTRIAL PARK	Records Holding 1023371			3.7			2.3	2.3			
199600231		Finalized	NPR	SMUD, LAGUNA WEST SUBSTATION				0			0	0	0		
199600291		Finalized	DEVMBA	CLAY STATION MITIGATION BANK				8.78							
199600320		Finalized	PREAPPCONS	TRAXLER/WAEGELL RANCH MITIGATION AREA	No records. Pre-app only.			0			0	0	0		
199600389		Finalized	NWP 26	BIG TRIANGLE PROPERTY, ROSSINI FARMS	See 1997-00151			0			0	0	0		
199600392		Finalized	NWP 26	MOUNTAIN TOP PROPERTY, SILVA-ROSSINI FRM	See 1997-00151			0			0	0	0		
199600485		Finalized	NWP 12	MATHER FIELD WEST ROADWAY PROJECT	65 cy for outfalls and associated fill, is only info. Unable to determine delineated from info.			0			0	0	0		65 cy outfalls/fill (resource type assumed str).
199600527		Finalized	NWP 3	RECLAMATION DISTRICT 2110 BANK PROTECTN	925 linear feet fill and rock revetment is only info. Permanent impact not a loss. Unable to determine delineated from info.			0	Y		0	0	0		925 linear feet fill/revetment (str)
199600546		Finalized	NWP 26	TWIN CITIES PROPERTY, ROSSINI FARMS	See 1997-00151. Records Holding 1023377			0			0	0	0		
199600547		Finalized	NWP 26	LAGUNA CREEK PROPERTY, ROSSINI FARMS	See 1997-00151. Records Holding 1023377			0			0	0	0		
199600573		Finalized	ATF	COSUMNES RIVER FILL	Impossible to quantify. 800cy fill plus addl 997 tons rip-rap. Unable to determine delineated figure from info.			0			0	0	0		800 cy fill and 997 tons rip-rap (str)
199600588		Finalized	NWP 12	MORRISON CREEK PIPELINE CROSSING, SRCSD	0.49 temp impacts only. Delineated figure from temp impacts.			0.49							
199700006		Finalized	SP	Sunridge Specific Plan - Douglas Road 103				4.71			1.98	7.25	8.62		
199700009		Finalized	RGP	RECLAMATION DISTRICT 2110 LEVEE REPAIRS	Records Holding 1023380. Partial OUT. Mokolumne, Dead Horse Cut, and Lost Slough. Mostly dredging, no info in file except 50,000 cu ft dredge material. No breakdown for locations. Unable to determine delineated figure from available info.			0	Y		0	0	0		1852 cy dredge from (str)
199700100		Finalized	NWP 26	CARILLION BOULEVARD EXTENSION, GALT	Records Holding 1023383			0.036			0.036				
199700144		Finalized	NWP 26, 33	DWIGHT ROAD EXTENSION				1.74			1.74				

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199700151		Finalized	NWP 26	L.V. ISLAND PRESERVE, ROSSINI, SACTO. CO	This project (1997-00151), 1996-00547, 1996-00546, 1996-00392, 1996-00389 impacts and mitigation are all compiled on this row, as part of the Laguna Creek Partnership Project. Individual delineated wous not available, so delineated figure is combined impacts and preservation. 1997-00151 is Records Holding 494071686.			97.04			29.43	26.09	67.61		
199700189		Finalized	NWP 3	WALNUT GROVE MARINA-FLOOD DAMAGE REPAIR	Inclusion subject to final boundary. Decided IN. Permit was for rebuilding to pre 1997 flood conditions (already permitted, legacy).			0			0	0	0		
199700289		Finalized	NWP 14	MATHER FIELD EAST ROADWAY PROJECT	Not enough info to determine delin or impacts. No mit. Record Holding 1023421. No additional info.			0			0	0	0		
199700314		Finalized	SP	STONE LAKES - DREDGE S-P CUT	Dredge 6000 linear feet of channel. (Perm imp not loss), Unable to determine delineation figure from this.			0	Y		0	0	0		Dredge 6000 linear feet (str)
199700441		Finalized	LOP	CITIZENS COMMUNICATIONS/LOST SLOUGH LINE	Lateral boring, no impact.			0			0	0	0		
199700565		Finalized	NWP 14	ALTA MESA, DRY CREEK, BRIDGE REPLACEMENT	No recorded impacts or mitigation. Record Holding 1023428			0			0	0	0		
199700650		Finalized	NWP 26	MATHER SPECIFIC PLAN AND HOUSING AREA	impacts 0.155. NOTE: Delineated acres are included in 2000-00006. Do not include any delineated figures here.			0			0.155	0.155			
199700678		Finalized	NWP 3	LAGUNA CREEK MITIGATION BANK, SACRAMENTO	0.007 perm imp not a loss. Needs to be reviewed with NWP 27/DEVMBA? No record in ORM of creation, only NWP 3 action.			5.87	Y	0.007					
199700708	RF	Pending	NWP 12, 43	Upper Laguna Creek Drainage Improvement and Trail System - WRDA Sac County	Outfall perm impacts not loss 0.10 acre			24.908	Y	0.1	0.095	0.095			
199700793		Finalized	PREAPPCONS	PEERY ARRILLAGA SUNRISE-DOUGLAS PROPERTY	Same as 2004-00707			0			0	0	0		
199800104		Pending	COMPCERT	ARROYO SECO MITIGATION BANK SITE, SACTO	No permit action, but is a known bank used for mit by other projects. Should probably be grouped with DEVMBA and/or NWP 27. JD only, 37.23 acres WOUS.			0			0				
199800148		Finalized	UNAUTHACT	KRAFT SEAWALL, TULLOCH	No impact			0			0	0	0		
199800155		Finalized	NWP 12, 14	KIEFER LANDFILL EXTRACTION/DUTRA PROPERY				0			0	0	0		
199800187		Finalized	LOP	LAGUNA CREEK PARTNERSHIP/FLOOD CNTL/SAC	CatX debris removal (800 cy from str). Impact placed in Other Mitigation. Unable to determine a delineation figure from this.			0	Y		0	0	0		Removal 800 cy from (str)
199800272		Finalized	NWP 14	AMTRAK/LIGHT RAIL EXPANSION TO FOLSOM	Review inclusion - rail, generally following hwy 50 from downtown Sac to Folsom.			0.376			0.376	0.38			

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199800288		Finalized	NWP 26	HARDESTER PARK - SOUTHGATE REC & PARK				0.103			0.103				
199800325		Finalized	SP	SLEEPY HOLLOW (FKA CALVINE MEADOWS)	Preservation acreage not entirely clear.			2.52			0.77	0.77	1.1		
199800330		Finalized	NWP 26	SHELDON PACIFIC PHASE I	Impacts an additional 0.01 acre wet on an adjacent site (whitehouse creek)			0.94			0.95	1.25			
199800350		Finalized	NWP 26	DIERKS RANCH/COUNTRY CLUB ESTATES/SAC CO				2.65			2.65	2.65	8.85		
199800424		Finalized	NWP 26	CALVINE/ELK GROVE-FLORIN COMMERCIAL				1.3			1.3	1.229			
199800451		Finalized	NWP 26	SIERRA HEALTH FOUNDATION COUNTRY ESTATES	Delineated UK, used impact figure.			0.06			0.06	0.06	0		
199800475		Finalized	PREAPPCONS	STATE ROUTE 16 REALIGNMENT	JD Only 0.37 acre WOUS			0			0	0	0		
199800485		Finalized	NWP 13	STONE LAKES/LEWIS RANCH PARCEL/RIPRAP	700 linear feet impacts. Assuming 1 cy per linear ft, surface area 5.197 x 700= 3638 sq feet. 0.084 acre perm impact not a loss.			0.084	Y	0.084	0	0	0		
199800504		Finalized	NWP 15	DELTA CROSS CHANNEL BRIDGE SEISMIC/RETRO				0			0	0	0		
199800566		Finalized	NWP 26	SHELDON PACIFIC PHASE II	Mitigate 0.21 create seasonal wet, OR mitigate in accordance with FWS (if 0.21 impacted is determined to be VP sp habitat). Decision was made to use what was known, so preservation component was not used.			4.69			0.21	0.21			
199800645		Finalized	SP PERMITMOD	ELLIOTT RANCH	See 1989-00090. This action is a mod to that SP. Delineation recorded in 1989-00090.			0			19.8	22			
199800653		Finalized	NWP 26	GALT INDUSTRIAL PARK: AVILA PROJECT				1.4			1.4	1.4			
199800681		Finalized	NWP 26	WEST VINEYARD STATION				0.06			0.06				
199800683		Finalized	SP	TRIANGLE ROCK PRODUCTS AGGREGATE MINE				7.6			4.03	11.34	10.26		
199800684		Finalized	NWP 26	ROBBINS VILLAGE				0.06			0.002				
199800696		Finalized	NWP 26	SHELDON PARK (PREVIOUSLY SHELDON 40)				1.47			1.47	0	0		
199900060		Finalized	LOP	FRANKLIN BLVD/THORNTON RD BRIDGE REPLACE	Approx half of project is in study area. Affects wetlands. Mokolumne, south side of study area. 0.74 "riparian habitat" credits and 1.38 shallow water hab credits for splittail both OUT STUDY AREA.			3.5			0.56	0	0	0.74 "riparian habitat" credits and 1.38 "shallow water habitat" credits for splittail both OUT STUDY AREA	
199900069		Finalized	NWP 26	REMINGTON ESTATES	Records Holding 1037120. There is a BO.			0.88			0.88	0.75	0		
199900069		Finalized	NWP 26 Inclusion	REMINGTON ESTATES	Row for FWS reqd mit			0			0	0.13	0.26		
199900110		Finalized	NWP 26	SHADOWBROOK SUBDIVISION	See 199000244. This is the same project, delineated acres are included in 199000244, not here. FWS mitigation was the only mitigation. All contents of this file have been transferred to 200700602.			0			0.257	0.257	0.514		
199900110		Finalized	NWP 26 Inclusion	SHADOWBROOK SUBDIVISION	Row for GGS amendment (33% used). Fund.			0			0	0	0	0.09 (Create wet) GGS FUND	

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199900118		Finalized	NWP 26	HARRIS RANCH	This project is the same as 1999-00312. Data is recorded here, but 99-00312 is likely the current file number (all it contains is a modification). There is an indication that applicant wanted to put remainder of wetland on-site into a preserve, but there is no record of vehicle to do so, therefore no on-site preservation was recorded here. Records Holding 1037122			13.33			0.96	0.63	0		
199900118		Finalized	NWP 26 Inclusion	HARRIS RANCH	Row for FWS reqd mit			0			0	0.33	1.82		
199900195		Finalized	PREAPPCONS	COSUMNES CORRECTIONAL FACILITY FENCE	No action in record.			0			0	0	0		
199900200		Finalized	NWP 14	MATHER SANITARY SEWER SYSTEM REHAB	No physical records. Sec 7 consult was initiated, for 0.06 permanent and 4.6 indirect, to (wet). No response or further info in record. Conservative estimate of FWS reqd mit was logged, but is actually uk.			4.66			0.06	0	0		
199900200		Finalized	NWP 14 Inclusion	MATHER SANITARY SEWER SYSTEM REHAB	Row for assumed 1:1, 2:1 FWS reqd mit.			0			0	0.06	0.12		
199900212		Finalized	NWP 12	LAGUNA CREEK WATERLINE CROSSING - AKT	Temp impacts only.			0.3			0	0	0		
199900299		Finalized	SP	GRANT LINE ROAD/SR 99 INTERCHANGE IMPROV	See 200701064. Impact and delineation info is confusing. Best estimates made from conflicting sources.			1.62			1.4242	2.63	0		
199900299		Finalized	SP Inclusion	GRANT LINE ROAD/SR 99 INTERCHANGE IMPROV	Row for FWS reqd mit.			0			0	0.89	1.78		
199900299		Finalized	SP PERMITMOD	GRANT LINE ROAD/SR 99 INTERCHANGE IMPROV	Delineated a combo of temp and permanent impacts.			0.046			0.033	0.04	0		
199900312		Finalized	NWP 26	HARRIS RANCH	Same project as 1999-00118. Data is recorded there, though this number is likely the current file number. Records Holding 1037128			0			0	0	0		
199900412		Finalized	NWP 26, 7	BOND ROAD FAMILY FITNESS CENTER OUTFALL	Records Holding 1037130. FWS mit is only mit. 0.04 perm imp (wet) not a loss.			0.04	Y	0.04	0	0.01	0.02		
199900412		Finalized	NWP 26, 7 Inclusion	BOND ROAD FAMILY FITNESS CENTER OUTFALL	Row for GGS mit (33.3% used), but was to be paid into PRES fund.			0			0	0	0	0.03 (Preserve Wet) paid into GGS FUND	
199900436		Finalized	NWP 7	LIVE OAK NORTH DRAINAGE IMPROVEMENT	Records Holding 1037132			0.94			0.94	1.01	0		
199900437		Finalized	NWP 26	SUMMERGATE PROPERTY NWP 26 REQUEST	Records Holding 1037132. FWS mit was only mit.			0.31			0.31	0.31	0.62		
199900439		Finalized	NWP 26	OAK BROOK APARTMENT COMPLEX-SPANOS,FOLSO	Delineation is estimated, from impacts.			0.02			0.02	0	0		
199900449		Finalized	UNAUTHACT	HOBDAY ROAD AND WOODS ROAD HOUSE CONSTRU	No Further action. Records Holding 1037132			4.242			0.112	0	0		
199900459		Finalized	NWP 26	RIO CONSUMES CORRECTIONAL PERIMETER	Records Holding 1037133. FWS mit was only mit reqd.			0.72			0.26	0.046	0.092		
199900501		Finalized	NPR	RANCHO SECO PHOTOVOLTAIC EXPANSION	X			0			0	0	0		

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199900516		Finalized	SP	ELK GROVE CREEK DRAINAGE	File on shelf.			7.23			0.854	1	3.07		
199900516		Finalized	SP Inclusion	ELK GROVE CREEK DRAINAGE	Row for FWS reqd mit, for SP.			0			0	0.044	0.202		
199900534		Finalized	NWP 26	SHELDON POINTE, UNIT #2 - SACRAMENTO CO	X			0.18			0.18	0	0		
199900590		Finalized	SP	Rio Del Oro - EIS	Addl 12.224 wet, and 0.721 other, isolated. All filled.	Y	12.945	56.632			27.9	13.288	76.15	2.98 (wet) enhance IN	
199900590		Finalized	SP Inclusion	Rio Del Oro - EIS	Row for addl Corps Reqd mit.			0			0	13	0		
199900618		Finalized	NWP 7	SHADOWBROOK OUTFALL, SACRAMENTO CO	Records Holding 1037169. No info in electronic files. Outfall considered 0.002 perm impact (str), not a loss.			0.002	Y	0.002	0	0	0		
199900653		Finalized	SP	FRANKLIN MEADOWS PROPERTY	Records Holding 1037170.			1.07			1.07	1.04	0		
199900653		Finalized	SP Inclusion	FRANKLIN MEADOWS PROPERTY	Row for FWS reqd mit.			0			0	0.03	0.06		
199900712		Finalized	SP	SILVER SPRINGS EAST (LOT P)	This project appears completed in ORM, but I believe was actually denied (confusion here). 2005-00325 is the "new" version of this file, but all actions currently withdrawn. Check to make sure no data is double counted between these two. Also, 2000-00780 is the mitigation property on which the creation mit would be performed for Lot P. There were previously existing wetlands onsite - check if these should be included as pres mit, and that they are not double counted.			10.78			10.78	10.78	20		
200000006		Finalized	NWP 26	MATHER AIRPORT CARGO EXPANSION	Records Holding 1037174. KATE SAID IGNORE. FWS mit was only mit. Note, delineated acreage includes all of 1997-00650. DO NOT put delineated acres in 1997-650.			1.73			1.01	1.01	2.1		
200000025		Finalized	SP	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	See 2003--00550. JD record unclear. Record extremely convoluted. Best available info. Non jurisdictional acreage AT LEAST 0.91 acres (wet). Portions of the delineated and impact figures may be outside SSHCP boundary, but isolating those figures is too difficult.	Y	0.91	84.184			13.655	9.815	0		
200000025		Finalized	SP Inclusion	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	Row for addl. Corps mit.			0			0	0.972	0		
200000025		Finalized	SP Inclusion	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	Row for addl. FWS mit.			0			0	2.75	0		
200000025		Finalized	SP Inclusion	EBMUD/SACRAMENTO COUNTY FREEPORT WATER	Row for addl. Corps mit.			0			0	11.2435	0		
200000055		Finalized	UNAUTHACT	KOSCHNER PROPERTY	No significant discharge. Closed.			0			0	0	0		
200000085		Finalized	NWP 14, 3	UNION PACIFIC RAILROAD GALT TO NEED	Records Holding 1037177. Only mitigation was FWS mit.			2.07			1.472	1.72	3.44		
200000085		Finalized	NWP 14, 3 Inclusion	UNION PACIFIC RAILROAD GALT TO NEED	Row for GGS mit (30% used)			0			0	0.51	0		

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200000147		Finalized	NWP 26	BEAZER-MCGEE PROPERTY	Data is estimated based on applicant proposal. BO unavailable. Corps did not require mit in addition to FWS requirements.			0.067			0.067	0.067	0.134		
200000163		Finalized	NWP 14	FOLSOM BLVD. WIDENING	Records Holding 1037179			0.094			0.035	0.06	0		
200000163		Finalized	NWP 14 Inclusion	FOLSOM BLVD. WIDENING	Row for acreage increase via culvert construction.			0			0	0.009	0		
200000203		Finalized	LOP	SHELDON ESTATES PROJECT	File Loc UK, no regulator assigned. A BO exists, but no copy available., Reqmts UK. Logged data from best available info. Conservative estimate of 1:1, 2:1 FWS reqd mit used.			1.308			0.576	0	0.732		
200000203		Finalized	LOP Inclusion	SHELDON ESTATES PROJECT	Row for FWS reqd mit. Conservative estimate of 1:1, 2:1 FWS reqd mit used.			0			0	0.576	1.152		
200000227		Finalized	NWP 39	SADDLE CREEK AND PRINGLE AVENUE	File Loc UK, no regulator assigned. There is a BO, reqmts UK. Logged data from best available info.			0.47			0.47	0.47	0		
200000232		Finalized	NWP 14	KNUTSON ROAD	Records Holding 1037193.			0.095			0.095	0.095	0.19		
200000244		Finalized	UNAUTHACT	ABEID PROPERTY	Vountary Restoration. Temp impact only. Records Holding 1037194. Delineated acres estimated from temp impact.			0.01			0	0.01	0		
200000251		Finalized	PREAPPCONS	SUNRIDGE 530 (fka SUNRIDGE VILLAGE & PEERY-ARRILLAGA)	Same as 2004-00707. FRC box 077-2013-0772_6_of_10. Confusing because one SP was supposedly complete, yet everything else including all 2004-00707 have been withdrawn.			0			0	0	0		
200000260				STRAWBERRY CREEK REALIGNMENT AT CALVINE	DA Number not found, File Loc UK.			0			0	0	0		
200000298		Finalized	NWP 27	CONSUMNES RIVER SALMONID BARRIER PROJECT	FRC box 077-2013-0772_7_of_10. Temp impacts only. No mit in record. Unable to determine delineated area (no figure for temp impacts. Zeroed, as data unavailable.			0			0	0	0		
200000332		Finalized	PREAPPCONS	WAEGELL FAMILY RANCH - TRAXLER'S HILL	X			0			0	0	0		
200000403		Finalized	NWP 3, 33	LAGUNA CREEK PIPELINE	Records Holding 1037198. Appears all impacts temporary, no special conditions.			0.03			0	0	0		
200000414	RF	Withdrawn	SP	Suncreek EIS - Sierra Sunrise	Part of Big Five.JD and project info available. Data for all Suncreek is only logged in 2008-00795 (reviewed as a group), except for 2006-00604. Because projects are within Mather core recovery area and must comply with the Sunridge ROD, creation mit was assumed 1:1 out of UDA. Preservation figures come from PN for these projects, (applicant suggested on-site preserves).			0			0	0	0		

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200000426		Finalized	NWP 13	MAHON LEVEE STABILIZATION	Records Holding 1037199. Str impacts only, 225 linear feet rip-rap is only info. 0.0268 perm impact (str) considered not a loss. Reveg is only mitigation. Delineated figure 225 x 160 (channel width), converted to acres. Impacts figure comes from assumed 1 cy per linear foot (1x5.197x5.197), so surface area is 5.197x225= 1169 sq ft.			0.83	Y	0.0268	0	0	0		
200000445		Finalized	NWP 39	KAPALUA ESTATES	On-site str acres is net increase via widened channel. Newly widened channel is preserved also, total of 2.56 acres.			1.2			0.22	1.58	0.98		
200000445		Finalized	NWP 39 Inclusion	KAPALUA ESTATES	Row for Corps reqd off site mit.			0			0	0.47	0		
200000470	RF	Pending	DEVMBA	NICOLAUS RANCH-W.FLINT MITIGATION AREA	Addl 1.6 acre pond, and 0.04 acre ditch non-jurisdictional. Creation acres are still proposed at time of this recording.	Y	1.64	1.93			0	36.75	0		
200000501		Finalized	NWP 3, 33	COSUMNES RIVER PIPELINE	Records Holding 1037202. Temp impacts only, to 200 linear feet of (str). Multiplied by channel width at location (85ft) to get rough acreage.			0.39			0	0	0		
200000523		Finalized	PREAPPCONS	SUNRISE COMMUNITY PLAN/WETLANDS PRESERVE	No Records			0			0	0	0		
200000634		Finalized	NWP 23	HWY. 16 GAP CLOSURE PROJECT	In study area. Records Holding 1037205.			0.378			0.102	0.18	0		
200000635		Finalized	SP	WRIGHT PARK (FKA TRIBUTARY POINTE)	Creation component likely satisfied both FWS and Corps reqs (VP creation).			1.49			0.42	0.42	1.07		
200000635		Finalized	SP Inclusion	WRIGHT PARK (FKA TRIBUTARY POINTE)	Row for FWS reqd mit.			0			0	0	3.22		
200000636		Finalized	NWP 39, 7	ELK GROVE UNIFIED SCHOOL DISTRICT/ALBIAN	Unclear how much of onsite preserve is what resource type. It is known that there are wet and str features in preserve, so total acres resources were divided by 2.			0.6			0.09	0	0.32		
200000636		Finalized	NWP 39, 7 Inclusion	ELK GROVE UNIFIED SCHOOL DISTRICT/ALBIAN	Row for FWS reqd mit.			0			0	0.08	0	0.16 (Preserve Wet) via CNLM Fund.	
200000644		Finalized	NWP 39	KYLE'S READY MIX	FWS mit requirements only.			0.4			0.06	0.112	1.264		
200100007		Finalized	SP	BRADSHAW 6 INTERCEPTOR	Only 2.13 temp impacts (Corps), but significant habitat impacts and mit (FWS). 0.4 (wet) Corps creation mit was covered by FWS mit.			7.62			0	0	0	0.473 enhanc (str) in Morrison Creek Watershed (in/out?)	
200100007		Finalized	SP Inclusion	BRADSHAW 6 INTERCEPTOR	Row for FWS reqd mit.			0			0	3.012	9.405		
200100007		Finalized	SP Inclusion	BRADSHAW 6 INTERCEPTOR	Row for FWS reqd GGS habitat. (33.3% used)			0			0	5.34	0		
200100008		Finalized	UNAUTHACT	SILVA PROPERTY	Likely a violation that needs investigation. However, this action has been "temporarily closed due to no time or resources". 5 year limit has passed. Zeros logged, as there is no info to record.			0			0	0	0		

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200100012		Finalized	NWP 3	FLORES DAM REPAIR	File loc UK. Dam repair. For retention of fill, originally Unauth. Figures come from best available data.			0.16			0.16	0.16	0		
200100041		Finalized	LOP	COSUMNES PRESERVE PARKING LOT & TRAIL	File Loc UK. There was compensatory mitigation, though unclear how much. Assumption made of 1:1 creation on Cosumnes Preserve lands. Potential FWS mit (if any) was not considered.			4.503			1.8	1.8	0		
200100046		Finalized	NPR	MEISS ROAD BRIDGE REMOVAL	X			0			0	0	0		
200100048		Finalized	NWP 39, 7	PARKLAND/BUSTED FLAT RANCH-SACRAMENTO CO	Records Holding 1037210.			0.242			0.242	0.23	0	0.39 Riparian habitat OUT. Riparian habitat (not aquatic resource) was in lieu of buffers.	
200100048		Finalized	NWP 39, 7 Inclusion	PARKLAND/BUSTED FLAT RANCH-SACRAMENTO CO	Row for FWS reqd mit.			0			0	0.01	0.02		
200100062		Finalized	SP	POWELL PROPERTY / ROBBINS VILLAGE UNIT 4	File loc UK.			1.504			1.504	1.024	0		
200100062		Finalized	SP Inclusion	POWELL PROPERTY / ROBBINS VILLAGE UNIT 4	Row for FWS and Corps Reqd mit.			0			0	0.004	0.008		
200100101		Finalized	SP	SUNRISE DOUGLAS 2 MASTER FILE	Appears this file is just a JD, impacts probably in other projects.			0			0	0	0		
200100114		Finalized	SP	ZINFANDEL VILLAGES-SACRAMENTO CO	File loc UK.			2.03			1.5	0.09	0.82		
200100114		Finalized	SP Inclusion	ZINFANDEL VILLAGES-SACRAMENTO CO	Row for Corps reqd mit.			0			0	0.45	0		
200100114		Finalized	SP Inclusion	ZINFANDEL VILLAGES-SACRAMENTO CO	Row for Corps and FWS reqd mit.			0			0	4.84	1.21		
200100134		Finalized	NPR	EAST FRANKLIN SPECIFIC PLAN-SACRAMENTO	X			0			0	0	0		
200100151		Finalized	NWP 39, 13	TAMARINDO SUBDIVISION	Records Holding 1037249.			1.967			0.131	0	0	0.748 riparian habitat OUT of STUDY AREA. Riparian habitat (not a wet resource) was in lieu of buffers.	
200100151		Finalized	NWP 39, 13 Inclusion	TAMARINDO SUBDIVISION	Row for FWS reqd mit.			0			0	0.137	0.274		
200100154		Finalized	SP	TRIBUTARY POINT VILLAGE 4B, ROAD X'ING	RH 1037249. Delineated figure from impacts, since no other info is available.			0.07			0.07	0.07	0		
200100177		Finalized	NWP 14	FOLSOM SRA-GRANITE BAY RECREATIONAL	File loc UK, Will? Electronic record sparse.			0.099			0.006	0	0		
200100184				KIEFER LANDFILL BUFFER LANDS	No ORM, electronic or paper record. Extensive research cannot find evidence of this Project # or file.			0			0	0	0		
200100195		Finalized	SP	WILDHAWK/DUNMORE PROPERTY	File Loc UK. FWS mit served as Corps reqd mit.			1.83			1.83	1.83	3.66		
200100223		Finalized	PREAPPCONS	SACRAMENTO STORMWATER MAINTENANCE	File Loc UK. No electronic or ORM data.			0			0	0	0		
200100230		Finalized	SP	Sunridge Specific Plan Properties EIS - SUNRIDGE VILLAGE	FWS mit served as Corps reqd mit.			2.99			2.99	3.38	9.18		
200100252		Finalized	SP	SUNRIDGE PARK (AKA RONENBERG PROPERTY)	FWS mit served as Corps reqd mit.			2			1.81	3.39	0.19		
200100252		Finalized	SP Inclusion	SUNRIDGE PARK (AKA RONENBERG PROPERTY)	Row for addl Corps reqd mit.			0			0	0	10.4		
200100263		Finalized	NWP 29	MCNAIR PROPERTY	Records Holding 1037252. Data is currently best of available electronic info.			2.3			0.01	0.01	0		

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200100307		Finalized	NWP 5	DELTA CROSS CHANNEL FLOW MONITORING STA	Records Holding 1037253. No impacts, no delineation record.			0			0	0	0		
200100403		Finalized	NWP 39	MEADOWS RANCHETTES	ATF			1.531			0.21	0.32	1.29		
200100403		Finalized	NWP 39 Inclusion	MEADOWS RANCHETTES	Row for FWS reqd mit. (GGS 33.3%)			0			0	0	0	0.171 (create wet) FUND. GGS 33.3%	
200100407		Finalized	NWP 7	EMERALD PARK COMPANY UNIT 22	0.03 perm imp (str) not a loss.			0.03	Y	0.03	0	0	0		
200100434		Finalized	SP	R&B ELK GROVE GILLIAM GAP CHANNEL DEVEL.	5.38 (wet) isolated, will be filled. File location UK, Finan? Delineation not available. Delineation figures are estimated from impacts figures.	Y	5.38	9.87			9.87	11.67	0		
200100434		Finalized	SP Inclusion	R&B ELK GROVE GILLIAM GAP CHANNEL DEVEL.	Row for FWS reqd mit.			0			0	3.58	7.16		
200100435		Finalized	SP	QUAIL RIDGE / FORMERLY BILBY 105	0.03 (wet) isolated. File location UK. Best info available.	Y	0.03	2.19			2.19	1.75	0		
200100435		Finalized	SP Inclusion	QUAIL RIDGE / FORMERLY BILBY 105	Row for addl FWS reqd mit.			0			0	0.44	0.88		
200100441		Finalized	NWP 39	MATHER EAST	X			3.07			0.39	0.13	2.68		
200100441		Finalized	NWP 39 Inclusion	MATHER EAST	Row for corps and FWS reqd mit.			0			0	0.2	1.6		
200100447		Finalized	NWP 39	MOHAMED ACRES	Corps and FWS reqd mit were unified.			0.14			0.14	0.14	0.28		
200100448		Finalized	SP	MONTELENA DJ ENTERPRISES SUNRIDGE	1.23 acre non-jurisdictional (other) - will be filled. Includes previous project numbers 1994-00212, 1994-00211, 1994-00159, 1994-00158, 1994-00157, 1993-00406.	Y	1.23	16.47			11.233	19.31	9.12		
200100491		Finalized	NPR	BONACCI PROPERTY	JD only			0			0	0	0		
200100531		Finalized	NWP 3	COSUMNES RIVER FLASHBOARD DAM REPAIR	0.227 perm imp (str) not a loss. Earlier NWP 3 exists, unable to determine from file what impacts were.			2.631	Y	0.227	0	0	0		
200100559		Finalized	SP	GALT RIVER OAKS	X			2.58			0.66	0.11	1.95		
200100559		Finalized	SP Inclusion	GALT RIVER OAKS	Row for the channel reroute creation acreage.			0			0	0.43	0		
200100559		Finalized	SP Inclusion	GALT RIVER OAKS	Row for addl FWS and Corps reqd mit.			0			0	0.25	0.5		
200100562		Finalized	SP	EAST FRANKLIN NORTH DRAINAGE	X			7.8			0.51	1.78	0		
200100562		Finalized	SP Inclusion	EAST FRANKLIN NORTH DRAINAGE	Row for addl Corps reqd mit.			0			0	3.4	0		
200100562		Finalized	SP Inclusion	EAST FRANKLIN NORTH DRAINAGE	Row for FWS reqd mit. (0.51 GGS creation was fully aquatic)			0			0	0.51	0		
200100584		Pending	SP	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Rows for this project are really SP MOD for a previously authorized SP. Figures are the most likely outcome. Since project was already authorized, considered complete, not RF. Modification is not yet completed. Figures deviate slightly from originally permitted SP.			26.45			8.08	5.05	5.6		
200100584		Pending	SP Inclusion	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Row for addl creation (increase in pond area). Proposed, not required.			0			0	2.08	0		
200100584		Pending	SP Inclusion	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Row for addl Corps reqd mit.			0			0	8.57	0		
200100584		Pending	SP Inclusion	VINTARA PARK (FKA BOND/WATERMAN PROPERTY	Row for addl FWS reqd pres mit. Creation was covered via Corps create requirement.			0			0	0	12.54		
200100605		Finalized	NPR	GREGG RETAINING WALL	X			0			0	0	0		

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200100624		Finalized	PREAPPCONS	WILDLANDS SNODGRASS SLOUGH MITIGATION	Records Holding 1037258. No electronic records. ORM has no useful data. Preapp only.			0			0	0	0		
200100633		Finalized	SP	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Addl perm imp 0.54 (wet) isolated	Y	0.54	10.18			5.84	4.33	4.34		
200100633		Finalized	SP Inclusion	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Row for addl Corps reqd mit.			0			0	2.59	5.32		
200100633		Finalized	SP Inclusion	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Addl row for addl Corps reqd mit.			0			0	0	5.53		
200100633		Finalized	SP Inclusion	THE GROVE AT LAGUNA RIDGE (FKA BIGHORN)	Addl row for FWS reqd mit.			0			0	0	0.9	0.45 Create wet (VP Conservation Fund)	
200100641		Finalized	NWP 39	BACKER PROPERTY-LENNAR COMMUNITIIES	On-site preservation acreage is assumed to be remainder of resources after impact. No specific info in file.			0.34			0.13	0.13	0.21	0.83 (Riparian Habitat) credit, OUT uda	
200100708		Finalized	NWP 39	BISHOP RANCH SUBDIVISION	X			0.3			0.04	0	0.26		
200100708		Finalized	NWP 39 Inclusion	BISHOP RANCH SUBDIVISION	FWS mit served as Corps reqd mit.			0			0	0.04	0.08		
200100710		Finalized	SP	SMUD COSUMNES POWER PLANT	X			47.08			1.307	1.95	0		
200100710		Finalized	SP Inclusion	SMUD COSUMNES POWER PLANT	Addl row for FWS reqd mit, including GGS creation mit. (33.3% rule used).			0			0	13.833	19.7		
200100710		Finalized	SP Inclusion	SMUD COSUMNES POWER PLANT	For addl Corps and FWS reqd mit. Note creation component satified both Corps and FWS vp mit requirements.			0			0	3	0		
200100710		Finalized	SP Inclusion	SMUD COSUMNES POWER PLANT	Addl row for FWS reqd mit as per amended BO.			0			0	0.291	0.196		
200100744		Finalized	SP	GALAXIDAS/BILBY RANCH PROPERTY	X			0.39			0.39	0.39	0		
200100763		Finalized	NWP 32	Chester Drive Property	Creation mit component (on this line) satisfied both Corps and FWS requirements.			2.01			0.852	0.653	1.158		
200100763		Finalized	NWP 32 Inclusion	Chester Drive Property	Row for addl FWS reqd mit.			0			0	0.626	0		
200200094		Finalized	NWP 14, 7	CHANCELLOR ESTATES	X			1.23			0.045	0.12	0		
200200236		Finalized	NWP 39	KINGSBRIDGE SUBDIVISION	X			4.48			0.43	1.07	4.05	1.76 (wet) enhanced IN	
200200236		Finalized	NWP 39 Inclusion	KINGSBRIDGE SUBDIVISION	Row for FWS reqd mit.			0			0	0	4.25		
200200402		Finalized	NWP 3	BLODGETT DAM REPAIR PROJECT	Impacts to (str), but how much is not clear. Also, no delineation. Logged as zeros, info not available.			0			0	0	0		
200200410		Finalized	PREAPPCONS	NORTH VINEYARD STATION SPECIFIC PLAN	Pre-App only. Looking at projects 2003-00245, 2003-00251, 1993-00651.			0			0	0	0		
200200487		Finalized	LOP	SUN RIVER PROPERTY / WETLAND RESTORATION				397.4			10.97	26.16	0	16.91 (str), and 319.15 (wet) enhanced OUT.	
200200523		Finalized	NWP 39	R&B EAST MEADOW PROJECT	Creation mit credits satisfied both Corps and FWS requirements.			0.06			0.06	0.06	0.12		
200200527		Finalized	NWP 39	R&B ALBIANI PROPERTY	0.005 (wet) isolated. NFWF payment was accepted by FWS as suitable to meet their creation requirement. FWS preservation credits were put on this row.	Y	0.005	0.081			0.081	0	0.27		
200200537		Withdrawn	SP	MORVAI PROPERTY-NORTH VINEYARD STATION	This permit appears to have been withdrawn for the time being. ORM does not reflect this. Delineation and impact info available.			0			0	0	0		

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200200538		Finalized	SP	SHELDON ROAD/STATE ROUTE 99 INTERCHANGE	X			2.73			0.67	1.14	0		
200200538		Finalized	SP Inclusion	SHELDON ROAD/STATE ROUTE 99 INTERCHANGE	Row for addl Corps reqd mit.			0			0	0.19	0		
200200538		Finalized	SP Inclusion	SHELDON ROAD/STATE ROUTE 99 INTERCHANGE	Row for addl FWS reqd mit.			0			0	1.101	2.99		
200200561	RF	Pending	EIS	MATHER FIELD MASTER EIS	See 200900880. Also, all permits withdrawn and are now part of 2009-00525 through 00530. Delineated waters for all of these projects is logged here.			90.64			0	0	0		
200200568		Finalized	SP	Sunridge Specific Plan Properties EIS - DOUGLAS ROAD 98	X			3.91			3.91	3.91	7.82		
200200568		Finalized	SP Inclusion	Sunridge Specific Plan Properties EIS - DOUGLAS ROAD 98	Row for addl FWS reqd mit.			0			0	0	7.82		
200200577		Withdrawn	NWP	NGUYEN CHURCH	PM unable to contact applicant. Work (culvert through dry creek) likely completed without permit. No figures available to log.			0			0	0	0		
200200589		Finalized	NWP 39	BRADSHAW VINEYARDS HOUSING	0.04 isolated (wet). Mary has file.	Y	0.04	0.255			0.001	0	0.254		
200200589		Finalized	NWP 39 Inclusion	BRADSHAW VINEYARDS HOUSING	Row for FWS GGS mit (33.3% used) Paid into fund (how to log?			0			0	0	0	0.212 (create wet) FUND. For GGS (33.3% used)	
200200614		Finalized	UNAUTHACT	15-ACRE WOODS RD. PROJECT	Probably impacts, but closed as "no further action" in 2009. Delineation verified 1.23 acres (wet). include?? Decision NO.			0			0	0	0		
200200634		Finalized	NWP 29	GARFOOT GREENS PROPERTY	FWS required additional mitigation, but Corps determined those areas of effect to be outside Corps project area. BO was not considered requisite to Corps verification. Addl FWS mit figures were not included.			2.204			0.134	0.134	0		
200200637		Finalized	NWP 14, 39	VISTA CREEK VILLAGE PROJECT	Not clear what impacts were permanent. Defaulted to all permanent.			0.44			0.44	0.07	0		
200200637		Finalized	NWP 14, 39 Inclusion	VISTA CREEK VILLAGE PROJECT	Row for FWS reqd mit.			0			0	0.37	0.74		
200200638	RF	Pending	SP	Emerald Estates	X			1.917			1.06	1.06	0.85		
200200638	RF	Pending	SP Inclusion	Emerald Estates	Row for addl Corps reqd mit. Note this figure was subtracted from FWS reqd preservation below. It appears Corps and FWS VP mits are not independent, but are part of same total.			0			0	0	2.12		
200200638	RF	Pending	SP Inclusion	Emerald Estates	Row for FWS reqd mit. See note above for Corps reqd mit.			0			0	0	7.5		
200200724		Finalized	NWP 39	BEAZER ELLIOTT RANCH EAST	X			0.26			0.26	0.26	0		
200200727		Finalized	NWP 39	COVENTRY PROJECT	X			0.278			0.109	0	0		
200200727		Finalized	NWP 39 Inclusion	COVENTRY PROJECT	Row for FWS reqd mit.			0			0	0	0.06		
200200728		Finalized	SP	WILDHAWK NORTH PROPERTY	0.65 isolated (other), 1.47 isolated (wet)	Y	2.12	7.36			2.38	0	4.98		
200200728		Finalized	SP Inclusion	WILDHAWK NORTH PROPERTY	Row for FWS reqd mit. Note creation component satisfies both Corp and FWS requirements.			0			0	4.41	10		
200200770		Finalized	NWP 39	CREEKSIDE UNIT NO. 4 PROPERTY	Preserve acreage approximate - no figure in record.			0.014			0.014	0	2.7		

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200200770		Finalized	NWP 39 Inclusion	CREEKSIDE UNIT NO. 4 PROPERTY	Row for FWS reqd mit.			0			0	0.014	0.28		
200200770		Finalized	NWP 39 Inclusion	CREEKSIDE UNIT NO. 4 PROPERTY	Row for FWS reqd mit (GGS) - 33.3% rule used.			0			0	0.25	0		
200200773		Finalized	NWP 39	NEWTON RANCH 2	X			0.283			0.283	0.283	0.566		
200200782		Finalized	NWP 12, 33	LAGUNA INTERCEPTOR EXTENSION PROJECT	Large impact, all but 0.002 acre (wet) was temporary. Addl 5.67 acres temp impact to (wet).			75.94			0.002	0.22	0		
200200782		Finalized	NWP 12, 33 Inclusion	LAGUNA INTERCEPTOR EXTENSION PROJECT	Row for FWS reqd mit. GGS habitat, 33.3% rule used.			0			0	1.502	0		
200200788		Finalized	NWP 14, 33	BRADSHAW ROAD BRIDGE REPLACEMENT AT MORR	See 2003-00811. 0.373 acres of Morrison Creek was delineated as part of that project, but it was not included there (this project overlaps). Log that 0.373 here. Impacts to Morrison Creek (for this project) are supposedly 0.037 acres.			0.373			0.01	0	0	0.01 paid into Sac County Wetland Restoration Trust Fund (Create wet?)	
200200808		Finalized	SP	SHELDON PLACE	Row for Sheridan portion of creation mit. Creation mit apparently met Corps and FWS requirements. FWS pres is also included in this row.			0.76			0.76	0.55	1.52		
200200808		Finalized	SP Inclusion	SHELDON PLACE	Row for Clay Station portion of creation mit.			0			0	0.21	0		
200300048		Finalized	NWP 44	TEICHERT PRAIRIE CITY SITE	Creation mit apparently met Corps and FWS requirements. FWS pres is also included in this row.			0.22			0.22	0	0.8	0.22 (create wet) Paid into CNLM fund.	
200300050	RF	Withdrawn	SP	Teichert Aggregates Quarry 404-acre	Addl 0.314 isolated (wet). Delineation and impact/project info available.	Y	0.314	6.99			3.15	3.15	3.334		
200300105		Finalized	NWP 32	LAKEMONT DRIVE 8	See 1990-00244. Delineation figures are in that project. Also see 1999-00110. This project is just the violation impacts and resolution.			0			0.12	0	0		
200300111		Finalized	NWP 29	ALBIANI EXCELSIOR ROAD PROJECT	X			0.42			0.32	0.32	0.1		
200300111		Finalized	NWP 29 Inclusion	ALBIANI EXCELSIOR ROAD PROJECT	Row for FWS reqd mit.			0			0	0.32	0.64		
200300128		Finalized	NWP 14, 33	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Addl 0.456 acres (wet) non-jurisdictional. Also, Excavation (perm imp not loss) of 0.03 (str) and 0.04 (wet). Learned in another project (2005-01061) that THIS one inadvertently filled addl 0.05 acres wet. Only 0.02 of this was included in delineation for this project, so addl 0.03 wet was added to delineated field.	Y	0.456	0.48	Y	0.07	0.1388	0	0		
200300128		Finalized	NWP 14, 33 Inclusion	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Row for FWS reqd mit (vp)			0			0	0.076	0.042		
200300128		Finalized	NWP 14, 33 Inclusion	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Row for FWS reqd mit (GGS) - 33.3% rule used.			0			0	0.969	0		
200300128		Finalized	NWP 14, 33 PERMITMOD	CALVINE RD WIDENING,KINGSBURG-VINEYARD	Row for inadvertant fill and acreage not included in original delineation.			0.03			0.05	0	0		
200300150		Finalized	UNAUTHACT	SACRAMENTO CONCRETE INC.	Appears resolved. No Corps documents in file…			0			0	0	0		
200300164		Withdrawn	NWP	REC DIST NO. 800 COSUMNES RIVER MAINTNCE	Withdrawn because applicant decided mitigation not financially feasible. No new plan on record.			0			0	0	0		

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200300177		Finalized	UNAUTHACT	RICE PROPERTY	Resolved in 2000-00644			0			0	0	0		
200300245		Pending	SP PERMITMOD	NORTH VINEYARD STATION DRAIN MASTER PLAN	Modification not complete. Adds addl delineated acres. A detention basin will be built, destroying waters. Since acreage of basin is unknown, creation figure comes from impacts.			1.19			0.086	0.086	0		
200300245		Finalized	SP	NORTH VINEYARD STATION DRAIN MASTER PLAN				18.097			16.328	24.18	0		
200300245		Finalized	SP Inclusion	NORTH VINEYARD STATION DRAIN MASTER PLAN	Row for Addl Corps and FWS reqd offsite mit			0			0	0.546	0		
200300245		Finalized	SP Inclusion	NORTH VINEYARD STATION DRAIN MASTER PLAN	Row for Addl Corps and FWS reqd offsite mit.			0			0	3.506	1.815		
200300251		Finalized	SP	VINEYARD CREEK	X			2.688			2.688	3.696	0		
200300251		Finalized	SP Inclusion	VINEYARD CREEK	Row for FWS reqd mit. Creation component required by FWS appears to have been met with Corps reqd create component.			0			0	0	2.186		
200300253		Finalized	PREAPPCONS	EAST ELK GROVE / TRIANGLE AREA	Info transferred to 1999-00516 Elk Grove Creek Drainage.			0			0	0	0		
200300286		Finalized	NWP 29	FRANKLIN CROSSING (FKA SOUTH BILBY80	Authorization to fill remaining acres authorized by original NWP 39, work was not finished. No additional changes.			0			0	0	0		
200300286		Finalized	NWP 39	FRANKLIN CROSSING (FKA SOUTH BILBY80	Addl 0.141 acre pond (other), and another 0.141 acre (str), delineated but non-jurisdictional.	Y	0.282	0.26			0.26	0.26	0		
200300337		Finalized	SP	BRADSHAW ROAD WIDENING, FLORIN-CALVINE	See 2003-00626. Subtracted 0.0231 (wet) from this delineation as it was included in 2003-00626. Actual value delineated for (str) was not clear, so added temp and perm impacts to get figure. Addl 0.09 isolated (wet).	Y	0.09	2.0969			0.6591	0.659	0		
200300337		Finalized	SP Inclusion	BRADSHAW ROAD WIDENING, FLORIN-CALVINE	Row for FWS reqd mit.			0			0	1.337	3.524		
200300352		Finalized	UNAUTHACT	RISSLING PROPERTY VIOLATION	File not on shelf - Ness? No further action. No electronic records.			0			0	0	0		
200300397		Finalized	RGP	ELK GROVE STREAM MAINT. GENERAL PERMIT	All impacts temporary. Previously permitted projects should include delineated waters for this area.			0			0	0	0		
200300440		Finalized	PREAPPCONS	DOUGLAS BUISNESS PARK	No info in file.			0			0	0	0		
200300550	RF	Pending	UNAUTHACT	VINEYARD INVESTORS ASSOCIATES VIOLATION	Settlement agreement not finalized. No mitigation figures. 1:1 creation mit assumption based on record. 2000-00025 impacted features on this site, but that project wasn't included in spreadsheet because of GIS geometry. If included later, remove SW4 (0.138), SW7 (2.271), and SWS1 (1.045) (all wet) from delineated figures HERE. Impacts to those features would be included in 2000-00025. THIS HAS BEEN DONE.			15.656			3.33	3.33	0		
200300626		Finalized	LOP	TAYLOR PROPERTIES GERBER & BRADSHAW ROAD	See 2003-00337			1.0645			0.8787	0.8787	0		

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200300626		Finalized	LOP Inclusion	TAYLOR PROPERTIES GERBER & BRADSHAW ROAD	Row for FWS reqd mit.			0			0	0.793	0.9706		
200300669	RF	Pending	SP	East Sacramento Ranch	Additional UNAUTHACT, closed "no further action", some fill likely occurred, unclear how much.			22.23			4.48	6.4	17.75	3 rehabilitation VP, IN uda.	
200300674		Finalized	NWP 14	NAVIGATOR MEMORIAL PHASE II @ MATHER	File missing, no electronic info. Not on shelf - Ness? (doesn't have it). Logged with zeros, as info was not retrievable.			0			0	0	0		
200300675		Withdrawn	UNAUTHACT	HAGLER PROPERTY WETLANDS	No info in file			0			0	0	0		
200300697		Withdrawn	NWP 14	SUNRIDGE SPECIFIC PLAN ROAD IMPROVEMENTS	Will believes this project would have been wrapped up into another Sunridge project(s). So, in a sense, not RF. Delineation and impact/project info available.			0			0	0	0		
200300717		Finalized	NWP 12	MATHER GROUNDWATER SYSTEM	X			0.01			0.005	0.025	0		
200300736		Finalized	NWP 13	MCCORMACK-WILLIAMSON TRACT EROSION REPAI	File not on shelf - Imamura does not have it. Impacts/delineated estimated. 0.2 acre (str) considered perm impact not loss.			0.2	Y	0.2	0	0	0		
200300777		Finalized	NWP 39	SCHNITZER STEEL EXPANSION	X			0.17			0.167	0.167	0		
200300796		Finalized	UNAUTHACT	AZIZ PROPERTY	May be violation, but never pursued. No additional info.			0			0	0	0		
200300811		Finalized	NWP 14, 33	BRADSHAW ROAD IMPROVEMENT JACKSON-FLORIN	Delineated does not include 0.373 acres of Morrison Creek (should get logged in 2002-00788). Mitigation includes restoration of 0.303 temp impacts (on-site) and off-site creation to mit for 0.101 acres perm impact. No data for off-site. Assumed in-kind, at Browns Creek VP preserve.			1.141			0.101	0.101	0		
200400012		Finalized	NWP 27	SOUTH STONE LAKE GGS MITIGATION PRESERVE	FWS required 4.4 acres GGS habitat (1.467 is 33.3%), which project self-mitigated. (ie, that acreage not available for other projects to use as mitigation).			2.06			1.34	1.467			
200400088		Finalized	NWP 39	EAST MEADOW III	X			0.016			0.016	0.016	0		
200400091		Finalized	SP	WILDHAWK SOUTH PROPERTY	Addl 0.34 (wet) isolated. Feature filled.	Y	0.34	0.954			0.954	1.29	0		
200400091		Finalized	SP Inclusion	WILDHAWK SOUTH PROPERTY	Row for FWS reqd mit. Creation component for GGS habitat (33.3% used), AND unclear if result is bank or fund.			0			0	0	0	0.14 (create wet) Bank OR Fund. For GGS (33.3% used)	
200400092		Finalized	NWP 39	BMD PROPERTIES EXPANSION PROJECT	No JD. Can only discern impacted waters.			0.03			0.03	0.1	0		
200400116	RF	Withdrawn	SP	Cordova Hills	One of Big Five. Delineation and impact/project info available.			89.106			39.63	39.63	65.138		
200400126		Finalized	NWP 38	FRANKLIN FIELD LANDFILL CLOSURE	Note large difference between delineated and impacts.			71.38			0.042	0	0		
200400126		Finalized	NWP 38 Inclusion	FRANKLIN FIELD LANDFILL CLOSURE	Row for FWS reqd mit. Note: preservation acres probably paid into fund (known paid, but no record where).			0			0	0.022	0	0.644 (Preserve wet), paid into FUND	
200400181		Finalized	NWP 39	MERITAGE BRITSCHGI PROPERTY	Addl 0.061 (wet) non-jurisdictional. All filled.	Y	0.061	0.083			0.083	0.077	0		
200400182		Finalized	NWP 14, 33	BOND ROAD WIDENING	Note: NFWF req was in original permit, but not in modification. However, applicant had already paid into fund.			1.87			0.38	0.38	0		

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200400182		Finalized	NWP 14, 33 Inclusion	BOND ROAD WIDENING	Row for FWS reqd mit. Create component for GGS (33.3% used).			0			0	1.159	0		
200400244		Withdrawn	SP	GAP SPECIFIC PLAN (AKA FLORIN-VINEYARD)	Inactive. Projects once part of this group have been reviewed separately.			0			0	0	0		
200400254		Finalized	SP	LENT RANCH	0.042 (str) impacts occur off-site (but not on any other numbered project site). This figure has been included in impacts and delineated acres for this project.			3.69			3.015	3.015	0.42		
200400254		Finalized	SP Inclusion	LENT RANCH	Row for FWS reqd mit. Creation component for GGS habitat (33.3% used).			0			0	3	0.908		
200400255		Finalized	NWP 29	MORVAI NORTH				1.635			0.152	0.152	1.483		
200400255		Finalized	NWP 29 Inclusion	MORVAI NORTH	Row for FWS reqd mit. Note creation component identical to Corps requirement. Only recorded once above.			0			0	0	0.304		
200400274		Withdrawn	NWP 39	NORTH VINEYARD GREENS UNIT #3	Inactive. This project # is wrapped up into 2006-00428.			0			0	0	0		
200400281		Finalized	NWP 14, 33	LEWIS STEIN ROAD EXTENSION PROJECT	X			3.85			0.301	0	0		
200400281		Finalized	NWP 14, 33 Inclusion	LEWIS STEIN ROAD EXTENSION PROJECT	Row for FWS reqd mit. (GGS 33.3%)			0			0	3.06	0		
200400294		Finalized	UNAUTHACT	GRIMES PROPERTY	Closed, 5 years passed since Corps became aware of violation. The only info is 0.80 acres fill to wet and str.			0.8			0.8	0	0		
200400298		Finalized	NWP 7, 32	BELL SOUTH / SIERRA HOLDINGS	Incomplete ATF NWP. Note, data is taken from best info available. No Corps or FWS reqd mit could be recorded. Data in creation is on-site proposed. Project is probably complete, though no record of final permit exists.			4.338			0.22	2.35	0		
200400303		Finalized	NWP 14	MATHER BIKE TRAIL	Delineation part of other projects. The only mitigation is FWS reqd preservation (wet).			0			0.004	0	0.112		
200400339		Finalized	NWP 39	SYCAMORE GROVE	X			0.17			0.17	0	0		
200400350		Finalized	NWP 14	BRUCEVILLE WIDENING	ATF			0.02			0.02	0.02	0		
200400409		Finalized	NWP 39	BRADSHAW CHRISTIAN HIGH SCHOOL	Has not been constructed, mitigation has not been established. Applicant not content with permit conditions as of 2007. No file activity since then.			2.499			0.291	1.154	2.208		
200400431		Finalized	NWP 27	COSUMNES PRESERVE WETLAND ENHANCEMENT	1.65 acres (wet) impacts via movement of soil to create islands. Net gain of 0.5 (wet)			153.6			1.65	2.15	0		
200400435		Withdrawn	LOP	PANATTONI BUSINESS PARK	Only upland portion of project built. Applicant reapplied to fill wetlands, but never sent requested info. Corps withdrew.			0			0	0	0		
200400458		Finalized	SP	Sunridge Specific Plan - Arista del Sol	Includes Grantline 220 proposed impacts and mitigation in figures. (See 2006-00604)			17.78			13.53	0.64	3.76		
200400458		Finalized	SP Inclusion	Sunridge Specific Plan - Arista del Sol	Row for Corps and FWS reqd mit. Mit was to be conducted in Mather Core Area if possible (IN).			0			0	10.1	19.47		
200400474		Finalized	LOP	VINEYARD MARKET SQUARE (BADELLA PROPERTY)	X			0.991			0.991	0.991	0		
200400474		Finalized	LOP Inclusion	VINEYARD MARKET SQUARE (BADELLA PROPERTY)	Inclusion for FWS required mit.			0			0	0.138	0.276		

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200400515		Finalized	SP	Glenborough at Easton and Easton Place	Addl 2.111 (wet) and 2.594 (other) isolated. All isolated are permanently impacted. How to categorize? File contained no record of the actual used mit bank location. UK was added to field.	Y	4.705	23.161			4.483	5.283	17.788		
200400555		Finalized	SP	Bottimore Property	X			3.326			2.563	3.132	0		
200400555		Finalized	SP Inclusion	Bottimore Property	Row for FWS reqd mit.			0			0	0	0.882		
200400564		Withdrawn	NWP 39	STONE HOUSE ROAD ELEMENTARY SCHOOL	X			0			0	0	0		
200400570		Finalized	NWP 39	Los Rios Community College District CRC Elk Grove Center Site	X			0.433			0.433	0.43	0		
200400629		Finalized	NWP 39	East Lawn Elk Grove Memorial Park Expansion Project	X			20.026			0.4	0.4	0		
200400640		Finalized	NWP 27	LAGUNA TERRACE MITIGATION SITE	Creation/restoration figures extrapolated from existing waters vs explanation of acres created or restored. Unclear from documentation.			5.95			0.46				
200400640		Finalized	NWP 27 Inclusion	LAGUNA TERRACE MITIGATION SITE	Addl row for project activities.			0			0				
200400640		Finalized	NWP 27 Inclusion	LAGUNA TERRACE MITIGATION SITE	Addl row for project activities.			0			0				
200400707	RF	Withdrawn	SP	The Ranch at Sunridge	Data taken from FWS datasheet. Original creation mit was going to be more than 1:1. Original impacts about 4 acres more…			21.45			10.48	10.48	10.97		
200400763		Finalized	SP	CENTRAL GALT INTERCHANGE	0.124 acre (str) non jurisdictional.	Y	0.124	3.437			2.143	1.4	0		
200400763		Finalized	SP Inclusion	CENTRAL GALT INTERCHANGE	Addl row for addl Corps reqd mit.			0			0	1.49	0		
200400782		Finalized	NWP 39	SECURITY PARK-GOLD FLAKE COURT	X			0.191			0.191	0	0		
200400782		Finalized	NWP 39 Inclusion	SECURITY PARK-GOLD FLAKE COURT	Row for FWS reqd mit.			0			0	0	0.786	0.056 (Create wet) Fund OR credits	
200400790		Finalized	NWP 29	HEDGE 22 PROPERTY (DEANE MCCOY ROAD)	Create component was called "VP habitat" by both FWS and Corps. No actual purchase records yet. FWS req was slightly greater but decision was made that FWS and Corps were asking for a single thing. Only the greater 0.291 acres was used for creation acres logged.			0.271			0.271	0.291	0		
200400790		Finalized	NWP 29 Inclusion	HEDGE 22 PROPERTY (DEANE MCCOY ROAD)	See Above Note. Row for FWS reqd mit.			0			0	0	0.582		
200400791	RF	Withdrawn	SP	EXCELSIOR ESTATES	One of Big Five. Delineation and impact/project info available. Applicant has proposed creation mitigation at a 1.3:1 ratio (this is what was logged). This mit is assumed to be outside the watershed and UDA.Preservation figure is also proposed at this time. Addl 13.61 acre isol/non jd, all filled.	Y	13.61	39.81			28.77	37.401	11.04		
200400802		Finalized	NWP 27, 33	BROWNS CREEK MITIGATION SITE	X			14.43			0				

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200500137		Finalized	UNAUTHACT	LOW/OSTER PROPERTY	Voluntary Restoration, Though no record of post-restoration in file. 0.02 (wet) was filled. Use this proj as another example of "should we be counting delineated on projects with no impacts?"			0.02			0	0	0		
200500221		Finalized	NWP 14, 33	FRANKLIN BOULEVARD WIDENING	Addl 0.12 isolated str.	Y	0.12	3.94			0.032	0	0		
200500221		Finalized	NWP 14, 33 Inclusion	FRANKLIN BOULEVARD WIDENING	Row for FWS reqd mit. Requirement for GGS was 0.6 preserve habitat, via fund OR preserve credit. Result uk. (33.3% is 0.2 wet)			0			0	0	0	0.2 Preserve Wet via fund OR credit. (GGS, 33.3% rule used)	
200500226		Finalized	NWP 14	GRANT LINE AND BOND ROAD INTERSECTION	X			0.455			0.39	0.56	0		
200500226		Finalized	NWP 14 Inclusion	GRANT LINE AND BOND ROAD INTERSECTION	Row for Corps reqd (wet) credits.			0			0	0.048	0		
200500226		Finalized	NWP 14 Inclusion	GRANT LINE AND BOND ROAD INTERSECTION	Row for FWS reqd pres (wet) credits.			0			0	0	0.52		
200500227		Finalized	PREAPPCONS	SUNRISE DOUGLAS ELECTRIC DISTRIBUTION	X			0			0	0	0		
200500325		Withdrawn	SP	SILVER SPRINGS EAST (LOT P)	See 1999-00712. Data logged there.			0			0	0	0		
200500371		Finalized	SP	INACTIVE RANCHO CORDOVA TEST SITE	Note all waters on-site were delineated in other projects, so no data has been logged here. No Impacts.			0			0	0	0		
200500398		Finalized	NWP 39	WULF/ALVAREZ PROPERTY	X			0.45			0.45	0.422	0		
200500398		Finalized	NWP 39 Inclusion	WULF/ALVAREZ PROPERTY	Row for FWS reqd mit.			0			0	0	0.3	0.15 (creat wet) Bank OR Fund	
200500438		Finalized	UNAUTHACT	8090 VINEYARD ROAD PROPERTY	Closed, no further action. Also, County may have required landowner to remove fill.			0			0	0	0		
200500461		Finalized	NWP 3	LOST SLOUGH BRIDGE MAINTENANCE	Bridge maintenance, no impact.			0.052			0	0	0		
200500516		Finalized	NWP 39	JAS-LARSON PROPERTY	0.07 temp imp only.			0.07			0	0	0		
200500525		Finalized	NWP 39	TRIANGLE POINT	See 201100033 and 200601045. 0.6 str and 0.44 wet delineated have been added to account for other projects that impact this site. Impacts for those are logged in their respective rows.			1.54			0.4	0.4	0		
200500531		Finalized	NWP 39	AMERICA'S CHOICE HIGH SCHOOL SITE	0.026 acres (wet) isolated.	Y	0.026	0.149			0.149	0	0		
200500531		Finalized	NWP 39 Inclusion	AMERICA'S CHOICE HIGH SCHOOL SITE	Row for FWS reqd mit.			0			0	0	0	0.175 (create wet) fund, FWS VP creation account. 0.35 (Preserve Wet) Bank or fund	
200500536		Finalized	NWP 29, 39	JACKSON PROPERTY	Actual delineated acreage lower, but applicant revised impacts and no new jd was performed.			0.465			0.465	0.473	0		
200500575		Withdrawn	UNAUTHACT	PRINGLE, CHARLES	X			0			0	0	0		
200500576		Finalized	UNAUTHACT	PRUITT, LLOYD	Closed. No Fill. No further action.			0			0	0	0		
200500577		Finalized	NWP 14	GREENE, SCOTT	X			0.001			0.001	0	0		
200500588		Finalized	NWP 23	STATE ROUTE 16 AND EXCELSIOR ROAD SAFETY	X			1.22			0.61	0.74	0		
200500588		Finalized	NWP 23 Inclusion	STATE ROUTE 16 AND EXCELSIOR ROAD SAFETY	Row for FWS reqd mit. Note creation component is fund, not credits!			0			0	0	1.48	0.74 create wet FUND	
200500594		Finalized	NWP 39	PARKSIDE PROJECT ON ORANGE AVENUE	X			0.091			0.091	0.07	0		

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200500594		Finalized	NWP 39 Inclusion	PARKSIDE PROJECT ON ORANGE AVENUE	Row for addl Corps reqd mit.			0			0	0.056	0		
200500594		Finalized	NWP 39 Inclusion	PARKSIDE PROJECT ON ORANGE AVENUE	Row for addl FWS reqd mit. Note, creation AND preservation may be by fund OR credits, can't tell.			0			0	0	0	0.021 creat wet fund or credit. 0.042 preserv wet, fund or credit.	
200500649		Pending	PREAPPCONS	SILVA RANCH MITIGATION SITE	Mitigation site for Anatolia (1901-10021)			0			0	0	0		
200500652		Finalized	NWP 39	JAS - NORTH VINEYARD 10 PROPERTY	X			0.18			0.18	0	0		
200500652		Finalized	NWP 39 Inclusion	JAS - NORTH VINEYARD 10 PROPERTY	Row for FWS reqd mit. Creation may be by fund or credits, can't tell.			0			0	0	0.04	0.02 Wet Creat may be by fund or credits.	
200500674		Withdrawn	NWP 39	FLORIN-BRADSHAW 43	X			0			0	0	0		
200500698		Finalized	NWP 14, 33	WILTON ROAD CULVERT REPLACEMENT PROJECT	Delineated from temp + perm impact acreages. Unable to determine split of resource acreages, so split evenly between wet and str.			0.28			0.09	0	0		
200500734		Finalized	UNAUTHACT	BRADSHAW INTERCEPTOR, SECTION 7	See 2009-00525 through 00530. All features are a part of larger Mather project. Delineated acres can be found there.			0			0.002	0	0		
200500734		Finalized	UNAUTHACT Inclusion	BRADSHAW INTERCEPTOR, SECTION 7	Row for FWS required mit.			0			0	0	0.74	0.18 funds placed in FWS VP (wet) creation acct.	
200500750		Finalized	PREAPPCONS	MATHER AIRPORT AREA	KATE SAID IGNORE.			0			0	0	0		
200500852		Finalized	PREAPPCONS	WESTBOROUGH AT EASTON	JD and project/impact info available in paper file. Did not go further than JD stage, don't know why.			0			0	0	0		
200500883		Finalized	NWP 29	MARTIN PROPERTY PROJECT	Permit was reverified to combine FWS and Corps requirements for creation credits.			0.048			0.048	0.048	0.096		
200500888		Pending	EIS	Suncreek Specific Plan _ Master File	One of Big Five. File exists as 6 other SPs: 200000414, 200600602, 603, 604, 605, and 200800795. All withdrawn at present (06/12/13).			0			0	0	0		
200500902		Finalized	NWP 7	CITY OF GALT WASTEWATER OUTFALL	0.007 perm imp (wet) not loss			0.007	Y	0.007	0	0	0		
200500906		Finalized	NWP 3, 33	ELK GROVE OUTFALL PIPE MAINTENANCE	22 locations/permits, rows removed for clarity. 0.076 (str) impacts are for sediment removal, not a loss.			0.076	Y	0.076	0	0	0		
200500956		Finalized	PREAPPCONS	SHELDON/BRADSHAW ROAD EXPANSION PROJECT	NPR. JD Available.			0			0	0	0		
200500958		Finalized	NWP 12	Elk Grove Water Service Pipeline	0.003 temp impacts only.			1.28			0	0	0		
200500977		Finalized	UNAUTHACT	SMUD EMERGENCY 12 KV REPAIR, ELK GROVE	Closed. Voluntary restoration.			0			0	0	0		
200500978		Finalized	NWP 3	LINE SECTION 9 PIPELINE ANOMALY REPAIRS	Resources are 'riparian wetland'. Temp impacts only. 0.04 preservation was FWS reqd for GGS (33.3%).			0.104			0	0.1	0.04		
200500990	RF	Withdrawn	SP	Kwan Elder Creek Estates Property	New PJD in, probably reasonably foreseeable. JD info available.			0.1			0.1	0.1	0		
200501045		Finalized	UNAUTHACT	COYOTE HILLS PROJECT	Closed. No Fill. No further action.			0			0	0	0		
200501046		Withdrawn	SP	MATSUOKA PROPERTY	Project has been chaged to vinyards not impacting WOUS.			0			0	0	0		
200501061		Finalized	NWP 39	GRAMMERCY PARK SUBDIVISION	X			0.064			0.064	0	0		

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200501102		Finalized	NWP 39	PACIFIC WEST LAGUNA RIDGE PROPERTY	Addl 0.0208 acre isolated (wet). 0.01 acre isolated (wet) was filled. Note mit is seasonal wet credits, though with SSHCP rules, filled ditches considered (str).	Y	0.0208	0.1183			0.05	0.05	0		
200501102		Finalized	NWP 39 Inclusion	PACIFIC WEST LAGUNA RIDGE PROPERTY	Inclusion for FWS required mit.			0			0	0.013	0		
200501116		Finalized	SP	TRIANGLE ROCK EXPANSION FLORIN RD SOUTH	2.58 isolated pond. Of onsite created acreage, cannot determine exact acreage of newly created channel. Defaulted to 0.99 (amount of channel filled/realigned). FWS mit requirements were met through Corps reqd 0.15 wet creation credits.	Y	2.58	11.03			10.09	24.7	0.96		
200501116		Finalized	SP Inclusion	TRIANGLE ROCK EXPANSION FLORIN RD SOUTH	Inclusion for Corps and FWS reqd off-site creation component.			0			0	0.15	0		
200501137		Finalized	NWP 3	SHED A EMERGENCY SEDIMENT REMOVAL	Sediment removal impacts 0.08 (str), not loss.			0.08	Y	0.08	0	0	0		
200600009		Finalized	NWP 18	CITY OF RANCHO CORDOVA FLOOD EMERGENCY	Construction of drainage ditches impact 0.009 acres (wet). Not loss.			0.009	Y	0.009	0	0	0		
200600194		Finalized	NWP 29	WATERMAN FAMILY APARTMENTS DEVELOPMENT	Note that PM specified via email that although creation components of equal acreage were required by Corps and FWS, a single purchase would meet requirements.			0.024			0.024	0.024	0		
200600194		Finalized	NWP 29 Inclusion	WATERMAN FAMILY APARTMENTS DEVELOPMENT	Inclusion for addl Corps reqd mit for indirect impacts.			0			0	0	0.439		
200600194		Finalized	NWP 29 Inclusion	WATERMAN FAMILY APARTMENTS DEVELOPMENT	Inclusion for addl FWS reqd preservation for direct impacts.			0			0	0	0.366		
200600196		Finalized	NWP 39	Security Park	X			0.395			0.169	0.199	0		
200600196		Finalized	NWP 39 Inclusion	Security Park	Inclusion for FWS required mit.			0			0	0.169	0.788		
200600254		Finalized	NWP 12	PG&E LINE 108 REPLACEMENT PROJECT	Additional 0.61 temp impacts.			0			0	0	0		
200600254		Finalized	SP	PG&E LINE 108 REPLACEMENT PROJECT	Line replacement project - Note delineated acres to impacts ratio. (8.4 acres temp imps only). Mit was required by FWS, and reiterated by Corps as the only mit required in permit.			128.378			0	0	2.47		
200600254		Finalized	SP Inclusion	PG&E LINE 108 REPLACEMENT PROJECT	SP Inclusion for additional FWS mitigation.			0			0	0	2.07		
200600381		Finalized	NWP 14	ELK GROVE BLVD/SR 99 INTERCHANGE PROJECT	Addl temp imps to 0.001 str and 0.026 wet. Also see 2008-00128			0.117			0.011	0	0		
200600403		Finalized	NWP 14	EAST STOCKTON BLVD. BIKE LANE PROJECT	Note: Impacts were to drainage ditch (str for SSHCP), but mit credits were for seasonal wetland (wet).			0.03			0.03	0.03	0		
200600428		Finalized	SP	NORTH VINEYARD GREENS PROJECT	1.53 isolated (wet).	Y	1.53	4.165			1.6	2.796	0		
200600428		Finalized	SP Inclusion	NORTH VINEYARD GREENS PROJECT	Row for FWS required mit			0			0	1.6	3.2		
200600438		Finalized	LOP	COURTLAND SEWER PROJECT	Horizontal drilling only, no impacts.			0			0	0	0		
200600477		Finalized	PREAPPCONS	UPPER LAGUNA CREEK COLLABORATIVE PLAN	X			0			0	0	0		

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200600512		Withdrawn	SP	SIMMERHORN COMMERCIAL PROJECT SITE	Talked with Zach Simmons. No longer seems reasonably foreseeable. JD and project info available.			0			0	0	0		
200600537		Finalized	NWP 39	SIENNA SUBDIVISION PROJECT	X			0.018			0.018	0.1	0		
200600552		Finalized	PREAPPCONS	PILLIKEN RANCH (SLOUGHHOUSE) PROJECT	X			0			0	0	0		
200600602	RF	Withdrawn	SP	Suncreek EIS - Jaeger Ranch, Shalako	Part of Big Five.JD and project info available. Data for all Suncreek is only logged in 2008-00795 (reviewed as a group), except for 2006-00604. Because projects are within Mather core recovery area and must comply with the Sunridge ROD, creation mit was assumed 1:1 out of UDA. Preservation figures come from PN for these projects, (applicant suggested on-site preserves).			0			0	0	0		
200600603	RF	Withdrawn	SP	Suncreek EIS - Lixouri Village	Part of Big Five.JD and project info available. Data for all Suncreek is only logged in 2008-00795 (reviewed as a group), except for 2006-00604. Because projects are within Mather core recovery area and must comply with the Sunridge ROD, creation mit was assumed 1:1 out of UDA. Preservation figures come from PN for these projects, (applicant suggested on-site preserves).			0			0	0	0		
200600604	RF	Withdrawn	SP	Suncreek EIS - Grantline 220	Part of Big Five. Only info is 3,96 acres delineated. All Reasonably Foreseeable data included in 2004-00458. No paper file. Part of Suncreek group, but supposedly reviewed separately. New app has not come in yet.			0			0	0	0		
200600605	RF	Withdrawn	SP	Suncreek EIS - Shalako	Part of Big Five.JD and project info available. Data for all Suncreek is only logged in 2008-00795 (reviewed as a group), except for 2006-00604. Because projects are within Mather core recovery area and must comply with the Sunridge ROD, creation mit was assumed 1:1 out of UDA. Preservation figures come from PN for these projects, (applicant suggested on-site preserves).			0			0	0	0		
200600614		Finalized	NWP 14, 33	WEST STOCKTON BLVD./LAGUNA CREEK BRIDGE	0.13 acre detention basin logged in 'wet'. (Delineation had it under wetland category).			4.13			0.113	0.113	0		
200600614		Finalized	NWP 14, 33 Inclusion	WEST STOCKTON BLVD./LAGUNA CREEK BRIDGE	FWS reqd preservation of 0.981 GGS habitat. 33.3% used in spreadsheet. Review fact that Corps impacts were to "Open Water" (str), but SSHCP rules log 33.3% as (wet).			0			0	0	0.327		
200600615		Finalized	NWP 29	LAKEMONT 33 SUBDIVISION	Re-verification. Unknown location of wet mit. No purchase record yet.			0.31			0.14	0.14	0		

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200600622		Finalized	NWP 29	PARK PLACE	Note - resources are drainage ditch (str for purposes of this study), but mit credits were for seasonal wet.			0.022			0.022	0.022	0		
200600648	RF	Withdrawn	SP	WHITELOCK PARKWAY CORRIDOR	Paul says probably will be built if mall project ever opens again - Talk to Lisa Gibson. JD and project/potential impact info available.			1.051			0.99	0.99	0	Suggested FWS Preservation of at least 1.98 acres (wet) via FUND.	
200600756		Finalized	NWP 39	ELK GROVE AUTO MALL PHASE III	0.057 acres isolated wet.	Y	0.057	0.19			0.073	0.22	0		
200600764		Finalized	NWP 3, ,33	ELK GROVE STORMWATER MAINTENANCE PROJECT	0.059 perm imp (str) not a loss. Many permits. Rows removed for clarity.			0.059	Y	0.059	0	0	0		
200600977		Finalized	PREAPPCONS	SOUTH EAST AREA SPECIFIC PLAN	X			0			0	0	0		
200601045		Finalized	NWP 14	Grant Line Road / Waterman Road Intersection Improvement	Impacts are impacting portion of waters delineated (0.6 str, 0.44 wet) for project 2005-00525 (Pending). Only the newly delineated waters are included here. Additional non-jurisdictional features (0.60 str).	Y	0.6	2.274			0.293	0.29	0		
200700060		Finalized	NWP 27	Deer Creek Mitigation Bank	Delineation includes figures from both this project number, and Deer Creek South (2008-00721), as activities from this number affect both areas.			22.32			0.512	12.64	0		
200700095		Finalized	NWP 33	Twin Cities Wetland Preserve	0.037 Temp impacts (str) only. (NWP 33). Note: this project is functioning as a bank although no NWP 27 or DEVMBA associated. Make sure to review as part of mitigation areas list.			25.743			0				
200700133	RF	Withdrawn	SP	ARBORETUM	One of Big Five. Addl 0.03 acre non-jd (wet), filled. Addl on-site restoration (not creation) of Laguna Creek corridor, 18.81 acres of wous.	Y	0.03	117.0833			30.13	43.68	11.01		
200700230		Finalized	UNAUTHACT	Gerber - Bradshaw Violation	Closed. No Fill.			0			0	0	0		
200700602		Withdrawn	NWP	Shadowbrook	Duplicate number. Project is 2003-00105.			0			0	0	0		
200700716	RF	Withdrawn	NWP 12	Mather Interceptor Project	Withdrawn by applicant. Delineation and impact information is available in file. Talk with Mary.			86.73			0.015	0.015	0.03		
200701006		Finalized	NWP 13	Cosumnes River Levee Repair, RD 800	Four sites, four separate permits. Rows removed for clarity. Unable to quantify amount of loss vs "impacts to". Project was emergency levee repairs.			1.89	Y	1.89	0	0	0		
200701006		Pending	UNAUTHACT	Cosumnes River Levee Repair, RD 800	Pending, but unauth will address only work done after permit expired. Work itself was within conditions of NWP.			0			0	0	0		
200701014		Finalized	NWP 3	Grant Line Channel Restoration Project	0.68 acre temp impacts (str). 0.19 perm imp not loss to (wet)			1.576	Y	0.19	0	0	0		
200701041		Finalized	NWP 27, 33	Bridge Over Laguna Creek - Safe Routes	Temporary impacts only.			0.54			0	0	0		

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200701062		Finalized	LOP	Walnut Grove Marine Dock Modernization	LOP for retention, modernization. Original permit was 9467. Inclusion subject to final boundary. Probably IN. Note Impacts are BAI from old documentation. Delineated acres assumed from impacts.			0.013			0.013	0	0		
200701064		Finalized	NWP 39	Reynolds & Brown CMD Court Property	Delineated acres were already part of 199900299, so not included here. Feature impacted in this NWP was already mitigated for in that project.			0			0.04	0	0		
200701147		Finalized	DEVMBA	Van Vleck Property Mitigation Bank	X			36.68			0				
200701357		Finalized	NWP 12	PG&E's Mather Gas Line Project	Temp impacts only.			4.27			0	0	0		
200701357		Finalized	NWP 12 PERMITMOD	PG&E's Mather Gas Line Project	Modification to delineation and increased temp impacts.			0.171			0	0	0		
200701465		Finalized	NWP 12	Walnut Grove Sewer Project	0.44 perm imp wet, not loss			5.66	Y	0.44	0	0	0		
200701887		Withdrawn	NWP 14	Florin Road Improvement Project	Withdrawn by applicant, March 2009. No further action. Original delineation and impact information is available in file.			0			0	0	0		
200701932		Withdrawn	NWP	SMUD Hedge Training Facility Expansion	Withdrawn by applicant. Last action was AJD in 2009. Not considered reasonably foreseeable at this point.			0			0	0	0		
200702046		Finalized	NWP 3, 33	E.G. Storm Water Maintenance	Sites A through O. Impacts 0.16 (str) via sediment and beaver dam removal.			7.48	Y	0.16	0	0	0		
200702104		Finalized	NWP 27	SMUD Nature Preserve Mitigation Bank	DEVMBA pending			55.66			0.114	24.96	52.58		
200702123		Finalized	PREAPPCONS	Pacific Grove Estates	No Permit Required.			0			0	0	0		
200702210		Finalized	NWP 27	Cosumnes Floodplain Mitigation Bank (aka New Hope)	Data placed in reverification			0			0				
200702210		Finalized	NWP 27	Cosumnes Floodplain Mitigation Bank (aka New Hope)	Reverification. No change from original permit. Temp impacts only. Additional 0.023 acres str not in orig delin added to logged delin.			1.265			0				
200702227	RF	Withdrawn	UNAUTHACT	Hardesty Sand and Gravel	Unresolved. Mitigation is estimated from available documents.			0.172			0.172	0.344	0		
200800061		Finalized	UNAUTHACT	Heatherpace Lane, Gerber Road Violation	Closed. No further action.			0			0	0	0		
200800062		Finalized	NWP 14	Gerber Road Violation	ATF permit.			0.0026			0.0026	0	0		
200800062		Finalized	UNAUTHACT	Gerber Road Violation	ATF initiated			0			0	0	0		
200800114		Finalized	NWP 12	Fresno Bridge 58.10 UPRR	In addition to logged impacts, removal of piles results in 0.0032 net increase in (wet). Did not log as wet creation as this would not have been considered fill in the first place. FWS mit was the only mit. 0.15 GGS habitat, Corps required 0.093 of that to be aquatic. Did NOT use 33.3% rule in this case.			0.07			0.031	0	0.093		

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200800128		Finalized	NWP 39	Plaza III	Note: Although verification states that previous delineation (2006-00381) was used for this project, review shows that the impact area of THIS project was actually not included in that JD. Therefore there are "delineated" entries for both projects.			0.033			0.033	0	0		
200800181		Withdrawn	NWP 14	Bruceville Road/Poppy Ridge Road Improvement Project	Withdrawn due to NPR.			0			0	0	0		
200800402		Finalized	NWP 27	Consumnes River Gravel Augmentation Project	Talking point: Impact vs improvement of function… 1.45 temp imp str.			2.2			0.75	0	0		
200800444	RF	Pending	SP	Stoneridge Quarry	Confirmed correct documents to use for delin/proposed impacts with Marc. Conceptual Mit Plan is 1:1 create at Corps approved mit bank… No Preserv, just avaoidance. No FWS Mit.			42.896			10.419	2.832	0		
200800444	RF	Pending	SP Inclusion	Stoneridge Quarry	Row for conceptual create wet component.			0			0	7.587	0		
200800475		Finalized	NWP 39	Prairie City State Vehicular Recreation Area	Addl 0.38 Isolated wet, 0.42 isolated pond (other). Mitigation: 1.434 acres restore existing resources - logged as rehabilitate Other.	Y	0.8	7.44			0.198	0	0	0.321 rehab wet OUT uda	
200800475		Finalized	NWP 39 Inclusion	Prairie City State Vehicular Recreation Area	X			0			0	0	0	1.113 rehab str OUT uda	
200800499		Finalized	UNAUTHACT Inclusion	Dillard/Meiss Road Parcels	File not on shelf - Dadey? (check for location of mit purchases). Settlement agreement finalized, however, as of 2010, applicant still has not purchased required credits. Conservative delineated figure taken from impacts. Will process a NWP 32 after conditions are met.			0.666			0.666	0.146	0		
200800499		Finalized	UNAUTHACT Inclusion	Dillard/Meiss Road Parcels	Row for FWS reqd mit.			0			0	0.374	0.748		
200800795	RF	Withdrawn	SP	Suncreek EIS - Smith-Dunmore Property	Part of Big Five. JD available. Data for all Suncreek is only logged here (reviewed as a group), except for 2006-00604. Because projects are within Mather core recovery area and must comply with the Sunridge ROD, creation mit was assumed 1:1 out of UDA. Preservation figures come from PN for these projects, (applicant suggested on-site preserves).			38.114			19.132	19.132	18.982		
200800909	RF	Pending	SP	Teichert--Aspen VIII & IX	May 30, 2014 PN does not specify preservation. Lisa Gibson has confirmed that 22.793 acres avoided WOUS will be preserved, but possibly used as a bank at a later date. Preservation acreage reserved (if any) for proposed project is uk at this time.			27.706			4.954	4.954	22.793		

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200800936		Finalized	PREAPPCONS	Bottimore Property	See 2008-001348 - should be same project under new number. No electronic records. JD only. Applicant withdrew request for verification. Permit Required, but no impact info.			0			0	0	0		
200800937		Finalized	NWP 27	Snake Marsh Habitat Improvement Project	Good Talking Point: Restoration of 1 acre wet by removal of water primrose. Restore normally lumped with creation (?), but is it in this case? I put it in Other as rehabilitation.			1	Y	1	0	0	0	1 rehab wet out UDA	
200800950		Finalized	NWP 27	Wong Wetland Restoration Project	Good Talking Point: impacts are excavation involved in restoration of original 3 acres (potential impact not loss).			3	Y	3	0	102	0		
200800974		Finalized	PREAPPCONS	Quail Lakes North	JD only. Resources on-site. No impact/project info yet.			0			0	0	0		
200801214		Finalized	NWP 7	City of Galt Effluent Pipeline Project	0.03 Temp imp str			0.12			0	0	0		
200801317		Finalized	NWP 7	Cosumnes River Elementary School Addition Project	0.004 perm imp (str) not a loss. Additional 0.16 isolated wet (AJD)	Y	0.16	3.87	Y	0.004	0	0	0		
200801348		Finalized	PREAPPCONS	Bottimore Site	JD only. Appears this project number was unneccessarily created, should be with 2004-00555			0			0	0	0		
200801349		Finalized	PREAPPCONS	Mahon Ranch	JD only. Significant amount of resources on-site. No impact/project info yet.			0			0	0	0		
200801362		Finalized	NWP 12	CSA Potable Water T-Main and Florin Road Sewer Project - WRDA Sacramento County	Temp imp 0.434 str, perm imp 0.001 str			12.077			0.001	0	0		
200801384	RF	Pending	DEVMBA	Apple Road Property	JD only. Significant amount of resources on-site. No impact info yet.			0			0	0	0		
200801664		Finalized	NWP 12	SMUD Twin Cities Road Pole Replacement	ATF - no JD, less than 0.001 acre temp impact to (wet).			0.001			0	0	0		
200801797		Finalized	NWP 14	UPRR Bridge Milepost 56.73 Fresno Subdivision	Temp imp 0.25 wet			0.38			0	0	0		
200900172		Finalized	NWP 33	Elk Grove Creek Pedestrian Overcrossing	0.47 temp imp str			4.56			0	0	0		
200900172		Finalized	NWP 42	Elk Grove Creek Pedestrian Overcrossing	See Inclusions			0			0.09	0.03	0		
200900172		Finalized	NWP 42 Inclusion	Elk Grove Creek Pedestrian Overcrossing	Corps mit requirement, str.			0			0	0.06	0		
200900172		Finalized	NWP 42 Inclusion	Elk Grove Creek Pedestrian Overcrossing	Revised BO required 0.24 aquatic (GGS) habitat credits (33% NOT used, full amount instead), FWS apprv cons bank, loc uk.			0			0	0.24	0		
200900199		Finalized	UNAUTHACT	SMUD power pole placement in Anatolia preserve	No Further Action. No data. File not on shelf, so unsure of actual impacts, if any. Ness does not know location of file.			0			0	0	0		
200900291		Pending	NPR	Six County Aquatic Resources Inventory	X			0			0	0	0		
200900369		Withdrawn	NWP 14	Grant Line Road/ Waterman Road Intersection Improvement	Withdrawn. Exists as 2006-01045.			0			0	0	0		

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200900404	RF	Withdrawn	SP	Mather Specific Plan - Airport Commercial	Do not include delineated waters. This figure is included in 2002-00561. Kate said all Mather Specific Plan projects can be summed. Data is logged only in "Master File" (2009-00530)			0			0	0	0		
200900477		Finalized	NWP 27	Cosumnes River Preserve Corral Ponds	Enhancement of exising wetland plus net increase of 0.8 wet			11.5			0	0.8	0	11.5 Enh Wet out UDA	
200900493	RF	Withdrawn	SP	Douglas Jaeger Widening	Withdrawn due to court order on Sunrise-Douglas.			1.514			1.514	1.514	2.226		
200900511		Finalized	EIS	Sunridge Properties - Sunrise Douglas Litigation	X			0			0	0	0		
200900525	RF	Withdrawn	SP	Mather Specific Plan - Commercial	Do not include delineated waters. This figure is included in 2002-00561. Kate said all Mather Specific Plan projects can be summed. Data is logged only in "Master File" (2009-00530)			0			0	0	0		
200900526	RF	Withdrawn	SP	Mather Specific Plan - Mining/Aggregate Extraction	Do not include delineated waters. This figure is included in 2002-00561. Kate said all Mather Specific Plan projects can be summed. Data is logged only in "Master File" (2009-00530)			0			0	0	0		
200900527	RF	Withdrawn	SP	Mather Specific Plan - Parks and Recreation	Do not include delineated waters. This figure is included in 2002-00561. Kate said all Mather Specific Plan projects can be summed. Data is logged only in "Master File" (2009-00530)			0			0	0	0		
200900528	RF	Withdrawn	SP	Mather Specific Plan - Regional Sports Park	Do not include delineated waters. This figure is included in 2002-00561. Kate said all Mather Specific Plan projects can be summed. Data is logged only in "Master File" (2009-00530)			0			0	0	0		
200900529	RF	Withdrawn	SP	Mather Specific Plan - University Village/Residential	Do not include delineated waters. This figure is included in 2002-00561. Kate said all Mather Specific Plan projects can be summed. Data is logged only in "Master File" (2009-00530)			0			0	0	0		
200900530	RF	Withdrawn	SP	Mather Specific Plan - Infrastructure and Master File	Do not include delineated waters. This figure is included in 2002-00561. Kate said all Mather Specific Plan projects can be summed. Data is logged only in "Master File" (2009-00530)			0			48.28	48.28	81.3		
200900576		Finalized	PREAPPCONS	North Vineyard Station Off-site Road improvements	File not on shelf. No electronic records.			0			0	0	0		
200900731		Finalized	NWP 27	Rooney Dam Repair and Fish Passage Improvement Project	X			0			0.08	0	0		
200900731		Finalized	NWP 3	Rooney Dam Repair and Fish Passage Improvement Project	0.06 perm imp (str) not loss. 0.26 temp imp str.			0.4	Y	0.06	0	0	0		
200900880		Finalized	NWP 14	Zinfandel Drive Extension Project - WRDA Sac County	No JD. Waters are part of larger Mather proj, which is logged in 2002-00561.			0			0.052	0.025	0		

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200900880		Finalized	NWP 14 Inclusion	Zinfandel Drive Extension Project - WRDA Sac County	NOTE: addendum to Corps Dec Doc showed reliance on FWS creation component to meet mit requirements. FWS preserv requirements were not tabulated into any mit ratio, nor was mentioned in verification, but were incuded in mitigation summary addendum. Additional mit reqd by FWS: 0.06 vp (wet) creation credits and 2.06 vp (wet) pres credits at FWS apprv Cons Bank.			0			0	0.06	2.06		
200900974		Finalized	NWP 33	Elk Grove Fiber Optic Cable Repair	0.003 temp imp wet			0.0124			0	0	0		
200901345		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Site A-Elk Grove Creek)	0.005 temp imp str, and 0.005 perm imp (str) not a loss.			0.01	Y	0.005	0	0	0		
200901430		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Sites B & F- Strawberry Creek)	0.04 temp imp str, and 0.04 perm imp (str) not a loss.			0.08	Y	0.04	0	0	0		
200901435		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Site C-Whitehouse Creek)	0.025 temp imp (str) and 0.025 perm imp (str) not a loss.			0.05	Y	0.025	0	0	0		
200901438		Finalized	NWP 3	Elk Grove Routine Stormwater Maintenance Project 2009-2010 (Sites D and E-Laguna Creek)	0.155 temp imp str, and 0.155 perm imp (str) not a loss.			0.31	Y	0.155	0	0	0		
200901599		Finalized	NWP 14	Schoeffler Road Improvement Project	X			0.024			0.024	0	0		
200901599		Finalized	UNAUTHACT	Schoeffler Road Improvement Project	After-the-fact permit initiated.			0			0	0	0		
200901637		Finalized	UNAUTHACT	Laguna Creek Batch Plant	Closed. No Fill.			0			0	0	0		
201000202		Finalized	NWP 12	Aerojet GET H Pipeline Extension	0.014 temp imp str.			0.023			0	0	0		
201000216	RF	Finalized	PREAPPCONS	Capital SouthEast Connector Project	Delineated figure high because 92.5 acres irrigated pasture considered to be wetland (from FEIR, Feb 2012). All figures proposed at this time. Impacts are considered equal to delineated in the absence of other info, and infered from FEIR. 1:1 creation mitigation is assumed Corps requirement.			127.6			127.6	127.6			
201000268		Finalized	UNAUTHACT	Franzia Violation at Gill Ranch	Referred to EPA. JD is in 2004-00813. Massive site, should JD be included here? For now delineated taken from impacts. Delineation actually verified over 500 acres wous, so for data considerations/skewing, etc, we only included the impact as a conservative delineated figure.			0.05			0.05	0	0		
201000455		Finalized	NWP 14	Vineyard Road Bridge Replacement-WRDA Sacramento County	Addl 0.0014 acre (str) perm impact not loss from bridge piers.			0.1347	Y	0.0014	0.0102	0.05	0		
201000491		Finalized	NWP 12	Sheldon Road & Highway 99 Overpass Gas Main Project	0.003 temp imp str			0.003			0	0	0		

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201000617		Finalized	NPR	Silverado Bank Lots 5 and 6	X			0			0	0	0		
201000729		Finalized	NWP 29	Arbor Creek Affordable Housing	X			0.2896			0.2896	0.2896	0		
201000823		Finalized	NPR	Line 108 Pipeline Replacement Project - Phase 1	X			0			0	0	0		
201000861		Finalized	NWP 14	Longleaf Drive Bridge	0.07 temp imp str. FWS reqd 0.63 GGS habitat (used 33.3%)			0.106			0.002	0.21	0		
201000938		Finalized	NWP 12	X09 Communication Poles Replacement Project - WRDA Sac County	X			2.01			0.001	0	0		
201000961	RF	Withdrawn	SP	Mather Airport Layout Plan	Application not yet received. Still Pre-App phase (06/06/13)			0			0	0	0		
201001133		Finalized	NWP 12	Line 108 Pipeline Replacement Project-Phase II	0.94 temp wet imps only.			2.635			0	0	0		
201001462		Finalized	NWP 14	Twin Cities Road Interchange Project	Create 0.053 wet requirement was to be at both "FWS and Corps Approved" mit bank. 0.142 Preservation was only reqd by FWS. At "FWS approved Cons bank".			0.64			0.053	0.053	0.142		
201001462		Finalized	NWP 14 Inclusion	Twin Cities Road Interchange Project	This row for stream impacts/mit. Net gain in acreage.			0			0.25	0.352	0		
201001462		Finalized	NWP 14 Inclusion	Twin Cities Road Interchange Project	Addl 0.01 Create wet credits at "Corps Approved mit bank. Loc UK. Inclusion to reflect Corps only reqd mit.			0			0.01	0.01	0		
201100033		Finalized	LOP	Grant Line Road Widening Project Phase 1, Additional Area	Impacts are affecting delineated waters on other delineated project sites. (2006-01045 + 2005-00525). Only delineation not included in those sites is logged here.			0.19			0.81	0.33	0		
201100033		Finalized	LOP Inclusion	Grant Line Road Widening Project Phase 1, Additional Area	X			0			0	0.96	0		
201100034		Finalized	NWP 42	Laguna Creek Bike Trail Connector	0.02 temp imp str. AJD: In addition to delin values at right, another 0.015 drainage ditch (unregulated), and 0.120 isolated wetlands. FWS req 0.044 pres wet for indirect imps at FWS apprv MIT bank. FWS also req 1.86 GGS habitat at FWS apprv CONS bank. (33.3% used).	Y	0.135	0.61			0	0.619	0.044		
201100073		Finalized	PREAPPCONS	Arcade Creek Gas Line Relocation	Julie input data into ORM. Permit probably required for work, but there is no additional info in file. Not sure of current status.			0			0	0	0		
201100197		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 1	No JD, 0.036 temp imp str			0.036			0	0	0		
201100200		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 2	Reverification, same 0.007 temp imp str as previous permit.			0			0	0	0		
201100200		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 2	No JD, 0.007 temp imp str			0.007			0	0	0		
201100201		Finalized	NWP 3, 13	City of Elk Grove Routine Stormwater Maintenance Project - Sites 3 and 4	No JD, 0.355 temp imp str			0.355			0	0	0		

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201100202		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 5	No JD, 0.096 temp imp str			0.096			0	0	0		
201100203		Finalized	NWP 3	City of Elk Grove Routine Stormwater Maintenance Project - Site 6	No JD, 0.002 temp imp str			0.002			0	0	0		
201100276		Finalized	SP	White Rock Road Widening - WRDA Sacramento County	Corps req 0.096 pres wet at Bryte Ranch, but said that is an overlap with FWS required 2.661 pres vern habitat at Bryte. Only the 2.661 is recorded.			6.11			1.022	0	2.661		
201100276		Finalized	SP Inclusion	White Rock Road Widening - WRDA Sacramento County	FWS req an addl 6.801 pres vern habitat at Service apprv CONS Bank.			0			0	0	6.801		
201100276		Finalized	SP PERMITMOD	White Rock Road Widening - WRDA Sacramento County	Modified location of Corps reqd mitigation from original SP - Two sites, both completely OUT of study area. Both sites are summed in creat wet field.			0			0	1.002	0		
201100339		Finalized	NWP 14	Elk Grove Hazardous Waste Facility	Addl 0.01 perm imp stream, 0.01 temp imp str			0.02			0.01	0	0		
201100339		Finalized	NWP 14, 33	Elk Grove Hazardous Waste Facility	No JD, 0.004 Temp Imp str, 0.03 Perm imp str. AJD 0.97 ponded features determined not WOUS (unregulated)	Y	0.97	0.034			0.03	0	0		
201100391		Finalized	NWP 7	SMUD East Campus - Operation Center Project	0.002 perm imp (str) not a loss. No JD			0.002	Y	0.002	0	0	0		
201100585		Finalized	NWP 12	Digital 395 Barstow to Reno	Temp impacts only, no mitigation. Use delineated?? 10.433 delineated, unspec resource types. All 3 cats present. 0.541 temp imp. 191 permit actions removed for clarity. Multiple reverifications, increase in temp impacts, no other changes. Decision was to evenly split delineated acres through resource types.			10.434			0	0	0		
201101017		Finalized	UNAUTHACT	Mohamed Violation	Resolved. Not a violation.			0			0	0	0		
201101019		Finalized	NWP 7	Anatolia Overchute	0.01 perm imp (str) not a loss.			0.01	Y	0.01	0	0	0		
201200116	RF	Pending	UNAUTHACT	Clay Station Properties, LLC Violation	Data from Lisa G's best estimate.			18.5			4	0	0		
201200195	RF	Pending	UNAUTHACT	Calosso Property Violation	Only PJD and impacts known.			44.567			10.291	0	0		
201200525		Finalized	NWP 12	Tracy-Hedge Optical Ground Wire (OPGW)	No JD, Overhead lines, no fill for all actions, 9 actions removed for clarity			0			0	0	0		
201200729		Finalized	NWP 6	Twin Cities Road Bridge Replacement Geotechnical Borings	Reverify work window			0			0	0	0		
201200729		Finalized	NWP 6	Twin Cities Road Bridge Replacement Geotechnical Borings	No JD			0.00006			0.00006	0	0		
201200945		Finalized	NWP 14	Dwight Road Extension - WRDA Sacramento County	No mit required other than FWS GGS mit, so included on this line. (33.3% rule used).			3.57			0.07	0.82	0		
201200969		Finalized	NWP 12	Jacobsen Water Development Project	No JD, Temp Imp 0.014 str			0.014			0	0	0		

EIS/EIR APPENDIX B

Summary of Process to Determine the Scope of the EIS/EIR (Scoping) (Part 1 of 2)

South Sacramento Habitat Conservation Plan Environmental Impact Statement/Environmental Impact Report

2013 Additional Scoping - Summary Report

PREPARED FOR:

U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office
Conservation Planning Division, Endangered Species Program
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

and

Sacramento County
Department of Community Development
827 7th Street, Room 220
Sacramento, CA 95814

May 20, 2015

South Sacramento Habitat Conservation Plan
Environmental Impact Statement/Environmental Impact Report

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May 20, 2015

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A NOI, NOP, Scoping Meeting Announcements, Scoping Meeting Materials, Scoping Meeting Notes, and Comments Received

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ACRONYMS AND ABBREVIATIONS

BDCP	Bay Delta Conservation Plan
BMPs	Best Management Practices
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CEQ	Council on Environmental Quality
CWA	Federal Clean Water Act
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	federal Environmental Protection Agency
IE	Implementing Entity
ITP	Incidental Take Permit
LURMP	Land Use and Resource Management Plan
NNL	National Natural Landmark
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NOP	Notice of Preparation
SOI	Sphere of Influence
SSHCP	South Sacramento Habitat Conservation Plan
UDA	Urban Development Area
USACE	United States Army Corps of Engineers
USB	Urban Services Boundary
USFWS	United States Fish and Wildlife Service

1 INTRODUCTION

This scoping summary report reviews the additional public scoping effort conducted in 2013 for the South Sacramento Habitat Conservation Plan (SSHCP) (Plan) environmental impact statement (EIS) and environmental impact report (EIR). Public scoping processes occurred twice: once in 2008 and once in 2013. In 2013, the draft SSHCP had been further refined, some conditions had changed, and sufficient time had elapsed that the applicants felt that a second scoping process was warranted. The 2013 scoping was primarily directed to stakeholders that had not been approached during the 2008 scoping process.

Lead agencies must solicit appropriate information from the public and must make a diligent effort to involve the public in their NEPA and CEQA processes. An early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action is required by the Council on Environmental Quality (CEQ) regulations and the Department of Interior regulations for implementing the National Environmental Policy Act (NEPA), as well as the California Environmental Quality Act (CEQA) Statues and Guidelines for preparation of an EIR. The process of public and inter-agency scoping is an integral part of the environmental review process. Scoping includes refining the proposed action and identifying all reasonable alternatives, identifying preliminary issues deserving of study, deemphasizing insignificant issues to narrow the scope of the environmental document, and identifying interested and affected persons. The results of the scoping process are used by lead agencies to determine the "scope" of their environmental document. The "scope" of an environmental document consists of the range of actions, alternatives, environmental effects, and mitigation measures to be considered and analyzed in the document.

The United States Fish and Wildlife Service (USFWS) (for the National Environmental Policy Act [NEPA]) and Sacramento County (for CEQA) are the lead agencies for preparation of this EIS/EIR. In addition, the U.S. Army Corps of Engineers (USACE), the US Environmental Protection Agency (USEPA), and the California Department of Fish and Wildlife (CDFW) will act as cooperating agencies under NEPA due to the nexus between the SSHCP and other federal and state environmental-permits required to implement the SSHCP. For the preparation of this EIS/EIR, the document must be in compliance with NEPA as amended, the NEPA regulations, and all other applicable federal laws, executive orders, regulations, and direction, and the EIS/EIR must be in compliance with the CEQA statute and guidelines and all other applicable state laws and regulations.

1.1 PUBLIC AND AGENCY INVOLVEMENT

1.1.1 Public Notices – Scoping

The 2013 public scoping began on October 28, 2013 with a Notice of Preparation (NOP) provided to the California State Clearinghouse (pursuant to CEQA) and on November 4, 2013 with the publication of a Notice of Intent (NOI) in the *Federal Register* (pursuant to NEPA). These documents are provided in Appendix A.

The NOP was distributed to state agencies on October 28, 2013 through the California State Clearinghouse and posted on the Clearinghouse website (http://www.derasearch.saccounty.net/portals/0/docs/EnvDocs_Notices/20030637020131028083136.pdf). The NOP was also posted on a project website developed by the County specifically for the SSHCP (http://www.per.saccounty.net/PlansandProjectsIn-Progress/Pages/SSHCPPlan.aspx). The NOP was sent to 60 recipients via US Postal Service and on November 12, 2013, Sacramento County staff sent an email to 178 recipients providing a link to the NOI and NOP and information about the scoping meetings. The announcements and their distribution are included in Appendix A.

The NOI was published in the federal register and was available on the website starting on October 28, 2013 (https://www.federalregister.gov/public-inspection).A news release prepared by the USFWS announcing the NOI and scoping meeting was sent by the USFWS Sacramento Regional Office, via e-mail to 153 recipients in and around Sacramento County on November 4, 2013. . Beginning on November 3, 2013, the NOI and News Release was also available for review on the USFWS's website at http://www.fws.gov/sacramento/. The announcements and their distribution are included in Appendix A.

The NOI and NOP provided the public information on the proposed SSHCP, notified the public of the intent to prepare the EIS/EIR, and provided details on how to participate in public scoping meetings to be held on November 20 and 21st, 2013. Both the NOI and NOP included a project description and a list of the covered species; the NOP also included a map of the plan area. The NOI informed the public that written comments would be accepted for 45 days after the start of the scoping period, or until December 19, 2013, while the NOP stated comments would be accepted for 30 days after the start of the scoping period, or until December 13, 2013.

Both the NOI and NOP identified various mechanisms to provide input during the scoping process including the two scoping meetings, Sacramento County email, USFWS facsimile, and mailing addresses for USFWS and the County.

1.1.2 Media Coverage

Although information was provided to media outlets, no articles concerning the project and habitat conservation issues in the Plan Area were published as a result of the 2013 NOI or NOP.

1.1.3 Public Scoping Meetings

The first 2013 public scoping meeting was held on Wednesday, November 20, from 6:30 p.m. to 8:30 p.m., at the Anthony Pescetti Community Room, Galt Police Facility, 455 Industrial Drive, Galt, CA 95632. Thirteen participants signed in for the Galt meeting. The meeting included an open house prior to and following the presentation of the proposed action, a summary of the NEPA process, and receipt of oral and written comments from the public.

The second 2013 scoping meeting was held on Thursday November 21, from 2:00 p.m. to 4:00 p.m., at the Governor's Office of Planning and Research, Large Conference Room 202, 2nd Floor, 1400 Tenth Street, Sacramento, California, 95814. Sixteen participants signed in for the Sacramento meeting. The meeting included an open house prior to and following the presentation of the proposed action, a summary of the NEPA process, and receipt of oral and written comments from the public.

Only one individual or group submitted a written comment during the two scoping meetings. All verbal and written scoping comments received from the agencies and the general public are provided in Appendix A and are summarized in Table 1 below.

1.1.4 Collaboration and Consultation with Tribes

The County coordinated with the Native American Heritage Commission to compile a list of individuals and organizations that may have knowledge of heritage lands or other resources of interest that the project could potentially affect. The NOP was sent to the State Clearing House and the Native American Heritage Commission was one of the reviewing agencies. The County also mailed the NOP to the Buena Vista Rancheria. The USFWS Sacramento Regional Office emailed the news release regarding the NOI and scoping

meetings to Rhonda Morningstar Pope (Tribal Chairwoman) and Roselynn Lwenya (Environmental Resources Director/THPO) at the Buena Vista Rancheria.

2 SIGNIFICANT ISSUES IDENTIFIED IN SCOPING COMMENTS

During the 2013 scoping period, a total of eight individuals or groups submitted letters. Many of these letters included multiple comments. Written comments via U.S. mail and e-mail came from state agencies, local agencies, non-profit groups, and concerned citizens. The written commenters included: Stone Lakes Wildlife Refuge and Association, the Delta Protection Commission, Lynn Wheat, Delta Stewardship Council, California Department of Transportation, Sacramento-Yolo Mosquito and Vector Control District, Friends of the Swainson's Hawk, and U.S. Department of the Interior National Park Service (National Park Service. Only one written comment was received during the two scoping meetings, from the Friends of the Swainson's Hawk.

In addition to the written comments received, individuals provided verbal comments. Verbal comments were provided via telephone to USFWS from the staff of Assemblyman Richard Pan on November 4, 2013 and from the Stone Lakes National Wildlife Refuge staff during a meeting with refuge staff, at the refuge, on January 21, 2014. In addition, a total of 19 verbal comments were provided at the two scoping meetings from those who attended. The scoping meeting comments are listed below in the "Scoping Meeting Comments" section in Appendix A. Most of the comments pertain to the SSHCP, while some apply to both the Plan and the EIS/EIR processes.

Eighty-four total written and verbal comments were received during scoping which were organized into 10 general topic areas. Table 1 summarizes the number and percentages of comments received related to each general topic area. Table 2 summarizes the comments received during scoping, organized by general topic area.

Table 1 Scoping Issue Summary

Air Quality	2	2%
Consistency with Local and Regional Planning Documents	14	17%
Economics	3	4%
Grazing and Mining	2	2%
Mitigation	9	11%
Permitted Activities	13	15%
Planning Process	19	23%
Preserves	6	7%
Sensitive Species	12	14%
Water Resources and Hydrology	4	5%
Total	**84**	

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
Air Quality			
	If approved, the HCP and related incidental take permit (ITP) seems to apply to a wide range of activities that could be mitigated to an accepted level of protection for listed species. This appears to be a convenient approach for the benefit of development in the region. However, the EIR/EIS should discuss the mechanisms that are/are not in place to ensure that those approved activities comply either individually or cumulatively with the federal Environmental Protection Agency (EPA) air quality standards for the region.	Lynn Wheat	12/18/2013
	Wouldn't deteriorating air quality (and the ability of member jurisdictions to easily adopt CEQA statements of Overriding Considerations) eventually jeopardize the sustainability of the habitat of the species this HCP is intended to protect (not to mention human health)?	Lynn Wheat	12/18/2013
Consistency with Local and Regional Planning Documents			
	The Delta Plan, including its policies and recommendations, should be acknowledged in the EIR's description of the project's environmental setting.	Delta Stewardship Council	12/17/2013
	Discuss or include in the EIR any inconsistencies with the Delta Plan as required by 15125(d) of the CEQA Guidelines.	Delta Stewardship Council	12/17/2013
	The EIR should include an analysis of the potential loss of agricultural land in the Delta caused by urban development covered by the SSHCP to be consistent with the Delta Plan Policy (DP P1 923 CCR Section 5010). Please quantify the aerial extent of the proposed urban development area (UDA) within the Delta, and discuss any potential impacts to agricultural resources.	Delta Stewardship Council	12/17/2013
	The EIR should analyze the impact of any urbanization or the placement of permanent agricultural easements on the opportunity to restore seasonal floodplain and riparian habitat within the Delta Plan's Cosumnes-Mokelumne Confluence area as per Delta Plan Policies- ER P2 (23 CCR Section 5006) and ER P3 (23 CCR Section 5007). The EIR should assess impacts to the opportunity to restore these areas for the habitat uses encouraged by the Delta Plan or the conservation measures recommended in the draft Bay Delta Conservation Plan.	Delta Stewardship Council	12/17/2013
	The Delta Plan Policy ER P5 (23 CCR Section 5009) calls for avoiding introductions of and habitat improvements for invasive non-native species. The EIR should analyze the project's potential to introduce or improve habitat for non-native invasive species.	Delta Stewardship Council	12/17/2013
	The NOP states that the EIR will analyze hydrology and presumably, flooding. The Delta Plan contains three policies that are most relevant to the County's consideration of this issue: Policy RR P2 (23 CCR section 5013) requires flood protection for residential development in rural areas, Policy RR P3 (23 CCR section 5014) restricts encroachment in floodways, and Policy RR P4 (23 CCR Section 5015) restricts encroachments in floodplains, including the Cosumnes-Mokelumne Confluence. Policy RR P4 states that "no encroachment shall be allowed or constructed unless it can be demonstrated by appropriate analysis that the encroachment will not have a significant impact on the floodplain values and functions."	Delta Stewardship Council	12/17/2013
	In addition, the Delta Plan contains a recommendation (RR R6) encouraging the Central Valley Flood Protection Board to evaluate designating additional floodways. Flood risk reduction should be included as a factor when evaluating various conservation and development scenarios. The EIR should include an analysis of potential conflicts between proposed activities in the SSHCP and the	Delta Stewardship Council	12/17/2013

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
	implementation of the project.		
	The Delta Reform Act specifically established a certification process for compliance with the Delta Plan's regulatory policies. If the South Sacramento Habitat Conservation Plan is a covered action under the Delta Plan, a way to streamline the process and make full use of the EIS/EIR is to include the information and analysis needed to support the certification of the Delta Plan consistency within the EIS/EIR, potentially including a draft certification as an appendix to the EIS/EIR.	Delta Stewardship Council	12/17/2013
	A portion of the project lies within the Primary Zone of the Sacramento-San Joaquin Delta (predominantly the land located west of Interstate 5) and is subject to consistency requirements with the Delta Protection Commission's Land Use and Resource Management Plan (LURMP) for the Primary Zone of the Delta. Please review the LURMP and ensure that the EIR is consistent with the goals and policies related to land use agriculture, natural resources, recreation access, water, levees and utilities infrastructure.	Delta Stewardship Council	12/17/2013
	The NOP indicates a list of covered activities that may not be supported in the Primary Zone of the Delta and may be inconsistent with Delta Protection Commission's Land Use and Resource Management Plan (LURMP) Policy P-2. Please specify which covered activities are being proposed in the Primary Zone of the Delta.	Delta Protection Commission	12/18/2013
	Please review the Delta Protection Commission's Land Use and Resource Management Plan to ensure consistency with agricultural policies.	Delta Protection Commission	12/18/2013
	Please review the Delta Protection Commission's Economic Sustainability Plan for the Sacramento-San Joaquin Delta (2011) which is an important document guiding future activities in the legal Delta. Proposals for habitat management activities should consider the recommendations on Economic Sustainability for Agriculture, Recreation and Tourism; and Habitat and Ecosystem Improvements (pg. 274, 276).	Delta Protection Commission	12/18/2013
	Scott Finley and Bart McDermott noted that the Bay Delta Conservation Plan (BDCP) applicants have proposed that the BDCP could "swap out" future BDCP preserves established in areas where the BDCP Plan Area overlaps the Plan Area of another HCPs— if that habitat is needed later by the other HCP. Bill Ziebron and Jan Knight said that BDCP proposal lacked sufficient detail and did not explain how a preserve "land swap" could be implemented.	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR
	What is the relationship between the SSCHP and the BDCP?	Assemblyman Richard Pan's Office via Robert Moler	11/04/2013 Phone Call with USFWS
Economics			
	How will the HCP be financed? How will the Plan Partners/Regulatory Agencies factor in inflation over the life of the permit?	Scoping Meeting Comment	11/21/2013
	Bart McDermott (Refuge Manager) asked how the SSHCP will assure that their wetland habitats can be managed for a 50 year permit term, and then in perpetuity— managing wetland habitats on the Refuge are much more "hands on" and expensive than managing their upland habitats. Rob Burness asked if the SSHCP will be able to fund the long-term management of the SSHCP preserve lands, especially those that are inside the Refuge boundary or in the area between the Refuge and the Cosumnes Preserve.	Stone Lakes NWR	01/21/2014 Meeting at Stone Lakes NWR
	Rob Burness asked how SSHCP covered-activity mitigation fees will be determined.	Stone Lakes NWR Association	01/21/2014 Meeting
	Bart McDermott (Refuge Manager) noted that the Refuge has extensive information	Stone Lakes NWR	01/21/2014

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
	on costs for wetland management, and could provide this information to the SSHCP. Bart estimates that seasonal wetland management on the Refuge is $200-$300 per acre; most of that cost is from water pumping and weed control.		Meeting at Stone Lakes NWR
Grazing and Mining			
	Is grazing land considered "agriculture" or "annual (non-native) grassland"?	Scoping Meeting Comment	11/21/2013
	Draft SSHCP Conservation Strategy (most recent version available at the time) p7-180 Tri-Colored Blackbird. Paragraph 4 discusses possible threats to the species. Please document all unsubstantiated claims with scientific and supportive evidence, and utilize current research as it pertains to mosquito control for all species	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
Mitigation			
	How do proposed or existing mitigation banks relate to the proposed HCP?	Scoping Meeting Comment	11/20/2013
	The EIS/EIR should discuss the time lag that will likely exist between the pace of new development (the immediate loss of habitat) and the timing of acquisition of new, replacement mitigation land.	Lynn Wheat	12/18/2013
	Can eminent domain ever be used to assist in purchasing new land if the time gap between immediate loss of habitat and the acquisition of new habitat ever becomes unacceptable?	Lynn Wheat	12/18/2013
	What measures will be adopted to ensure that the SSHCP covered-activity impact fees will always correlate with the market prices of mitigation land?	Lynn Wheat	12/18/2013
	Page 6-63 paragraph 3- "No vehicle access or traffic would be able to access preserves." Please ensure that the Sacramento-Yolo Mosquito and Vector Control District has the appropriate provisions contained with the SSHCP to allow for District access to all SSHCP preserve and buffer areas.	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	Can the area of mitigation originally proposed for Swainson's hawk be considered again? Similarly, the eastern and western portions of the Plan Area differ in importance to Swainson's hawk; therefore, can the conservation for Swainson's hawk be concentrated east of I-5 as much as possible?	Scoping Meeting Comment	11/21/2013
	Mitigation in the area west of I-5 and west of Snodgrass Slough may not be effective or a good long term solution because these areas are below sea level.	Scoping Meeting Comment	11/21/2013
	Will ratio for Swainson's hawk mitigation be 1:1, and be dependent on the land cover type?	Scoping Meeting Comment	11/21/2013
	If the SSHCP is a covered action under the Delta Plan, it would be affected by the Delta Plan's Policy G P1 (23 CCR Section 5002(b)(2) which states " Covered actions not exempt from CEQA must include applicable feasible mitigation measures identified in the Delta Plan's Program EIR or substitute mitigation measures that the proposing agency finds are equally or more effective"	Delta Stewardship Council	12/17/2013
SSHCP Permitted (Covered) Activities			
	While many of the potential impacts remain unknown at this time, failure to address mosquito breeding issues during the planning, construction and management process of aquatic habitats may result in enforcement actions to the landowner.	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	Excavation Activities: The cubic yard removal thresholds for beaver dam and related blockage removal may exceed the limits provided by the SSHCP. Please include a recognition of the impacts to public health cause be beaver dams and other blockages by creating mosquito habitat and by following the provisions contained in this SSHCP, allow these dams to be removed in excess of the allowable cubic yards	Sacramento-Yolo Mosquito Vector Control District	12/12/2013

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
	on an as needed basis.		
	Chapters 6.8.2/6.8.3 page 6-84 and 6-87, Uses and Activities Not Permitted within Stream Buffer Zones: To the exception list under "clearing or cutting of riparian woodland vegetation," please add "Vegetation removal for the purpose of mosquito control and BMP implementation."	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	Please include Drainage Maintenance and Mosquito Reduction Best Management Practices (BMP) Implementation to the list of SSHCP management activities	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	Add AMM16- Implement Mosquito Reducing BMPs in all designs, management and construction plans.	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	Restoration and Creation Guidelines: Please add a section under Project Design to include a requirement to reference, construct, and manage any habitat restoration or creation projects following the Sacramento-Yolo Mosquito and Vector Control District BMP manual.	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	The HCP must recognize that in certain instances the health and safety code may be the more restrictive of landowner regulatory requirements, thus requiring BMP implementation to reduce mosquito breeding.	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	Scott Finley noted that the Stone Lakes NWR Refuge Association is very concerned about rapid loss of grazing lands and wildlife habitat inside the Refuge planning boundary to new vineyards. He would like information on any SSHCP plans for early preservation of habitat and the SSHCP conservation strategy's "get ahead/stay ahead" component	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR
	Rob Burness and Scott Finley asked about current acres in the SSHCP's "take area" (the UDA), and asked if acres presented in the NOI and NOP will change because of LAFCo's recent decision denying the proposed Elk Grove sphere of influence (SOI) expansion. Rob Burness noted that the lands within the proposed SOI expansion area are critical foraging habitat for several Refuge species, and that area is essential to providing a habitat link between the Cosumnes Preserve and the Refuge	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR
	Bart McDermott noted that sandhill cranes, curlews, and other species use the proposed Elk Grove SOI expansion area to go back and forth between the Refuge and the Preserve; however, farmland throughout this linkage area is being lost to vineyards and solar, and the dairies present during the Refuge scoping period (20 year ago) are now closed. Species on the Refuge will need this adjacent area to remain as farmland. Also, this linkage area is important in the long run, because other areas of existing species-habitat will likely be lost to rising sea level and saltwater intrusion over time. Bart stated that the SSHCP is a good mechanism to preserve farmland habitats east of Interstate 5 (I-5).	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR
	Scott Finley asked how the SSHCP will incorporate Climate Change information in future land-acquisition decisions for preserves—has expected salt water intrusion and land-subsidence been considered in development of alternative conservation strategies? Will expected sea level rise be included in the SSHCP analysis?	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR
	Rob Burness asked a question about the Kammerer Road improvement project, and if this work would be part of the Capitol Connector highway project (a SSHCP Covered Activity), or if it will be a separate project constructed by the City of Elk Grove.	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
Planning process			
	Who are the NEPA/CEQA lead/cooperating agencies?	Scoping Meeting Comment	11/21/2013
	Can PowerPoints and maps shared at tonight's meeting be provided to the public through the County's website?	Scoping Meeting Comment	11/20/2013 and 11/21/2013
	How can the public get involved in the process? How can the public get minutes from the LAWG and RAWG meetings?	Scoping Meeting Comment	11/20/2013
	As a responsible agency, Caltrans is committed to coordinate with Sacramento County and the other federal, State, and local partners as the SSHCP is being developed. Please include Caltrans in any interagency working groups that may be formed and provide us with any information on project actions.	California Department of Transportation	11/26/2013
	The EIR/EIS should address the potential impact if cities within the HCP area either "opt out" of the HCP at a later date, and/or independently acquire mitigation lands (inside or outside of their jurisdiction) to reserve that land as mitigation for development projects occurring within their own jurisdiction. For instance, the EIR should address the problems associated with competing territorial mitigation lands undermining the HCP's effort to acquire mitigation lands to support regional development.	Lynn Wheat	12/18/2013
	The EIR/EIS should clearly articulate the processes that would be involved if the HCP is being subjected to an amendment request. The public is interested in assessing the political arena in which this final document will exist so we may be confident in the HCP's ability to provide long-term protection of the species in the region.	Lynn Wheat	12/18/2013
	Bart McDermott (Stones Lakes National Wildlife Refuge manager) requested a briefing about the SSHCP.	Stone Lakes National Wildlife Refuge	11/04/2013
	It should be noted that both the Cosumnes River Riparian Woodland National Natural Landmark (NNL) and American River Bluffs and Phoenix Park Vernal Pools NNL appear to be within the plan area of approximately 374,000 acres or quite possibly within the smaller 123,000-acre UDA.	National Park Service, Pacific West Region	01/16/2014
	The boundary of the Cosumnes River Riparian Woodland NNL is currently being evaluated for possible expansion by the National Park Service. If expanded, the landmark would continue to be part of the much larger Cosumnes Preserve, which encompasses an additional 820 acres.	National Park Service, Pacific West Region	01/16/2014
	What role will PMC Consulting firm play in the preparation of the EIS/EIR?	Scoping Meeting Comment	11/20/2013
	What alternatives will be evaluated in the EIS/EIR?	Scoping Meeting Comment	11/20/2013
	How will the HCP and HCP EIS/EIR public comment period and approval process proceed? How can the public get involved in this process?	Scoping Meeting Comment	11/20/2013
	What role does California Department of Fish and Wildlife (CDFW) have in this planning process? What action will CDFW take on the HCP?	Scoping Meeting Comment	11/21/2013
	Why won't the use of eminent domain be utilized during implementation of the HCP?	Scoping Meeting Comment	11/20/2013
	The EIS/EIR should include an Alternative that includes the original SSHCP western boundary, which ended at Interstate-5.	Friends of the Swainson's Hawk	11/20/2013 Scoping Meeting Comment Card
	Alternatives- Include an EIS/EIR alternative with the higher mitigation ratio for	Friends of the Swainson's Hawk	11/20/2013

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
	impacts to Swainson's hawk.		Scoping Meeting Comment Card
	The "preferred alternative" should limit the SSHCP's "area of take" to be the of the adopted urban services boundary (USB). Multiple reasons were given to support this as the preferred alternative.	Friends of the Swainson's Hawk	12/16/2013
	Will there be a cumulative effects analysis?	Scoping Meeting Comment	11/21/2013
	What alternatives will be evaluated in the EIS/EIR?	Scoping Meeting Comment	11/21/2013
	Beatrix Treiterer (Deputy Refuge Manager) asked for information about the future SSHCP Implementing Entity (IE)—has the IE format has been determined, or will alternative IE formats be included in the EIS/EIR and the final format determined later?	Stone Lakes NWR	01/21/2014 Meeting at Stone Lakes NWR
Preserves			
	How can farmland co-exist with preserves?	Scoping Meeting Comment	11/20/2013
	The SSHCP should reference the Sacramento-Yolo Mosquito and Vector Control District, Mosquito Reduction BMPs for a variety of land uses including managed wetlands, habitats, and preserves.	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	The SSHCP should reference the Sacramento-Yolo Mosquito and Vector Control District, Mosquito Reduction BMP manual for BMP implementation on all preserve areas in an effort to reduce mosquito breeding and subsequent pesticide applications.	Sacramento-Yolo Mosquito Vector Control District	12/12/2013
	Bart McDermott asked what was minimum "patch size" used by the SSHCP when estimating availability of species habitat for preservation?	Stone Lakes NWR	01/21/2014 Meeting at Stone Lakes NWR
	Sean Wirth noted that the Refuge Association believes lands below sea level should not be included in the inventory of land/habitat available for preservation under the SSHCP	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR
	Rob Burness requested detailed information on methods the SSHCP used to determine which lands were suitable for preservation and included in the SSHCP "habitat inventory." Rob asked if the Refuge Association would be able to "weigh in" on the assumptions and methods used by the SSHCP to quantify the amount of suitable habitat available for future preservation.	Stone Lakes NWR Association	01/21/2014 Meeting at Stone Lakes NWR
Sensitive Species			
	What does it mean to "take" a species or its habitat?	Scoping Meeting Comment	11/20/2013
	Provide rational for why some species were dropped as "SSHCP covered-species" between the 2008 and 2013 HCP public scoping meetings.	Scoping Meeting Comment	11/20/2013
	The DEIR should address the direct, indirect and cumulative impacts on the state listed species, the Swainson's Hawk in terms of both loss of nesting habitat, nesting pairs, foraging habitat and the loss of range of a threatened species. If 52 nesting sites will be lost, where will these pairs nest? What will be the effect on species reproduction? What is the anticipated level of direct, indirect and cumulative "take" of this threatened species?	Friends of the Swainson's Hawk	12/16/2013

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
	Does the EIR serve as the foundation document for the CDFW issuance of a 2081 permit for the "take" of Swainson's hawk?	Friends of the Swainson's Hawk	12/16/2013
	What is the comparative quality of Swainson's hawk foraging and nesting habitat that you expect in the anticipated area of Elk Grove SOI expansion that is included in the SSHCP "permit area"? Please compare each of the EIS/EIR alternatives with these issues in mind.	Friends of the Swainson's Hawk	12/16/2013
	Please do not rely on the CNDDB which is not intended as a census of existing threatened species, but instead use the several recent surveys by CDFW, the City of Rancho Cordova, the City of Elk Grove and records of the County of Sacramento about Swanson's Hawk nesting sites.	Friends of the Swainson's Hawk	12/16/2013 and 11/20/2013 Scoping Meeting Comment Card
	Include potential impact on Swainson's hawk nesting sites outside of the SSHCP plan area (within 2-5 miles) because of loss of foraging habitat proposed inside the Plan area.	Friends of the Swainson's Hawk	11/20/2013 Scoping Meeting Comment Card
	Include future reproductive potential of current known nest sites of Swainson's hawk because of loss of foraging habitat	Friends of the Swainson's Hawk	11/20/2013 Scoping Meeting Comment Card
	Include loss of nourishment to migrating Swainson's hawks, especially juveniles.	Friends of the Swainson's Hawk	11/20/2013 Scoping Meeting Comment Card
	State the assurances of how Swainson's hawk habitat will be fully mitigated by preservation of land at a 1:1 mitigation ratio; and explain how that quality is adequate to ensure no loss of range of Swainson's hawk.	Friends of the Swainson's Hawk	11/20/2013 Scoping Meeting Comment Card
	Stone Lakes National Wildlife Refuge staff and the Stone Lakes Association members would like information on the SSHCP Covered Species that use the Refuge, and information on SSHCP activities that could occur within the Refuge planning boundary.	Stone Lakes National Wildlife Refuge	01/21/2014 Meeting at Stone Lakes NWR
	Thirteen of the 30 SSHCP covered species listed in the NOI and NOP are known to occur within the Refuge boundary, and four other covered-species (pallid bat, ferruginous hawk, tricolored blackbird, and Stanford's arrowhead) may occur inside the Refuge boundary.	Stone Lakes National Wildlife Refuge	01/24/2014 Email to USFWS
	Sean Wirth noted that Todd Gardner (CDFW) did a lot of work identifying criteria for defining Swainson's hawk high-value habitat inside the Plan Area, but this information was not integrated into recent drafts of those HCP chapters—which resulted in a lot of EIS/EIR scoping comments from the Friends of Swainson's Hawk.	Stone Lakes National Wildlife Refuge Association	01/21/2014 Meeting at Stone Lakes NWR
	Are the species protected in the SSHCP present in the Delta?	Assemblyman Richard Pan's Office via Robert Moler	11/04/2013 Phone Call with USFWS

Table 2 Scoping Comment Summary

Issue Category	Comment Received	Commenter	Date
Water Resources and Hydrology			
	The EIS/EIR should summarize the regional allocation of water within the HCP area and the known projects that are awaiting approval of the HCP.	Lynn Wheat	12/18/2013
	To the extent that any existing and/or future habitat may rely upon water on the site (or immediate vicinity), the EIS/EIR should discuss the potential for land owners to sell/transfer water rights that may have an adverse impact to species protection.	Lynn Wheat	12/18/2013
	To what extent will the construction of the new water delivery structures/systems be evaluated in the cumulative impacts analysis?	Scoping Meeting Comment	11/20/2013
	Will the EIS/EIR evaluate indirect effects/impacts on water resources?	Scoping Meeting Comment	11/20/2013

APPENDIX A

2013 NOP

2013 NOI

2013 Scoping Meeting Announcements and Distribution List

2013 Scoping Meeting Materials

2013 Scoping Meeting Notes

2013 Written Comments Received

2008 Scoping Report Summary

2013 Notice of Preparation (NOP) and Distribution List

Department of
Community Development
Lori A. Moss, Director

Divisions
Building Permits & Inspection
Code Enforcement
County Engineering
Planning & Environmental Review

DEPARTMENT OF COMMUNITY DEVELOPMENT
Planning and Environmental Review Division
NOTICE OF PREPARATION

OCTOBER 28, 2013

TO: ALL INTERESTED PARTIES

SUBJECT: NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR SOUTH SACRAMENTO HABITAT CONSERVATION PLAN (CONTROL NUMBER 2003-PLE-0637)

Sacramento County will be the Lead Agency under the California Environmental Quality Act (CEQA) for preparation of an Environmental Impact Statement and Environmental Impact Report (EIS/EIR) for a project known as the SOUTH SACRAMENTO HABITAT CONSERVATION PLAN (SSHCP). This Notice of Preparation has been sent to responsible and trustee agencies and involved federal agencies pursuant to Section 15082 of the CEQA Guidelines. Agencies should comment on the scope and content of the environmental information that is germane to the agencies' statutory responsibilities in connection with the proposed project. Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but not later than 30 days after receipt of this notice. Late comments received prior to 5:00 PM Friday December 13, 2013, will be considered.

The project description, location, and the probable environmental effects are contained in the attached materials and may also be viewed online at:
http://www.per.saccounty.net/EnvironmentalDocuments/Pages/SearchPublicNotices.aspx

The SSHCP has not been finalized or distributed for agency or public review. Requests for details beyond the attached project description or other specific questions about the project may be directed to Marianne Biner at 916-874-7520 or Catherine Hack at 916-874-8783.

Two scoping meetings will be held for the public and agencies to provide input on the scope and content of the EIS/EIR. The first scoping meeting will be tailored towards information and input with the general public on **Wednesday, November 20,** from 6:30 p.m. to 8:30 p.m., at the Anthony Pescetti Community Room, Galt Police Facility, 455 Industrial Drive, Galt, CA 95632. The second scoping meeting will be directed towards government agencies on **Thursday November 21,** from 2:00 p.m. to 4:00 p.m., at 1400 10th Street, Sacramento, CA 95814, Governor's Office of Planning and Research, Large Conference Room 202.

Please send your Agency's response to this Notice to:

Catherine Hack, Environmental Coordinator
Department of Community Development
Planning and Environmental Review Division
827 7th Street, Room 220, Sacramento, CA 95814
or via e-mail at: DERA@saccounty.net

Your response should include the name of a contact person in your agency.

827 7th Street, Room 220 • Sacramento, California 95814 • phone (916) 874-7914 • fax (916) 874-8343 • www.saccounty.net

PROJECT TITLE
SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

CONTROL NUMBER
03-PLE-0637

PROJECT APPLICANTS (PLAN PARTNERS)

- County of Sacramento
- City of Elk Grove
- City of Rancho Cordova
- City of Galt
- Capital Southeast Connector JPA
- Sacramento Regional County Sanitation District
- Sacramento County Water Agency
- Future SSHCP JPA

INTENT OF PROJECT
The intent of the proposed project is to provide development and infrastructure projects with streamlined, predictable federal and state permitting processes while creating a robust preserve system to protect habitat, open space, and agricultural lands.

Pursuant to the California Environmental Quality Act (CEQA) the County of Sacramento is circulating this Notice of Preparation (NOP) to inform the public that the County intends to gather information to prepare a joint Environmental Impact Report (EIR) and Environmental Impact Statement (EIS) on the proposed South Sacramento Habitat Conservation Plan (SSHCP). The EIS/EIR may include additional analysis in response to comments on the NOP. The joint EIS/EIR will analyze the environmental effects of the United States Fish and Wildlife Service (USFWS) proposed issuance of an incidental take permit (ITP) under Section 10(a)(1)(B) of the Federal Endangered Species Act of 1973, as amended (ESA), the California Department of Fish and Wildlife (CDFW) proposed issuance of an incidental take permit under Section 2081(b)(2) of the California Endangered Species Act, as amended (CESA). The joint EIS/EIR will also analyze the approval and implementation of the SSHCP and Aquatic Resources Program (ARP) required for the proposed incidental take permit and permits pursuant to Section 404 of the Clean Water Act. The SSHCP will provide habitat and protection for 30 species of plants and animals, 10 of which are either state or federally listed as protected pursuant to ESA and/or CESA. The anticipated ITPs would be in effect for a period of 30 to 50 years.

The SSHCP also seeks a Master Streambed Alteration Agreement (MSAA) under California Fish and Game Code, Section 1600 et seq.. The Plan Partners are also seeking a variety of permits pursuant to Section 404 of the Clean Water Act from the U.S. Army Corps of Engineers (Corps) and a Water Quality Certification pursuant to Section 401 of the Clean Water Act from the Regional Water Quality Control Board. The SSHCP would protect vernal pool, wetland, and stream habitats that are subject to the federal Clean Water Act (CWA) and California's Porter–Cologne Water Quality Control Act.

In addition to local actions, the Plan Partners are seeking the following federal and state permits and actions:

- A Programmatic General Permit from the Corps authorizing discharge of dredged or fill materials into waters of the US for private and public projects that are consistent with the SSHCP.
- A Letter of Permission process from the Corps that will result in an expedited District Engineer review and authorization of discharge of dredged or fill materials into waters of the US for private and public projects that do not qualify under the Programmatic General Permit and are approved through the SSHCP Incidental Take Permit.
- A streamlined Individual Permit process from the Corps that will result in an expedited District Engineer review and authorization of discharge of dredged or fill materials into waters of the US for large private and public projects that do not qualify under the Programmatic General Permit or Letter of Permission and are approved through a SSHCP Incidental Take Permit. The streamlining would be based on a regional Section 404(b)(1) alternative site analysis, and minimization based on the SSHCP conservation strategy, which would be included in the SSHCP EIS Record of Decision. It is anticipated that large projects that are SSHCP covered activities will be able to rely heavily on the SSHCP EIS for the Corp's NEPA compliance, and those projects that do require site-specific NEPA analysis will generally be able to meet NEPA requirements by preparing a tiered EA.
- A Water Quality Certification (or waiver) pursuant to Section 401 of the Clean Water Act from the Central Valley Regional Water Quality Control Board authorizing discharge of dredged or fill materials into waters of the US for private and public projects approved under a SSHCP ITP.
- A Master Streambed Alteration Agreement pursuant to Section 1600 et seq. of the California Fish and Game Code from CDFW authorizing modifications to river, stream, or lake.
- An incidental take permit pursuant to Section 2081(b)(2) of the CESA from CDFW.
- An incidental take permit pursuant to Section 10(a)(1)(B) of the ESA from the USFWS.
- A Corps approved in-lieu-fee and/or land dedication program providing required compensatory mitigation beyond the compensatory mitigation already provided in the SSHCP.

PROJECT SUMMARY -- SSHCP AND AQUATIC RESOURCE PROGRAM:

The SSHCP identifies urban development and public infrastructure projects within an Urban Development Area (UDA) and defines mitigation and avoidance measures for covered species and habitat that will be affected by the covered activities identified in the SSHCP. The SSHCP will consolidate mitigation in areas with high habitat value, thereby enhancing the long-term viability of species populations and habitat.

The ARP is a regional conservation approach for aquatic resources located within the SSHCP Plan Area; this approach minimizes impacts to aquatic resources, avoids impacts to a significant amount of high quality aquatic resources and directs mitigation at a landscape level to preserve largely intact watersheds including their associated aquatic resources. A primary goal of ARP implementation is

to achieve no net loss of aquatic function and services. The ARP is directly tied to, and is a fully integrated element of the SSHCP.

In order to implement the SSHCP, the County and its Plan Partners would adopt a participant-paid fee that would be based on loss of habitat acreage, habitat type, long-term management costs and costs to administer the SSHCP. Fees would fund the habitat conservation restoration/creation, management elements of the proposed SSHCP and administration. Supplementary funding sources would be sought from grants or other sources to acquire preserve lands that would contribute to the recovery of covered species, but which are not required as mitigation for covered activities.

The SSHCP includes a mitigation strategy that is consistent with the intent of federal and state wetland regulations. The intent of the ARP is to explain how implementation of the SSHCP, in conjunction with the ARP, will satisfy the requirements of the CWA (Sections 404 and 401), California Fish and Game Code Section 1600 et seq., and Porter-Cologne Act for covered activities, and how the ARP will streamline wetlands permitting in a coordinated fashion.

PROJECT LOCATION

The geographic location of the proposed SSHCP includes approximately 374,000 acres within south Sacramento County (unincorporated area) and the cities of Rancho Cordova, Elk Grove, and Galt (Plate NOP-1, Project Location). The geographical boundaries of the Plan Area are U.S. Highway 50 to the north, the Sacramento River levee and County Road J11 to the west, the Sacramento County line with El Dorado and Amador counties to the east, and the San Joaquin county line to the south. The Plan Area excludes the City of Sacramento, the City of Folsom, the lands of the Miwok tribe, and the Sacramento County community of Rancho Murieta.

Almost all incidental take of SSHCP covered-species is expected to occur inside an area referred to as the Urban Development Area or UDA. The UDA corresponds to land within the County's Urban Services Boundary (USB), and to land within the city limits of Rancho Cordova, Elk Grove, and Galt, and within Elk Grove's proposed sphere of influence and Galt's adopted sphere of influence. A limited amount of infrastructure development, such as planned road widening projects and recycled water conveyance pipelines would occur in the SSHCP Planning Area outside the UDA.

PROJECT OBJECTIVE:

The objective of the SSHCP is to implement a regional conservation strategy that will provide private and public projects with streamlined, predictable federal and state permitting processes while creating a comprehensive preserve system to protect habitat, open space, and agricultural lands.

PROJECT DESCRIPTION:

The proposed conservation strategy for the SSHCP provides for the conservation of covered species and their associated habitat types in order to aid recovery of the species, fully mitigate for the impacts of covered activities on the species and their habitats, and provide a regional approach to the avoidance and mitigation of biological and aquatic resource impacts. The SSHCP and ARP are based on the concepts of conservation biology and landscape ecology, the ecological needs of the covered species and the nature, quality, and geographic distribution of the different habitat types.

The SSHCP would minimize and mitigate incidental take and provide for the conservation of 30 covered species that may occur in the Plan Area, 10 of which are either state or federally listed as

protected pursuant to ESA and/or CESA. The anticipated ITP would be in effect for a period of 30 to 50 years. The plan identifies 20 different habitat cover types including vernal pool aquatic and upland habitat, other wetland habitats, riparian woodland, blue oak woodland, and rural agricultural crops. Bisecting the Plan Area is the Cosumnes River and Deer Creek corridor which contains agricultural lands and extensive riparian habitat (Plate NOP-2).

With an approved SSHCP, larger habitat preserves that are linked by habitat corridors would be created outside the UDA, and smaller habitat preserves would be created inside the UDA, also linked by corridors. The key principles of conservation biology that guide the design for the SSHCP include minimizing habitat fragmentation, minimizing edge effects, establishing linkages amongst preserves, establishing buffers and setbacks, maintaining heterogeneity within preserves, protecting watersheds, maintaining or increasing species population size, maintaining species distribution across their native range, and establishing large preserves. The ultimate preserve system is designed to fit into the larger landscape of protected open space within the permit area and connect existing habitat areas. Existing and proposed conservation areas within the reserve system are identified on Plate NOP-3.

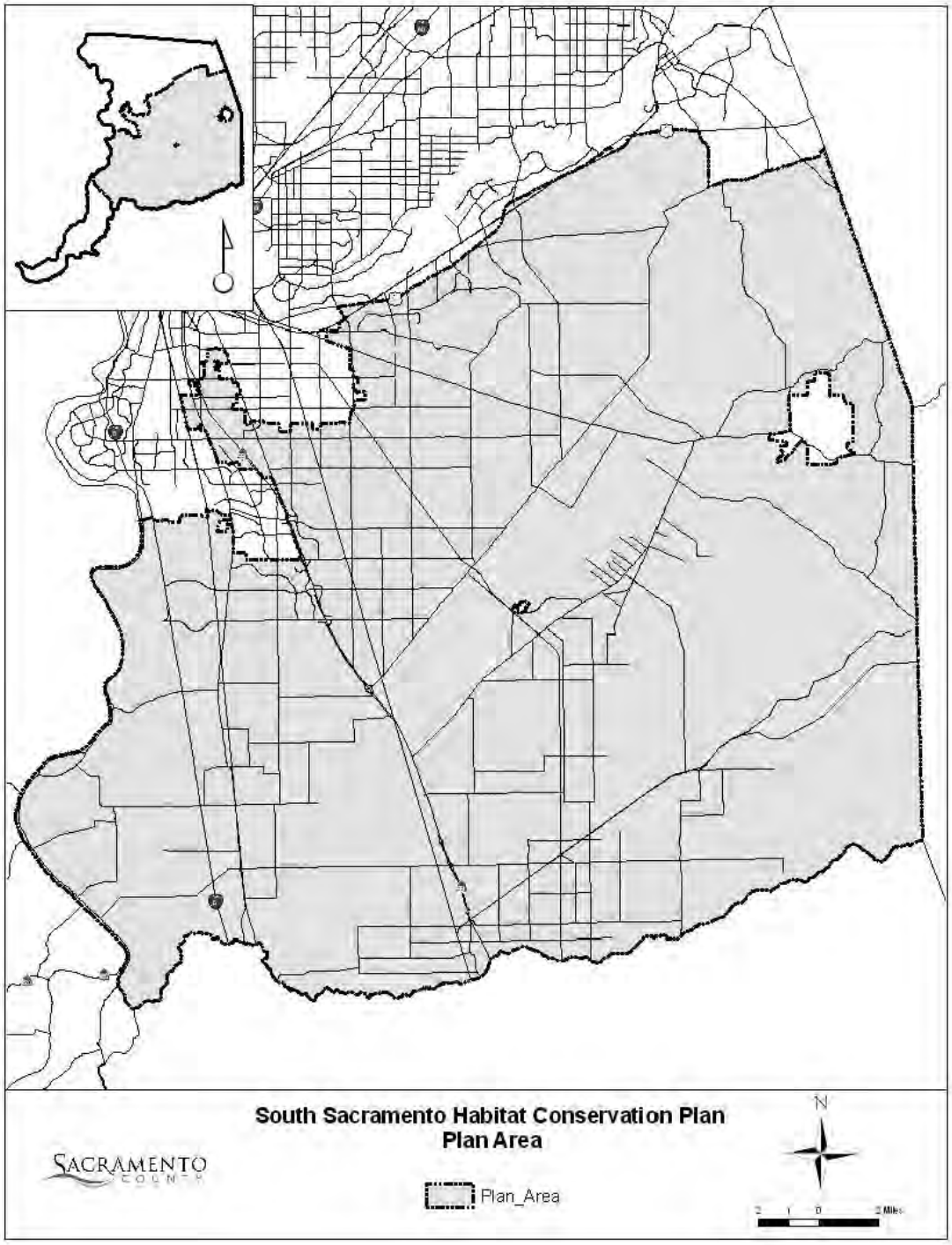
Planned Conservation Inside the UDA

Given that the effects of covered activities would be concentrated mostly within the UDA and these effects cannot be completely offset outside the UDA (particularly vernal pools), establishing preserves and linkages inside the UDA is critical to the conservation strategy. Reserve assembly inside the UDA, including new preserves and linkages, generally would build on the framework of existing and planned preserves and linkages using specific design methods. The following preserve and habitat linkage categories are employed to establish the Reserve System within the UDA: Landscape Preserve, Core Preserve, Minor Preserve, Satellite Preserve, Linkage, Laguna Creek Wildlife Corridor, Flexible Preserve, and Soft-lined Criteria-based Preserve.

Planned Conservation Outside the UDA

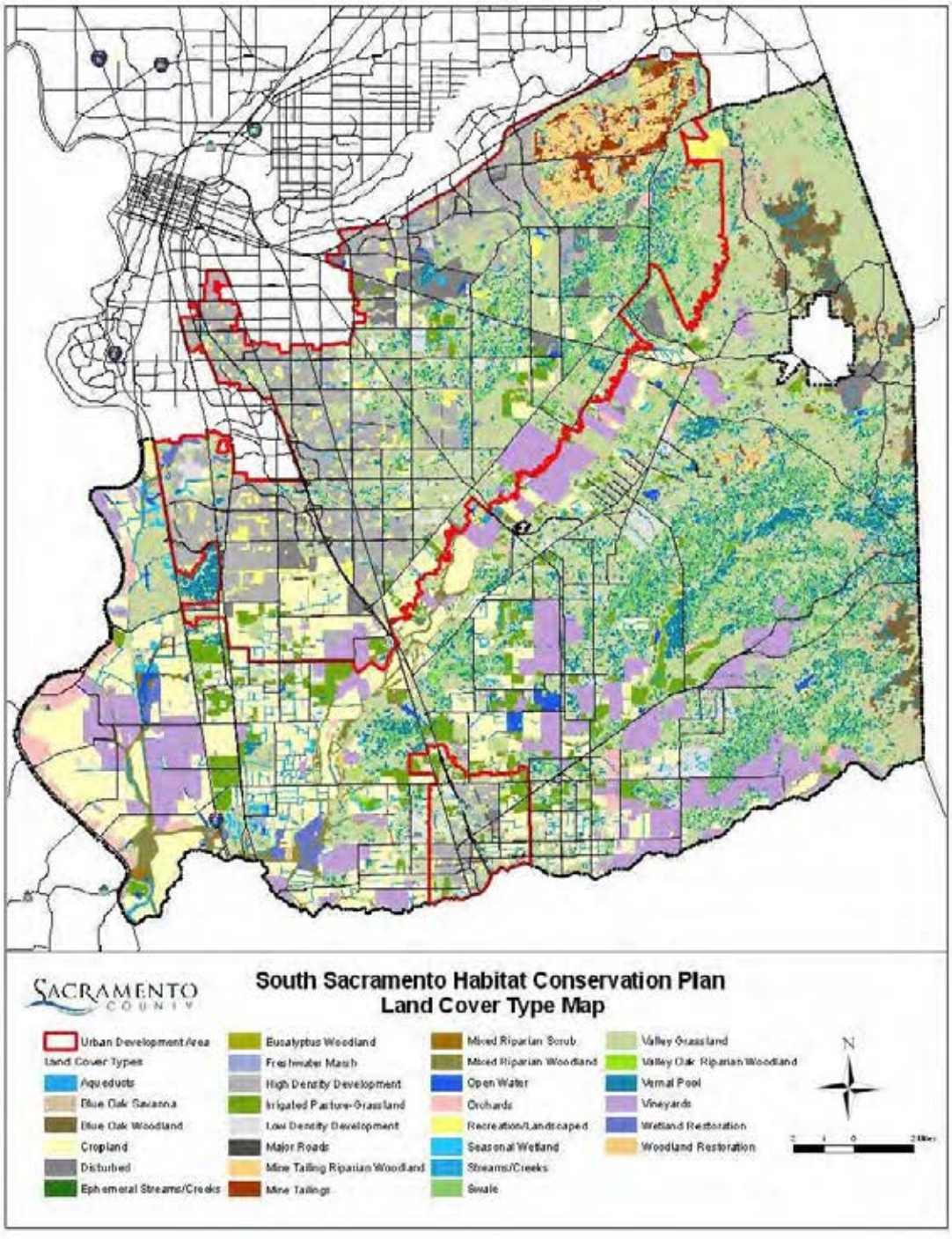
Outside the UDA, where fewer effects of covered activities would result (primarily related to infrastructure), reserve design can be more directly focused on the biological goals and objectives for the covered species and natural communities. In general, conservation opportunities are much more available and reserve design can be more flexible outside the UDA with regard to preserve location because large contiguous parcels that could support covered species are more abundant and are not constrained by the more site-specific urban development pressures inside the UDA. Therefore, reserve design outside the UDA employs a narrative set of criteria that articulates the biological goals and objectives and corresponding conservation actions intended to guide and direct conservation outside the UDA.

Plate NOP-1 Project Location



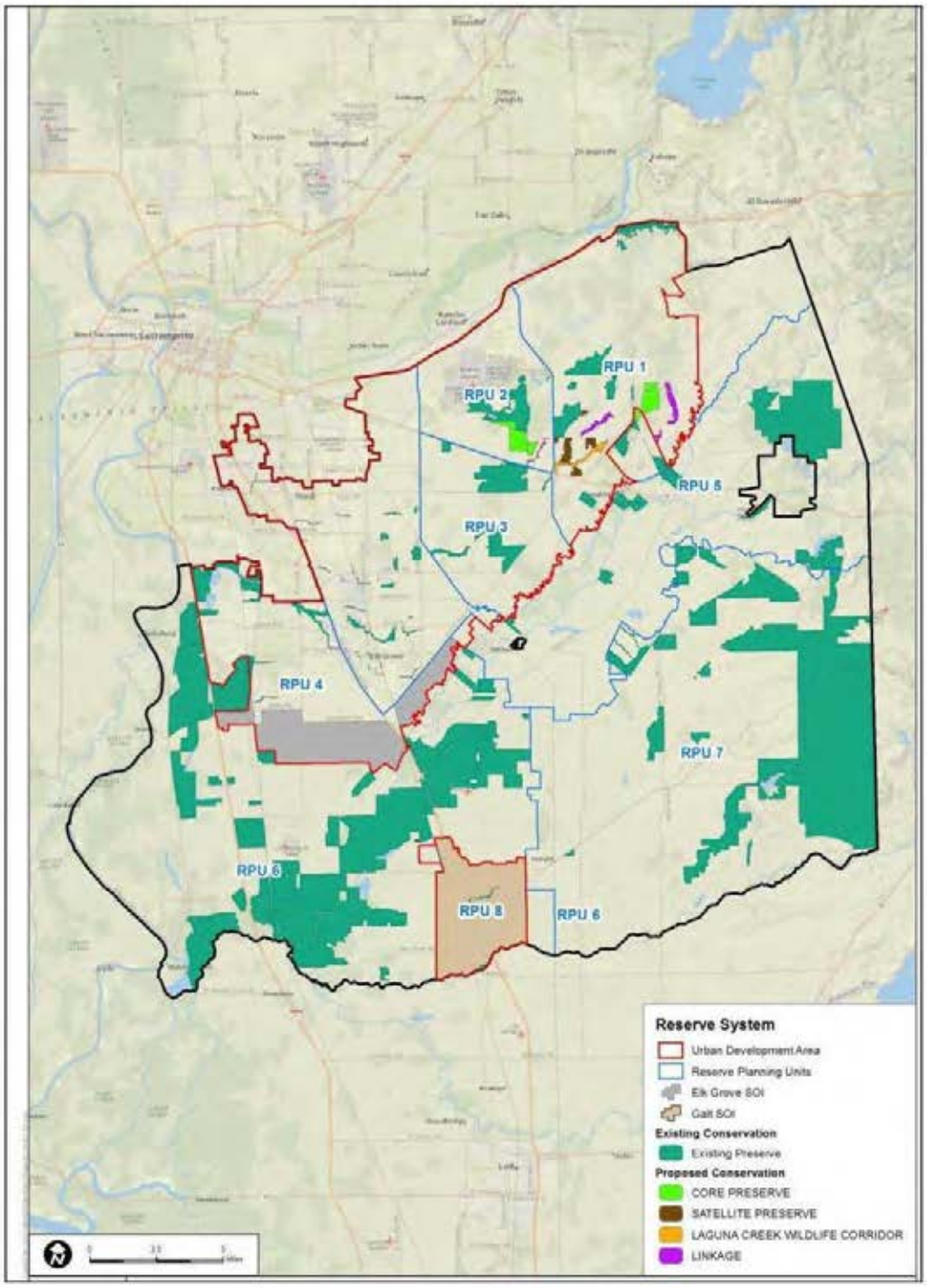
Notice of Preparation NOP-6 03-PLE-0637

Plate NOP-2 SSHCP Habitat Types



Notice of Preparation NOP-7 03-PLE-0637

Plate NOP-3 Proposed Reserve System



Notice of Preparation NOP-8 03-PLE-0637

Reserve Planning Units

To assist with Plan implementation, the Plan Area is further divided into Reserve Planning Units; these Reserve Planning Units are geographic subdivisions of the Plan Area designed to ensure that habitat for covered species is conserved across the Plan Area; that the conserved habitat is heterogeneous across the Plan Area; and that large-scale ecological functions and processes are maintained. Each Reserve Planning Unit is designed to encompass habitat for a suite of covered species and known species occurrences based on existing information. By designating spatially diverse Reserve Planning Units and using the SSHCP biological goals and objectives to set conservation criteria for each unit, the Conservation Strategy will assure that the covered species are adequately and representatively conserved throughout the Plan Area. In total, the SSHCP could preserve or restore nearly 50,000 acres of native and naturalized landcovers within the Plan Area boundary. When combined with existing preserve lands, the SSHCP could result in a large and interconnected reserve system encompassing approximately 113,600 acres within the SSHCP Plan Area. The total amount of preserve land proposed under the SSHCP is subject to further refinement prior to release of the public Draft SSHCP.

The timing and sequence of land acquisition relative to impacts is critical to the success of the Plan. A "stay ahead" provision of the SSHCP was developed to adhere to California Department of Fish and Wildlife's requirements that all impacts of a particular project must be mitigated prior to the impact occurring. The "stay ahead" provision will ensure that conservation measures occur prior to impacts.

Covered Species

There are 30 wildlife and plant species proposed for coverage under the Plan including 10 state or federally listed species. **Table NOP-1 Covered Species**, lists those species and their current status. Species may be added or deleted from this list as Plan development continues.

Covered Activities

Potential ground disturbance from proposed covered-activities of the SSHCP may encompass up to 42,400 acres (40,000 acres within the UDA and 2,400 acres outside the UDA). The total amount of potential ground disturbance from covered activities is subject to further refinement prior to release of the public Draft SSHCP. Covered activities may include the construction, installation, or extension of:

- Private development projects
- Transportation facilities
- Surface and groundwater delivery facilities
- Water treatment facilities
- Sewer and recycled water treatment and conveyance facilities
- Solid waste sanitation facilities
- Public facilities (fire station, police stations, hospitals, schools, community centers, cemeteries, and administration centers)
- Indoor and outdoor recreation facilities
- Energy utility facilities
- Aggregate mining activities
- Habitat management activities

Table NOP-1 Covered Species[1]

Mammals	**Invertebrates**
American Badger, *Taxidae taxus*	Mid-Valley Fairy Shrimp, *Branchinecta mesovallensis*
Pallid Bat, *Antrozous pallidus*	Ricksecker's Water Scavenger Beetle, *Hydrochara ricksecker*i
Western Red Bat, *Lasirus blossevillii*	Valley Elderberry Longhorn Beetle, *Desmocerus californicus dimorphus*, (FT)
Yuma Myotis Bat, *Myotis yumanensis*	Vernal Pool Fairy Shrimp, *Branchinecta lynch*i, (FT)
	Vernal Pool Tadpole Shrimp, *Lepidurus packardi,* (FE)
Birds	**Plants**
White-Tailed Kite, *Elanus leucurus*	Ahart's Dwarf Rush, *Juncus leiospermus var. ahartii*
Cooper's Hawk, *Accipiter cooperii*	Boggs Lake Hedge-Hyssop, *Gratiola heterosepala* (SE)
Ferruginous Hawk, *Buteo regalis*	Dwarf Downingia, *Downingia pusilla*
Greater Sandhill Crane, *Grus Canadensis tabida* (ST)	Legenere, *Legenere limosa*
Loggerhead Shrike, *Lanius ludovicianus*	Pincushion Navarretia, *Navarretia myertsii*
Northern Harrier, *Circus cyaneus*	Sacramento Orcutt Grass, *Orcuttia viscida*, (SE, FE)
Swainson's Hawk, *Buteo swainsoni* (ST)	Slender Orcutt Grass, *Orcuttia tenuis,* (SE, FE)
Tricolored Blackbird, *Agelaius tricolor*	Sanford's Arrowhead, Sagittaria sanfortii
Western Burrowing Owl, *Athene cunicularia hypugaea*	
Amphibians	**Reptiles**
California Tiger Salamander, *Ambystoma californiense* (central valley, DPS), (FT)	Giant Garter Snake, *Thamnophis gigas* (FT)
Western Spadefoot Toad, *Scaphiopus hammondii*	Western Pond Turtle, *Actinemys marmorata marmorata* and *A. m. pallida* (2 sub-species: Northwestern and Southwestern)

Biological Goals and Objectives

Habitat loss and fragmentation is a threat common to the covered species in the Plan Area. Loss and fragmentation of land cover types that provide habitat for the covered species will be among the main effects of covered activities in the Plan Area; therefore, the biological goals and objectives focus on land cover type protection and connectivity as key components of the SSHCP Conservation

[1]: F - federal, S – State, E – endangered, T – threatened

Notice of Preparation NOP-10 03-PLE-0637

Strategy. Through protecting and connecting large contiguous areas of the different land cover types, the Conservation Strategy will preserve broad landscape ecological functions, maintain the abundance and heterogeneity of land cover types, and preserve populations of individual species.

Biological goals provide the broad guiding principles of the Conservation Strategy and are required by the USFWS' 5-Point Policy to be included in HCPs. Biological objectives are measureable objectives that, when implemented collectively, achieve the biological goals.

For each biological goal and objective there is a set of conservation actions that would be implemented and monitored.

Landscape Level Conservation

Land conservation is a key component of the Conservation Strategy, which calls for the establishment, enhancement, and long-term management of a Reserve System for the benefit of natural communities, covered species, and overall biodiversity and ecosystem functions. The system of new reserves is anticipated to be linked to existing protected lands to form a network of protected areas.

Community Level Conservation

Reserve assembly actions have been divided into natural community and other land cover categories that link to the biological goals and objectives. The natural communities include agriculture, valley grassland, vernal wetland, blue oak woodland and savanna, riparian, non-vernal wetlands, open water, and stream and creek. Conservation will occur through acquisition of lands in fee title or placement of conservation easements. The conservation actions associated with each of the eight communities are listed below.

- Agriculture—Conserving agriculture to benefit covered species in the Plan Area includes protecting and managing (including enhancement of) cropland and irrigated pasture. The agricultural conservation strategy is designed to maintain a mosaic of agricultural crop types distributed throughout the main agricultural area of the Plan Area as a method of conserving agricultural habitats that benefit the covered species. A diverse array of agricultural types will allow for variation in crop types from year to year in specific fields but overall will maintain important habitat functions. Agriculture will also be preserved to allow for management actions that will enhance the habitat value of these areas for covered species, such as increasing prey.
- Valley Grassland—Valley grassland will be conserved to benefit covered species and protect grassland ecological functions in the Plan Area. Conservation of large tracts of valley grassland will provide watershed functions and water filtration for vernal pools, other ephemeral wetlands, streams/creeks, and open water.
- Vernal Pool—To benefit covered species and to maintain ecological functions, vernal pools will be restored and conserved in the Plan Area. To conserve the full diversity of ecological conditions, mitigation for the loss of vernal pool habitat should occur through the conservation of vernal pool habitat in the same geologic formation where impacts occur, when it would be beneficial for the covered species.

- Blue Oak Woodland and Savanna—Conserving and restoring blue oak woodland and savanna will benefit covered species in the Plan Area. The main conservation focus will be connectivity to the existing Deer Creek Hills Preserve, which will be connected to lands inside and outside the UDA by protected preserve linkages.
- Riparian—The conservation strategy for riparian includes conserving mixed riparian woodland, mixed riparian scrub, and valley oak riparian woodland to benefit covered species populations in the Plan Area.
- Non-vernal Wetland—The conservation strategy for community would include conservation, restoration or creation of seasonal wetland, freshwater marsh, and swale.
- Open Water—Conserving, restoring and creating open water will benefit covered species and ecological functions in the Plan Area.
- Stream and Creek—Conserving and/or creating stream/creek will benefit covered species and protect ecological functions in the Plan Area.

Species Level Conservation

The plan provides a framework for conservation of known occurrences of covered species as well as habitat that would allow target populations to expand. These species-by-species biological goals and objectives take into account the opportunities for expansion of existing populations keeping in mind the various life cycle requirements of each species.

Management Measures

The SSHCP includes specific actions for the management of the Reserve System for the conservation and enhancement of natural communities and the covered species. Management measures would include both routine management and adaptive management depending on the identified management needs of each preserve and linkage. Routine management is expected to include common open space management activities such as controlling public access to sensitive areas, fencing, signage, trail repair, trash removal, patrols, etc. Adaptive management, in both an "active" and "passive" context would occur throughout the term of the ICP and may include full-scale actions, pilot programs, and research.

Potential management activities, particularly in the context of vernal pool and grassland habitat, will likely include invasive species control, thatch management (grazing or fire), manipulation of percent suspended organic matter in vernal pool environments, hydrology studies to determine watershed and vernal pool function, predator control, and disease control (treatment of water source).

As it is assembled, the Reserve System will be routinely monitored to ensure habitat health and reserve functionality. Typical monitoring activities would include surveys for covered species.

PROBABLE ENVIRONMENTAL EFFECTS OF THE PROPOSED SSHCP

The analysis within the EIS/EIR is expected to include the following environmental topical areas of probable effects: land use; agriculture; soils; geology; mining; hydrology; water quality; drainage;

biological resources; wetlands and waters of the U.S. and State; transportation; air quality; climate change; cultural, historic, and paleontological resources; and public facilities and services.

INTENDED USES OF THE EIS/EIR

The Plan Partners including: Sacramento County, City of Elk Grove, City of Galt, City of Rancho Cordova, Sacramento County Water Agency, Sacramento Regional County Sanitation District, and Capital Southeast Connector Joint Powers Authority, are seeking concurrent and parallel authorizations from federal and state regulatory wetland programs for covered activities authorized through the SSHCP and the associated ITPs. The EIS/EIR will serve as the environmental document for actions taken by the federal, state, and local agencies.

RESPONSIBLE AGENCIES

- United State Fish and Wildlife Service
- United States Army Corps of Engineers
- United States Environmental Protection Agency
- California Department of Fish and Wildlife
- State Water Resources Control Board (?)
- Central Valley Region Water Quality Control Board
- City of Elk Grove
- City of Rancho Cordova
- City of Galt
- Capital Southeast Connector Joint Powers Authority
- Sacramento Regional County Sanitation District
- Sacramento County Water Agency
- Future SSHCP Joint Powers Authority

2013 NOP – US Mail Distribution List

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2013 NOP – Email Alert

From: Radmacher. Richard [mailto:RADMACHERR@saccounty.net]
Sent: Tuesday, November 12, 2013 1:56 PM
To: [redacted]
Subject: South Sacramento Habitat Conservation Plan NOI/NOP

Dear SSHCP Stakeholders,

The South Sacramento Habitat Conservation Plan (SSHCP) Partners and the US Fish and Wildlife Service (USFWS) are pleased to announce the release of the Notice of Intent (NOI) and Notice of Preparation (NOP) to prepare a joint Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) for the South Sacramento Habitat Conservation Plan. To view links to the NOI and/or NOP please follow the link below.

http://www.per.saccounty.net/PlansandProjectsIn-Progress/Pages/SSHCPPlan.aspx

Two scoping meetings will be held in November for the public and agencies to provide input on the scope of the EIR/EIS. The first scoping meeting will be held on Wednesday, November 20th in Galt from 6:30 to 8:30 pm. This scoping meeting will be tailored to the general public. A second scoping meeting will be held on Thursday, November 21th in Sacramento from 2:00 to 4:00 pm and is tailored to the agencies. The public is welcome to attend either meeting, but due to limited space is encouraged to attend the November 20th meeting in Galt. More information regarding the two scoping meetings can be found in the attached flyer.

For those of you that are unable to attend one of our scoping meetings, but would still like to provide input, a commnet card is attached for your convenience. If you have any questions or concerns regarding the SSHCP please don't hesitate to contact me. For additional information regarding the EIS/EIR please direct your inquires to Marianna Biner at (916) 874-7520 or by email at binerm@saccounty.net.

Sincerely,

Richard Radmacher
Senior Planner
Department of Water Resources
827 7th Street, Room 230
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2013 Notice of Intent
(NOI)

2013 Scoping Meeting Announcements and Distribution Lists

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS–R8–ES–2013–N209]; [FF08E00000–FXES11120800000F2–123–F2]

Habitat Conservation Plan for South Sacramento County, California

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of intent, request for comments, and notice of public scoping meetings.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), intend to gather additional information and to prepare, in coordination with the County of Sacramento, California, a joint environmental impact statement and environmental impact report (EIS/EIR) under the National Environmental Policy Act and the California Environmental Quality Act for the proposed South Sacramento Habitat Conservation Plan (HCP). The draft EIS/EIR will evaluate the impacts of several alternatives related to the proposed issuance of Endangered Species Act permits to eight permit applicants in south Sacramento County, California. The permit applicants intend to apply for either a 30-year or a 50-year permit from the Service that would authorize the incidental take resulting from implementation or approval of covered activities, including various kinds of development projects. We also announce public scoping meetings and the opening of a public comment period. We request data, comments, new information, or suggestions from other concerned governmental agencies, the scientific community, Tribes, industry, or any other interested party.

DATES: To ensure consideration, please send your written comments by December 19, 2013. We will hold two public scoping meetings at different locations in the plan area (see *Public Meetings* under **SUPPLEMENTARY INFORMATION** for dates, times, and locations). In addition to this notice, we will also announce the public scoping meetings in local news media and on the Internet at *http://www.fws.gov/sacramento.*

ADDRESSES: Please address written comments to Nina Bicknese, Senior Fish and Wildlife Biologist, Sacramento Fish and Wildlife Office, 2800 Cottage Way, W–2605, Sacramento, CA 95825. Alternatively, you may send comments by facsimile to (916) 414–6713.

FOR FURTHER INFORMATION CONTACT: Mike Thomas, Chief, Conservation Planning Division, or Eric Tattersall,

Deputy Assistant Field Supervisor, at the address shown above (see **ADDRESSES**) or at (916) 414–6600 (telephone). If you use a telecommunications device for the deaf, please call the Federal Information Relay Service at (800) 877–8339.

SUPPLEMENTARY INFORMATION: We intend to gather additional information and to prepare, in coordination with the County of Sacramento, California, a joint environmental impact statement and environmental impact report (EIS/ EIR) under the National Environmental Policy Act and the California Environmental Quality Act for the proposed South Sacramento Habitat Conservation Plan (HCP). This notice revises information on the proposed HCP previously published on June 10, 2008 (73 FR 32729). The draft EIS/ EIR will evaluate the impacts of several alternatives related to the proposed issuance of Endangered Species Act permits to eight permit applicants (the County of Sacramento, City of Elk Grove, City of Rancho Cordova, City of Galt, the Capital Southeast Connector Joint Powers Authority, the Sacramento Regional County Sanitation District, the Sacramento County Water Agency, and a South Sacramento Habitat Conservation Plan Joint Powers Authority) for activities they would conduct or approve within a proposed 374,000-acre plan area located in south Sacramento County, California.

The permit applicants intend to apply for either a 30-year or a 50-year permit from the Service that would authorize the incidental take of 22 animal species. Incidental take would result from implementation or approval of covered activities, including private development projects, transportation facilities, surface and groundwater delivery facilities, water treatment facilities, solid waste sanitation facilities, public facilities, recreation facilities, energy utility facilities, aggregate mining activities, and future preserve land-management activities. We also announce public scoping meetings and the opening of a public comment period. We request data, comments, new information, or suggestions from other concerned governmental agencies, the scientific community, Tribes, industry, or any other interested party.

We publish this notice in accordance with the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.;* NEPA), and its implementing regulations in the Code of Federal Regulations (CFR) at 40 CFR 1500–1508, as well as in compliance with section 10(c) of the Endangered Species Act (16 U.S.C. 1531 *et seq.;* Act), and in compliance with the California Environmental Quality Act (CEQA). We intend to prepare a joint draft EIS/ EIR to evaluate the impacts of several alternatives related to the potential issuance of an incidental take permit (ITP) to the permit applicants, as well as impacts of the implementation of the supporting proposed habitat conservation plan (HCP).

The permit applicants propose to prepare the South Sacramento Habitat Conservation Plan as part of their application for an ITP under section 10(a)(1)(B) of the Act. The proposed HCP will include measures necessary to minimize and mitigate the impacts, to the maximum extent practicable, of potential proposed taking of federally listed species to be covered by the ITP, and the habitats upon which they depend. The covered activities and projects proposed by the HCP would disturb a maximum total of 42,243 acres within the plan area and would include the construction of residential and commercial development projects, improvements to existing transportation facilities, new transportation facilities (including the proposed Capital Southeast Connector highway), new surface water and groundwater delivery facilities, water treatment facilities, solid waste sanitation facilities, public facilities (including fire stations, police stations, hospitals, schools, community centers, cemeteries, and administration centers), indoor and outdoor recreation facilities, energy utility facilities, aggregate mining activities, and future habitat-management activities.

The plan area, the area in which all impacts would be evaluated and all conservation actions will be implemented, is approximately 374,000 acres within unincorporated south Sacramento County and within the cities of Rancho Cordova, Elk Grove, and Galt. The approximate geographical boundary of the plan area would be the area bound by U.S. Highway 50 in the north, the San Joaquin County line to the south, the Sacramento River levee and County Road J11 to the west, and the Sacramento County line with El Dorado and Amador counties to the east. The 374,000-acre plan area would include a 123,000-acre urban development area (UDA) where most ground-disturbing development, infrastructure activities, and projects would occur. The UDA corresponds to land within the County's urban services boundary (USB); and to land within the city limits of Rancho Cordova, Elk Grove, and Galt; land within Elk Grove's proposed sphere of influence; and land within Galt's adopted sphere of influence.

Almost all ground disturbance and incidental take of federally listed endangered and threatened species would occur on approximately 40,000 acres within the UDA. A limited amount of infrastructure development, such as planned road widening projects and recycled water conveyance pipelines, would disturb or remove approximately 2,443 acres of native and naturalized landcovers outside the UDA. In addition, the HCP would include an aquatic resource program that would avoid, minimize, or fully mitigate potential covered activity impacts to existing aquatic resources within the plan area, and would facilitate the U.S. Army Corps of Engineers' development of a process for permit applicant compliance with the Clean Water Act (33 U.S.C. 1251 *et seq.*). The permit applicants also propose to permanently preserve or restore approximately 8,950 acres of the UDA and preserve approximately 40,980 acres outside the UDA, following criteria that would expand the size of existing preserves and create linkages and corridors between existing preserves. In total, the HCP proposes to permanently preserve or restore 49,930 acres of native and naturalized landcovers within the plan area boundary. When combined with the existing preserve lands, the HCP would result in a large and interconnected 113,623-acre habitat reserve system within the 374,000-acre plan area.

Background Information

Section 9 of the Act and Federal regulations prohibit the taking of fish and wildlife species listed as endangered or threatened under section 4 of the Act. Take of federally listed fish or wildlife is defined under the Act as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect listed species, or attempt to engage in such conduct. The term ''harass'' is defined in the regulations as to carry out actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3). The term ''harm'' is defined in the regulations as significant habitat modification or degradation that results in death or injury of listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3).

However, under specified circumstances, the Service may issue permits that allow the take of federally

listed species, provided that the take is incidental to, but not the purpose of, an otherwise lawful activity. Regulations governing permits for endangered and threatened species can be found at 50 CFR 17.22 and 17.32, respectively. Section 10(a)(1)(B) of the Act contains provisions for issuing such incidental take permits to non-Federal entities for the take of endangered and threatened species, provided the following criteria are met:

1. The taking will be incidental;
2. The applicants will, to the maximum extent practicable, minimize and mitigate the impact of such taking;
3. The applicants will develop a proposed HCP and ensure that adequate funding for the HCP will be provided;
4. The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild; and
5. The applicants will carry out any other measures that the Service may require as being necessary or appropriate for the purposes of the HCP.

Thus, the purpose of issuing ITPs is to allow the permit applicants, under their respective authorities, to authorize new development and infrastructure, while conserving covered species and their habitats. Implementation of a regional habitat conservation plan, rather than a species-by-species or project-by-project approach, would enhance benefits of conservation measures for covered species and would eliminate expensive and time-consuming efforts associated with processing individual ITPs for each project within the applicants' proposed plan area. The Service expects that the permit applicants will request ITP coverage for a period of 30 to 50 years.

Alternatives in the Draft Environmental Impact Statement

The proposed action alternative presented in the draft EIS/EIR will be compared to a no-action alternative. The no-action alternative represents estimated future conditions to which the proposed action's estimated conditions can be compared. Other action alternatives considered, including their potential impacts, will also be addressed in the draft EIS/ EIR and compared to a no-action condition.

No-Action Alternative

Because the proposed covered activities would provide needed regional infrastructure and economic development, these types of activities would occur within the plan area regardless of whether a 10(a)(1)(B) ITP is requested or issued. Although future activities would be similar to the covered activities proposed by the HCP, not all activities would necessitate an incidental take permit or consultation with the Service. Under the no action alternative, the permit applicants could implement a covered activity that fully avoids impacts to protected species and their habitats. Where potential impacts to federally protected species could not be avoided, the permit applicants could minimize and mitigate their impacts through individual formal or informal consultations with the Service. When applicable, the permit applicants would potentially seek individual section 10(a)(1)(B) ITPs on a project-by-project basis. Under the no-action alternative, the permit applicants may also satisfy the requirement of the Clean Water Act's sections 404 and 401, the California Fish and Game code section 1600, and the Porter-Cologne Act, and other applicable law, on a project-by-project basis. Thus, under the no-action alternative, various permit applicants would likely need to develop and file numerous separate permit applications over the 30-to-50-year project period. This activity-by-activity approach could be more time consuming and less efficient and could result in smaller and fragmented mitigation areas.

Proposed Action Alternative

The proposed action alternative is the issuance of an ITP for the take of covered species, caused by covered activities within the proposed plan area, for a period of 30 to 50 years. The proposed action HCP, developed and implemented by the permit applicants, must meet the requirements of section 10(a)(2)(A) of the Act by providing measures to minimize and mitigate the effects of the potential incidental take of covered species to the maximum extent practicable. The proposed HCP allows for a comprehensive mitigation approach for unavoidable impacts, and reduces permit processing times and efforts for the permit applicants and the Service.

Covered activities under the proposed HCP are otherwise lawful activities that applicants carry out consistent with all HCP requirements, including, but not limited to:

1. Construction of private development projects within the UDA (e.g., single- and multi-family homes, residential subdivisions, commercial or industrial projects, offices, and park infrastructure);
2. Installation and/or maintenance of utility infrastructure within the UDA (e.g., transmission or distribution lines and facilities related to electric, telecommunication, natural gas, and other types of energy utilities);
3. Installation and/or maintenance of surface and groundwater delivery facilities within the UDA;
4. Construction, maintenance, and/or improvement of water treatment facilities within the UDA;
5. Construction, maintenance, and/or improvement of solid waste sanitation facilities within the UDA;
6. Construction, use, and maintenance of public facilities (e.g., fire stations, police stations, schools, hospitals, community centers, cemeteries, and administration centers) within the UDA;
7. Construction, use, or maintenance of other public infrastructure, including indoor and outdoor recreation facilities, within the UDA;
8. Excavation, use, maintenance, and/or expansion of quarries, gravel mining, or other aggregate mining activities within the UDA;
9. Construction, maintenance, and/or improvement of new roads, bridges, and other transportation infrastructure facilities outside the UDA and within the UDA, including the proposed Southeast Connector highway;
10. Construction, maintenance, and/or improvement of recycled water conveyance pipelines and outside the UDA and within the UDA; and
11. Maintenance and land management activities on conservation lands outside the UDA and within the UDA.

We anticipate that the following 30 species of plants and animals, including seven federally listed threatened (T) or endangered (E) species, will be included as covered species in the permit applicants' proposed HCP:

Mid-valley fairy shrimp *(Branchinecta mesovallensis)*
Ricksecker's water scavenger beetle *(Hydrochara ricksecker)*
Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)* (T)
Vernal pool fairy shrimp *(Branchinecta lynchi)* (E)
Vernal pool tadpole shrimp *(Lepidurus packardi)* (E)
California tiger salamander, central California distinct population segment (*Ambystoma californiense)* (T)
Western spadefoot toad *(Scaphiopus hammondii)*
Giant garter snake *(Thamnophis gigas)* (T)
Western pond turtle *(Actinemys marmorata marmorata* and *A. m. pallida)* (two subspecies)
American badger *(Taxidea taxus)*
Pallid bat *(Antrozous pallidus)*
Western red bat *(Lasiurus blossevillii)*
Yuma myotis bat *(Myotis yumanensis)*
White-tailed kite *(Elanus leucurus)*
Cooper's hawk *(Accipiter cooperii)*
Ferruginous hawk *(Buteo regalis)*
Greater sandhill crane *(Grus canadensis tabida)*
Loggerhead shrike *(Lanius ludovicianus)*

Northern harrier *(Circus cyaneus)*
Swainson's hawk *(Buteo swainsoni)*
Tricolored blackbird *(Agelaius tricolor)*
Western burrowing owl *(Athene cunicularia hypugaea)*
Ahart's dwarf rush *(Juncus leiospermus var. ahartii)*
Boggs Lake hedge hyssop *(Gratiola heterosepala)*
Dwarf downingia *(Downingia pusilla)*
Legenere *(Legenere limosa)*
Pincushion navarretia (*Navarretia myersii*)
Sacramento Orcutt grass (*Orcuttia viscida*) (T)
Slender Orcutt grass (*Orcuttia tenuis*) (T)
Sanford's arrowhead (*Sagittaria sanfordii*)

The permit applicants seek incidental take authorization for all applicable covered species. Candidate and federally listed species that are not likely to be taken by the covered activities, and therefore not covered by the proposed ITP, may also be addressed in the proposed HCP, to explain why the permit applicants believe these species will not be taken.

Environmental Review and Next Steps

The Service will conduct an environmental review to analyze the proposed action, along with other alternatives evaluated, and the associated impacts of each. The draft EIS/EIR will be the basis for the impact evaluation for each covered species. The draft EIS/EIR is expected to provide biological descriptions of the affected species and habitats, as well as the effects of the proposed action and other alternatives on other resources, such as soils, geology, water quality, agriculture, vegetation, wetlands, wildlife, cultural resources, transportation, air quality, land use, recreation, water use, local economy, and environmental justice.

Following completion of the environmental review, the Service will publish a notice of availability and a request for comment on the draft EIS/EIR and on the permit applications, which will include the proposed HCP. We anticipate that the draft EIS/EIR and proposed HCP will be completed and available to the public in March or April 2014.

Public Comments

We request data, comments, new information, or suggestions from other concerned governmental agencies, the scientific community, Tribes, industry, or any other interested party on this notice. We will consider these comments in developing an EIS/EIR and in the development of a South Sacramento Habitat Conservation Plan and incidental take permit. We particularly seek comments on the following:

1. Biological information concerning the proposed covered species;
2. Relevant data concerning the proposed covered species;
3. Additional information concerning the range, distribution, population size, and population trends of the proposed covered species;
4. Current or planned activities in the subject area and their possible impacts on the proposed covered species;
5. The presence of archeological sites, buildings and structures, historic events, sacred and traditional areas, and other historic preservation concerns that are required to be considered in project planning by the National Historic Preservation Act (16 U.S.C. 470 *et seq.*); and
6. Identification of any other environmental issues that should be considered with regard to the proposed development and the permit action.

You may submit your comments and materials by one of the methods listed in the **ADDRESSES** section.

Comments and materials we receive on this notice will be available for public inspection by appointment, during normal business hours, at our office (see **FOR FURTHER INFORMATION CONTACT**).

Public Availability of Comments

Written comments we receive become part of the public record associated with this action. Before including your address, phone number, email address, or other personal identifying information in your comments, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

Public Scoping Meetings

The purpose of scoping meetings is to provide the public with a general understanding on the background of the proposed HCP and activities it would cover, alternative proposals under consideration for the draft EIS/EIR, the Service's role, and steps to be taken to develop the draft EIS/EIR for the proposed HCP. Two public scoping meetings will be held:

1. Wednesday, November 20, from 6:30 p.m. to 8:30 p.m., at the Anthony Pescetti Community Room, Galt Police Facility, 455 Industrial Drive, Galt, CA 95632.
2. Thursday November 21, from 2:00 p.m. to 4:00 p.m., at the Governor's Office of Planning and Research, Large Conference Room 202, 2nd Floor, 1400 Tenth Street, Sacramento, California, 95814.

The meeting will include a 1-hour open house prior to the formal scoping meeting. The open house will provide an opportunity to learn about the proposed action, permit area, and species covered. The open house will be followed by a presentation of the proposed action, a summary of the NEPA process, and comments from the public. The primary purpose of these meetings and public comment period is to solicit suggestions and information on the scope of issues and scope of alternatives for the Service to consider when drafting the EIS/EIR. Written comments will be accepted at the meetings. Comments can also be submitted by methods listed in the **ADDRESSES** section. Once the draft EIS/EIR and proposed HCP are complete and made available for review, there will be additional opportunity for public comment on the content of these documents during a 90-day draft EIS/EIR public comment period.

Meeting Location Accommodations

Please note that the meeting locations are accessible to wheelchair users. If you require additional accommodations, please notify us at least 1 week in advance of the meeting (see **FOR FURTHER INFORMATION CONTACT**).

Authority

We provide this notice under section 10 of the Act (16 U.S.C. 1531 *et seq.*) and by NEPA regulations (40 CFR 1501.7, 1506.6, and 1508.22).

Dated: October 29, 2013.

Alexandra Pitts,

Deputy Regional Director, Pacific Southwest Region, Sacramento, California.

[FR Doc. 2013–26366 Filed 11–1–13; 8:45 am]

BILLING CODE 4310–55–P

Department of the Interior
U.S. Fish & Wildlife Service
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

Phone: 916/414-6600
Fax: 916/414-6713
Website: http://www.fws.gov/sacramento/

News Release

For Immediate Release

November 4, 2012
Media Contacts:
Sarah Swenty, sarah_swenty@fws.gov, (530) 665-3310

NOI Published and Scoping Meetings Scheduled for the South Sacramento Habitat Conservation Plan

Plan to Help Offset Impacts to Threatened and Endangered Species

Sacramento – The U.S. Fish and Wildlife Service (Service) and Sacramento County announce a Notice of Intent (NOI) to prepare a joint Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) for the proposed South Sacramento Habitat Conservation Plan (HCP). The Service and the HCP permit-applicants intend to work together to preserve endangered species and to streamline the existing development-permitting process. To do that, a habitat conservation plan will be prepared for a 374,000-acre area of south Sacramento County, California. The HCP is being prepared to preserve natural lands in Sacramento County and protect habitat for 30 special-status plant and animal species, including seven federally listed species.

This announcement opens a 45-day comment period on the NOI. **All comments should be received by December 19, 2013.**

Two scoping meetings will be held for the public and agencies to provide input on the scope and content of the EIS/EIR. The first scoping meetings will be held **Wednesday, November 20,** from 6:30 p.m. to 8:30 p.m., at the Anthony Pescetti Community Room, Galt Police Facility, 455 Industrial Drive, Galt, CA 95632. The second scoping meeting will be held **Thursday, November 21,** from 2:00 p.m. to 4:00 p.m., at the Governor's Office of Planning and Research, Large Conference Room 202, Second Floor, 1400 Tenth Street, Sacramento, California, 95814.

The Notice of Intent was published today and is available for review in the Federal Register and on the Service's website at http://www.fws.gov/sacramento/. The California Environmental Quality Act's Notice of Preparation (NOP) for the EIS/EIR was also released today and is available for review at http://www.per.saccounty.net/EnvironmentalDocuments/Pages/SearchPublicNotices.aspx.

America's fish, wildlife, and plant resources belong to all of us, and ensuring the health of imperiled species is a shared responsibility. Together with the local community, the state and federal agencies are working to actively engage conservation partners and the public in the search for improved and innovative ways to conserve and recover imperiled species.

The HCP is being prepared to support compliance with the federal Endangered Species Act. The HCP will also provide the basis for an Incidental Take Permit from the California Department of Fish and Wildlife, and the basis for streamlining U.S. Army Corps of Engineers permits under the Clean Water Act.

The EIS/EIR will be prepared in compliance with the National Environmental Policy Act and the California Environmental Quality Act. The EIS/EIR will describe the underlying purposes, needs, and objectives for developing, approving and implementing a HCP in south Sacramento County; will identify alternatives, including the proposed HCP; describe the existing environment conditions that could be affected by each alternative; and will analyze the potential effects of each alternative on the environment.

To submit written comments, please use one of the following methods and note that your comment is in reference to the South Sacramento Habitat Conservation Plan (SSHCP):

- *U.S. Mail*: Nina Bicknese, Senior Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, 2800 Cottage Way, Room W-2605, Sacramento, CA 95825.
- *Fax*: U.S. Fish and Wildlife Service, 916-414-6713, Attn: Nina Bicknese.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service. For more information on our work and the people who make it happen, visit www.fws.gov/cno. Connect with our Facebook page at http://www.facebook.com/usfwspacificsouthwest, follow our tweets at http://twitter.com/USFWSPacSWest, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfws_pacificsw.

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2013 NOI News Release – Email Alert

From: Swenty, Sarah [mailto:sarah_swenty@fws.gov]
Sent: Monday, November 04, 2013 9:13 AM
Subject: NOI Published and Scoping Meetings Scheduled for the South Sacramento Habitat Conservation Plan: Plan to Help Offset Impacts to Threatened and Endangered Species

NOI Published and Scoping Meetings Scheduled for the South Sacramento Habitat Conservation Plan

Plan to Help Offset Impacts to Threatened and Endangered Species

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• *Fax*: U.S. Fish and Wildlife Service, 916-414-6713, Attn: Nina Bicknese.

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people. We are both a leader and trusted partner in fish and wildlife conservation, known for our scientific excellence, stewardship of lands and natural resources, dedicated professionals, and commitment to public service. For more information on our work and the people who make it happen, visit www.fws.gov/cno. Connect with our Facebook page at http://www.facebook.com/usfwspacificsouthwest, follow our tweets at http://twitter.com/USFWSPacSWest, watch our YouTube Channel at http://www.youtube.com/usfws and download photos from our Flickr page at http://www.flickr.com/photos/usfws_pacificsw.

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2013 NOI News Release – Email Alert Distribution

Name	Title	Organization Name
	Chair	Sacramento Audubon
	Executive Director	Audubon California
John Costa	Director, Government Affairs	North State Building Industry Association
	Director	Construction Materials Association of CA
Jeff Rodeo	Controller	California Building Industry Assoc
Nita Vail	Executive Director	CA Rangeland Trust
Dawn Clover	Directort, Govt Affairs	CA Cattlemen's Association
Justin Oldfield	Director, Industry Affairs	CA Cattlemen's Association
Dan Gallardo	President	Yolo County Cattlemen and Wool Growers Association
Rex Albright	Executive Director	Rancho Cordova Chamber of Commerce
Rod Campbell	Director	City of Lincoln Planning Department
Robert McGarvey	Mayor	City of Rancho Cordova
Sandra Kiriu	Director	Galt Community development Dept
John Little	Sycamore Environmental	French Camp Conservation Bank
Kari Hawkins	Project Manager	Conservation Resources, Arroyo Seco Cons. Bank
Bjorn Gregersen	Vice President	ECORP Consulting
Julie Maddox	Marketing Coordinator, Wildlands, Inc.	Kimball Island Conservation Bank
Julie Maddox	Marketing Coordinator, Wildlands, Inc.	Gilsizer Slough S Giant Garter Snake Conservation Bank
Erik Grotte	CFO	Conservation Resources
Matt Gause	Senior Ecologist	Westervelt Ecological Services
Travis Hemmen		Westervelt Ecological Services; Mariner VP Conservation Bank
Steve French	Charter Properties	Bryte Ranch Conservation Bank
Ed Flynn	Wetlands Resources LLC	Elsie Gridley Multi-Species Conservation Bank
Kari Hawkins	Administrator	Laguna Creek Conservation Bank
Julie Maddox	Marketing Coordinator, Wildlands, Inc.	River Ranch Conservation Bank
Julie Maddox	Marketing Coordinator, Wildlands, Inc.	Pope Ranch Conservation Bank
Julie Maddox	Marketing Coordinator, Wildlands, Inc.	Orchard Creek Conservation Bank
Steve Mayo	Senior Habitat Planner	San Joaquin County Council of Govts
Jim Allan	Ag Commissioner	Solano County Department of Agriculture
John Young	Ag Commissioner	Yolo County
Brad Wagenknecht	Supervisor, Dist.1	Napa County Board of Supervisors
Brad Wagenknecht	Supervisor, Dist.1	Napa County Board of Supervisors
Gladys Coil	Clerk	Napa County Board of Supervisors
Georgia Flake	Clerk	Placer County Board of Supervisors
	Clerk	Solano County Board of Supervisors
	Clerk	Yolo County Board of Supervisors
Donna Stottlemeyer	Clerk of the Board	Yuba County Board of Supervisors
Melissa Batteate		Placer County
Jeffrey Redding	Director	Napa County Conservation Development & Planning
	Director	Placer County Planning Dept
Thomas Hutchings	Director	Sacto County Planning & Community Development
Kerry Sullivan	Director	San Joaquin County Community Development Dept
Doug Libby	Principal Planner	Sutter County Planning Services Department
David Morrison	Assistant Director	Yolo County Planning Div
Kevin Maller	Director	Yuba County Community Development
Jeff Boehm	Executive Director	The Marine Mammal Center
		Common Cause
Carol Whitam	Chair, VP Recovery Plan Implementation Team	CA Native Plant Society
Mark Biddlecomb	Director	Ducks Unlimited
Eric Hansen	Consulting Environmental Biologist	Independent Contractor
Graham Sharpe	Manager	HDR Engineering, Inc
Greg Suba	Conservation Program Director	California Native Plant Society
		Born Free USA

Name	Title	Organization Name
Jim Little	President	Forest Landowners of California
Justin Caporusso	Public Affairs Specialist	Rural County Representatives of California (RCRC)
Catherine Troka	First Vice-President	League of Women Voters
Maureen Marcotte	Senior Administrative Assistant	H.T. Harvey & Associates
Pamel Flick	California Representative	Defenders of Wildlife
Roxanne Hatfield	Editor-in-Chief	Northern California Herpetological Society
Sue Britting	Interim Executive Director	California Native Plant Society
Tim Dunbar	Executive Director	Mountain Lion Foundation
Tiffany Meyer	Research Program Specialist (GIS)	California Dept of Forestry and Fire Protection
Gretchen Lebednik		Cardno Entrix
Dan Corcoran	Environmental Division Manager	El Dorado Irrigation District
John Bayless	Executive Vice President	Bayless & Hicks
Paul Kronenberg	President	
Carol Whiteside	Executive Director	Great Valley Center
Betty Walker	Manager	Contra Costa County Farm Bureau
Sandy Elles	Executive Director	Napa County Farm Bureau
Joe Fischer	President	Placer County Farm Bureau
Richard Matteis	Administrator	California Farm Bureau Federation
Paul Wenger	President	California Farm Bureau Federation
Kate Campbell	Assistant Editor, Ag Alert/California Country	California Farm Bureau Federation
Bruce Blodgett	Executive Director	San Joaquin County Farm Bureau
Mary Ann Diehl	Executive Secty	Solano County Farm Bureau
Denise Sagara	Executive Director	Yolo County Farm Bureau
Megan Foster	Executive Director	Yuba-Sutter County Farm Bureau
Jim Little	President	Forest Landowners of CA
Brian Plant		Remy, Thomas, Moose and Manley, LLP
David Cismowski	Manager, Govt Pubs Section	CA State Library
Cindy Won-Nakata	Section 6 Grants Coordinator	California Department of Fish and Wildlife
Eugenia Laychak	Principal	EJL & Associates
		KTXL, Channel 40
Judy Farah	News Director	KFBK
Jennifer Weiss	News Assignment Editor	KXTV, Channel 10
Lisa Maria Burcar	Assignment Editor	KCRA, Channel 3
Walt Shaw	News Director	KHTK
Ben Wallace	Executive Director	Contra Costa RCD
Mark Egbert	District Manager	El Dorado County RCD/Georgrtown Divide RCD
	Director	Napa County RCD
William Mosher	Chairman	Sloughhouse RCD
Larry Lloyd	District Manager	Sutter County RCD
Mimi Cary	Secretary/District Clerk	Yuba County RCD
	Chair	Sierra Club - Mother Lode Ch
Terry Davis	Conservation Program Coordinator	Mother Lode Chapter Sierra Club
Eric Heath	Owner/Manager	Leave No Trace Adventures
Janice Mackey	Information Officer, Regions 3 & 4	California Department of Fish and Wildlife
Sandy Morey	Regional Mgr	California Department of Fish and Wildlife, Sac Valley-Central Sierra Reg 2
Kevin Thomas	District Supervisor	California Department of Fish and Wildlife-Red Lake Wildlife Area
Cherilyn Burton	Staff Environmental Scientist	California Department of Fish and Wildlife
Cherilyn Burton	Staff Environmental Scientist	California Department of Fish and Wildlife
Cliff Feldheim		CA Dept of Water Resources
Diane Colborn	Chief Consultant	State Assembly Standing Committee-Water, Parks & Wildlife
Chuck Bonham	Director	California Department of Fish and Wildlife
Charlton Bonham	Director	California Department of Fish and Wildlife

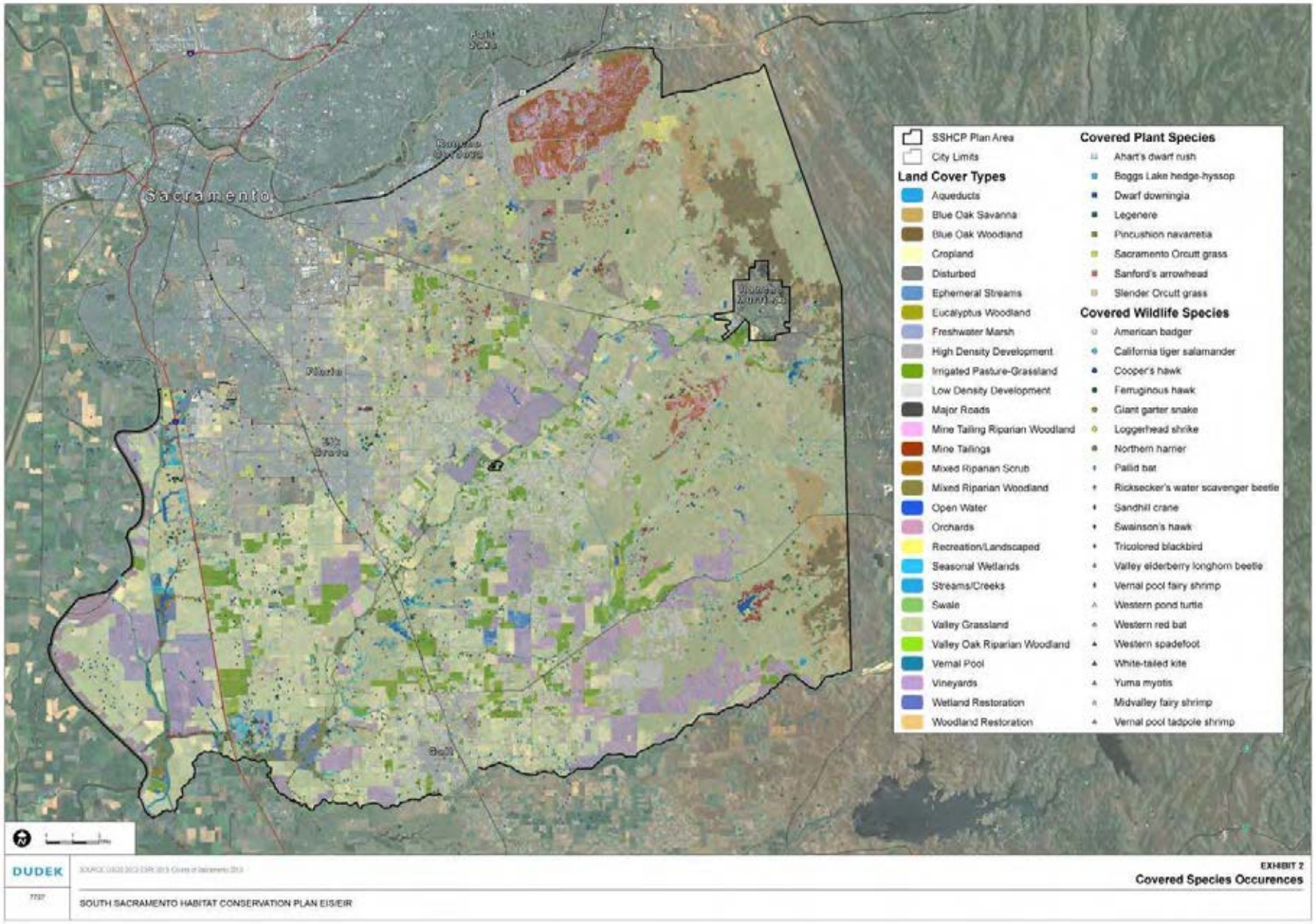
Name	Title	Organization Name
Adrianna Shea	Dept. Executive Director - External Affairs	California Department of Fish and Wildlife
Janet Upton	Deputy Director, Communications	California Department of Forestry and Fire Protection
Jordan Traverso	Deputy Director	California Department of Fish and Wildlife
Mark Cowin	Director	CA Dept of Water Resources
Luz Rodriguez	Public Information Officer	Sacramento-Yolo Mosquito Vector Control District
Scott Wilson	Acting Regional Manager, Region 3	California Department of Fish and Wildlife,Central Coast Reg
Jim Frazier	Assemblymember	California State Assembly
Richard Pan	Assemblymember	California State Assembly
Roger Dickinson	Assemblymember	California State Assembly
Ken Cooley	Assemblymember	California State Assembly
Ted Gaines	Minority Caucus Chair	California State Senate
Ted Gaines	Senator	California State Senate
Darrell Steinberg	Senate President pro Tem	California State Senate
Cathleen Galgiani	Senator	California State Senate
Lois Wolk	Senator	California State Senate
Rhonda Morningstar Pope	Tribal Chairwoman	Buena Vista Rancheria
Roselynn Lwenya	Environmental Resources Director/THPO	Buena Vista Rancheria
Chuck Ingels	County Director	UC Coop Extension - Sacto County
Jerry McNerney	Congressman	District Office, Stockton
Jerry McNerney	Congressman	District Office, Stockton
John R. Garamendi	Congressman	District Office, Fairfield
Doug LaMalfa	Congressman	District Office, Oroville
Doug LaMalfa	Congressman	District Office, Redding
John R. Garamendi	Congressman	District Office, Fairfield
Amerish "Ami" Bera	Congressman	District Office, Rancho Cordova
Amerish "Ami" Bera	Congressman	District Office, Rancho Cordova
Doris Matsui	Congresswoman	District Office, Sacramento
Doris Matsui	Congresswoman	District Office, Sacramento
Jim Kenna	State Director	BLM, State Office
Donald Yasuda	Regional Analyst/R5 Strategic Decision Support Cadre	USFS
Jay Miller	Remote Sensing Specialist	USFS
Col William J. Leady	District Engineer	Army Corps
Patti Clinton	Natural Resources Specialist	BOR, Central Cal. Area Office
Bill Aley	Natural Resources Specialist	BOR, Central Cal. Area Office
Dwane Coffey	Distr Conservationist	USDA NRCS - Sacramento Field Office
John Aguirre	President	CA Assoc of Wine Grape Growers
Matthew Rodriquez	Secretary	CA Environmental Protection Agency
Andrew Ball	Member	CA Water Commission
Terry Erlewine	General Manager	State Water Contractors
James Herota	Staff Environmental Specialist	Central Valley Flood Protection Board
Larry Bauman	Executive Director	Central Valley Project Water Assoc
Melinda Terry	Executive Director	CA Central Valley Flood Control Assoc
Melida Terry	Manager	North Delta Water Agency
Stephen Testa	Executive Officer	Mining and Geology Board
Barbara Barrigan-Parrilla		Restore the Delta
Mike Wade	Executive Director	CA Farm Water Coalition
Kellye Kennedy	Senior Project Manager	Santa Clara Valley Water District
Matt Weiser		Sacramento Bee

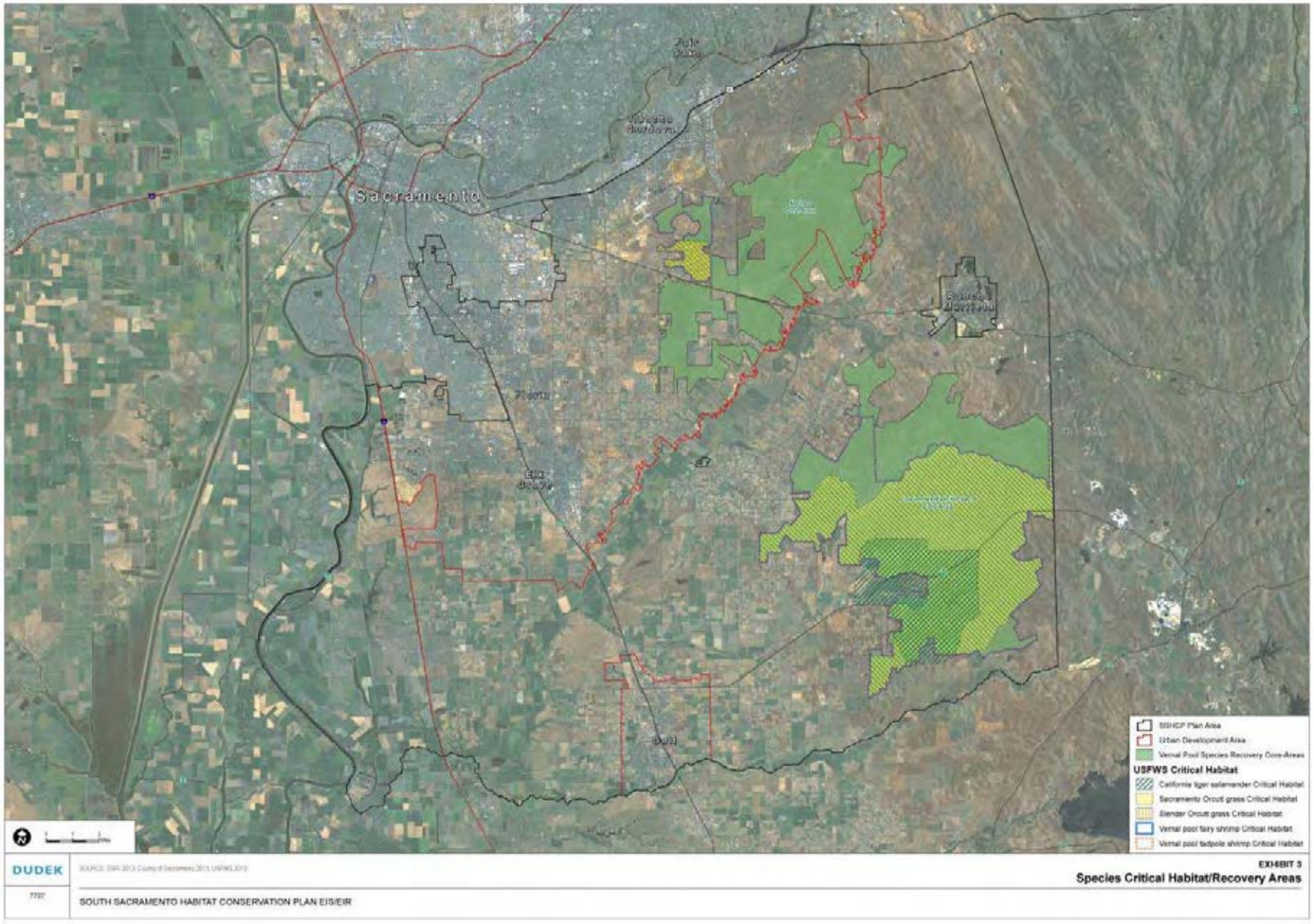
Title	Organization Name
Chair	Sacramento Audubon
Executive Director	Audubon California
Director, Government Affairs	North State Building Industry Association
Director	Construction Materials Association of CA
Controller	California Building Industry Assoc
Executive Director	CA Rangeland Trust
Directort, Govt Affairs	CA Cattlemen's Association
Director, Industry Affairs	CA Cattlemen's Association
President	Yolo County Cattlemen and Wool Growers Association
Executive Director	Rancho Cordova Chamber of Commerce
Director	City of Lincoln Planning Department
Mayor	City of Rancho Cordova
Director	Galt Community development Dept
Sycamore Environmental	French Camp Conservation Bank
Project Manager	Conservation Resources, Arroyo Seco Cons. Bank
Vice President	ECORP Consulting
Marketing Coordinator, Wildlands, Inc.	Kimball Island Conservation Bank
Marketing Coordinator, Wildlands, Inc.	Gilsizer Slough S Giant Garter Snake Conservation Bank
CFO	Conservation Resources
Senior Ecologist	Westervelt Ecological Services
	Westervelt Ecological Services; Mariner VP Conservation Bank
Charter Properties	Bryte Ranch Conservation Bank
Wetlands Resources LLC	Elsie Gridley Multi-Species Conservation Bank
Administrator	Laguna Creek Conservation Bank
Marketing Coordinator, Wildlands, Inc.	River Ranch Conservation Bank
Marketing Coordinator, Wildlands, Inc.	Pope Ranch Conservation Bank
Marketing Coordinator, Wildlands, Inc.	Orchard Creek Conservation Bank
Senior Habitat Planner	San Joaquin County Council of Govts
Ag Commissioner	Solano County Department of Agriculture
Ag Commissioner	Yolo County
Supervisor, Dist.1	Napa County Board of Supervisors
Supervisor, Dist.1	Napa County Board of Supervisors
Clerk	Napa County Board of Supervisors
Clerk	Placer County Board of Supervisors
Clerk	Solano County Board of Supervisors
Clerk	Yolo County Board of Supervisors
Clerk of the Board	Yuba County Board of Supervisors
	Placer County
Director	Napa County Conservation Development & Planning
Director	Placer County Planning Dept
Director	Sacto County Planning & Community Development
Director	San Joaquin County Community Development Dept
Principal Planner	Sutter County Planning Services Department
Assistant Director	Yolo County Planning Div
Director	Yuba County Community Development
Executive Director	The Marine Mammal Center
	Common Cause
Chair, VP Recovery Plan Implementation Team	CA Native Plant Society
Director	Ducks Unlimited
Consulting Environmental Biologist	Independent Contractor
Manager	HDR Engineering, Inc
Conservation Program Director	California Native Plant Society
	Born Free USA

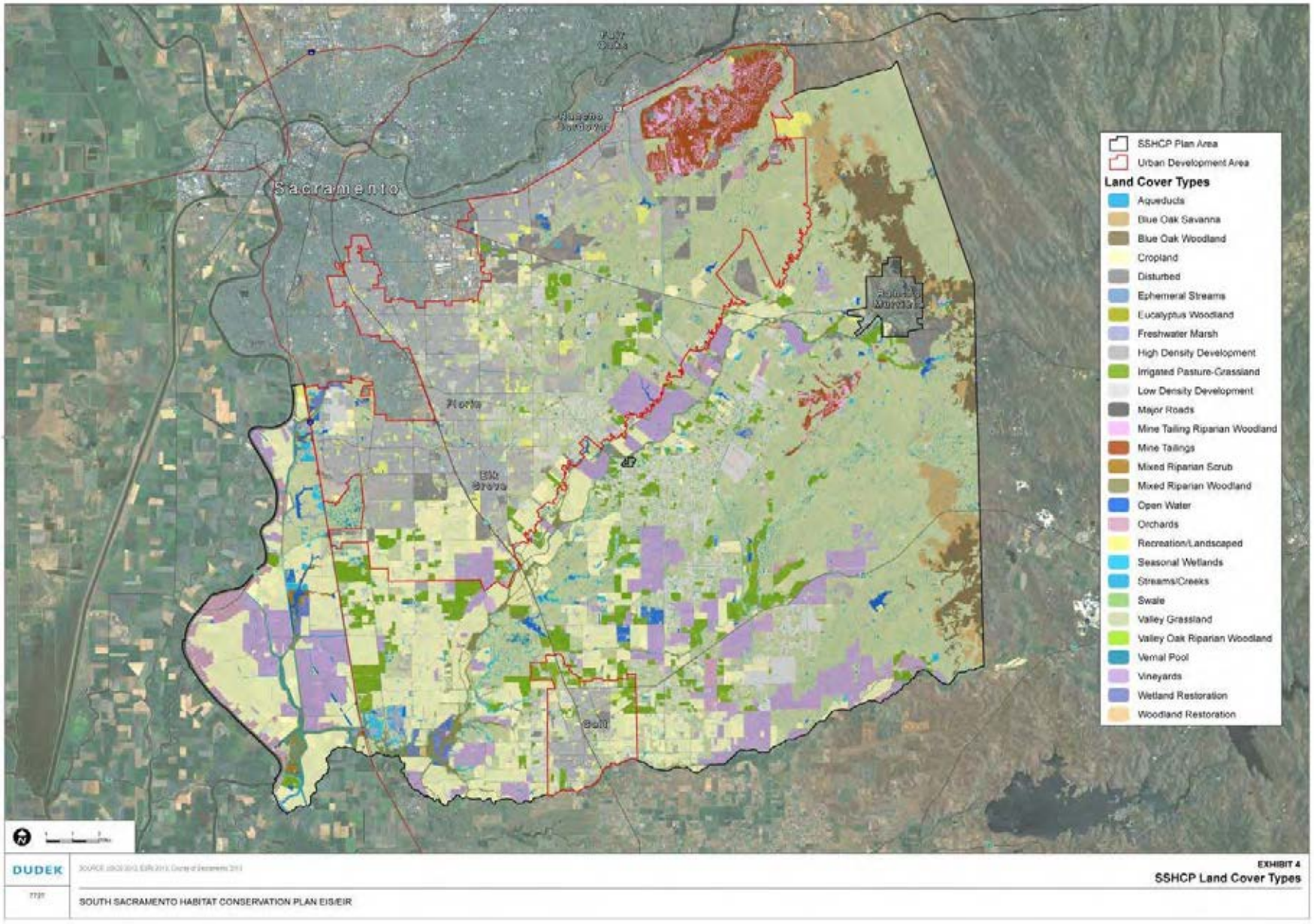
Title	Organization Name
President	Forest Landowners of California
Public Affairs Specialist	Rural County Representatives of California (RCRC)
First Vice-President	League of Women Voters
Senior Administrative Assistant	H.T. Harvey & Associates
California Representative	Defenders of Wildlife
Editor-in-Chief	Northern California Herpetological Society
Interim Executive Director	California Native Plant Society
Executive Director	Mountain Lion Foundation
Research Program Specialist (GIS)	California Dept of Forestry and Fire Protection
	Cardno Entrix
Environmental Division Manager	El Dorado Irrigation District
Executive Vice President	Bayless & Hicks
President	
Executive Director	Great Valley Center
Manager	Contra Costa County Farm Bureau
Executive Director	Napa County Farm Bureau
President	Placer County Farm Bureau
Administrator	California Farm Bureau Federation
President	California Farm Bureau Federation
Assistant Editor, Ag Alert/California Country	California Farm Bureau Federation
Executive Director	San Joaquin County Farm Bureau
Executive Secty	Solano County Farm Bureau
Executive Director	Yolo County Farm Bureau
Executive Director	Yuba-Sutter County Farm Bureau
President	Forest Landowners of CA
	Remy, Thomas, Moose and Manley, LLP
Manager, Govt Pubs Section	CA State Library
Section 6 Grants Coordinator	California Department of Fish and Wildlife
Principal	EJL & Associates
	KTXL, Channel 40
News Director	KFBK
News Assignment Editor	KXTV, Channel 10
Assignment Editor	KCRA, Channel 3
News Director	KHTK
Executive Director	Contra Costa RCD
District Manager	El Dorado County RCD/Georgrtown Divide RCD
Director	Napa County RCD
Chairman	Sloughhouse RCD
District Manager	Sutter County RCD
Secretary/District Clerk	Yuba County RCD
Chair	Sierra Club - Mother Lode Ch
Conservation Program Coordinator	Mother Lode Chapter Sierra Club
Owner/Manager	Leave No Trace Adventures
Information Officer, Regions 3 & 4	California Department of Fish and Wildlife
Regional Mgr	California Department of Fish and Wildlife, Sac Valley-Central Sierra Reg 2
District Supervisor	California Department of Fish and Wildlife-Red Lake Wildlife Area
Staff Environmental Scientist	California Department of Fish and Wildlife
Staff Environmental Scientist	California Department of Fish and Wildlife
	CA Dept of Water Resources
Chief Consultant	State Assembly Standing Committee-Water, Parks & Wildlife
Director	California Department of Fish and Wildlife
Director	California Department of Fish and Wildlife
Dept. Executive Director - External Affairs	California Department of Fish and Wildlife

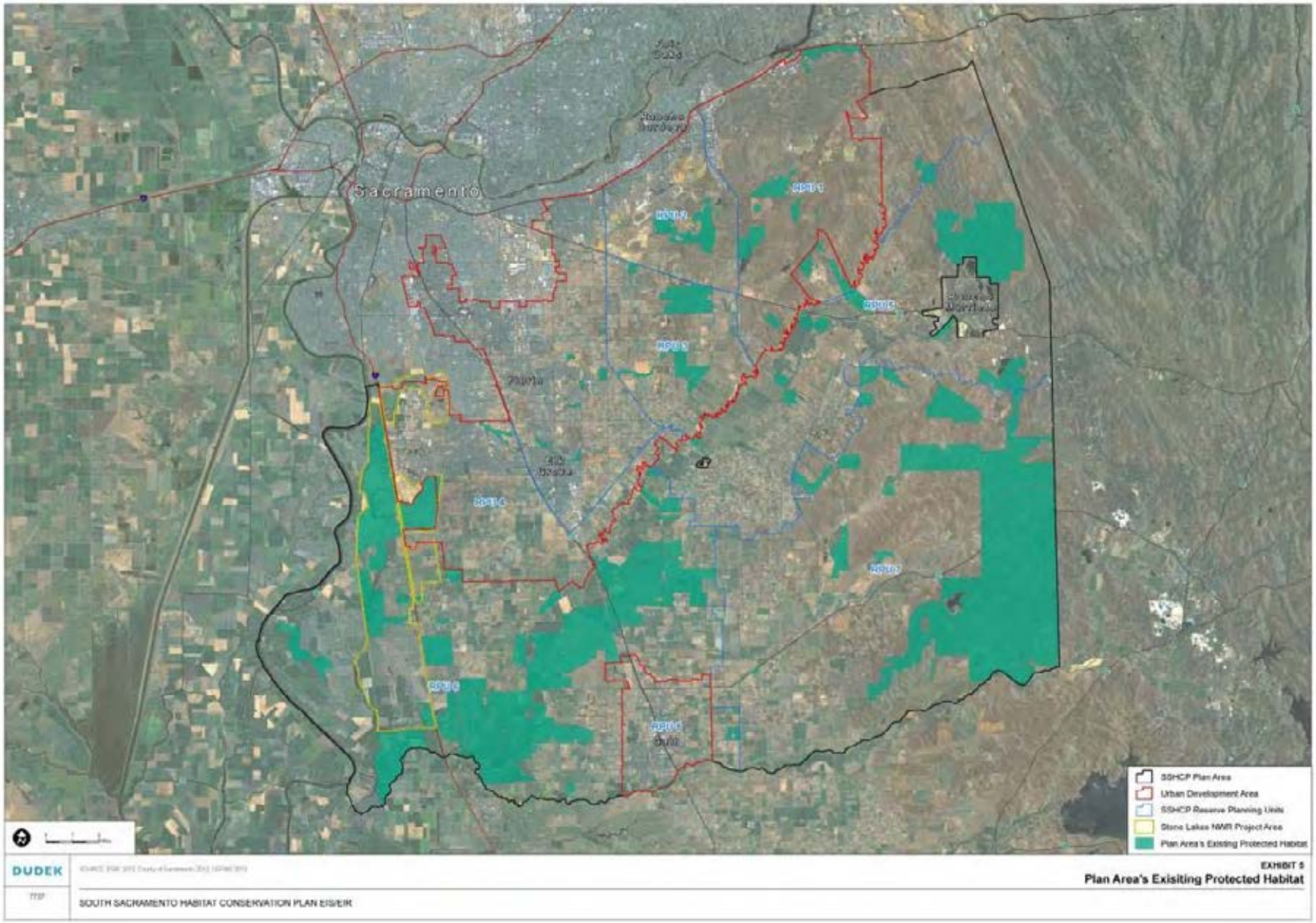
Title	Organization Name
Deputy Director, Communications	California Department of Forestry and Fire Protection
Deputy Director	California Department of Fish and Wildlife
Director	CA Dept of Water Resources
Public Information Officer	Sacramento-Yolo Mosquito Vector Control District
Acting Regional Manager, Region 3	California Department of Fish and Wildlife,Central Coast Reg
Assemblymember	California State Assembly
Assemblymember	California State Assembly
Assemblymember	California State Assembly
Assemblymember	California State Assembly
Minority Caucus Chair	California State Senate
Senator	California State Senate
Senate President pro Tem	California State Senate
Senator	California State Senate
Senator	California State Senate
Tribal Chairwoman	Buena Vista Rancheria
Environmental Resources Director/THPO	Buena Vista Rancheria
County Director	UC Coop Extension - Sacto County
Congressman	District Office, Stockton
Congressman	District Office, Stockton
Congressman	District Office, Fairfield
Congressman	District Office, Oroville
Congressman	District Office, Redding
Congressman	District Office, Fairfield
Congressman	District Office, Rancho Cordova
Congressman	District Office, Rancho Cordova
Congresswoman	District Office, Sacramento
Congresswoman	District Office, Sacramento
State Director	BLM, State Office
Regional Analyst/R5 Strategic Decision Support Cadre	USFS
Remote Sensing Specialist	USFS
District Engineer	Army Corps
Natural Resources Specialist	BOR, Central Cal. Area Office
Natural Resources Specialist	BOR, Central Cal. Area Office
Distr Conservationist	USDA NRCS - Sacramento Field Office
President	CA Assoc of Wine Grape Growers
Secretary	CA Environmental Protection Agency
Member	CA Water Commission
General Manager	State Water Contractors
Staff Environmental Specialist	Central Valley Flood Protection Board
Executive Director	Central Valley Project Water Assoc
Executive Director	CA Central Valley Flood Control Assoc
Manager	North Delta Water Agency
Executive Officer	Mining and Geology Board
	Restore the Delta
Executive Director	CA Farm Water Coalition
Senior Project Manager	Santa Clara Valley Water District
	Sacramento Bee

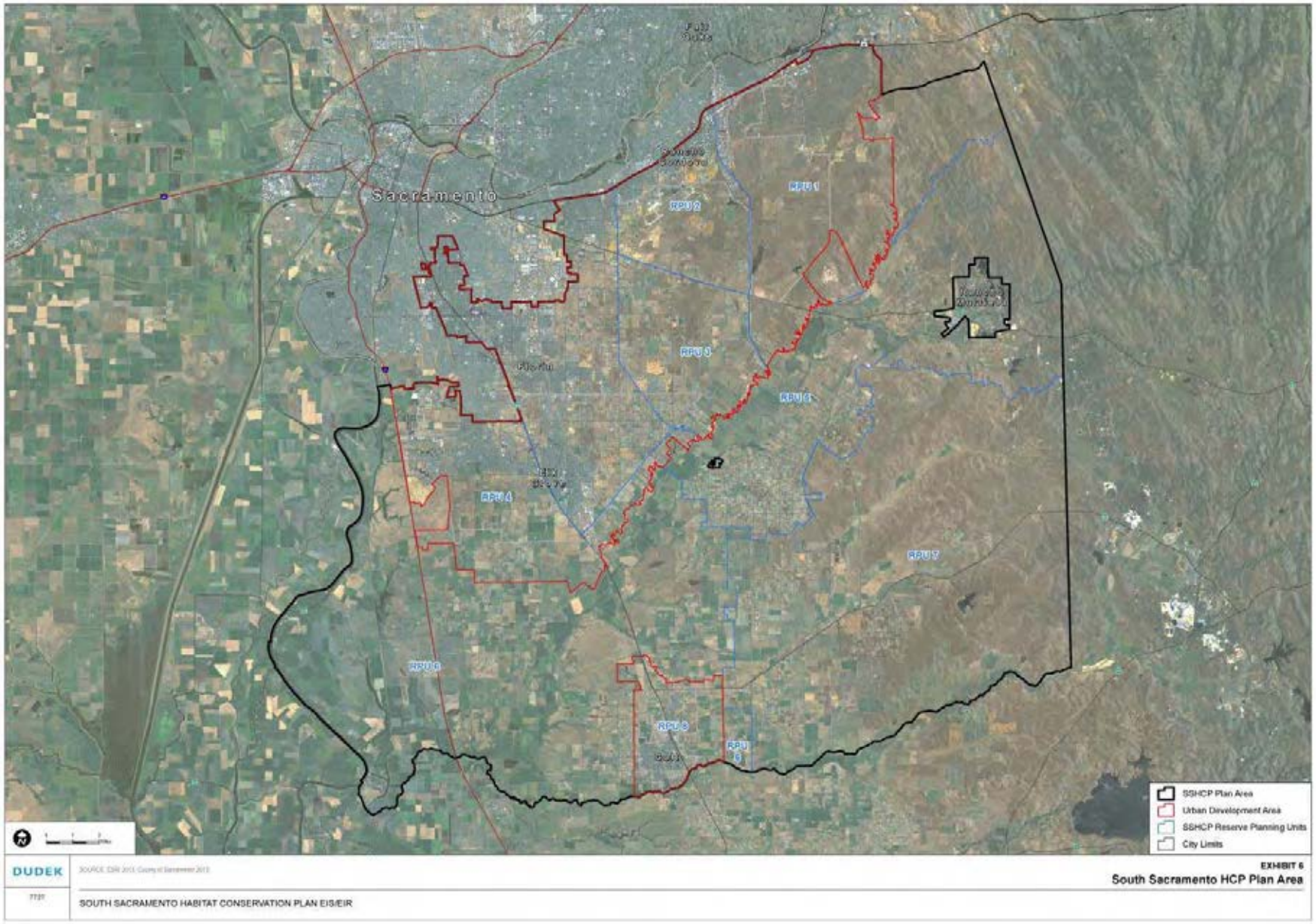
Scoping Meeting Materials


Sacramento
Elk Grove
Galt
SSHCP Plan Area
City Limits
Land Cover Types
Aqueducts
Blue Oak Savanna
Blue Oak Woodland
Cropland
Disturbed
Ephemeral Streams
Eucalyptus Woodland
Freshwater Marsh
High Density Development
Irrigated Pasture-Grassland
Low Density Development
Major Roads
Mine Tailing Riparian Woodland
Mine Tailings
Mixed Riparian Scrub
Mixed Riparian Woodland
Open Water
Orchards
Recreation/Landscaped
Seasonal Wetlands
Streams/Creeks
Swale
Valley Grassland
Valley Oak Riparian Woodland
Vernal Pool
Vineyards
Wetland Restoration
Woodland Restoration
Covered Plant Species
Ahart's dwarf rush
Boggs Lake hedge-hyssop
Dwarf downingia
Legenere
Pincushion navarretia
Sacramento Orcutt grass
Sanford's arrowhead
Slender Orcutt grass
Covered Wildlife Species
American badger
California tiger salamander
Cooper's hawk
Ferruginous hawk
Giant garter snake
Loggerhead shrike
Northern harrier
Pallid bat
Ricksecker's water scavenger beetle
Sandhill crane
Swainson's hawk
Tricolored blackbird
Valley elderberry longhorn beetle
Vernal pool fairy shrimp
Western pond turtle
Western red bat
Western spadefoot
White-tailed kite
Yuma myotis
Midvalley fairy shrimp
Vernal pool tadpole shrimp
DUDEK
EXHIBIT 2
Covered Species Occurences
SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR


Sacramento
SSHCP Plan Area
Urban Development Area
Vernal Pool Species Recovery Core Areas
USFWS Critical Habitat
California tiger salamander Critical Habitat
Sacramento Orcutt grass Critical Habitat
Slender Orcutt grass Critical Habitat
Vernal pool fairy shrimp Critical Habitat
Vernal pool tadpole shrimp Critical Habitat
DUDEK
EXHIBIT 3
Species Critical Habitat/Recovery Areas
SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR


Sacramento
Florin
Elk Grove
Galt
SSHCP Plan Area
Urban Development Area
Land Cover Types
Aqueducts
Blue Oak Savanna
Blue Oak Woodland
Cropland
Disturbed
Ephemeral Streams
Eucalyptus Woodland
Freshwater Marsh
High Density Development
Irrigated Pasture-Grassland
Low Density Development
Major Roads
Mine Tailing Riparian Woodland
Mine Tailings
Mixed Riparian Scrub
Mixed Riparian Woodland
Open Water
Orchards
Recreation/Landscaped
Seasonal Wetlands
Streams/Creeks
Swale
Valley Grassland
Valley Oak Riparian Woodland
Vernal Pool
Vineyards
Wetland Restoration
Woodland Restoration
DUDEK
EXHIBIT 4
SSHCP Land Cover Types
SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR


Sacramento
SSHCP Plan Area
Urban Development Area
SSHCP Reserve Planning Units
Stone Lakes NWR Project Area
Plan Area's Existing Protected Habitat
DUDEK
EXHIBIT 5
Plan Area's Exisiting Protected Habitat
SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR


Sacramento
RPU 1
RPU 2
RPU 3
RPU 4
RPU 5
RPU 6
RPU 7
RPU 8
RPU 9
SSHCP Plan Area
Urban Development Area
SSHCP Reserve Planning Units
City Limits
DUDEK
EXHIBIT 6
South Sacramento HCP Plan Area
SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

South Sacramento
Habitat Conservation Plan
SOUTH SACRAMENTO
HABITAT CONSERVATION PLAN
Draft SSHCP Working Schedule of Deliverables
May-13
June-13
July-13
August-13
September-13
October-13
November-13
December-13
January-14
February-14
March-14
April-14
May-14
June-14
July-14
August-14
September-14
October-14
November-14
December-14
January-15
February-15
March-15
HCP
Draft Chapters
Administrative Draft (complete)
Draft (public release)
Post in Federal Register
Administrative Final
Final HCP
ARP
Administrative Draft (complete)
Draft (public release)
Post in Federal Register
Administrative Final
Final ARP
EIR/EIS
First Administrative Draft
Second Administrative Draft
Public Review Draft
Post in Federal Register
Public Hearing
Administrative Final
Final EIR/EIS
Implementing Agreement
Administrative Draft
Draft
Post in Federal Register
Administrative Final
Final Implementing Agreement
Public Outreach
Deal Points Briefing
Stakeholder Briefings
Public Review and Workshop Process
Review Closes
Post in Federal Register
Hearings
Progress Reports
Public Hearings - Draft Documents
Adoption Hearings
Permit Package
Submit Permit Package to USFWS/Corps/CDFW
1. Complete administrative draft documents.
2. Public review draft documents - permit application submittal.
3. Adoption hearings.
May 30, 2013

South Sacramento
Habitat Conservation Plan
Public Comment Opportunities During the Preparation of the EIS/EIR
Notice of Preparation and Notice of Intent Released
Provide Written Comments
Now - December 13, 2013
Public Provides Comments at Scoping Meetings
November 20, 2013 Galt
November 21, 2013 Sacramento
County and USFWS Prepare the Draft EIS/EIR
• Consider Scoping Comments
• Compare Alternatives
• Analyze Substantive Effects
• Develop Mitigation Measures
Draft EIS/EIR
Public Provides Comments During the 90-day Public Comment Period
Spring 2014
Public Provides Comments at Meetings and/or Public Hearings on the Draft EIS/EIR
Spring 2014
County and USFWS write the Final EIS/EIR
• Respond to Substantive Comments
• Revise Text Based on Comments
Final EIS/EIR
Public Provides Comments During the 30-day Final Review Period
Fall 2014
Agency Decisions
• Consider any Public Comments
• County Prepares Findings
• USFWS prepares Record of Decision
GREEN indicates opportunities to provide input

South Sacramento Habitat Conservation Plan

Please help us prepare the EIS/EIR for a South Sacramento Habitat Conservation Plan.

We need your help. The County of Sacramento and U.S. Fish and Wildlife Service are working together to prepare a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) that will analyze impacts of a Habitat Conservation Plan (HCP) proposed for south Sacramento County. The HCP will provide a framework under the Endangered Species Act to help local communities accommodate development while conserving plant and animal species. The Draft EIS/EIR is expected to be publicized by the spring of 2014.

What is your role during this public scoping process?

Your help is needed to inform the County and the Service of the important issues you want studied in the EIS/EIR. Please focus your comments on:

- Potential impacts that the EIS/EIR should study in depth.
- Problems the proposal may cause, and ways to solve them.
- Better, more effective mitigation measures.
- Suggestions for reasonable alternatives to the proposal.
- Questions you want addressed in the EIS/EIR
- Specific habitat locations inside the Urban Development Area that you think should be preserved.

Please make your comments as specific as you can.

Sometimes participants identify issues during scoping meetings that are too broad to be useful for EIS/EIR analytical purposes - For example, "cultural impacts" - what does this mean? What precisely are the impacts or issues that you want examined? When we encounter a comment as broad as this, we have to guess about what you meant, and you may find that your issues are not covered in the EIS/EIR. Thus, you should refine broad general topics, and specify which issues need evaluation and analysis.

South Sacramento Habitat Conservation Plan

What information will the Draft EIR/EIS contain?

- Descriptions of a proposed HCP and alternative HCPs under consideration.
- A detailed analysis of direct, indirect, and cumulative impacts of all HCP alternatives on the human and environmental resources that you identify in your scoping comments.
- Resources and topics that will be analyzed in the draft EIS/EIR may include, but may not be limited to: Soils, Hydrology, Water Quality, Land Use, Mining, Agriculture, Wildlife and Plants, Wetlands, Cultural Resources, Socio-economics, Public Services, and Transportation.

Public Comment: What's Next?

- Your scoping comments and the comments others submit will appear in a Scoping Report. The report will be available this winter on the South Sacramento HCP web site: *www.per.saccounty.net/ PlansandProjectsInProgress/Pages/SSHCPPlan.aspx*
- You will have opportunities to provide additional comments in the spring of 2014 when the Draft EIS/EIR is expected to be released for public review.

Please submit your written comments from this scoping meeting, the Notice of Preparation (NOP), or the Notice of Intent (NOI) **before December 13, 2013 to:**

Catherine Hack
County of Sacramento,
Department of Community Development
Planning and Environmental Review
827 7th St, Room 220
Sacramento, CA 95814

or

Nina Bicknese
Sacramento Fish and Wildlife
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-260
Sacramento, CA 95825
nina_bicknese@fws.gov

The NOP and NOI, the scoping meeting handouts, and additional comment-forms are available at: http://dev.per2.saccounty.net/PlansandProjectsIn-Progress/Pages/SSHCPPlan.aspx

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

Would you like to be added to the SSHCP mailing list? □ Yes □ No

If so, please provide your contact information.

Name: _____

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Catherine Hack, 827 7th Street, Room 220, Sacramento, CA 95814

PLEASE FOLD ALONG THIS LINE FOR MAILING

PLACE STAMP HERE

County of Sacramento
Department of Community Development
Planning and Environmental Review
ATTN: Catherine Hack
827 7th Street, Room 220
Sacramento, CA 95814

South Sacramento Habitat Conservation Plan

OCTOBER 20, 2013 SSHCP EIS/EIR SCOPING MEETING (GALT)

NAME	ORGANIZATION	E-MAIL	PHONE #	MAILING ADDRESS
Emily Bacchini	SMUD	emily.bacchini@smud.org	916-732-6334	
Mitch Gaskey	SBM	mgaskey@sbmcorp.com	916-565-3683	
MICHAEL MONASKY	ELK GROVE RESIDENT	[redacted]		
John & Margaret Duarte	Land owner Elk Grove/Franklin	[redacted]		
Kate Wheatley	Taylor & Wiley	kwheatley@taylorwiley.com	916 929 5545	
Marta Carrillo	Resident		[redacted]	
Tish Espinosa	Resident	[redacted]		
Michelle Tovar	AWE	mtovar@areawest.net	916-987-3362	
Arid Miller	AWE	amiller@areawest.net	916-987-3362	
Becky Rozumowicz	AWE	becky@areawest.net	" "	
Lynn Wheat	Resident	[redacted]		
NOVEMBER 21, 2013		Scoping Meeting		
Roxbury Wackford	BMW Consulting	[redacted]		
[illegible]	[illegible]	jpachl@sbcglobal.net	916-444-0910	
Ammon Rice	SMUD	ammon.rice@smud.org	916-732-7466	
Vanessa Emerzian	BSK	emerzianv@gmail.com	707-362-1484	
Megan Brooks	DSC	Megan.Brooks@DeltaCouncil	9	
Clive Ghirardelli	DWMR	ghirardellid@saccounty.net	875-4557	

South Sacramento Habitat Conservation Plan

OCTOBER 20, 2013 SSHCP EIS/EIR SCOPING MEETING (GALT)

NAME	ORGANIZATION	E-MAIL	PHONE #	MAILING ADDRESS
JACK KAUTZ	Farms –	[redacted]		
Andrew Galsteen	- Pattern Ranch	[redacted]		
	November 21, 2013	Scoping Meeting		
Herb Garms	Barton Ranch		[redacted]	
Larry Larsen	Law offices of Gregory Thatch	llarsen@thatchlaw.com		
BJORN GREGERSEN	ECORP CONSULTING	BGREGERSEN@ECORPCONSULTING.com	916-782-9100	2525 WARREN DR. ROCKLIN CA 95667
Jude Lamare	Friends of Swainson's Hawk	Swainsons@sbcglobal.net	916 447-4956	717 K St 529 ~~Swainson~~ SACTO 95814
SCOTT FINLEY	STONE LAKES NWRA	SBGFINLEY@SBCGLOBAL.NET	916-933-1219	
~~[illegible]~~				
ETIENNE OZORAK	Sac. County DWMR	OZORAKE@saccounty.net	916-875-4115	9850 Goethe Rd Sac 95827
Kate Wheatley	Taylor + Wiley	kwheatley@taylor-wiley.com	929 5545	
Mark Hanson	Cordova Hills	mhanson@sbmcorp.com	916-565-3667	5241 Arnold Ave McClellan, CA 95652
TRAVIS Hemmen	Westervelt	themmen@westervelt.com	916-646-3644	600 N. Market Blvd., Sac, CA 95834
PETE DWELLEY	JACKSON TWSHP	pedwelley@gmail.com	916 420 0610	

Scoping Meeting Notes

DUDEK

980 9TH STREET, 17TH FLOOR SUITE 1750
SACRAMENTO, CALIFORNIA 95814
T 916 [illegible] F 916 [illegible]

SOUTH SACRAMENTO HCP EIS/EIR

SCOPING MEETING NOTES

Meeting Title:	Scoping Meeting #1
Meeting Date:	November 20, 2013
Location:	Galt Police Headquarters, Galt, California
Attendees:	**County of Sacramento:** Marianne Biner, Rich Radmacher, Bill Ziebron
	USFWS: Nina Bicknese
	Dudek: Sarah Lozano
	Ascent: Sean Bechta
	Members of the public

1. Can the powerpoint and maps shared at tonight's meeting be provided to the public through the County's Website?
2. Provide a rationale for why species were dropped between the 2008 and 2013 HCP efforts.
3. What does it mean to "take" a species or its habitat?
4. How will the HCP and HCP EIS/EIR public comment period and approval process proceed?
5. How can the public get involved with this process? How can the public get minutes from the LAWG and RAWG meetings?
6. Why won't the use of eminent domain be utilized during implementation of the HCP?
7. To what extent will the construction of new water delivery structures/systems be evaluated in the cumulative impacts analysis? Similarly, will the EIS/EIR evaluate indirect effects/impacts on water resources?
8. How do existing or proposed mitigation banks relate to the proposed HCP?
9. How can farmland coexist with preserves?
10. What role will PMC play in the EIS/EIR?

Notes prepared by Sarah Lozano, Dudek, December 3, 2013

South Sacramento HCP/NCCP/EIS/EIR
Subject: EIS/EIR Scoping Meeting Notes

MEETING NOTES

Meeting Title:	Scoping Meeting #2
Meeting Date:	November 21, 2013
Location:	Governor's Office of Planning and Research, Sacramento, California
Attendees:	**County of Sacramento:** Marianne Biner, Cathy Hack, Rich Radmacher, Bill Ziebron **USFWS:** Nina Bicknese **USACE:** Mary Pekenham-Walsh **Dudek:** Sarah Lozano **Ascent:** Curtis Alling, Claudia Funari Members of the public

1. Who are the CEQA/NEPA lead/cooperating agencies?
2. What role will CDFW plan in this process? What action will CDFW take on the HCP?
3. Will there be a cumulative effects/impacts analysis?
4. What alternatives would be evaluated in the EIS/EIR? Can the area of mitigation for originally proposed for Swainson's hawk be considered once again? Similarly, the eastern and western portions of the Plan Area differ in importance to Swainson's hawk, therefore, can the conservation for Swainson's hawk be concentrated east of I-5 as much as possible?
5. Mitigation in the area west of I-5 and west of Stodgrass Slough may not be effective or a good long term solution because these areas are below sea level.
6. How will the HCP be financed? How will the Plan Partners Regulatory Agencies factor in inflation over the life of the permit?
7. Will the ratio for Swainson's hawk mitigation be 1:1 and dependent on the land cover type?
8. Is grazing land considered "agriculture" or "annual (non-native) grassland"?
9. Will the powerpoint and maps shared at today's meeting be available on the County's website? And if, so, by when?

Notes prepared by Sarah Lozano, Dudek, December 3, 2013

Comments Received

Edmund G. Brown Jr.
Governor

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Ken Alex
Director

Notice of Preparation

October 28, 2013

To: Reviewing Agencies

Re: South Sacramento Habitat Conservation Plan (SSHCP)
SCH# 2008062030

Attached for your review and comment is the Notice of Preparation (NOP) for the South Sacramento Habitat Conservation Plan (SSHCP) draft Environmental Impact Report (EIR).

Responsible agencies must transmit their comments on the scope and content of the NOP, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of the NOP from the Lead Agency. This is a courtesy notice provided by the State Clearinghouse with a reminder for you to comment in a timely manner. We encourage other agencies to also respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

Catherine Hack
Sacramento County
827 Seventh Street, Room 220
Sacramento, CA 95818

with a copy to the State Clearinghouse in the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the environmental document review process, please call the State Clearinghouse at (916) 445-0613.

Sincerely,

Scott Morgan
Director, State Clearinghouse

RECEIVED
OCT 29 2013
County Of Sacramento
Department of Community Development
Planning and Environmental Review Division

Attachments
cc: Lead Agency

Document Details Report
State Clearinghouse Data Base

SCH# 2008062030
Project Title South Sacramento Habitat Conservation Plan (SSHCP)
Lead Agency Sacramento County

Type NOP Notice of Preparation

Description The proposed SSHCP is a regional approach to conserving species and addressing issues related to urban development, habitat conservation, open space protection and agricultural protection. The SSHCP would authorize the County, cities of Elk Grove, Rancho Cordova and Galt, and two public utility agencies to issue permits allowing landowners to engage in specific development activities that could result in incidental takes of listed species.

Lead Agency Contact

Name Catherine Hack
Agency Sacramento County
Phone 916 874 7183 **Fax**
email
Address 827 Seventh Street, Room 220
City Sacramento **State** CA **Zip** 95818

Project Location

County Sacramento
City Elk Grove, Rancho Cordova, Galt
Region
Cross Streets Regional
Lat / Long
Parcel No. Numerous
Township **Range** **Section** Region **Base**

Proximity to:

Highways Hwy 16
Airports Franklin Field
Railways Union Pacific
Waterways American, Sacramento, Cosumnes Rivers and Tributaries
Schools Various
Land Use Regional project encompassing various types of urban, rural residential and agricultural land use designations.

Project Issues Air Quality; Archaeologic-Historic; Drainage/Absorption; Economics/Jobs; Flood Plain/Flooding; Forest Land/Fire Hazard; Geologic/Seismic; Minerals; Noise; Public Services; Recreation/Parks; Sewer Capacity; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Wildlife; Growth Inducing; Landuse; Cumulative Effects; Agricultural Land

Reviewing Agencies Resources Agency; Department of Conservation; Department of Parks and Recreation; Department of Water Resources; Department of Fish and Wildlife, Region 2; Native American Heritage Commission; California Highway Patrol; Caltrans, District 3 S; Air Resources Board; Regional Water Quality Control Bd., Region 5 (Sacramento); Delta Stewardship Council

Date Received 10/28/2013 **Start of Review** 10/28/2013 **End of Review** 11/26/2013

Notice of Completion

Control Number # 03-PWE-0637 SEE NOTE BELOW **SCH # 2008062030**

Mail to: PO Box 3044, Sacramento CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth street, Sacramento CA 95814

Project Title: South Sacramento Habitat Conservation Plan (SSHCP)
Lead Agency: Sacramento County
Mailing Address: 827 7th Street, Room 220
City: Sacramento Zip: 95818
Contact Person: Catherine Hack
Phone: (916) 874-7183
County: Sacramento

Project Location
County: Sacramento City/Nearest Community: Elk Grove, Rancho Cordova, Galt
Cross Streets: Regionall Zip Code: Regional
Lat. / Long.: Regional° ____ ' ____ " N/ ____ ° ____ ' " W Total Acres: 341,000
Assessor's Parcel No.: Numerous Section: Regionall Twp: ____ Range: ____ Base: ____
Within 2 Miles: State Highway # 16 Waterways: American, Sacramento, Cosumnes rivers and tributaries
Airports: Franklin Field Railways: Union Pacific Schools: Various

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Document Type
CEQA: ☒ NOP ☐ Draft EIR ☐ Early Cons ☐ Supplement/Subsequent EIR ☐ Neg Dec (Prior SCH No.) ____ ☐ Mit Neg Dec Other: ____
NEPA: ☐ NOI ☐ EA ☐ Draft EIS ☐ FONSI
OTHER: ☐ Joint Document ☐ Final Document ☐ Other: ____

Local Action Type
☐ General Plan Update ☐ General Plan Amendment ☐ General Plan Element ☐ Community Plan
☐ Specific Plan ☐ Master Plan ☐ Planned Unit Development ☐ Site Plan
☐ Rezone ☐ Prezone ☐ Use Permit ☐ Land Division (subdivision, etc.)
☐ Annexation ☐ Redevelopment ☐ Coastal Permit ☒ Other: HCP

Development Type
☐ Residential: Units ____ Acres ____
☐ Office: Sq. Ft. ____ Acres ____ Employees ____
☐ Commercial: Sq. Ft. ____ Acres ____ Employees ____
☐ Industrial: Sq. Ft. ____ Acres ____ Employees ____
☐ Education: ____
☐ Recreational: ____
☐ Water Facilities: Type:____ MGD:____
☐ Transportation: Type:____
☐ Mining: Mineral:____
☐ Power: Type:____ MW:____
☐ Waste Treatment: Type:____ MGD:____
☐ Hazardous Waste: Type:____
☐ Other: HCP

Project Issues Discussed in Document
☐ Aesthetic/Visual
☒ Agricultural Land
☒ Air Quality
☒ Archeological/Historical
☐ Coastal Zone
☒ Drainage/Absorption
☒ Economic/Jobs
☐ Fiscal
☒ Floodplain/Flooding
☒ Forest Land/Fire Hazard
☒ Geologic/Seismic
☒ Minerals
☒ Noise
☐ Population/Housing Balance
☒ Public Services/Facilities
☒ Recreation/Parks
☐ Schools/Universities
☐ Septic Systems
☒ Sewer Capacity
☒ Soil Erosion/Compaction/Grading
☒ Solid Waste
☒ Toxic Hazardous
☒ Traffic/Circulation
☒ Vegetation
☒ Water Quality
☒ Water Supply/Groundwater
☒ Wetland/Riparian
☒ Wildlife
☒ Growth Inducing
☒ Land Use
☒ Cumulative Effects
☐ Other: ____

Present Land Use/Zoning/General Plan Use
Regional project encompassing various types of urban, rural residential and agricultural land use designations

Project Description
The proposed SSHCP is a regional approach to conserving species and addresssing issues related to urban development, habitat conservation , open space protection and agricultural protection. The SSHCP would authorize the County, cities of Elk Grove, Rancho Cordova and Galt, and two public utiliity agencies to issue permits allowing landowners to engage in specific development acitivities that could result in incidental take of listed species.

NOTE: Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g., from a Notice of Preparation or previous draft document) please fill it in.

NOP Distribution List SA

County: Sacramento

SCH# 2008062030

esources Agency

- [■] Resources Agency — Nadell Gayou
- [ ] Dept. of Boating & Waterways — Nicole Wong
- [ ] California Coastal Commission — Elizabeth A. Fuchs
- [ ] Colorado River Board — Tamya Trujillo
- [■] Dept. of Conservation — Elizabeth Carpenter
- [ ] California Energy Commission — Eric Knight
- [ ] Cal Fire — Dan Foster
- [ ] Central Valley Flood Protection Board — James Herota
- [ ] Office of Historic Preservation — Ron Parsons
- [■] Dept of Parks & Recreation — Environmental Stewardship Section
- [ ] California Department of Resources, Recycling & Recovery — Sue O'Leary
- [ ] S.F. Bay Conservation & Dev't. Comm. — Steve McAdam
- [■] Dept. of Water Resources Resources Agency — Nadell Gayou

ish and Game

- [ ] Depart. of Fish & Wildlife — Scott Flint, Environmental Services Division
- [ ] Fish & Wildlife Region 1 — Donald Koch
- [ ] Fish & Wildlife Region 1E — Laurie Harnsberger
- [■] Fish & Wildlife Region 2 — Jeff Drongesen
- [ ] Fish & Wildlife Region 3 — Charles Armor
- [ ] Fish & Wildlife Region 4 — Julie Vance
- [ ] Fish & Wildlife Region 5 — Leslie Newton-Reed, Habitat Conservation Program
- [ ] Fish & Wildlife Region 6 — Gabrina Gatchel, Habitat Conservation Program
- [ ] Fish & Wildlife Region 6 I/M — Heidi Sickler, Inyo/Mono, Habitat Conservation Program
- [ ] Dept. of Fish & Wildlife M — George Isaac, Marine Region

Other Departments

- [ ] Food & Agriculture — Sandra Schubert, Dept. of Food and Agriculture
- [ ] Depart. of General Services — Public School Construction
- [ ] Dept. of General Services — Anna Garbeff, Environmental Services Section
- [ ] Dept. of Public Health — Jeffery Worth, Dept. of Health/Drinking Water
- [ ] Delta Stewardship Council — Kevan Samsam

Independent Commissions,Boards

- [ ] Delta Protection Commission — Michael Machado
- [ ] Cal EMA (Emergency Management Agency) — Dennis Castrillo
- [■] Native American Heritage Comm. — Debbie Treadway
- [ ] Public Utilities Commission — Leo Wong
- [ ] Santa Monica Bay Restoration — Guangyu Wang
- [ ] State Lands Commission — Jennifer Deleong
- [ ] Tahoe Regional Planning Agency (TRPA) — Cherry Jacques

Business, Trans & Housing

- [ ] Caltrans - Division of Aeronautics — Philip Crimmins
- [ ] Caltrans - Planning — Terri Pencovic
- [■] California Highway Patrol — Suzann Ikeuchi, Office of Special Projects
- [ ] Housing & Community Development — CEQA Coordinator, Housing Policy Division

Dept. of Transportation

- [ ] Caltrans, District 1 — Rex Jackman
- [ ] Caltrans, District 2 — Marcelino Gonzalez
- [■] Caltrans, District 3 — Gary Arnold
- [ ] Caltrans, District 4 — Erik Alm
- [ ] Caltrans, District 5 — David Murray
- [ ] Caltrans, District 6 — Michael Navarro
- [ ] Caltrans, District 7 — Dianna Watson
- [ ] Caltrans, District 8 — Dan Kopulsky
- [ ] Caltrans, District 9 — Gayle Rosander
- [ ] Caltrans, District 10 — Tom Dumas
- [ ] Caltrans, District 11 — Jacob Armstrong
- [ ] Caltrans, District 12 — Maureen El Harake

Cal EPA

Air Resources Board

- [■] All Projects — CEQA Coordinator
- [ ] Transportation Projects — Jon Taylor
- [ ] Industrial Projects — Mike Tollstrup
- [ ] State Water Resources Control Board — Regional Programs Unit, Division of Financial Assistance
- [ ] State Water Resources Control Board — Student Intern, 401 Water Quality Certification Unit, Division of Water Quality
- [ ] State Water Resouces Control Board — Phil Crader, Division of Water Rights
- [ ] Dept. of Toxic Substances Control — CEQA Tracking Center
- [ ] Department of Pesticide Regulation — CEQA Coordinator

Regional Water Quality Control Board (RWQCB)

- [ ] RWQCB 1 — Cathleen Hudson, North Coast Region (1)
- [ ] RWQCB 2 — Environmental Document Coordinator, San Francisco Bay Region (2)
- [ ] RWQCB 3 — Central Coast Region (3)
- [ ] RWQCB 4 — Teresa Rodgers, Los Angeles Region (4)
- [■] RWQCB 5S — Central Valley Region (5)
- [ ] RWQCB 5F — Central Valley Region (5), Fresno Branch Office
- [ ] RWQCB 5R — Central Valley Region (5), Redding Branch Office
- [ ] RWQCB 6 — Lahontan Region (6)
- [ ] RWQCB 6V — Lahontan Region (6), Victorville Branch Office
- [ ] RWQCB 7 — Colorado River Basin Region (7)
- [ ] RWQCB 8 — Santa Ana Region (8)
- [ ] RWQCB 9 — San Diego Region (9)

[■] Other Delta Stewardship

[ ] _____ Conservancy

Last Updated 9 /24/2013

SACRAMENTO-YOLO
MOSQUITO
& VECTOR
CONTROL
DISTRICT

1.800 429.1022
FIGHTtheBITE.net

County of Sacramento
Department of Community Development
Planning and Environmental Review Division
Attn: Catherine Hack, Environmental Coordinator
827 7th Street, Room 220
Sacramento, CA 95814

December 12, 2013

Re: Notice of Preparation of the Draft Environmental Impact Report for South Sacramento Habitat Conservation Plan # 2003-PLE-0637

DAVID BROWN, MANAGER

2013 BOARD OF TRUSTEES

The Sacramento-Yolo Mosquito and Vector Control District (District) appreciates the opportunity to review and comment on the Notice of Preparation of the Draft Environmental Impact Report for South Sacramento Habitat Conservation Plan (SSHCP).

The District has reviewed the SSHCP and is providing comments and concerns relating to the preparation of the Environmental Impact Report (EIR) to be incorporated into the Plan.

General Comment:
Drawing on previous work by the Central Valley Joint Venture Working Group, the District has compiled and published a list of Mosquito Reduction Best Management Practices (BMPs) for a variety of land uses including managed wetlands, habitats, and preserves. The SSHCP should reference the BMP manual for BMP implementation on all preserve areas in an effort to reduce mosquito breeding and subsequent pesticide applications. The Districts' BMP Manual may be viewed and downloaded from our website at: http://www.fightthebite.net/physical-control. Furthermore, the SSHC must recognize that in certain instances the HSC may be the more restrictive of landowner regulatory requirements, thus requiring BMP implementation to reduce mosquito breeding

The following are comments relating to specific issues contained within the SSHCP:

Chapter 5.6.1 *Land Management and Monitoring*
Comment: Please include Drainage Maintenance and BMP Implementation to the list of management activities. (BMP Manual)

Chapter 6.6.2 *Avoidance and Minimization Measures*
Comment: Add AMM 16 – Implement Mosquito Reducing BMPs in all designs, management and construction plans.

Chapter 6.6.3 *Avoidance and Minimization Analyses*
Comment: Page 6-63 paragraph 3 - "*No vehicle access or traffic would be able to access preserves.*" Please ensure that District has the appropriate provisions contained within the SSHCP to allow for District access to all preserve and buffer areas.

Chapter 6.7.1 *Excavation Activities, Table 6-46*
Comment: Every year the District works with the appropriate permitting agencies and landowners to remove multiple beaver dams and related blockages that are causing immediate mosquito breeding. The cubic yard removal thresholds for these public health threats may exceed the limits provided by the SSHCP. Please include a recognition of the impacts to public health caused by beaver dams and other blockages, and by following the provisions contained in this SSHCP, allow these dams to be removed in excess of the allowable cubic yards on an as needed basis.

Chapters 6.8.2/ 6.8.3 *page 6-84 and 6-87 Uses and Activities Not Permitted Within Stream Buffer Zones*
Comment: Add to the exception list under "*clearing or cutting of riparian woodland vegetation*" - Vegetation removal for the purpose of mosquito control and BMP implementation.

Chapter 7 *Draft SSHCP Conservation Strategy, p7-180 Tri-Colored Blackbird*
Comment: Paragraph 4 discusses possible threats to the species. Please document all unsubstantiated claims with scientific and supportive evidence, and utilize current research as it pertains to mosquito control for all species.

Appendix M – *Restoration and Creation Guidelines*
Comment: Please add a section under *Project Design* to include a requirement to reference, construct, and manage any habitat restoration or creation projects following the Districts BMP manual.

While many of the potential impacts remain unknown at this time, failure to address mosquito breeding issues during the planning, construction, and management process of aquatic habitats may result in enforcement actions to the landowner. The District has the authority to abate a public nuisance as defined in Section 2010 of the California Health and Safety Code (HSC) and may pursue enforcement actions pursuant to Sections 2060 of the HSC which can involve civil fines of up to $1000/per day.

The District remains committed to working with and assisting the SSHCP's Federal, State, and Local permitting agencies as well as local landowners to develop reasonable mosquito control measures as site specific projects are implemented and managed. It is important to include mosquito control operations as an integral component of the overall SSHCP to ensure effective mosquito control over the life of this permit. Please do not hesitate to contact me at 916-405-2085 with any questions or concerns as the SSHCP continues to be developed.

Sincerely,

Marty Scholl
Sacramento-Yolo MVCD
Ecological Management Supervisor
mscholl@FightTheBite.net

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DEC 13 2013
County of Sacramento
Department of Community Development
Planning and Environmental Review

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conservancy
Open Space. For all of us.

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EXECUTIVE DIRECTOR
Aimee Rutledge

December 10, 2013

Milgatte Associates, LP
P.O. Box 1405
Sloughhouse, CA 95683
Attn: Herb Garms

Dear Mr. Garms,

I have attached the 2013 monitoring report, which references the Conservation Easement on your Milgate Associates L.P. property that was recorded on November 29, 2012 and the Baseline Documentation Report (BDR) completed in October 2012.

Section 10 of your Conservation Easement requires you to give notice to SVC if you are planning on selling your property or transferring an interest in your property. SVC reminds you of this requirement to make sure we can fulfill our responsibilities in the easement and so we can promptly communicate with any new owners.

We had a lovely day monitoring the property and I greatly appreciate the CE boundary markers you placed. SVC appreciates the opportunity to work with you to protect the special resources on your property. We hope to see you at our upcoming events. For a full list of events visit our website at www.sacramentovalleyconservancy.org.

Please call or email me if you have any questions concerning this report.

Sincerely,

Lucie A. Adams

Lucie Adams, Stewardship Director

Sacramento Valley Conservancy
P.O. Box 163351
Sacramento, CA 95816
(916) 974-4329
ladams@sacramentovalleyconservancy.org

Attached: Annual Monitoring Report
SVC Stewardship and Transfer Policy

cc: Forest Halford – Western Land Company
Coyote Creek Inc.
County of Sacramento, Division of Environmental Review and Assessment
California Dept. of Fish and Wildlife: Region 2 Manager

Sacramento Valley Conservancy 2013 Monitoring Report
Milgate Conservation Easement

Date of Report: December 10, 2013

Date of monitoring visit: November 7, 2013

Property Data:

Name: Milgate Associates, L.P., Conservation Easement

Address: Barton Ranch
3830 Scott Road
Sloughhouse, CA 95683

Acres: 78.68 acres

Date of Recorded Easement: November 29, 2012

Current Owner:

Milgate Associates, L.P
P.O. Box 1405
Sloughhouse, CA 95683
Attn: Herb Garms
(916) 214-6722

Reports also sent to:

Coyote Creek Inc.
Attn: Herb Garms
8698 Elk Grove Blvd., Suite 3, #334
Elk Grove, CA 95624-3300

County of Sacramento
Division of Environmental Review and Assessment
Attn: Director
827 7th Street
Sacramento, CA 95814
Telephone: (916) 874-7914

California Department of Fish and Wildlife, Region 2
Attn: Regional Manager
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670
Telephone: (916) 358-2912

Purpose

The Milgate Conservation Easement Area possesses wildlife and habitat values of great importance and includes oak woodlands, oak grasslands and natural habitat for Swainson's hawk (*Buteo swainsoni*). This Conservation Easement Deed for Oak and Hawk Habitat on Agricultural Land and Agreement Creating Enforceable Restrictions in Perpetuity protects 78.68 acres of oak tree canopy and grasslands as Swainson's hawk (*Buteo swainsoni*) habitat as mitigation requirements by Sacramento County. The area protected by the Conservation Easement will offset the loss of oak tree canopy and Swainson's hawk foraging habitat for the proposed development Easton Place and Glenborough at Easton. Both Sacramento County and the California Department of Fish and Wildlife have approved the establishment of the mitigation.

The purpose of the Conservation Easement is to identify, protect, sustain and forever protect the Conservation Values (oak woodlands, oak grasslands and natural habitat for Swainson's hawk) from impairment by retaining the Easement Area predominantly in its agricultural and open space condition. The Conservation Purposes will be achieved through continues agricultural uses of the easement as provided in the Covenants, Terms, Conditions and Restriction of the Conservation Easement Deed.

Location

The property is located in the northeast section of Sacramento County, south of the city of Folsom. The entrance to the Easement Area is approximately 4.4 miles south on Scott Road from its intersection with White Rock Road. Access to the property is through a locked gate on the east side of Scott Road just past the bridge at Carson Creek.

Description of Uses

The Easement Area consists of annual grassland and oak woodlands and is used for livestock grazing and is part of the larger 3000 acre Barton Ranch. The 78.68 acre Milgate Easement is directly adjacent to the 241 acre Barton-Mosher Conservation Easement. Together they create a 320 acre area of Conservation Easements on the Barton Ranch.

The Easement Area has been owned by the Barton family since the late 1800's. The original homestead is north of the entrance to the Easement Area. Approximately 75 head of cattle graze the property from November to May.

A portion of the Conservation Area is reserved for the future development of a public recreational trail. The future trail is part of a plan for a public trail system connecting the American and Consumnes Watersheds to include 10,000 acre recreational wildlife habitat corridor.

Man made alterations

The Easement area contains a double track dirt road and numerous single track trails. East of the Easement area is Wall Town, an abandoned mining town. Along the eastern section of the Easement Area are several disturbed areas from past mining operations. Barbed wire fencing is adjacent to the eastern and northern boundaries and in other portions of the Easement Area. The Easement Area has been surveyed and boundaries and corners have been marked with metal t-posts.

Are restrictions in the Conservation Easement being complied with?

Yes, I observed property to be in compliance with the easement and management plan.

The property is in good condition. All gates and fences are in good condition. There is no sign of public access, illegal dumping of trash, or excavation on the property. No buildings and no paving or impervious materials was observed. No road building or alteration of the topography was observed. No equipment or fuel storage was observed. No unseasonable watering or use of fertilizers, herbicides or pesticides was observed. There is no off road vehicle disturbance.

Preserve Manager Comments:

Herb Garms, Ranch Manager, said everything went well this year and he had little to report. Herb said about 75 head of cattle graze on the total 3000 acres. Herb has had no trouble with dumping and only occasional trespassing from people wishing to fish in Carson Creek.

Other Observations:

Residual Dry Matter values were between 700 -1500 lbs/acre.

Date of Inspection and Method: November 7, 2013

The SVC monitors parked on the ranch road heading north, and walked to all the photo points. Monitors began at PP 4 and then followed the green t- post stakes marking the easement boundary to PP 3, 2 then 1.

Weather: Sunny, warm and clear

Photo Log:
Photo reference is from the Milgate Associates L.P Conservation Easement Baseline Documentation Report (October 2012). Photo point (PP).

#1 – PCR PP4 – View north
#2 – PCR PP4 – View northeast
#3 – PCR PP4 – View east

#4 – PCR PP3 – View west
#5 – PCR PP3 – View northwest
#6 – PCR PP3 – View north
#7 – PCR PP2 – View south
#8 – PCR PP2 – View southwest
#9 – PCR PP2 – View west
#10 – PCR PP1 – View east
#11 – PCR PP1 – View southeast
#12 – PCR PP1 – View south

Person's Attending the Inspection:
Herb Garms - Barton Mosher Sacramento Ranches
Forest Halford - Western Land Company
Lucie Adams - SVC Stewardship Director
Fred Tracy - SVC Program Assistant

Report Written By:

Lucie A. Adams

Lucie Adams, SVC Stewardship Director December 10, 2013

P.O. Box 163351
Sacramento, CA 95816
Sacramento Valley Conservancy
(916) 974-4329

On File at SVC office:

- Baseline Documentation Report
- Conservation Easement
- Copies of photos taken
- Management Plan

DELTA STEWARDSHIP COUNCIL
A California State Agency

980 NINTH STREET, SUITE 1500
SACRAMENTO, CALIFORNIA 95814
WWW.DELTACOUNCIL.CA.GOV
(916) 445-5511

December 17, 2013

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DEC 18 2013
County Of Sacramento
Department of Community Development
Planning and Environmental Review Division

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Randy Fiorini
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Patrick Johnston
Hank Nordhoff
Frank L. Ruhstaller

Executive Officer
Christopher M. Knopp

Catherine Hack, Environmental Coordinator
County of Sacramento
Department of Community Development
Planning and Environmental Review Division
827 7th Street, Room 220, Sacramento, CA 95814

Via Email: DERA@saccounty.net

RE: South Sacramento Habitat Conservation Plan NOP, SCH# 2008062030

Dear Ms. Hack:

This letter responds to your Notice of Preparation (NOP) of a Draft Environmental Impact Report (EIR) for the South Sacramento Habitat Conservation Plan (SSHCP) and its request for comments on the scope and content of the environmental information that is relevant to our agency's responsibility in connection with the proposed project.

State law specifically directs the DSC to provide "advice to local and regional planning agencies regarding the consistency of local and regional planning documents with the Delta Plan" (Water Code sec 85212). The Delta Stewardship Council adopted the Delta Plan on May 16, 2013, and the Plan's regulatory policies became effective on September 1, 2013. The Delta Plan, including its policies and recommendations, should be acknowledged in the EIR's description of the project's environmental setting.

The NOP's project summary states that the South Sacramento Habitat Conservation Plan "identifies urban development and public infrastructure projects within an Urban Development Area (UDA) and defines mitigation and avoidance measures for covered species and habitat that will be affected by the covered activities identified in the SSHCP." The NOP indicates that the covered activities may include the construction, installation, or extension of:

- Private development projects.
- Surface and groundwater delivery facilities.
- Water treatment facilities.
- Sewer and recycled water treatment and conveyance facilities.
- Solid waste sanitation facilities.
- Public facilities (police station, hospitals, schools, community centers, and administration centers).
- Indoor and outdoor recreation facilities.
- Energy utility facilities.
- Aggregate mining activities.
- Habitat management activities.

We recommend the following matters be discussed or included in the EIR:

- **Inconsistencies with the Delta Plan.** The EIR should discuss any inconsistencies between the project and the Delta Plan, as required by 15125(d) of the CEQA Guidelines. Note, too, that the CEQA Guidelines' Appendix G states that a project that is inconsistent with any applicable land use plan, policy, or regulation may result in a finding of significant impact on biological resources.

- **Agricultural Resources:** The EIR should include an analysis of the potential loss of agricultural land in the Delta caused by urban development covered by the SSHCP. Delta Plan Policy **DP P1** (23 CCR Section 5010) states that new residential, commercial, or industrial development is permitted outside the urban boundaries only if it is consistent with the land use designated in the relevant county general plan. It is intended to strengthen existing Delta communities while protecting farmland and open space, providing land for ecosystem restoration needs, and reducing flood risk. Please quantify the areal extent of the proposed UDA within the Delta, and discuss any potential impacts to agricultural resources.

- **Biological Resources:** The NOP states that the EIR will identify any potential impacts of the SSHCP on biological resources. Delta Plan Policy **ER P2** (23 CCR Section 5006) states that habitat restoration must be carried out consistent with Appendix 3 of the Delta Plan regulations, which is an excerpt from the California Department of Fish and Wildlife's Draft Ecosystem Restoration Program *Conservation Strategy*, which calls for restoring habitats at appropriate elevations. Further guidance is provided by Delta Plan Recommendation **ER R2**, which states, for the Cosumnes-Mokelumne Confluence, "Allow these unregulated and minimally regulated rivers to flood over their banks during winter and spring frequently and regularly to create seasonal floodplains and riparian habitats that grade into tidal marsh and shallow subtidal habitats."

  The Delta Plan establishes six habitat restoration areas in the Delta, one of which, the Cosumnes-Mokelumne Confluence, is located within the SSHCP Plan Area. Delta Plan Policy **ER P3** (23 CCR Section 5007) calls for protecting opportunities to restore habitat in these areas. More specifically, the policy states that "significant adverse impacts to the opportunity to restore as described in section 5006 must be avoided or mitigated." Potential mitigation measures could include elevating facilities so that water can flow underneath to allow for future restoration of habitats dependent on tides or periodic flooding, or locating facilities at the edge of the restoration area, rather than in the middle, to improve opportunities for restoring habitat connectivity. The mitigation shall be determined, in consultation with the California Department of Fish and Wildlife, considering the size of the project area and the type and value of habitat that could be restored in that area.

  We recommend that the EIR analysis include the impact of any urbanization or the placement of permanent agricultural easements on the opportunity to restore these types of habitat within the Delta Plan's Cosumnes-Mokelumne Confluence area.[1] The EIR should assess impacts to the opportunity to restore these areas for the habitat uses encouraged by the Delta Plan or the conservation measures recommended in the draft Bay Delta Conservation Plan.

[1] The boundaries of the priority habitat restoration areas are depicted in Appendix 5 of the Delta Plan regulations.

Delta Plan Policy **ER P5** (23 CCR Section 5009), calls for avoiding introductions of and habitat improvements for invasive nonnative species. It states, "The potential for new introductions of or improved habitat conditions for nonnative invasive species, striped bass, or bass must be fully considered and avoided or mitigated in a way that appropriately protects the ecosystem." The EIR should analyze the project's potential to introduce or improve habitat for nonnative invasive species.

- **Hydrology:** The NOP states that the EIR will analyze hydrology, which we presume includes flooding. The Delta Plan contains three policies that are most relevant to the County's consideration of this issue: Policy **RR P2** (23 CCR section 5013) requires flood protection for residential development in rural areas, Policy **RR P3** (23 CCR section 5014) restricts encroachment in floodways, and Policy **RR P4** (23 CCR Section 5015) restricts encroachments in floodplains, including the Cosumnes-Mokelumne Confluence.[2] Policy **RR P4** states that "no encroachment shall be allowed or constructed unless it can be demonstrated by appropriate analysis that the encroachment will not have a significant impact on the floodplain values and functions."

  In addition, the Delta Plan contains a recommendation (**RR R6**) encouraging the Central Valley Flood Protection Board to evaluate designating additional floodways. Flood risk reduction should be included as a factor when evaluating various conservation and development scenarios. We recommend that the EIR include analysis of potential conflicts between proposed activities in the SSHCP and the implementation of the project.

Other matters for your consideration

The Delta Reform Act specifically established a certification process for compliance with the Delta Plan's regulatory policies (See attachment on Covered Actions for details). According to the Delta Reform Act, it is the state or local agency approving, funding, or carrying out the project that must certify consistency with the Delta Plan. This certification is subject to appeal to the DSC. Should you determine the South Sacramento Habitat Conservation Plan is a covered action, a way to streamline the process and make full use of the EIS/EIR is to include the information and analysis needed to support the certification of Delta Plan consistency within the EIS/EIR, potentially including a draft certification as an appendix to the EIS/EIR.

Please also note that the final EIR for the Delta Plan includes a Mitigation Monitoring and Reporting Plan that describes the mitigation required for covered actions. If you should determine the South Sacramento Habitat Conservation Plan is a covered action, it would be affected by the Delta Plan's Policy **G P1** (23 CCR Section 5002(b)(2)), which states, "Covered actions not exempt from CEQA must include applicable feasible mitigation measures identified in the Delta Plan's Program EIR or substitute mitigation measures that the proposing agency finds are equally or more effective."

I encourage you to contact Jessica Davenport at jdavenport@deltacouncil.ca.gov or (916) 445-2168 with your questions, comments, or concerns. We would like to work with you to ensure the consistency of the South Sacramento Habitat Conservation Plan with the Delta Plan while also avoiding, minimizing or mitigating potential environmental impacts and we look forward to continued coordination between our agencies to further our related efforts. We are available to continue discussions about how to ensure that your project is consistent with the Delta Plan.

---

[2] RR P4 refers to the "Cosumnes River-Mokelumne River Confluence, as defined by the North Delta Flood Control and Ecosystem Restoration Project (McCormack-Williamson), or as modified in the future by the Department of Water Resources or U.S. Army Corps of Engineers."

Sincerely,

Cindy Messer
Deputy Executive Officer

cc: Erik Vink, Delta Protection Commission
Carl Wilcox, Department of Fish and Wildlife
Scott Cantrell, Department of Fish and Wildlife
Dave Zezulak, Department of Fish and Wildlife
Len Marino, Central Valley Flood Protection Board
Kacey Lizon, Sacramento Area Council of Governments

DEPARTMENT OF TRANSPORTATION
DISTRICT 3 – SACRAMENTO AREA OFFICE
2379 GATEWAY OAKS DRIVE, SUITE 150
SACRAMENTO, CA 95833
PHONE (916) 274-0635
FAX (916) 263-1796
TTY 711

Flex your power!
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November 26, 2013

032013-SAC-0173
03-SAC-16
SCH# 2008062030

Ms. Catherine Hack
County of Sacramento
827 7th Street, Room 220
Sacramento, CA 95814

South Sacramento Habitat Conservation Plan (SSHCP)—Notice of Preparation (NOP)

Dear Ms. Hack:

Thank you for including the California Department of Transportation (Caltrans) in the review and comment process for the South Sacramento Habitat Conservation Plan (Plan) NOP. The Plan proposes a regional conservation strategy to provide private and public projects with streamlined, predictable federal and state permitting processes while creating a comprehensive and regional preserve system to protect habitat, open space, and agricultural lands through avoidance and mitigation of impacts. The geographic location of the Plan includes 374,000 acres within south Sacramento County (unincorporated area) and the cities of Rancho Cordova, Elk Grove, and Galt. Generally the Plan limits are United States Highway (US) 50 to the north, the Sacramento River levee and County Road J11 to the west, the Sacramento County line with El Dorado and Amador Counties to the east, and the San Joaquin County line to the south.

As the responsible agency, Caltrans is committed to coordinate with Sacramento County and the other federal, State, and local partners as the SSHCP is being developed. Please include Caltrans in any interagency working groups that may be formed and provide us with any information on project actions.

If you have any questions regarding these comments or require additional information, please contact Melody L. Friberg, Intergovernmental Review Coordinator, at (916) 263-1625 or by email at: melody.friberg@dot.ca.gov

Sincerely,

Tracey Frost

TRACEY FROST, Chief
Office of Transportation Planning – South

c: Scott Morgan, State Clearinghouse

RECEIVED
DEC 2 – 2013
County Of Sacramento
Department of Community Development
Planning and Environmental Review Division

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY EDMUND G. BROWN, JR., *Governor*

DELTA PROTECTION COMMISSION
2101 Stone Blvd., Suite 210
West Sacramento, CA 95691
Phone (916) 375-4800 / FAX (916) 376-3962
Home Page: www.delta.ca.gov

Contra Costa County Board of Supervisors

Sacramento County Board of Supervisors

San Joaquin County Board of Supervisors

Solano County Board of Supervisors

Yolo County Board of Supervisors

Cities of Contra Costa and Solano Counties

Cities of Sacramento and Yolo Counties

Cities of San Joaquin County

Central Delta Reclamation Districts

North Delta Reclamation Districts

South Delta Reclamation Districts

CA State Transportation Agency

CA Department of Food and Agriculture

CA Natural Resources Agency

CA State Lands Commission

December 18, 2013

Catherine Hack, Environmental Coordinator
County of Sacramento
Department of Community Development
Planning and Environmental Review Division
827 7th Street, Room 220
Sacramento, CA 95814

Subject: Notice of Preparation of A Draft Environmental Impact Report for South Sacramento Habitat Conservation Plan (Control Number 2003-PLE-0637)

Dear Ms. Hack:

Delta Protection Commission (Commission) staff have reviewed the *Notice of Preparation (NOP) of A Draft Environmental Impact Report (EIR) for South Sacramento Habitat Conservation Plan (SSHCP)*. A portion of the project lies within the Primary Zone of the Sacramento-San Joaquin Delta (predominately the land located west of Interstate 5), and is subject to consistency requirements with the Delta Protection Commission's Land Use and Resource Management Plan (LURMP) for the Primary Zone of the Delta.

At this stage in your project we recommend that you review the LURMP to ensure that the EIR is consistent with our goals and policies related to land use, agriculture, natural resources, recreation access, water, levees and utilities infrastructure. You can access the LURMP on our website at: http://www.delta.ca.gov/plan.htm . We also recommend that the following matters be addressed in the EIR:

1. Please note that LURMP Land Use Policy P-2 states: "local governments general plans and zoning codes shall continue to promote and facilitate agriculture and agriculturally-supporting commercial and industrial uses as the primary land uses in the Primary Zone; recreation and natural resources land uses shall be supported in appropriate locations and where conflicts with agricultural land uses or other beneficial uses can be minimized." That said, the NOP

indicates a list of covered activities that may not be supported in the Primary Zone of the Delta. Please specify which covered activities are being proposed in the Primary Zone.

2. The Commission is that the SSHCP "support the long-term economic viability of agriculture; support the continued capability for agricultural operations to diversify and remain flexible to meet changing market demands and crop production technology; and encourage compatibility between agricultural practices and wildlife habitat (LURMP Agriculture Goals, pg. 13)." Please review the LURMP to ensure consistency with the agriculture policies.

3. Please review the DPC's Economic Sustainability Plan (ESP) for the Sacramento-San Joaquin Delta (2011),which is an important document guiding future activities in the legal Delta. Proposals for habitat management activities should consider the recommendations on Economic Sustainability for Agriculture, Recreation and Tourism; and Habitat and Ecosystem Improvements (pg. 274, 276). You can access the ESP on our website at: http://www.delta.ca.gov/Final_ESP_Jan_2012.htm .

Thank you for the opportunity to provide input on the NOP. If you have any questions please contact Raymond Costantino, Associate Environmental Planner, or myself at (916) 375-4800.

Sincerely,

Erik Vink
Executive Director

Biner. Marianne

From:	Hack. Catherine
Sent:	Thursday, December 19, 2013 7:33 AM
To:	Biner. Marianne
Subject:	FW: SSCHCP
Attachments:	sac_034334staffprop.pdf; EGsuitable_habitat_5_26_06.pdf; countyswhapprovedhab.pdf

Catherine Hack, Environmental Coordinator
Department of Community Development - Planning and Environmental Review
827 7th Street, Room 220, Sacramento, CA 95814 | (916) 874-7183
www.per.saccounty.net
SACRAMENTO COUNTY

From: Maulit. Justin
Sent: Wednesday, December 18, 2013 1:39 PM
To: Hack. Catherine
Subject: FW: SSCHCP

From: Judith Lamare [mailto:swainsonshawk@sbcglobal.net]
Sent: Monday, December 16, 2013 12:39 PM
To: DERA (Web Page)
Cc: Jim Pachl; Friends of the Swainsons Hawk; Nina Bicknese; Tina.bartlett@wildlife.ca.gov
Subject: SSCHCP

Catherine Hack, Environmental Coordinator

Comments on NOP for the South Sacramento Habitat Conservation Plan (2003-PLE_0637)

At the Scoping meeting November 21, 2013 I submitted comments orally and in writing. The following comments supplement my previously submitted comments.

1. The DEIR should address the direct, indirect and cumulative impacts on the state listed species, the Swainson's Hawk, in terms of both loss of nesting habitat, nesting pairs, foraging habitat, and the loss of range of a threatened species? An estimated 52 nest sites will be lost; where will these nesting pairs nest? What will be the effect on the species reproduction? What is the anticipated level of direct, indirect and cumulative "take" of this threatened species. Does the EIR serve, as we would expect, as a foundation document for DFW issuance of a 2081 permit for take of Swainson's Hawk?

2. What is the comparative quality of the foraging habitat that you expect in the anticipated area of expansion of Swainson's Hawk nesting and foraging? Please compare each of the alternatives with these issues in mind. Please note that the success of

Swainson's Hawk reproductive activity and survival of young is directly dependent upon availability of food supply which is reasonably available to nesting hawks during the breeding and nesting season. Destruction of foraging habitat eliminates food supply and forces hawks to travel greater distances to find prey, resulting in less food for the nest and a greater likelihood of nest failure, nestling mortality and reduced reproductive performance.

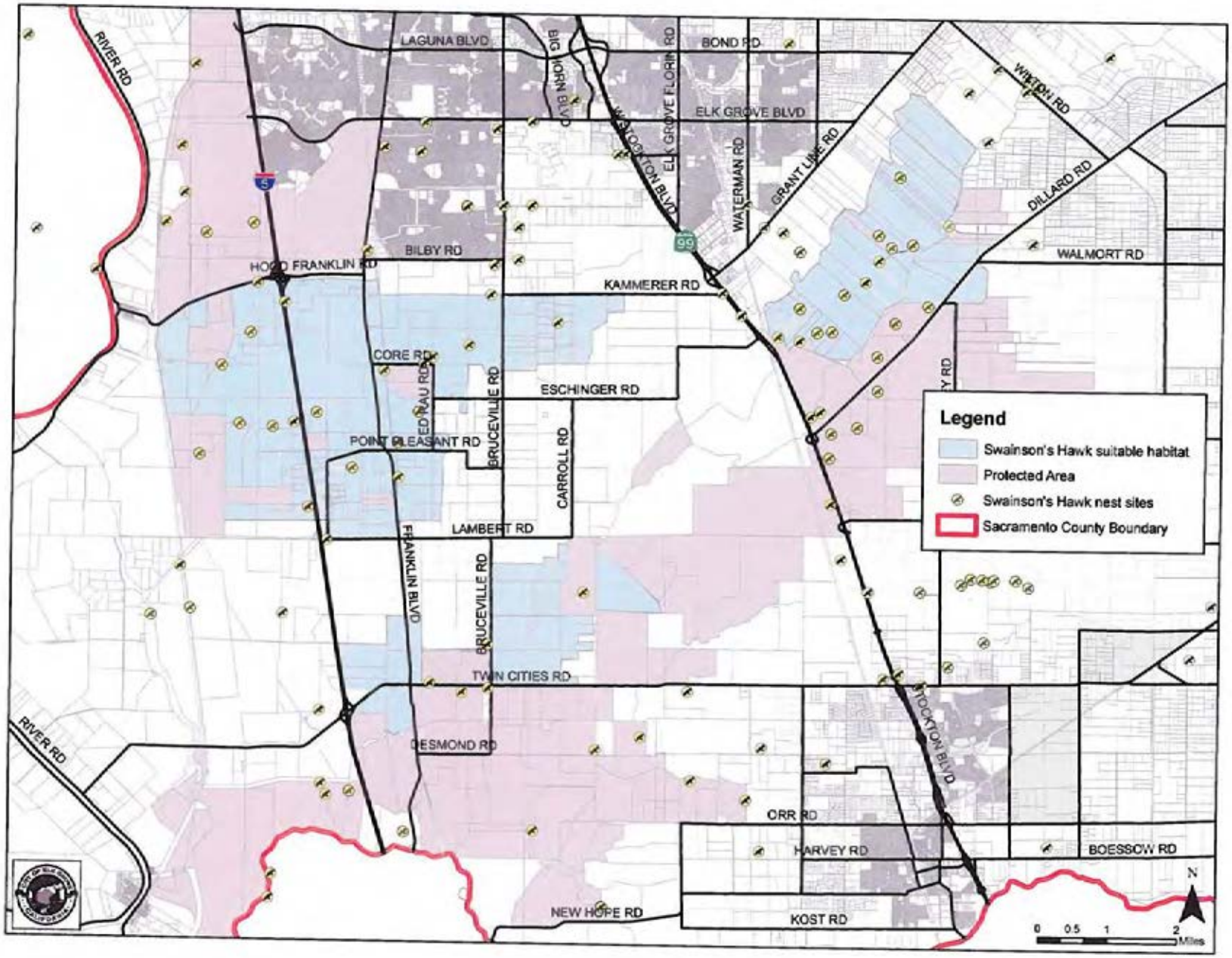
2. Please do not rely on the CNDDB which is not intended as a census of existing threatened species, but instead use the several recent surveys by California Department of Fish and Wildlife, the City of Rancho Cordova, the City of Elk Grove and records of the County of Sacramento on nesting sites. CNDDB is known to be incomplete by the preparers of the SSCHCP. The CNDDB is not intended by the Department of Fish and Wildlife to be used in CEQA review as a comprehensive inventory.

3. Alternatives. The preferred alternative area of take should be limited to the area within the adopted USB. There are several reasons why this should be the preferred alternative:
1) Areas outside the USB are not included in the federally and state approved plans for transportation and air quality planning and are not planned for urban growth. (SACOG MTP/SCS and SMAQMD Air Quality Plans)
2) The SACOG Blueprint for regional urbanization which anticipates long term growth does not include any anticipated urbanization south of Elk Grove before 2050. The possibility of urbanization after 2050 is far too speculative to consider.
3) The Elk Grove SOIA Final EIR (October, 2013) identified significant and unavoidable biological impacts and other impacts if the Elk Grove SOI was extended to either the 8,000 acres requested, or the Regional Enhanced Alternative (approximately 4000 acres).
4) The Elk Grove SOI Final EIR and LAFCo staff report identifies over 3,000 acres available inside the City limit, and 2,000 acres adjacent to Elk Grove and inside the USB that would be available for annexation and urbanization. For the area inside the USB in the Elk Grove application for expansion, see attachment showing 485 acres is west of 99 and 1477 acres is east of 99 and south of Grant Line Road.) The available 3,000 acres inside the City and the additional 2000 acres inside the USB but outside the City would be more than enough to meet the expected land demand for urban uses in the foreseeable future. There is a 1200 acre vacant, undeveloped and unplanned area within the City which could be zoned entirely for job related uses, but the City has not done so. SACOG also said in its July 2013 comment letter on the SOI proposal that the area outside the City but inside the USB "is the next logical extension of the City of Elk Grove SOI."
5) The Sacramento LAFCo Commission denied Elk Grove's application to expand its Sphere of Influence into the area south of Elk Grove (vote of 5-2 on November 6, 2013). The reasons given by the Commissioners included lack of consistency with regional planning for infrastructure, particularly concern for water supply, need to protect farmland, biological impacts, and availability of ample opportunity within Elk Grove's current city limits to develop urban uses desired by Elk Grove. We can provide further documentation of what Commissioners said were reasons for denial if this information would be helpful.

6) The area south of Elk Grove has been identified in the past by DFW, County and City of Elk Grove, as a prime area for mitigation for take of Swainson's Hawk foraging habitat inside the USB. (See attached maps)
7) If land south of Elk Grove is not included in the area of mitigation, owners in this area will be denied the opportunity to voluntarily sell their land or conservation easements for mitigation, and the pool of available land to mitigate for Swainson's Hawk impact will be diminished with serious consequences for both the economics and the feasibility of the plan as well as the rights of landowners in this area.

Thank you for considering our comments on the NOP.

Judith Lamare, President
Friends of the Swainson's Hawk
717 K Street, Ste 529
Sacramento, CA 95814
916 447 4956
www.swainsonshawk.org
swainsonshawk@sbcglobal.net


LAGUNA BLVD
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WATERMAN RD
GRANT LINE RD
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WALMORT RD
RIVER RD
BILBY RD
HOOD FRANKLIN RD
KAMMERER RD
CORE RD
EDRAU RD
BRUCEVILLE RD
ESCHINGER RD
POINT PLEASANT RD
CARROLL RD
LAMBERT RD
FRANKLIN BLVD
TWIN CITIES RD
DESMOND RD
STOCKTON BLVD
ORR RD
HARVEY RD
BOESSOW RD
NEW HOPE RD
KOST RD
Legend
Swainson's Hawk suitable habitat
Protected Area
Swainson's Hawk nest sites
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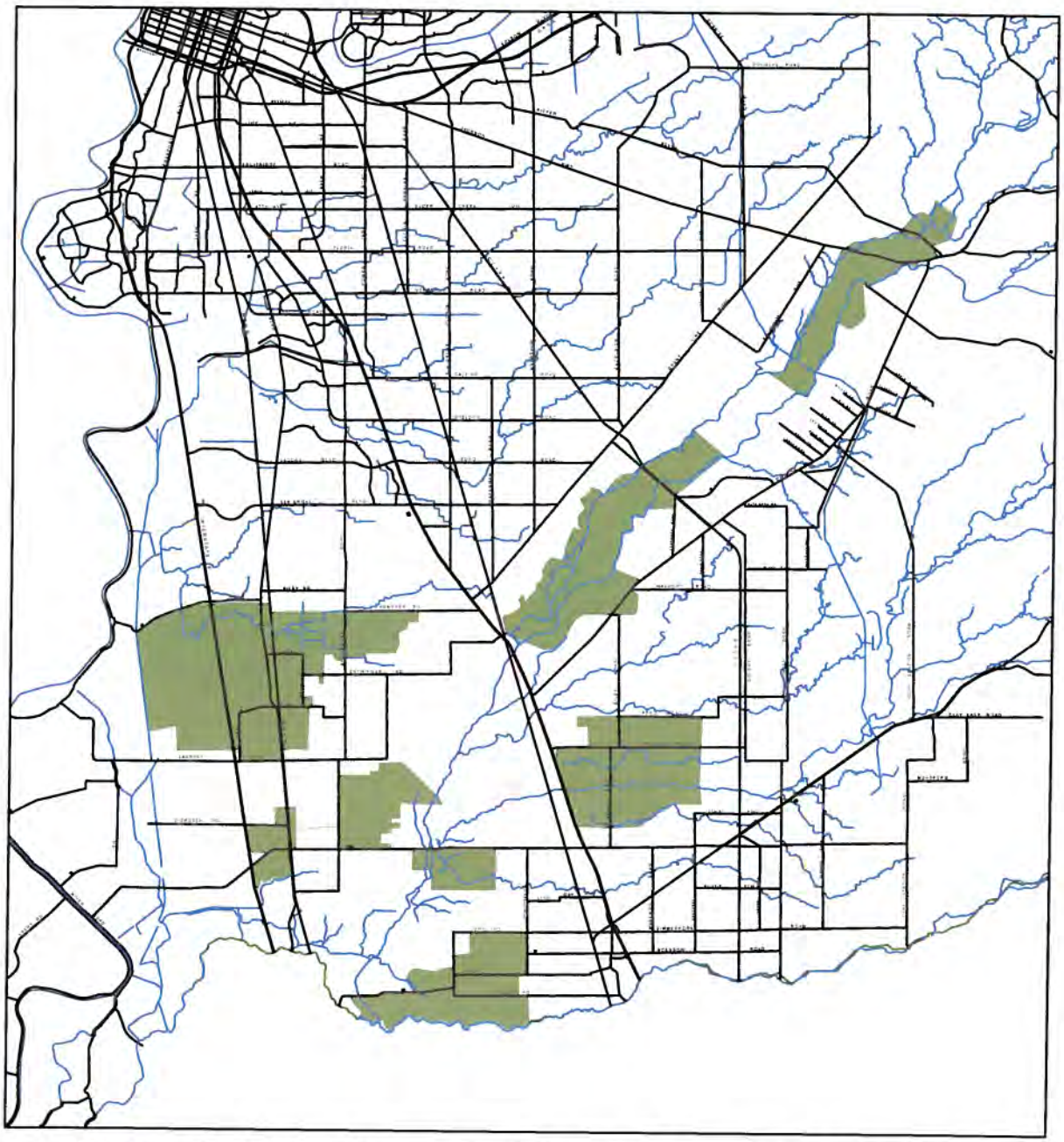

Potential Swainson's Hawk Mitigation Areas

Disclaimer: The green regions on this map represent information provided to the Planning Department from the California Department of Fish and Game. The purpose is to guide project applicants in selecting areas for potential Swainson's Hawk mitigtion lands.
Not all areas shown in green will be acceptable, however the green regions represent geographic areas where there is a high likelyhood that a particular parcel will be approved for Swainson's Hawk mitigation. It is possible that areas outside the green regions will be approved as mitigation as well.
All requests for approval of a particular parcel for mitigation should be directed to the Planning Department.
A form and instructions to request approval of a parcel(s) for mitigation is available at www.saccounty.net/planning/swainsons-hawk-ordinance/index.html.

Prepared by the Sacramento County Planning and Community Development Department
Updated November 8, 2005

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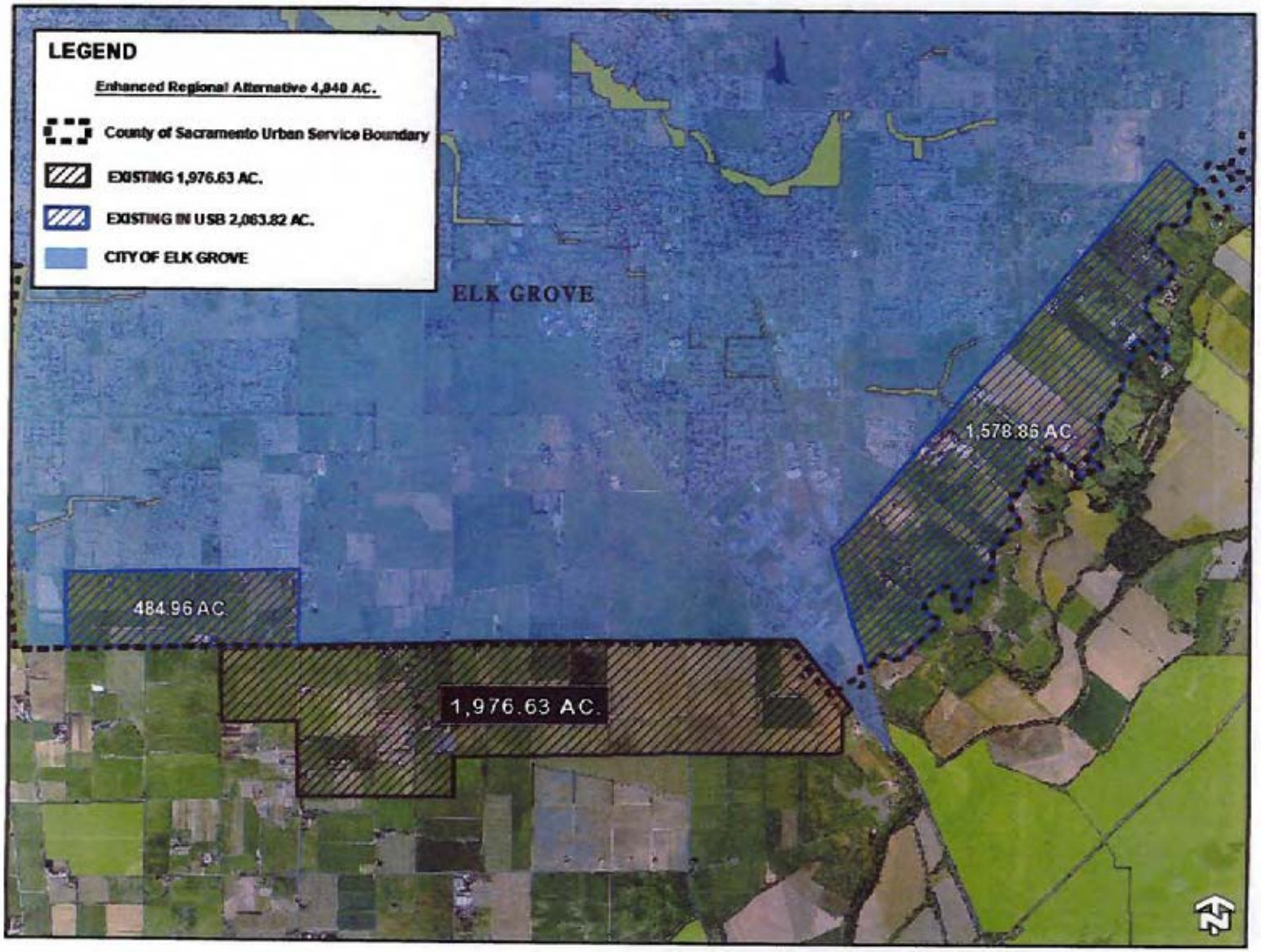

LEGEND
Enhanced Regional Alternative 4,848 AC.
County of Sacramento Urban Service Boundary
EXISTING 1,976.63 AC.
EXISTING IN USB 2,063.82 AC.
CITY OF ELK GROVE
ELK GROVE
1,578.86 AC.
484.96 AC.
1,976.63 AC.

Agenda

November 21, 2013 2:00-4:00PM
Governor's Office of Planning and Research
1400 10th Street, Sacramento

South Sacramento Habitat Conservation Plan (SSHCP)
Environmental Impact Statement/Environmental Impact Report
(EIR/EIS) Agency Scoping Meeting

- Introductions
- Presentation of SSHCP
- Environmental Analysis Overview
- Roundtable Questions and Comments from Agencies
- Next Steps/Schedule

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential environmental topics that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

Alternatives – Analysis include original boundary of I-5 alternative with higher mitigation ratio for SWH

Analysis of take – include future reproductive potential of current known nest sites of Swainson's hawk because of loss of foraging habitat

include potential impact on nesting sites outside plan area within 2-5 miles because of loss of foraging habitat

include loss of nourishment to migrating Swainson's hawks, esp juvenile

Available data – use all available data on nesting Swainson's hawks nesting in Sac County

How to assure that SWH habitat loss is mitigated by preservation of land at 1:1 ratio – & land quality is adequate to ensure no loss of range of Swainson's hawk?

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Judith Lamare

Title and Organization/Business (if applicable): Pres Friends of the Swainson's Hawk

Email address: swainsonshawk@sbcglobal.net

Mailing address: 717 K St 529

Phone: 916-447-4956

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Catherine Hack, 827 7th Street, Room 220, Sacramento, CA 95814

-----Original Message-----
From: Nina Bicknese [mailto:Nina_Bicknese@fws.gov]
Sent: Wednesday, December 18, 2013 8:09 PM
To: Marianne Biner SacCo; Hack. Catherine; Bill Ziebron
Cc: Rich Radmacher; Sarah Lozano; Curtis Alling
Subject: FW: South Sacramento HCP NOP comments

For your information.

(Lynn Wheat was at the Galt scoping meeting, sitting next to the man in the raincoat that asked many questions).

Nina Bicknese, Senior Fish and Wildlife Biologist U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office
Conservation Planning Division, Endangered Species Program
2800 Cottage Way, Sacramento, CA. 95825
(916) 414-6633, FAX (916) 414-6712
nina_bicknese@fws.gov
www.fws.gov/sacramento
https://twitter.com/UsfwsSacArea

-----Original Message-----
From: lynn wheat [redacted]
Sent: Wednesday, December 18, 2013 8:05 PM
To: nina_bicknese@fws.gov
Subject: South Sacramento HCP NOP comments

Ms. Bicknese,

Please accept the following NOP comments:

1. The EIR/EIS should address the potential impact if cities within the HCP area either opt out of the HCP at a later date, and/or independently acquire mitigation lands (inside or outside of their jurisdiction) to reserve that land as mitigation for development projects occurring within their own jurisdiction.

For example, several years ago the City of Elk Grove purchased Swainson Hawk mitigation land outside of their proposed Sphere of Influence and adopted a policy to reserve that land for development projects within their jurisdiction. If this trend were to continue, the EIR should address the problems associated with competing territorial mitigation lands undermining the HCP's effort to acquire mitigation lands to support regional development.

2. If approved, the HCP and related ITP seems to apply to a wide range of activities that could be mitigated to an accepted level of protection for listed species. This appears to be a convenient approach for the benefit of development in the region. However, the EIR/EIS should discuss the mechanisms that are/are not in place to ensure that those approved activities comply either individually or cumulatively with the federal EPA air quality standards for the region.

Wouldn't deteriorating air quality (and the ability of member jurisdictions to easily adopt CEQA Statements of Overriding Considerations) eventually jeopardize the sustainability of the habitat of the species this HCP is intended to protect (not to mention human health)?

3. The EIR/EIS should discuss the time lag that will likely exist between the pace of new development (the immediate loss of habitat) and the timing of acquisition of new, replacement mitigation land. Can eminent domain ever be used to assist in purchasing new land if the time gap between immediate loss of habitat and the acquisition of new habitat ever becomes unacceptable? What measures will be adopted to ensure that the impact fees will always correlate with the market prices of mitigation land?

4. The EIR/EIS should summarize the regional allocation of water within the HCP area and the known projects that are awaiting approval of the HCP.
To the extent that any existing and/or future habitat may rely upon water on the site (or immediate vicinity), the EIR/EIS should discuss the potential for land owners to sell/ransfer water rights that may have an adverse impact to species protection.

5. The EIR/EIS should clearly articulate the processes that would be involved if the HCP is being subjected to an amendment request. The public is interested in assessing the political arena in which this final document will exist so we may be confident in the HCP's ability to provide long-term protection of the species in the region.

Thank you,

Lynn Wheat
[redacted]

OFFICIAL CORRESPONDENCE BY ELECTRONIC MAIL
NO HARD COPY TO FOLLOW

PACIFIC WEST REGION
333 Bush Street, Suite 500
San Francisco, CA 94104-2828

N2219 (PWR-NR)
January 16, 2014
Memorandum

To: Nina Bicknese, Senior Fish and Wildlife Biologist
Sacramento Fish and Wildlife Office
2800 Cottage Way, W–2605
Sacramento, CA 95825

From: Acting Regional Director, Pacific West Region

Subject: National Park Service Comments on Notice of Intent to Prepare EIS/EIR: Habitat Conservation Plan for South Sacramento County, California

We commend the U.S. Fish and Wildlife Service (USFWS) and County of Sacramento, California on their intent to prepare cooperatively a Habitat Conservation Plan for South Sacramento County. Thank you for the extension in time and opportunity to provide comments on the above subject, and we hope our comments that follow will be helpful.

It should be noted that both the Cosumnes River Riparian Woodland National Natural Landmark (NNL) and American River Bluffs and Phoenix Park Vernal Pools NNL appear to be within the plan area of approximately 374,000 acres or quite possibly within the smaller 123,000-acre Urban Development Area (UDA).

In the case of the Cosumnes River Riparian Woodland NNL, it was designated by the Secretary of the Interior in January 1976, and it envelops three adjacent tracts consisting of approximately 255 acres. This NNL is nationally significant in that it represents a small remnant of a biotic community type, riparian woodland, that once formed a major and integral part of the California Central Valley. These three tracts along the Cosumnes River are some of the very few still remaining (see attached map: CosumnesRiverRiparianNNL).

Currently, the two landowners within the Cosumnes River Riparian Woodland NNL are the CA Department of Fish and Wildlife and a private landowner, Mr. John Belcher. The natural landmark is wholly within the Cosumnes Preserve which is managed by the Bureau of Land Management in cooperation with other state, federal, and private landowners. It should also be mentioned that the boundary of the landmark is currently being evaluated for possible expansion by the National Park Service. If expanded, the landmark would continue to be part of the much larger Cosumnes Preserve, which encompasses an additional 820 acres. If expanded, additional landowners would include The Nature Conservancy, CA Department of Water Resources, Sacramento County, and a private landowner, Mr. Chuck Williams.

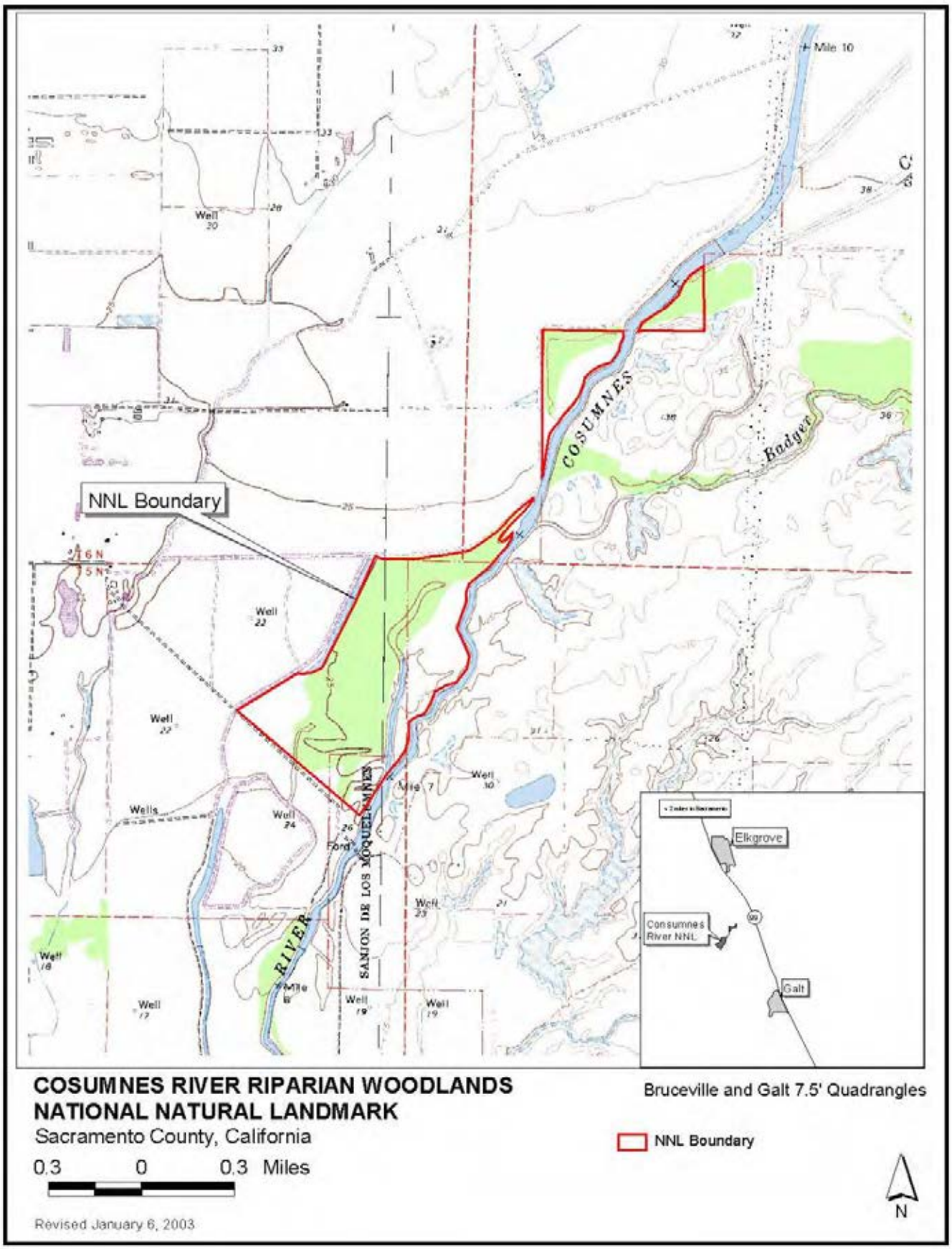
In the case of American River Bluffs and Phoenix Park Vernal Pools NNL, it too was designated in January 1976 and is composed of two noncontiguous units, blue oak woodland and a vernal pool field (see attached map: AmericanPhoenixOwnershipBluffs&PoolsNNL.pdf). The woodland includes a portion of the American River bluffs that have eroded over time, creating four steep south-trending ravines. The vernal pool field contains a unique grouping of species of *Brodiaea* including several hybrid forms, and as such is an important research and teaching site for plant evolution, genetics, and ecology. Landownership within American River Bluffs and Phoenix Park Vernal Pools NNL includes the CA Department of Parks and Recreation, Sacramento County, U.S. Bureau of Reclamation, Fair Oaks Recreation and Parks District, and several private landowners.

The National Natural Landmarks (NNL) program was established in 1962 and is managed by the National Park Service in cooperation with other state, federal, municipal, and private landowners. The Cosumnes River Riparian Woodland NNL is one of ninety-nine NNLs within the Pacific West Region of the National Park

Service. If you have any questions related to the National Natural Landmarks program, please contact Pacific West Region NNL coordinator, Mr. Steve Gibbons, at (360-854-7203) or steve_gibbons@nps.gov .

If your agency requires further information or has questions about the above comments, please do not hesitate to contact Mietek Kolipinski, PhD, Pacific West Region, Natural Resources Programs Specialist, at 415 623 2204 or mietek_kolipinski@nps.gov.

/s/ Stephanie Burkhart
(signed original on file)
Christine S. Lehnertz
Attachments (2):
CosumnesRiverRiparianNNL.pdf
AmericanPhoenixOwnershipBluffs&PoolsNNL.pdf
cc:
Steve Gibbons, PWR, NNL Regional NNL Program Coordinator
Deputy Regional Director, Resource Management and Planning, Pacific West Region
Chief, Natural Resource Programs, Pacific West Region
Briana Collier, NPS, Environmental Protection Specialist, Ft., Collins, CO



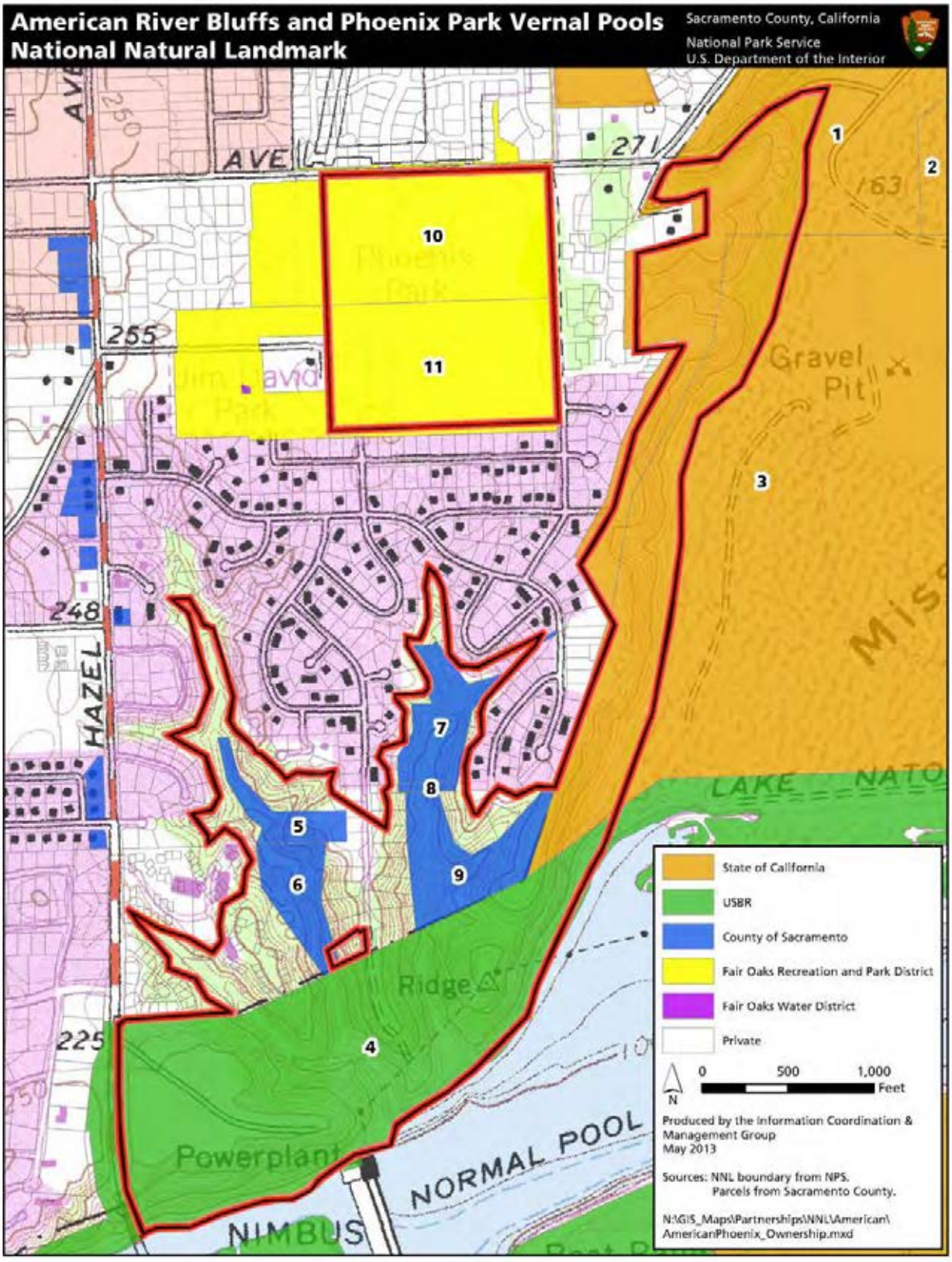
COSUMNES RIVER RIPARIAN WOODLANDS
NATIONAL NATURAL LANDMARK
Sacramento County, California

0.3 0 0.3 Miles

Bruceville and Galt 7.5' Quadrangles

NNL Boundary

Revised January 6, 2003


American River Bluffs and Phoenix Park Vernal Pools
National Natural Landmark
Sacramento County, California
National Park Service
U.S. Department of the Interior
AVE
271
163
255
248
225
HAZEL
Gravel Pit
Ridge
Powerplant
NORMAL POOL
NIMBUS
LAKE
1
2
3
4
5
6
7
8
9
10
11
State of California
USBR
County of Sacramento
Fair Oaks Recreation and Park District
Fair Oaks Water District
Private
0
500
1,000
Feet
N
Produced by the Information Coordination & Management Group
May 2013
Sources: NNL boundary from NPS.
Parcels from Sacramento County.
N:\GIS_Maps\Partnerships\NNL\American\AmericanPhoenix_Ownership.mxd

From: rmburness@comcast.net [mailto:rmburness@comcast.net]
Sent: Friday, January 24, 2014 4:27 PM
To: nina_bicknese@fws.gov; hackc@saccounty.net
Cc: Richard Radmacher; jan_knight@fws.gov; Bart McDermott; Beatrix Treiterer; Dale Claypoole; SCOTT FINLEY; Sean Wirth
Subject: Request that covered species model information be provided and evaluated in CEQA and NEPA documents

Dear Ms. Bicknese and Ms. Hack,

Representatives of the Stone Lakes NWR staff and the Stone Lakes NWR Association recently met with Sacramento County staff working on the South Sacramento Habitat Conservation Plan (SSHCP) concerning the plan and its relationship with the Stone Lakes NWR. As a consequence of that meeting we are very much interested in gaining a better understanding on how the covered species models were derived, especially for those species found in and around the Stone Lakes NWR. The Swainson's hawk is of particular interest, as substantial high quality foraging acreage is necessary in order to support the important concentration of hawks in southwest Sacramento County.

The Stone Lakes NWR Association is an independent organization that, by agreement, works as a "Friends Group" to advance the goals and the objectives of the Stone Lakes NWR. We feel that it is important that the SSHCP clearly identify the assumptions, criteria and process used in developing the species models. The Stone Lakes NWR Association has requested that the preparers of the draft SSHCP provide us with additional details regarding the development of the species models. In particular, we are interested in the habitat inventory assumptions and data associated with Swainson's hawk foraging acreage, including the acreages and maps of habitat that is potentially problematic, such as included habitat currently in vineyards and orchards (and presumed to be restorable to foraging habitat), included habitat below sea level and/or potentially below sea level as determined by climate change modelling, and excluded foraging habitat anticipated to be developed for other uses or designated for restoration to non foraging habitat.

We have requested that the SSHCP preparers provide us with this information at their earliest opportunity. In addition, we are requesting as part of the Notice of Preparation Process, that the CEQA and NEPA documents for the Plan incorporate the above information in the impacts analysis.

In recognition of the important role that the Stone Lakes NWR will play in realizing the habitat protection objectives of the SSHCP, we hope that Refuge staff and Association members will be able to establish ongoing cooperation and coordination with your respective agencies as the SSHCP finally moves into the environmental analysis, hearing approval and implementation phases.

Sincerely,

Rob Burness
Conservation Chair
Stone Lakes NWR Association

From: rmburness@comcast.net [mailto:rmburness@comcast.net]
Sent: Friday, January 24, 2014 4:10 PM
To: billziebron@yahoo.co
Cc: Richard Radmacher; nina_bicknese@fws.gov; jan_knight@fws.gov; Bart McDermott; Beatrix Treiterer; Dale Claypoole; SCOTT FINLEY; Sean Wirth
Subject: Followup to Stone Lakes Meeting and request for covered species model information.

Dear Mr. Ziebron,

We appreciated the opportunity to meet on January 21st with you and Mr. Radmacher to discuss the South Sacramento Habitat Conservation Plan (SSHCP) and its relationship with the Stone Lakes NWR. We are very much interested in gaining a better understanding on how the covered species models were derived, especially for those species found in and around the Stone Lakes NWR. The Swainson's hawk is of particular interest, as substantial high quality foraging acreage is necessary in order to support the important concentration of hawks in southwest Sacramento County.

The Stone Lakes NWR Association is an independent organization that, by agreement, works as a "Friends Group" to advance the goals and the objectives of the Stone Lakes NWR. We feel that it is important that the SSHCP clearly identify the assumptions, criteria and process used in developing the species models. The Stone Lakes NWR Association requests that you provide us with additional details regarding the development of the species models. In particular, we are interested in the habitat inventory assumptions and data associated with Swainson's hawk foraging acreage, including the acreages and maps of habitat that is potentially problematic, such as included habitat currently in vineyards and orchards (and presumed to be restorable to foraging habitat), included habitat below sea level and/or potentially below sea level as determined by climate change modelling, and excluded foraging habitat anticipated to be developed for other uses or designated for restoration to non foraging habitat. We would very much appreciate your providing us with this information at your earliest opportunity.

In recognition of the important role that the Stone Lakes NWR will play in realizing the habitat protection objectives of the SSHCP, we hope that Refuge staff and Association members will be able to establish ongoing cooperation and coordination as the HCP finally moves to hearing, approval and implementation. Thanks for your assistance in this request.

Rob Burness
Conservation Chair
Stone Lakes NWR Association

From: McDermott, Bart [mailto:bart_mcdermott@fws.gov]
Sent: Wednesday, November 13, 2013 4:34 PM
To: Nina Bicknese
Subject: South Sacramento HCP Comment Opportunity

Hi Nina. We just noticed the NOI on this plan and were wondering if we should work with you on our comments that pertain to the covered species that are associated with the Refuge and surrounding area. We have an active Friends Group that is also planning to attend the public meetings and submit comments. Do you think we can set up a meeting with the County POC for this plan to discuss any concerns and issues regarding the Refuge?
Thanks,

Bart McDermott
Refuge Manager
Stone Lakes NWR
Elk Grove, CA
916-775-4426 Office
916-869-6632 Cell
http://www.fws.gov/stonelakes

Table NOP-1 Covered Species[1]

Mammals	Invertebrates
American Badger, *Taxidae taxus*	Mid-Valley Fairy Shrimp, *Branchinecta mesovallensis*
Pallid Bat, *Antrozous pallidus*	Ricksecker's Water Scavenger Beetle, *Hydrochara rickseckeri*
Western Red Bat, *Lasirus blossevillii*	Valley Elderberry Longhorn Beetle, *Desmocerus californicus dimorphus*, (FT)
Yuma Myotis Bat, *Myotis yumanensis*	Vernal Pool Fairy Shrimp, *Branchinecta lynchi*, (FT)
	Vernal Pool Tadpole Shrimp, *Lepidurus packardi*, (FE)
Birds	**Plants**
White-Tailed Kite, *Elanus leucurus*	Ahart's Dwarf Rush, *Juncus leiospermus var. ahartii*
Cooper's Hawk, *Accipiter cooperii*	Boggs Lake Hedge-Hyssop, *Gratiola heterosepala* (SE)
Ferruginous Hawk, *Buteo regalis*	Dwarf Downingia, *Downingia pusilla*
Greater Sandhill Crane, *Grus Canadensis tabida* (ST)	Legenere, *Legenere limosa*
Loggerhead Shrike, *Lanius ludovicianus*	Pincushion Navarretia, *Navarretia myertsii*
Northern Harrier, *Circus cyaneus*	Sacramento Orcutt Grass, *Orcuttia viscida*, (SE, FE)
Swainson's Hawk, *Buteo swainsoni* (ST)	Slender Orcutt Grass, *Orcuttia tenuis*, (SE, FE)
Tricolored Blackbird, *Agelaius tricolor*	Sanford's Arrowhead, Sagittaria sanfortii
Western Burrowing Owl, *Athene cunicularia hypugaea*	
Amphibians	**Reptiles**
California Tiger Salamander, *Ambystoma californiense* (central valley, DPS), (FT)	Giant Garter Snake, *Thamnophis gigas* (FT)
Western Spadefoot Toad, *Scaphiopus hammondii*	Western Pond Turtle, *Actinemys marmorata marmorata* and *A. m. pallida* (2 sub-species: Northwestern and Southwestern)

Biological Goals and Objectives

Habitat loss and fragmentation is a threat common to the covered species in the Plan Area. Loss and fragmentation of land cover types that provide habitat for the covered species will be among the main effects of covered activities in the Plan Area; therefore, the biological goals and objectives focus on land cover type protection and connectivity as key components of the SSHCP Conservation

[1]: F - federal, S – State, E – endangered, T – threatened

Notes from SSHCP Meeting with the Stone Lakes National Wildlife Association.
Stone Lakes NWR Headquarters building, January 21, 2013. Notes prepared by N. Bicknese

Participants

Bart McDermott, Refuge Manager
Beatrix Treiterer, Deputy Refuge Manager
Rob Burness, Stone Lakes NWR Association
Scott Finley, Stone Lakes NWR Association
Dale Claypoole, Stone Lakes NWR Association
Sean Wirth, Sierra Club/ECOS
Jan Knight, SFWO Deputy Field Supervisor
Nina Bicknese, SFWO Senior Fish and Wildlife Biologist
Rich Radmacher, Sacramento County
Bill Ziebron, Ziebron Group

- Bart McDermott asked how much public scoping has been done for the SSHCP. Nina summarized previous scoping meetings in 2008. Bill reviewed 2013 scoping meetings and current status of the HCP and the EIS/EIR: Draft HCP expected in late spring 2014, EIS/EIR and draft Implementing Agreement expected in late summer 2014. Public draft documents will have a 90 day public review. Final documents expected in spring 2015. A Sacramento Board of Supervisors workshop is scheduled for January 28, 2014.

- Rich reviewed map of Planning Area, UDA boundary and acres.

- Bart McDermott provided map of the Refuge boundary, which includes 17,900 acres; Refuge is currently 35% complete; all of Refuge boundary overlaps with current SSHCP Planning Area.
    1. Refuge staff and the Association have been involved with the Bay Delta Conservation Plan (BDCP) and are developing appropriate avoidance and minimization measures for BDCP actions expected inside the Refuge boundary.
    2. Refuge staff and the Association would like information on the SSHCP Covered Species that use the Refuge, and information on SSHCP activities that could occur within the Refuge boundary.
    3. Refuge staff and Association have been involved in the proposed Elk Grove SOI expansion on the eastern border of the Refuge boundary, and the potential effects of future development in that expansion area on the species that travel between the Refuge and Cosumnes Preserve lands.
    4. The Refuge cannot purchase land outside of their designated boundary, but FWS may be able to secure agricultural easements to preserve habitat links between the Refuge and Cosumnes, possibly in association with the Sacramento National Wildlife Refuge.

- Scott Finley noted that the Refuge Association is very concerned about rapid loss of grazing lands and wildlife habitat inside the Refuge boundary to vineyards. He would like information on any SSHCP plans for early preservation of habitat and the SSHCP conservation strategy's "get ahead/stay ahead" component.

- Beatrix Treiterer noted that 11 BDCP covered species overlap with the Refuge boundary; she would like to know how many of the 30 SSHCP covered species have habitat inside the Refuge boundary. After discussion, the Refuge staff and Association decided to review the species list presented in the NOI and NOP and then will provide a comment letter that identifies which SSHCP covered species are also Stone Lakes NWR species.

- Rob Burness and Scott Finley asked about current acres in the SSHCP's take area" (the UDA), and asked if acres presented in the NOI and NOP will change because of LAFCo's recent decision denying the proposed Elk Grove SOI expansion.

- Bill Ziebron summarized the history of the proposed Elk Grove SOI expansion, and explained that the 2008 scoping and the 2010 administrative draft SSHCP addressed the proposed SOI expansion as part of the SSHCP's "UDA" because the SOI expansion was "reasonably foreseeable" at that time. Bill noted that the November 2013 LAFCo decision changes this assumption; however, exactly what 2014 public draft SSHCP will present regarding the UDA boundary near Elk Grove is still being determined. Bill noted that the City of Elk Grove presented an idea at last week's SSHCP "RAWG" meeting, but the permitting agencies expressed concerns. Bill noted that the primary concern is that urban development is not approved for areas outside the USB and incorporated city limits. Bill Ziebron and County staff are meeting with Elk Grove on Friday 1/24/14, which may result in an agreement on what the SSHCP analysis will assume about the UDA boundary near Elk Grove.

- Rob Burness noted that the lands within the proposed SOI expansion area are critical foraging habitat for several Refuge species, and that area is essential to providing a habitat link between the Cosumnes Preserve and the Refuge.

- Bart McDermott noted that Sandhill cranes, curlews, and other species use the proposed expansion area to go back and forth between the Refuge and the Preserve, however, farmland throughout this linkage area is being lost to vineyards and solar, and the dairies present during the Refuge scoping period (20 year ago) are now closed. Species on the Refuge will need this adjacent area to remain as farmland. Also, this linkage area is important in the long run, because other areas of existing species-habitat will likely be lost to rising sea level and saltwater intrusion over time. Bart stated that the SSHCP is a good mechanism to preserve farmland habitats east of I-5.

- Scott Finley and Bart McDermott noted that the BDCP applicants have proposed that the BDCP could "swap out" future BDCP preserves established in areas where the BDCP Plan Area overlaps the Plan Area of another HCPs— if that habitat is needed later by the other HCP. Bill Ziebron and Jan Knight said that BDCP proposal lacked sufficient detail and did not explain how a preserve "land swap" could be implemented.

- Scott Finley asked how the SSHCP will incorporate Climate Change information in future land-acquisition decisions for preserves has expected salt water intrusion and land-subsidence been considered in development of alternative conservation strategies? Will expected sea level rise be included in the SSHCP analysis?

- Rich Radmacher stated that details of the SSHCP's Preserve Assembly Criteria/Process are still being developed, and he noted that the Service has requested additional detail about the proposed Preserve Assembly Process. Rich noted that approximately 6000 acres of the SSHCP Plan Area could be below sea level, but the current Conservation Strategy requires any preserved land that becomes below sea-level would be replaced with new preserves that are above sea-level. Rich thinks SSHCP mitigation requirements will need to preserve 10,000 to 15,000 acres of existing "high-value" Swainson's hawk habitat. After the recent LAFCo decision, approximately 45,000 acres of "high-value" habitat are currently available for preservation in the SSHCP Plan Area. Rich noted that the proposed BDCP "fore bay" project area was not included in the 45,000 acres of high-value Swainson's hawk habitat.

- Bart McDermott asked what was minimum "patch size" used by the SSHCP when estimating availability of species habitat for preservation? Rich Radmacher stated that he thinks minimum patch size used was 20 acres for all landcover types. Rich noted that this minimum patch size assured that small undeveloped lots within areas of existing ag-residential development were not included in the SSHCP' inventory of existing land/habitat available for habitat preservation.

- Sean Wirth noted that the Refuge Association believes lands below sea level should not be included in the inventory of land/habitat available for preservation under the SSHCP.

- Rob Burness requested detailed information on methods the SSHCP used to determine which lands were suitable for preservation and included in the SSHCP "habitat inventory." Rob asked if the Refuge Association would be able to "weigh in" on the assumptions and methods used by the SSHCP to quantify the amount of suitable habitat available for future preservation. Bill and Nina requested the Refuge Association describe their concerns, questions, and ideas as EIS/EIR Scoping comments.

- Rob Burness stated that the Refuge Association will submit these scoping comments: 1) that the SSHCP EIS/EIR analysis needs to present assumptions used about the acres and locations of species habitat currently available for preservation, and 2) that the Refuge Association be provided with copies of the GIS data that the SSHCP used to quantify/inventory the amount and locations of available habitat. Rob stated the Refuge Association is requesting this information now in order to provide well-informed scoping comments. Nina asked if the Refuge Association will be requesting this information for all 30 SSHCP species models; Rob stated that the Refuge is primarily interested in how the SSHCP is quantifying amount and locations of existing habitat for Sandhill crane and Swainson's hawk.

- Sean Wirth noted that Todd Gardner (CDFW) did a lot of work identifying criteria for defining Swainson's hawk high-value habitat inside the Plan Area, but this information was not integrated into recent drafts of those HCP chapters—which resulted in a lot of EIS/EIR scoping comments from the Friends of Swainson's Hawk (FOSH).

- Beatrix Treiterer asked for information about the future SSHCP Implementing Entity (IE)—has the IE format has been determined, or will alternative IE formats be included in the EIS/EIR and the final format determined later? Bill Ziebron stated that the SSHCP Implementing Entity format is still being determined, but believes the SSHCP's IE will include a JPA, similar to the Santa Clara HCP Implementing Entity. Bill stated that the SSHCP Implementing entity will not be structured like a habitat-conservancy, as in the Natomas HCP, but the SSHCP format will likely include some type of day-to-day manager. Bill stated that this two-part SSHCP Implementing Entity format will assure that SSHCP biological decisions will remain separated from any local planning process or politics.

- Bart McDermott asked how the SSHCP will assure that their wetland habitats can be managed for 50 year permit term, and then in perpetuity – managing wetland habitats on the Refuge are much more "hands on" and expensive than managing their upland habitats. Rob Burness asked if the SSHCP will be able to fund the long-term management of the SSHCP preserve lands, especially those that are inside the Refuge boundary or in the area between the Refuge and the Cosumnes Preserve. Rob asked how SSHCP covered-activity fees will be determined.

- Rich Radmacher stated that a new consulting firm (EPS, in Berkley CA) is under contract to conduct the economic analysis. Their analysis will incorporate land cost differences in each Plan Area zone, and costs for vernal pool and other land management will be based on recent local examples and discussions with

local preserve managers. In addition, Dudek (consultant writing the HCP document) has extensive experience managing HCP preserve lands in southern California.

- Bart McDermott noted that the Refuge has extensive information on costs for wetland management, and could provide this information to the SSHCP. Bart estimates that seasonal wetland management on the Refuge is $200-$300 per acre; most of that cost is from water pumping and weed control. Rich requested the Refuge provide that information for use in the SSHCP economic analysis.

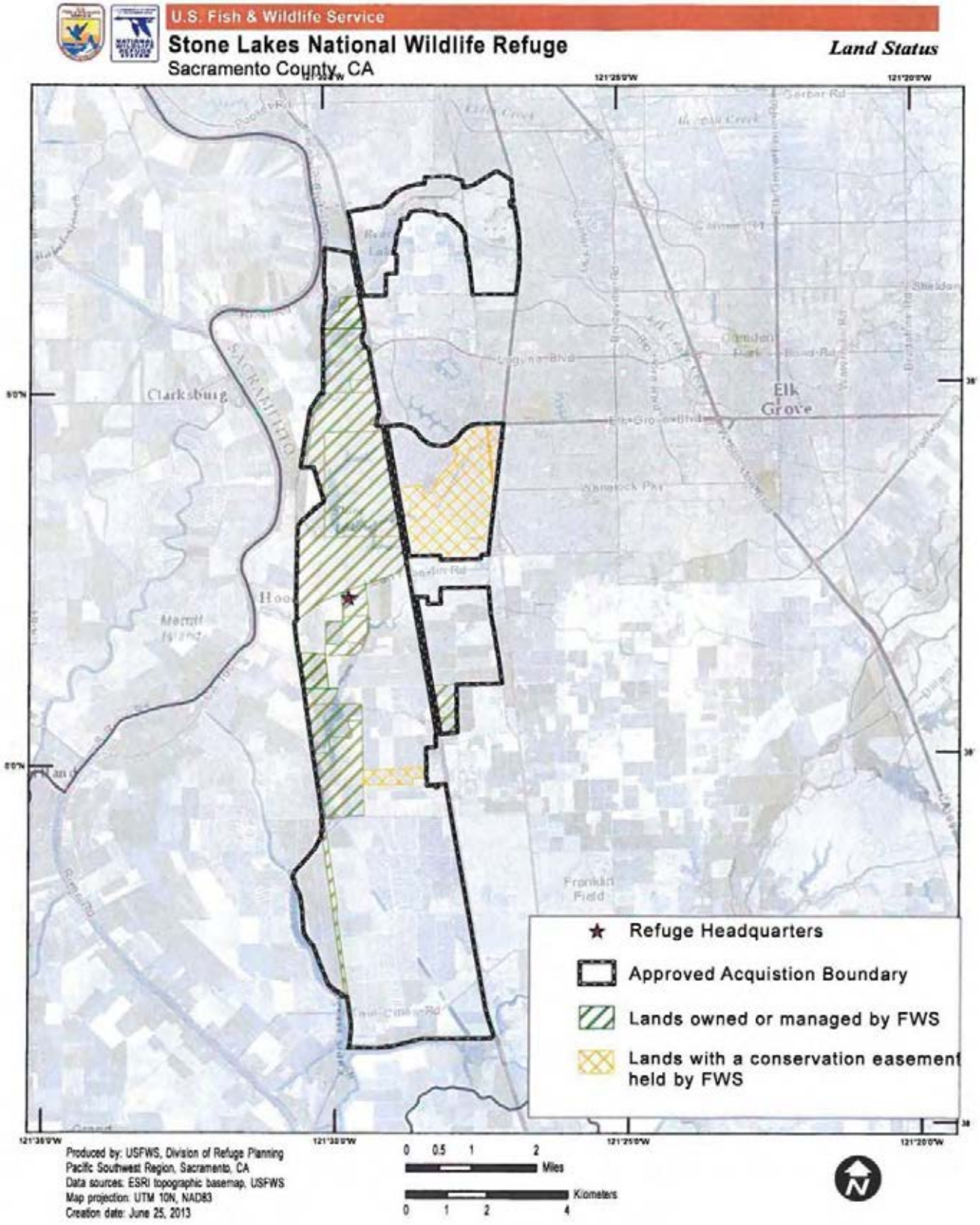
- Rob Burness asked a question about the Kammerer Road improvement project, and if this work would be part of the Capitol Connector highway project, or if it will be an Elk Grove project. Rich Radmacher stated that regardless of who completes those improvements, the improvements on Kammerer Road will be a SSHCP covered activity. Bart McDermott noted that the Refuge and Refuge Association have met with the Connector JPA.

- Bart Mc Dermott summarized that the Refuge will be submitting the following scoping comments to the County and the USFWS contacts listed on the NOP and NOI:
    1. Comments on the SSHCP covered species that occur within the Refuge boundary area;
    2. Comments on SSHCP conservation strategy elements proposed within the Refuge boundary and in the area between the Refuge and the Cosumnes Preserve, and any suggestions for alternative SSHCP conservation strategies in these areas;

    3. Comments on Covered Activity projects the SSHCP would allow inside the Refuge boundary and in the area between the Refuge and the Cosumnes Preserve (including the 5 "major" projects, private development, and the Capitol Connector highway project).

January 21, 2014, Stone Lake National Wildlife Refuge headquarters

Meeting: South Sacramento HCP			
Name	**Organization**	**Email**	**Phone Number**
Bart McDermott	STONE LAKES NWR	bart_mcdermott@fws.gov	916-775-4426
Rob Burness	Friends of Stone Lake	rmburness@comcast.net	916-456-4332
SCOTT FINLEY	STONE LAKES NWR ASSN	~~SBCF~~ -SBGFINLEY@SBCGLOBAL.NET	9169331 2
BEATRIX TREITERER	"	beatrix_treiterer@fws.gov	916-775-4421
Sean Wirth	Sierra Club / ECOS	wirthsoscranor@yahoo.com	916-852-9905
Dale Claypoole	STONE LAKES Assoc.	Claypoole@sbcglobal.net	916-457-3145
Jan Knight	USFWS	jan_knight@fws.gov	916-414-6700
Nina Bicknese	USFWS	nina_bicknese@fws.gov	916-414-6633
RICH RADMACHER	SAC. COUNTY	RADMACHERR@SACCOUNTY.NET	916-874-5369
Bill Ziebron	Ziebron Group	billziebron@yahoo.com	916-761-2358


U.S. Fish & Wildlife Service
Stone Lakes National Wildlife Refuge
Sacramento County, CA
Land Status
121°25'0"W
121°20'0"W
Clarksburg
Elk Grove
Franklin Field
Refuge Headquarters
Approved Acquistion Boundary
Lands owned or managed by FWS
Lands with a conservation easement held by FWS
121°30'0"W
0 0.5 1 2
Miles
0 1 2 4
Kilometers
N
Produced by: USFWS, Division of Refuge Planning
Pacific Southwest Region, Sacramento, CA
Data sources: ESRI topographic basemap, USFWS
Map projection: UTM 10N, NAD83
Creation date: June 25, 2013

U.S. Fish & Wildlife Service

A UNIT OF THE National Wildlife Refuge System

Stone Lakes
National Wildlife Refuge

1624 Hood-Franklin Rd
Elk Grove, CA 95757 - 9774
E-mail: stonelakes@fws.gov
Phone Number: 916-775-4421

Visit the Refuge's Web Site:
http://www.fws.gov/refuge/stone_lakes/

Overview

Stone Lakes National Wildlife Refuge

The Stone Lakes National Wildlife Refuge, located south of Sacramento, California, lies within the Sacramento-San Joaquin delta, the destination of thousands of migrating waterfowl, shorebirds, and other water birds. The refuge was established in 1994 and is one of the few urban refuges that have the potential to attract and educate thousands of visitors in a region that is becoming the new Silicon Valley of California.

Through a number of innovative partnerships, the refuge is protecting scarce natural habitats and agricultural resources in an area threatened by urban sprawl and agricultural changes. Stone Lakes Refuge contains both seasonal and permanent wetlands, riparian forest, and grasslands, as well as some of the last remaining freshwater lakes in the central valley.

These habitats support large populations of migratory water birds, a major rookery for several colonial nesting species such as great blue herons, and a warm water fishery. Several endangered, threatened, and special-status species benefit from these habitats: the valley elderberry longhorn beetle, Swainson's hawk, and greater sandhill crane.

Visitor numbers increase every year; they topped 8,500 in 2001, despite a lack of developed facilities such as a visitor education center and restrooms. Volunteers from the local area dedicate their time on weekends guiding visitors through grasslands and tree-lined waterways to educate the public about the refuge in their backyard.

Getting There . . .

Recreation & Education Opportunities

Environmental Education
Photography
Wildlife Observation
Learn More >>

Management Activities

The primary focus of management on the refuge is to restore and maintain wetland and riparian habitats. Wetland habitats include seasonal, permanent wetlands, and vernal pools. The wetlands are managed through manipulation of water levels through pumping and vegetation control.

Impoundments are flooded in early fall; and water is maintained through spring. Vegetation such as cattails and bulrush is manipulated through mowing and disking. The refuge also works cooperatively with local agencies to chemically control water hyacinth.

Impoundments are managed by the local mosquito district to control mosquitoes through the use of mosquito fish and other means. Riparian restorations involve the planting of native vegetation including valley oak, cottonwood, willow, Oregon ash, box-elder, rose, elderberry, and native blackberry in appropriate areas.

A grazing program is used to manage the grasslands to promote native species and control exotics such as pepper grass and star thistle. Refuge staff and volunteers survey wildlife

The refuge headquarters is located at 1624 Hood Franklin Road. Take Interstate 5 south from Sacramento, approximately 12 miles to the Hood Franklin exit. Turn west (right) about 1 mile. The office is a two story building with a red tile roof on the south (left) side of the road.

A self-guided hike to the universally accessible wildlife viewing platform is open to the public every second and fourth Saturday of each month except July and August. The trail is normally open from 9 a.m. to 3 p.m.; but please call the information line (916-775-4420) for any updates to the schedule.

To find the entrance to the hiking trail, take Interstate 5 south from Sacramento, approximately 10 miles, to the Elk Grove exit. After exiting, turn right on the off-ramp before going back over the overpass, and meet at the gate for special events and public access days.

Get Google map and directions to this refuge/WMD from a specified address:

Your full starting address **AND** town and state **OR** zip code

Get Directions

Google Maps opens in a new window

NOTE: When using this feature, you will be leaving the U S. Fish & Wildlife Service domain. We do not control the content or policies of the site you are about to visit. You should always check site policies before providing personal information or reusing content.

These driving directions are provided as a general guide only. No representation is made or warranty given as to their content, road conditions or route usability or expeditiousness. User assumes all risk of use.

Wildlife and Habitat

Stone Lakes NWR is composed of a rich mosaic of habitats across several properties that are managed by the Service.

Learn More>>

populations to monitor use by migratory and breeding birds. The rookery is also monitored for population trends and nesting success. Water quality and contaminants monitoring are also underway.

Learn More>>

2008 Scoping Report

South Sacramento Habitat Conservation Plan's Joint Environmental Impact Report/Environmental Impact Statement Scoping Report

INTRODUCTION

Primary principles of the California Environmental Quality Act (CEQA) and the National Environmental Policy Act of 1969 as amended (NEPA) process include full public disclosure and open public participation in the decision-making process. To support preparation of a joint Environmental Impact Statement and Environmental Impact Report (EIS/EIR), the lead agencies solicited input from the public to help identify issues and concerns that they feel should be addressed in the joint document. To initiate the scoping process, the County, the lead CEQA agency, sent a Notice of Preparation (NOP) to the State Clearing House on June 10, 2008 (Control No. 03-0637). The NOP was published and distributed by the California State Clearing House on July 11, 2008. On June 10, 2008, the U.S. Fish and Wildlife Service (USFWS), the lead NEPA agency, published a Notice of Intent (NOI) in the Federal Register on July 10, 2008 (73 FR 3279). The NOP and NOI included a comment period of 50 days. Copies of the NOP and NOI are contained in Appendix A of this Scoping Report.

The published notices provided a brief summary of the project and the lead agencies intention to prepare a joint EIR/EIS. During the NOI and NOP comment period, the lead agencies held four public scoping meetings and one public workshop to solicit information on alternative actions, including the proposed project.

Under NEPA regulations, any agency which has jurisdiction by law or has special expertise with respect to any environmental issue which should be addressed in an EIS may be a cooperating agency upon request of the NEPA lead agency. Roles of a cooperating agency, include participation in the scoping process, and development of the NEPA document (40 CFR §1501.6). Under CEQA (State CEQA Guidelines §15381), those state or local agencies that issue permits, have approval authority, or provide funding for the project are referred to as Responsible Agencies. CEQA Responsible Agencies play a similar role to a NEPA Cooperating Agency, but in practice generally limit their participation to a commenting role.

The California Department of Fish and Game (CDFG) and the Army Corps of Engineers (USACE) participated in one or more public scoping meetings and alternatives formulation workshop (see Appendix G of this scoping report for Cooperating agency letters).

PUBLIC OUTREACH

The public was invited to participate in the scoping process through a variety of media. Email that included a flyer announcement of the scoping meeting purpose, locations, and dates were sent by the County to some 1,400 interested parties and organizations. Display ads of the meeting announcement were published in the following newspapers at least one week prior to each public meeting:

Sacramento Bee (Metro Section):	July 1, 2008
Grapevine:	July 4, 2008
Galt Herald and River Valley Times:	July 2, 2008

In addition, the City of Elk Grove sent a meeting announcement attached to each resident's utility bill informing them of the scoping meetings.

The public announcements are included in Appendix B of this scoping report.

MEETING LOCATION AND FORMAT

Public scoping meetings were held on the following dates and times:

July 8, 2008	from 6:30 pm to 8:30 pm in Galt
July 11, 2008	from 10 am to 12:00 pm in Sacramento
July 15, 2008	from 6:30 pm to 8:30 pm in Rancho Cordova
July 16, 2008	from 6:30 p.m. to 8:30 pm in Elk Grove

Each meeting was held in an open house format, beginning with a short presentation to explain the purpose of the scoping meeting, followed by a 15-minuite Power Point presentation by Rich Radmacher (the County's Project Manager for the SSHCP) which summarized available information on the proposed SSHCP project. Approximately 12 information poster boards summarizing the proposed SSHCP and the environmental resources within the SSHCP planning area were available for public review and comment during the open-house portion of the meeting. Staff from the Lead and the Cooperating Agencies was available at each informational poster board to provide information on the natural resources in the SSHCP planning area and solicit public comments (See Appendix C and D for meeting materials).

ISSUES IDENTIFIED IN COMMENTS RECEIVED

A total of approximately eighty comment letters, including e-mails, from individuals, businesses, organizations, and agencies were received. The primary issues identified by the public they wished to be addressed in the EIS/EIR are:

1. Geographic Areas to be Addressed
   - Dry Creek
   - Borden Ranch
   - Highway 99, Zone 9
   - Cordova Hills
   - Highway 50 to 99 connector
   - City of Elk Grove sphere of influence
   - Cosumnes River flood plain
   - Adjacent counties and impacts of agriculture to urban/agricultural activities
   - UDA development impact on adjacent areas including agriculture

2. Resource Topics/Issues
   - Gravel mining and processing
   - Livestock grazing
   - Grazing leases
   - Impacts to agriculture
   - Urban sprawl

3. Regulatory Topics
   - Mitigation banking
   - In lieu fee program
   - Consistency with Corps mitigation regulations

4. Corrections to poster board Maps presented at the public meetings
   - Arno and Valensin Rd & Rily is a vineyard, not vernal pool
   - Waegell Home Ranch has no vineyards, cropland shown as grazing land, and pond south of Florin Road is Tri-Colored Blackbird habitat

5. Agency involvement
   - RWQCB involvement

6. Cumulative Impacts Analysis
   - South of Elk Grove South of Kammerer Road
   - Cordova Hills infrastructure impact, including roads
   - Elk Grove sphere of influence
   -Galt outside UDA development impact

Copies of each written comment received are included in Appendix E and F of this scoping report.

MEETING AND COMMENT TRANSCRIPTS

The following section includes the scoping meeting date and location, and a transcript of each comment (See Appendix D for sign-in sheets and Appendix E for each comment card).

July 8, 2008, Galt, CA, at the Anthony Pescetti Community Room, Galt Police Facility, 455 Industrial Drive, Galt, CA 95632

Thirteen public and three agency participants registered on the meeting's sign-in sheets. (See Appendix D.)

Eight written comments and one verbal comment were received at this meeting (see Appendix E and F for all comment cards) :

Tina B. Holt (1)--The Herald area in Southeast Sacramento County are open agricultural and flood plain lands. Rich with diverse species such as Swainson's Hawk; Tiger Salamander; Bald Eagle; Elderberry Beetle. Chiefly the Borden Ranch is the most preservable land in the area consisting of riparian creek, oaks, cottonwood, elderberry, Prime Ag land when it is not in flood plain stage during winder & early spring. The land is 400 acres on a historic family ranch 'Borden.' The rest of the area approx. 1200 acres are in productive vineyards.

Gary Patterson (1)--I want this E.I.R. to address the specific impacts of surface gravel mining and its related activities, i.e. blacktop, concrete production, topsoil removal, etc. Impacts on all listed species and impacts on the local communities must be addressed in the E.I.R. Impacts of water supply to adjacent properties, traffic on these rural roads, dust on adjacent agricultural operations, noise impacts on neighbors, etc. Also the impact on public utilities like roads & drainages. I also want the E.I.R. to address the specific right to farm ordinances in Sac. County and those rights in relation to its neighbors.

Gary Patterson (2)--I believe this E.I.R. needs to specifically address the area of Dry Creek at the south edge of the county. Impacts on all species listed and the local communities by operations other than what zoning allows. This E.I.R. needs to address the cumulative impact of these species protections on adjacent counties. Specifically the Borden gravel mining proposal along Dry Creek at the south each side of the county. This E.I.R. needs to address the impacts of agriculture/urban interaction.

Kathleen Amos --What habitat issues are involved in the area just west of Hwy 99 (in Zone 9) along Twin Cities Rd.? (A group wants to put a senior housing project there—the group is called, "Citizens to Protect the Future of Galt" even though the land is OUTSIDE the city limits of Galt). We @ Galt Parks & Rec want to support as large a regional area for "passive rec" activities (like hiking, bird-watching, etc.) around the city of Galt.

Jerry Stribling (Verbal comments)--
Livestock grazing needs to be preserved,
Limitations on grazing/farming
Leased land—will HCP reduce availability of land for lease
Native pasture
Concerned about urban sprawl

Doug Trimble --Arno and Valensin Rd & Rily is a vineyard not a vernal pool

Tina Holt (2)--Traffic noise from increased activity in Herald where a mining proposal threatens the community; suggesting 285 rock trucks would use the narrow roads. This is the equivalent of 12,000 cars a day. The air quality and noise would be unbearable.

Tina B. Holt (3) --As a resident of the rural community of Herald my concerns are about mining and the negative cumulative impacts that increased rock truck traffic will have. Also I fear the loss of important Ag land on Borden by mining Borden Ranch. The damage to Dry Creek watershed of Borden Ranch would be an environmental disaster. Also the amount of water consumption by a mining operation on Borden Ranch would be devastating to the residential wells in the neighborhood. I know of 7 wells that have been depleted. The air quality would be degraded. The road damage from rock truck traffic is a costly negative impact: over $600,000.00 a mile to replace.

Mining of Borden Ranch and the increased truck, traffic, noise pollution is not wanted in the rural residential community of Herald.

While the loss of prime ag land on Borden Ranch would be most unfortunate; if mining were to occur; a railroad spur line must be developed for the efficient removal of mined materials to a High Way 104 location that will in no way burden Herald residents.

July 11, 2008, Sacramento, CA, at the Sixth Floor Meeting Room, Sacramento County Administration Building, 700 H Street, Sacramento, CA 95814

Twenty-two people, including thirteen public and seven agency participants registered on the meeting's sign-in sheets (see Appendix D).

The four written comments (See Appendix E for all comments) included:

Michael Devereaux (1)--Will the Corps of Engineers consider the new South Sacramento Habitat an approved:

1. Mitigation bank; or

2. an in lieu fee program; or

3. a permittee-responsible mitigation project for purposes on the new Corps rulemaking issued earlier this year?

[no name provided]--Did the team consider involving the Regional Water Quality Control Board. Most of the time, the Corp requirements are in-line with the NPDFS require., but there may be additional measures that applicants should know about.

Thanks.

Michael Devereaux (2)--Will the SSHCP have a feature that would allow it to incorporate private wetland preserve areas into the preserve system managed by the SSHCP?

Judy Waegell --Waegell Home Ranch map designation connections. We have no vineyards, some parcels that are cropland are designated as grassland, Pond south of Florin Road not colored Blue = Tri Colored Blackbird habitat.

July 15, 2008, Rancho Cordova, at the American River Room, Rancho Cordova City Hall, 2729 Prospect Park Drive, Rancho Cordova, CA 95670

Thirteen public and two agency participants registered on the meeting's sign-in sheets. (See Appendix D.)

The two written comments (See Appendix E for all comments) included:

Mark Hanson --Regarding Cordova Hills, the impacts outside the UDA for roadway, sewer, water, dry utilities should be taken into account (covered activities). Cordova Hills project is 2,419 acres all within the USB, but will require a 4-6 lane roadway crossing & possibly other infrastructure through the northeastern side of the Keifer Landfill's bufferlands. Cordova Hills will require 3 access points & due to spacing requirements the southern entrance to Cordova Hills must traverse through the bufferlands outside the USA. Cordova Hills owns this portion of the bufferlands & no uses requiring urban services are proposed, but construction of necessary project infrastructure outside the UDA will be needed.

Michael Devereaux--

1. The EIR/EIS needs to cover the impacts on the South Sac HCP of the proposed Highway 50 to Highway 99 connector road, for which a joint powers agency was just created; the HCP also needs to provide permit coverage for the connector.

2. The EIR/EIS needs to include development in the City of Elk Grove's "South of Kammerer Road" areas as a future development area covered by the permits to be issued for the South Sac HCP.

July 16, 2008, Elk Grove, at the City Council Chambers, Elk Grove City Hall, 8400 Laguna Palms Way, Elk Grove, CA 95758

Twenty-four public and two agency participants registered on the meeting's sign-in sheets. (See Appendix D.)

The three written comments (See Appendix E for all comments) included:

bwackford@aol.com --Continue to look at City of Elk Grove sphere of influence and annexing proposal. Area should be addressed in EIR. Potential for future growth should be assessed. Avenues for EG to blend these areas into plan should be kept open. A "50 year" plan should clearly look to the future & the reality that growth will occur. we trust you'll continue to listen with an open mind and include the City of Elk Grove & its current & future residents in the decision making process.

Michael Winn --With the City of Elk Grove's formal application to amend the city's sphere of influence, the SSHCP environmental review should address that acreage for future development (or "take" habitat). The EIR/EIS should also evaluate the mitigation type and quantity for the proposed SOI areas.

Don Smith --We are very concerned about protecting the resources of the Cosumnes River floodplain area. Specifically riparian habitat protection in zones 3c [illegible] 8, 9 near Grantline Road, Highway 99, and Kammerer Road. At a minimum the area within the 200 year floodplain of Cosumnes River & Deer Creek.

It is a sensitive area with wetlands, vernal pools endangered species habitat. It is being threatened by the development and expansion of the City of Elk Grove. The analysis should consider the impacts of expansion of the City of Elk Grove. Identification of resources in the sensitive areas and mitigation (if any).

I believe that keeping City of Elk Grove expansion outside the 200 year floodplain will cover the zone & concerns.

WORKSHOP

The workshop was held on Tuesday, August 19, at the Florin Service Center, 7000 65th Street, Sacramento, CA 95823, and was attended by 35 public and three agency participants (see Appendix H). Workshop announcements were e-mailed to those individuals who attended the previous four scoping meetings and to the individuals, organizations, and agencies on the mailing list previously used for the public scoping meetings.

The purpose of the workshop was to gather information regarding specific natural areas and natural resources inside the UDA where participants would like to see habitat conserved, know of specific biological information, believe inappropriate for a preserve, or may cause concern if preserved.

Alternatives Workshop Comments Received

Participants in the Alternatives Workshop identified areas of concern by pointing out some 230 specific locations on maps of Zones 1, 2, 3, 4, 5, and 12.

REPORT SECTION ON AGENCY COMMENTS RECEIVED? (I.E. APPENDIX F)

At a minimum, a scoping report must include some discussion of comments received from any **regulatory** agency – determines level of "controversy" under NEPA (for our letters received, this is EPA and CDFG).

APPENDICES

A. NOP/NOI
B. Public Notices
C. Meeting Materials
D. Sign-in Sheets
E. Public Comments
F. Agency Comments
G. Coordination Letters
H. Workshop

Appendix A

NOI/NOP

Notice of Intent
Notice of Preparation

FR Doc E8-12963[Federal Register: June 10, 2008 (Volume 73, Number 112)]
[Notices]
[Page 32729-32732]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr10jn08-66]

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

[FWS-R8-ES-2008-N0106; 1112-0000-81420-F2]

Habitat Conservation Plan for South Sacramento, Sacramento County, CA

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of intent to prepare an Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) and notice of public scoping meetings.

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) we, the Fish and Wildlife Service (Service), advise the public that we intend to gather information necessary to prepare, in coordination with the County of Sacramento (the County), a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR). The EIS/EIR will analyze the environmental effects of the Service's proposed issuance of an incidental take permit under section 10(a)(1)(B) of the Federal Endangered Species Act of 1973 as amended (ESA), for a habitat conservation plan (HCP) within a portion of south Sacramento County, California. The County, along with their local partners (the cities of Elk Grove, Rancho Cordova, Galt, the Sacramento Regional County Sanitation District, and the Sacramento County Water Agency), is facilitating the preparation of the South Sacramento HCP (SSHCP) in compliance with section 10(a)(2) of the ESA. The County and their local partners intend to apply to the Service for a 30-year permit that would authorized the incidental take of 40 species due to ground-disturbing private activities implemented under the SSHCP. The County, in accordance with the California Environmental Quality Act (CEQA) and with 40 CFR 1506.6(b)(3), has published a similar notice of preparation

for this EIS/EIR with the State Clearinghouse.

We provide this notice to (1) Describe the proposed action and possible alternatives; (2) announce the initiation of a public scoping period, including when and where scoping meetings will be held; (3) advise other interested Federal, State, and local agencies, affected Tribes, and the public of our intent to prepare an EIS/EIR and invite their participation in the scoping process and; (4) obtain suggestions, comments, and useful information from interested parties and other agencies on the range of actions, the significant issues, range of alternatives, and impacts to be considered in the EIS/EIR document. We invite written comments on this notice from any interested party.

DATES: Submit written comments on or before July 30, 2008. Four public scoping meeting will be held on:

1. Tuesday, July 8, 2008, from 6:30 p.m. to 8:30 p.m., Galt, CA.
2. Friday, July 11, 2008, from 10 a.m. to 12:00 p.m., Sacramento, CA.
3. Tuesday, July 15, 2008, from 6:30 p.m. to 8:30 p.m., Rancho Cordova, CA.
4. Wednesday, July 16, 2008, from 6:30 p.m. to 8:30 p.m., Elk Grove, CA.

ADDRESSES: The public meetings will be held at the following locations:

1. Tuesday, July 8, 2008, at the Anthony Pescetti Community Room, Galt Police Facility, 455 Industrial Drive, Galt, CA 95632.
2. Friday, July 11, 2008, at the Sixth Floor Meeting Room, Sacramento County Administration Building, 700 H Street, Sacramento, CA 95814.
3. Tuesday, July 15, 2008, at the American River Room, Rancho Cordova City Hall, 2729 Prospect Park Drive, Rancho Cordova, CA 95670.
4. Wednesday, July 16, 2008, at the City Council Chambers, Elk Grove City Hall, 8400 Laguna Palms Way, Elk Grove, CA 95758.

Submit written comments to Nina Bicknese, Conservation Planning Branch, Sacramento Fish and Wildlife Office, Fish and Wildlife Service, 2800 Cottage Way, Room W-2605,

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Sacramento, CA 95825. Comments may also be sent by facsimile to (916) 414-6713.

FOR FURTHER INFORMATION CONTACT: Nina Bicknese, Senior Fish and Wildlife Biologist, Sacramento Fish and Wildlife Office at (916) 414-6600. Additional details of the County's proposed South Sacramento Habitat Conservation Plan are available at http://frwebgate.access.gpo.gov/cgi-bin/leaving.cgi?from=leavingFR.html&log=linklog&to=http://

www.planning.saccounty.net/habitat-conservation/overview/html.

SUPPLEMENTARY INFORMATION:

Reasonable Accommodation

Persons needing reasonable accommodations in order to attend and participate in a public meeting should contact Nina Bicknese at (916) 414-6600 as soon as possible. In order to allow sufficient time to process requests, please call no later than one week before the public meeting. Information regarding this proposed action is available in alternative formats upon request.

Background

The County and their local partners anticipate that landowners and individuals will continue to request their discretionary or ministerial approval of ground-disturbing land development projects in portions of south Sacramento County where species listed as threatened or endangered under the ESA are present. The County and their local partners intend to apply for a permit from the Service for the incidental take of listed species resulting from their approval of otherwise lawful land-use changes within portions of south Sacramento County over the next 30 years. Pursuant to the ESA and federal regulations governing incidental take permits (ITPs), the County and their local partners are in the process of preparing a habitat conservation plan titled South Sacramento HCP (SSHCP). Development of the SSHCP involved a public process that has included open meetings of a stakeholder Steering Committee.

Section 9 of the ESA (16 U.S.C. 1538) and Federal regulations (50 CFR 17.21 and 17.31) prohibit the ``take'' of wildlife species listed as endangered or threatened. The term ``take'' means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect listed species, or to attempt to engage in such conduct (16 U.S.C. 1532). ``Harm'' in the definition of ``take'' includes significant habitat modifications or degradations (50 CFR 17.3). Pursuant to section 10(a)(1)(B) of the ESA, the Service may permit authorized take of species other wise prohibited by Section 9 of the ESA if such taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity (16 U.S.C. 1539). Federal regulations governing ITPs for threatened and endangered wildlife species, respectively, are promulgated in 50 CFR 17.32 and 50 CFR 17.22 and in Section 10(a)(2) of the ESA. Pursuant to these regulations, no permit authorizing incidental take may be issued unless the applicant prepares a Habitat Conservation Plan (HCP). An HCP must include: a description of the activities sought to be authorized; the names of the species sought to

be covered by the ITP; the impacts that will likely result from the proposed taking; steps the applicant will take to minimize and mitigate such taking to the maximum extent practicable; the funding that will be available to implement such steps; biological goals and objectives; a monitoring plan; an adaptive management plan; alternatives to the proposed taking the applicant considered and reasons why such alternatives are not proposed for implementation; other measures that may be necessary or appropriate for the purposes of the HCP; and the procedures the applicant will use to deal with unforeseen circumstances over the term of the ITP.

The SSHCP Planning Area--the area in which all impacts would be evaluated and all conservation actions will be implemented--is approximately 341,000-acres within south Sacramento County. The approximate geographical boundary of the SSHCP Planning Area is the area bound by U.S. Highway 50 in the north, the county line dividing Sacramento County with San Joaquin County on the south, the county line dividing Sacramento County with Amador and El Dorado counties in the east, and Interstate 5 on the west. The SSHCP's 341,000-acre Planning Area includes a 123,000-acre Urban Development Area (UDA) where most ground-disturbing development and infrastructure projects would be approved by the County and its local partners over the next 30 years. The 123,000-acre UDA includes lands within Sacramento County's Urban Service Boundary, lands within the city limits of Rancho Cordova, Elk Grove, and Galt, and lands within Galt's adopted sphere of influence area. The County and its partners propose that approximately 43,500 acres within the 123,000-acre UDA would be developed or otherwise disturbed, while approximately 8,000 acres of the UDA would be permanently preserved or restored. The County and its partners also propose that approximately 40,500 acres of the Planning Area outside the UDA would be permanently preserved or restored, and only approximately 2,000 acres of the Planning Area outside the UDA would be developed or otherwise disturbed.

The species proposed for coverage in the SSHCP are those that occur within the SSHCP Planning Area and are currently listed as federally threatened or endangered, or that may become federally listed during the term of the proposed permit. The County intends to request an ESA section 10(a)(1)(B) permit to authorize the incidental take of 40 species (7 federally listed and 33 unlisted). The proposed SSHCP would provide for the long-term conservation and management of these 40 covered-species and their habitats within the SSHCP Planning Area. Species may be added or deleted during the course of the SSHCP development based on public comment, new information, further analysis, and agency consultation. Listed animal species proposed to be covered under the SSHCP permit are the federally-endangered vernal pool tadpole shrimp (Lepidurus packardi), the federally-threatened California tiger salamander (Ambystoma californiense), the federally-threatened giant

garter snake (Thamnophis gigas), the federally-threatened valley elderberry longhorn beetle (Desmocerus californicus dimorphus), and the federally-threatened vernal pool fairy shrimp (Branchinecta lynchi). Listed plant species proposed to be covered are the federally endangered Sacramento Orcutt grass (Orcuttia viscida) and the federally endangered slender Orcutt grass (Orcuttia tenuis).

The 33 unlisted species (27 animal and 6 plant species) proposed to be covered under the SSHCP permit are the mid-valley fairy shrimp (Branchinecta mesovallensis), Ricksecker's water scavenger beetle (Hydrochara rickseckeri), western pond turtle (2 sub-species) (Actinemys marmorata marmorata and Actinemys marmorata pallida), western spadefoot toad (Scaphiopus hammondii), the white-tailed kite (Elanus leucurus), Cooper's hawk (Accipiter cooperii), the ferruginous hawk (wintering) (Buteo regalis), golden eagle (Aquila chrysaetos), the state-threatened Swainson's hawk (Buteo swainsoni), bald eagle (Haliaeetus leucocephalus), loggerhead shrike (Lanius ludovicianus), northern harrier (nesting) (Circus cyaneus), sharp-shinned hawk (Accipiter striatus), the state-endangered American peregrine falcon (wintering) (Falco peregrinus anatum), tricolored blackbird (nesting) (Agelaius tricolor),

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western burrowing owl (Athene cunicularia hypugaea), long-eared owl (Asio otus), merlin (Falco columbarius), short-eared owl (Asio flammeus), white-faced ibis (Plegadis chihi), yellow breasted chat (Icteria virens) the state-threatened greater sandhill crane (Grus canadensis tabida), American badger (Taxidae taxus), pallid bat (Antrozous pallidus), ringtail (Bassariscus astutas), western red bat (Lasirus blossevilli),Yuma myotis bat (Myotis yumanensis), Ahart's dwarf rush (Juncus leiospermus var. ahartii), dwarf downingia (Downingia pusilla), legenere (Legenere limosa), pincushion navarretia (Navarretia myersii), Sanford's arrowhead (Sagittaria sanfordii) and the state-endangered Bogg's Lake hedge-hyssop (Gratiola heterosepala). Should any of these unlisted covered-species become listed under the ESA during the term of the permit, take authorization for those species would become effective upon listing. The County proposes to include 8 plant species (2 listed and 6 unlisted) in the SSHCP. The ESA does not prohibit the incidental take of federally listed plants on private lands unless the take is a violation of state law or regulation. We propose to include these plant species on the ITP in recognition of the conservation benefits that would be provided for these plant species under the SSHCP and to meet regulatory obligations under Section 7 of the ESA and the California Endangered Species Act (CESA). All wildlife and plant species included on the proposed ITP would receive assurances under the Service's ``No Surprises'' regulations found in 50 CFR

17.22(b)(5) and 17.32(b)(5).

The activities proposed for coverage in the SSHCP are wide-ranging, but are generally related to urban-suburban development on city and unincorporated lands. Proposed covered-activities presently include the construction, installation, extension, or removal of: (1) Private and commercial developments, (2) transportation facilities, (3) surface water and groundwater supply and delivery facilities, (4) water treatment facilities, (5) flood control facilities, (6) sanitation facilities (landfills, transfer stations, recycling stations), (7) public facilities (fire stations, police stations, hospitals, schools, community centers, cemeteries, and administration centers), (8) outdoor and indoor recreation facilities, (9) utility facilities, (10) aggregate mining activities, and (11) conservation activities (habitat restoration, creation, and enhancement; preserve management and monitoring). These covered activities are expected to impact 18 existing habitat and agricultural land-cover types within the 341,000-acre Planning Area. Approximately 43,500 acres of the existing natural habitat and agricultural land-cover in the Planning Area would be converted to a developed condition under the proposed SSHCP.

The proposed SSHCP Conservation Strategy would provide a regional approach for the conservation of the 40 covered-species and their 18 habitat types so as to aid recovery of the species and to minimize and mitigate impacts of the covered activities on the species and their habitats within the Planning Area. The 18 species habitat types include vernal pools and associated uplands, valley grasslands, other wetlands, woodlands, riparian habitats, and several agricultural land-cover types. The proposed SSHCP Conservation Strategy would protect a total of approximately 47,000 acres and restore or create a total of approximately 1,500 acres within the 341,000-acre Planning Area. The SSHCP Planning Area would be divided into a system of 12 conservation zones with an explicit amount of species habitat preservation directed to specific zones. The County and its partners anticipate that large landscape preserves and linkage corridors would be established outside of the UDA, and that these habitat preserves would be established within a matrix of open space and agricultural land uses. The proposed Conservation Strategy also includes approximately 8,000 acres of habitat preserves within the UDA, but these UDA habitat preserves would be much smaller and would eventually be surrounded by urban or suburban development. Components of the proposed SSHCP conservation program are now under consideration by the Service and the County. These components may include monitoring, adaptive management, species avoidance measures, and species mitigation measures including the preservation, restoration, and enhancement of suitable habitat. It is anticipated the SSHCP would be implemented through a section 10(a)(1)(B) incidental take permit and an Implementation Agreement.

Environmental Impact Statement/Report

The proposed EIS/EIR will consider (1) The proposed action (i.e. the Service issues an ITP for the SSHCP proposed by the County and its partners), (2) a no-action alternative (i.e. the Service does not issue an ITP and a SSHCP is not implemented) and, (3) reasonable alternatives to the proposed action (i.e. the Service considers alternative versions of the SSHCP, and then permits alternative). We anticipate that several alternatives will be developed for analysis in the EIS/EIR. These alternatives might vary by the number of covered species; the covered activities, different strategies for avoiding, minimizing, and mitigating the impacts of incidental take; the amount of land preserved or restored, the type of future conservation efforts; or a combination of these factors. A detailed description of all reasonable alternatives, including the proposed action, will be included in the EIS/EIR.

The EIS/EIR will analyze in depth all significant environmental issues identified through this scoping process. These issues may include biological resources, agricultural resources, land use, housing, hydrology and water resources, cultural resources, aesthetics, transportation and circulation, mineral resources, recreation, air quality, noise and vibration, or other components of the human environment that could be directly, indirectly, or cumulatively impacted by the proposed action or by the alternatives.

We anticipate that a draft EIS/EIR and the draft SSHCP will be available in late 2009 and will have a 60-day public review period. The environmental review of the EIS/EIR will be conducted in accordance with the requirements of NEPA (42 U.S.C. 4321 et seq.), its implementing regulations (40 CFR 1500-1508), other applicable regulations, and Service policy and guidance on compliance with those regulations. We expect to complete the final EIS/EIR in the middle of 2010 and to make the decision on issuing a section 10(a)(1)(B) permit for a SSHCP in late 2010.

The U.S. Army Corps of Engineers (Corps) will be a NEPA Cooperating Agency on the proposed EIS/EIR pursuant to 40 CFR 1501.6, 1506.3(c), and 1508.5. The County and their partners expect to apply to the Corps for a Programmatic General Permit (PGP) under Section 404 of the Clean Water Act (CWA). Section 404 of the CWA regulates and requires Corps authorizations for discharges of dredged or fill material into waters of the United States. A PGP is among the types of general permits which can be issued for any category of activities involving discharges of dredged or fill material if the Corps makes certain determinations (33 U.S.C. 1344(e)). Corps regulations promulgated under the CWA define dredged or fill material in detail at 33 CFR 323.2 and regulations concerning processing of Corps permits are at 33 CFR part 325. The Corps may use the

EIS/EIR to inform their discretionary decision to issue to a PGP for certain components of the proposed SSHCP.

The California Department of Fish and Game (CDFG) will be a NEPA Cooperating Agency on the proposed EIS/EIR pursuant to 40 CFR 1501.6 and 1508.5. The County and their partners expect to apply to CDFG for an incidental take permit under Section 2081 of the California Fish and Game code and to apply for a Lake or Streambed Alteration Agreement under Section 1600 of the California Fish and Game code. CDFG intends to use the EIS/EIR in conducting its review of the SSHCP as a CEQA Trustee Agency. CDFG will also use the EIS/EIR in makings its CEQA findings in their decision to issue an incidental take permit under Section 2081 of the California Fish and Game Code. As a CEQA Responsible Agency, CDFG may also use the EIS/EIR during their consideration to approve a Lake or Streambed Alteration Agreement under Section 1600 of the California Fish and Game Code. The SSHCP will incorporate best management practices that have been developed in cooperation with, and approved by, CDFG.

This notice of intent is being furnished in accordance with 40 CFR Sections 1501.2, 1501.7, 1506.6, and 1508.22 to obtain suggestions, comments, and useful information from other agencies and the public on the scope of the proposed EIS/EIR, including the significant environmental issues deserving of study, the range of actions, the range of alternatives, and the range of impacts to be considered. Written comments from interested parties are invited to ensure that all issues related to the proposed section 10(a)(1)(B) incidental-take permit application are identified. Comments will only be accepted in written form. You may submit written comments by mail, facsimile transmission, or in person (see ADDRESSES). All comments received will become part of the official administrative record. Our practice is to make comment letters (including names, home addresses, home phone numbers and email addresses of respondents) available for public review. You may request that we withhold personal information, if so, please state this prominently at the beginning of your comments. However, we cannot guarantee that we will be able to do so.

Dated: June 4, 2008.

John Engbring,

Deputy Regional Director, California and Nevada Region, Sacramento, California.

[FR Doc. E8-12963 Filed 6-9-08; 8:45 am]

BILLING CODE 4310-55-P

Municipal Services Agency
Paul J. Hahn
Administrator

COUNTY OF SACRAMENTO
CALIFORNIA

DEPARTMENT OF
ENVIRONMENTAL REVIEW AND ASSESSMENT

JOYCE HORIZUMI
Director,
Environmental Coordinator

NOTICE OF PREPARATION

JUNE 11, 2008

TO: ALL INTERESTED PARTIES

SUBJECT: NOTICE OF PREPARATION OF A JOINT DRAFT ENVIRONMENTAL IMPACT REPORT AND ENVIRONMENTAL IMPACT STATEMENT FOR SOUTH SACRAMENTO HABITAT CONSERVATION PLAN (CONTROL NUMBER 03-PLE-0637)

Sacramento County will be the California Environmental Quality Act (CEQA) lead local agency and the US Fish and Wildlife Service will be the National Environmental Policy Act (NEPA) lead federal agency for preparation of a joint Environmental Impact Statement/Environmental Impact Report/ (EIS/R) for a project known as the SOUTH SACRAMENTO HABITAT CONSERVATION PLAN. This Notice of Preparation (NOP) has been sent to responsible and trustee agencies, involved federal agencies, and interested persons pursuant to Section 15082 of the CEQA Guidelines and section 1506.2 and 1506.6 of the NEPA regulations. A similar NEPA Notice of Intent (NOI) was published in the Federal Register on June 10, 2008 (73 FR 32729). Agencies should comment on the scope and content of the environmental information that is germane to the agencies' statutory responsibilities in connection with the proposed project. Due to the time limits mandated by State law, your response must be sent at the earliest possible date, but not later than 50 days after receipt of this notice. The County and USFWS will hold four public scoping meetings on the proposed SSHCP to solicit information from the public on the proposed plan, alternatives, and the scope of issues and impacts to be addressed in the Environmental Impact Statement/Environmental Impact Report. Scoping meeting dates, time and location follow.

1. **Galt, Tuesday, July 8, 6:30 to 8:30 pm,** Galt Police Department, Anthony Pescetti Community Room, 455 Industrial Dr., Galt, CA. 95632.

2. **County of Sacramento, Friday, July 11, 10:00 am to 12:00 pm**, Sacramento County Administration Building, Sixth Floor Training Room, 700 H Street, Sacramento, CA. 95814

3. **Rancho Cordova, Tuesday, July 15, 6:30 to 8:30 pm**, Rancho Cordova City Hall, American River Room, 2729 Prospect Park Dr., Rancho Cordova, CA. 95670

4. **Elk Grove, Wednesday, July 16, 6:30 to 8:30 pm**, Elk Grove City Council Chambers, 8400 Laguna Palms Way, Elk Grove, CA. 95758

Dates and location of the public meetings will, among other methods, also be advertised on the following website: http://www.DERA.SacCounty.net .

The SSHCP proposed location, project description, and the probable environmental effects are contained in the attached materials. This NOP may also be viewed online at: http://www.DERA.SacCounty.net. Please send your Agency's response to this Notice to:

Ms. Joyce Horizumi, Environmental Coordinator
Department of Environmental Review and Assessment
827 7th Street, Room 220, Sacramento, CA 95814
or via e-mail at: DERA@saccounty.net.

Your response should reference the DERA Control Number (03-PLE-0637) and include the name of a contact person in your agency.

Persons and agencies with specific questions about the project should contact Mr. Peter Morse, Department of Environmental Review and Assessment (DERA), Project Manager, at (916) 874-7914 for further information. Additional details of the County's proposed draft SSHCP are available at http://www.planning.saccounty.net/habitat-conservation/overview.html.

PROJECT TITLE
SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

CONTROL NUMBER
03-PLE-0637

PROJECT PROPONENT
County of Sacramento

PROJECT PERMITTEES (PARTNERS)
County of Sacramento
City of Elk Grove
City of Rancho Cordova
City of Galt
Sacramento Regional County Sanitation District (includes County Sanitation District-1)
Sacramento County Water Agency

INTENT
Pursuant to the California Environmental Quality Act (CEQA) the County of Sacramento is circulating this Notice of Preparation (NOP) to inform the public that the County intends to gather information to prepare, in coordination with US Fish and Wildlife Service (USFWS), a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) on the proposed South Sacramento Habitat Conservation Plan (SSHCP). The joint EIS/EIR will analyze the environmental effects of the USFWS's proposed issuance of an incidental take permit under Section 10(a)(1)(B) of the federal Endangered Species Act of 1973, as amended (FESA), the California Department of Fish and Game's proposed issuance of an incidental take permit under Section 2081(b)(2) of the state Endangered Species Act, as amended (CESA), and local approval and implementation of the habitat conservation plan associated with the proposed incidental take permit. The County of Sacramento is facilitating preparation of the joint environmental document with project permittees and is the lead agency under the California Environmental Quality Act (CEQA). The SSHCP will cover 40 species, 10 of which are either state or federally listed. The County and its partners intend to apply for permits from the USFWS and the CDFG for the incidental take of covered species resulting from otherwise lawful activities. Anticipated permit life is 30 years. Pursuant to the Federal Endangered Species Act (FESA), the County and its partners must prepare a regional habitat conservation plan (HCP) as part of their application for the Federal incidental take[1] permit. In addition, the County and its partners expect to apply to the US Army Corps of Engineers (Corps) for a Programmatic General Permit under Section 404 of the Clean Water Act. Such a permit would be issued to allow the discharge of dredge or fill materials into waters within the regulatory jurisdiction of the Corps.

[1] The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect listed species, or to attempt to engage in such conduct, and includes take resulting from significant habitat modifications or degradations.

PROJECT SUMMARY

The proposed SSHCP is a regional approach to conserving species and addressing issues related to urban development, habitat conservation, open space protection, and agricultural protection. The SSHCP would minimize regulatory hurdles and streamline the permitting process for projects that engage in development related activities inside the urban development area or UDA. The SSHCP would consolidate environmental efforts to protect and enhance vernal pool habitat and other aquatic and upland habitats to provide ecologically viable conservation areas in south Sacramento County for numerous species. Adoption of the SSHCP would authorize the County and its partners to issue permits that allow landowners to engage in specific development activities (covered activities) that could result in the incidental take of listed species. The County and its partners would adopt a developer-paid fee based on loss of habitat acreage, habitat type and long-term management costs. Fees would fund the habitat preservation, restoration and management elements of the proposed SSHCP.

PROJECT LOCATION

The geographic location of the proposed SSHCP includes a combined 341,000 acres within south Sacramento County (unincorporated area) and the cities of Rancho Cordova, Elk Grove, and Galt. The geographic boundaries of the SSHCP planning area are Highway 50 to the north, the County line to the east and south, and Interstate 5 to the west. The plan area excludes the City of Sacramento, the City of Folsom, Folsom's Sphere of Influence, the Sacramento-San Joaquin Delta, and the Sacramento County community of Rancho Murieta (Plate NOP-1 SSHCP Planning Area).

PROPOSED SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

The proposed conservation strategy for the SSHCP provides for the conservation of covered species and their associated habitat types so as to aid recovery of the species, fully mitigate for the impacts of covered activities on the species and their habitats, and provide a regional approach to the avoidance, minimization and mitigation of impacts on the Waters of the United States. It is based on the concepts of conservation biology and landscape ecology, the ecological needs of the covered species and the nature, quality and geographical distribution of the different habitat types.

The permits issued for implementing the SSHCP would minimize and mitigate incidental take and provide for the conservation of 40 covered species that may occur in the plan area. The plan identifies 18 different habitat types including vernal pool aquatic and upland habitat, other wetland habitats, oak woodland, and rural agricultural crops. Bisecting the plan area is Cosumnes and Deer Creek corridor which contains agricultural lands and extensive riparian habitat (Plate NOP-2 SSHCP Habitat Types).

The proposed SSHCP conservation strategy includes the following elements:

- Protect approximately 8,000 acres of habitat inside the UDA.
- Protect approximately 39,000 acres outside the UDA.
- Restore approximately 1,500 acres of habitat in the plan area.

Plate NOP-1 SSHCP Planning Area

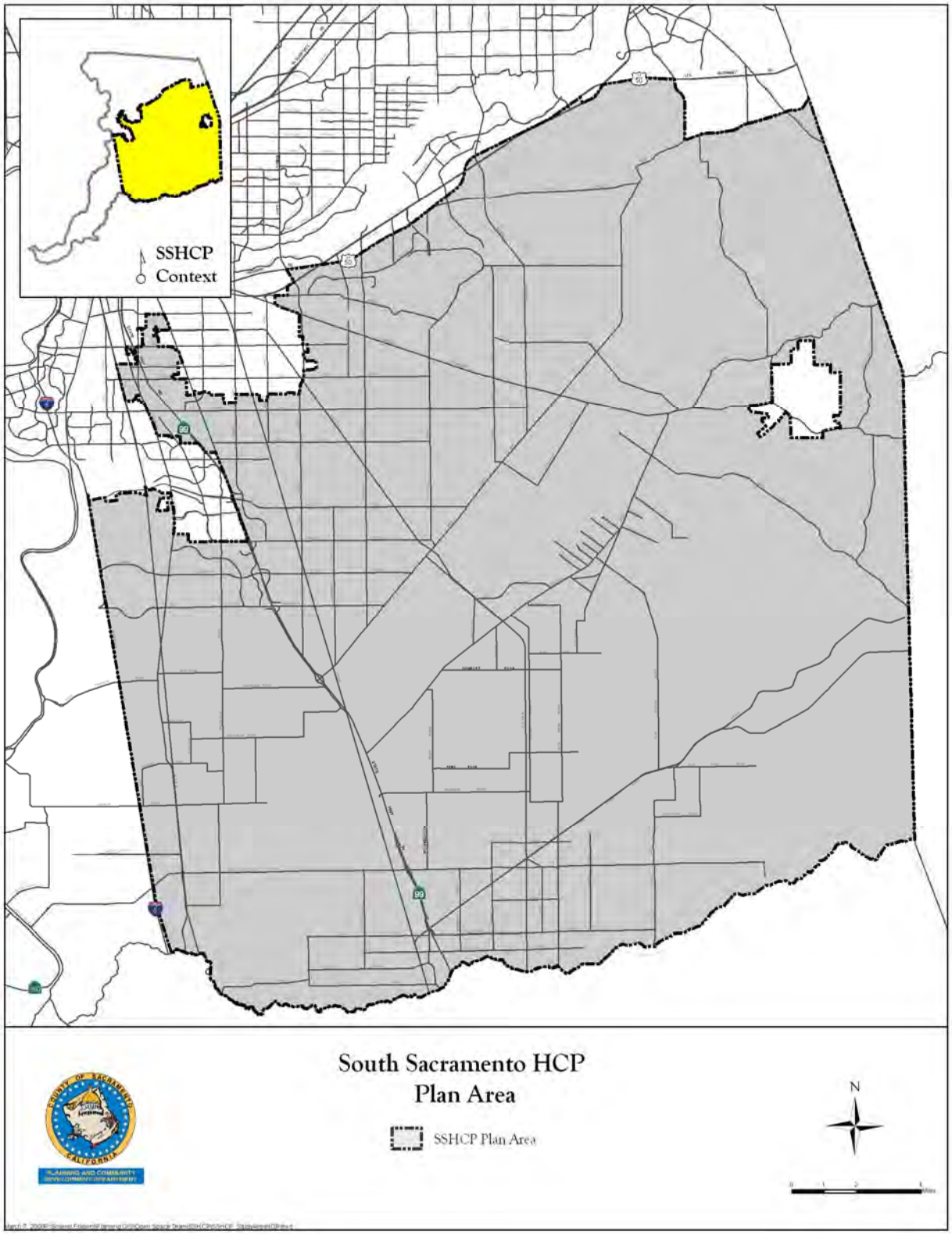
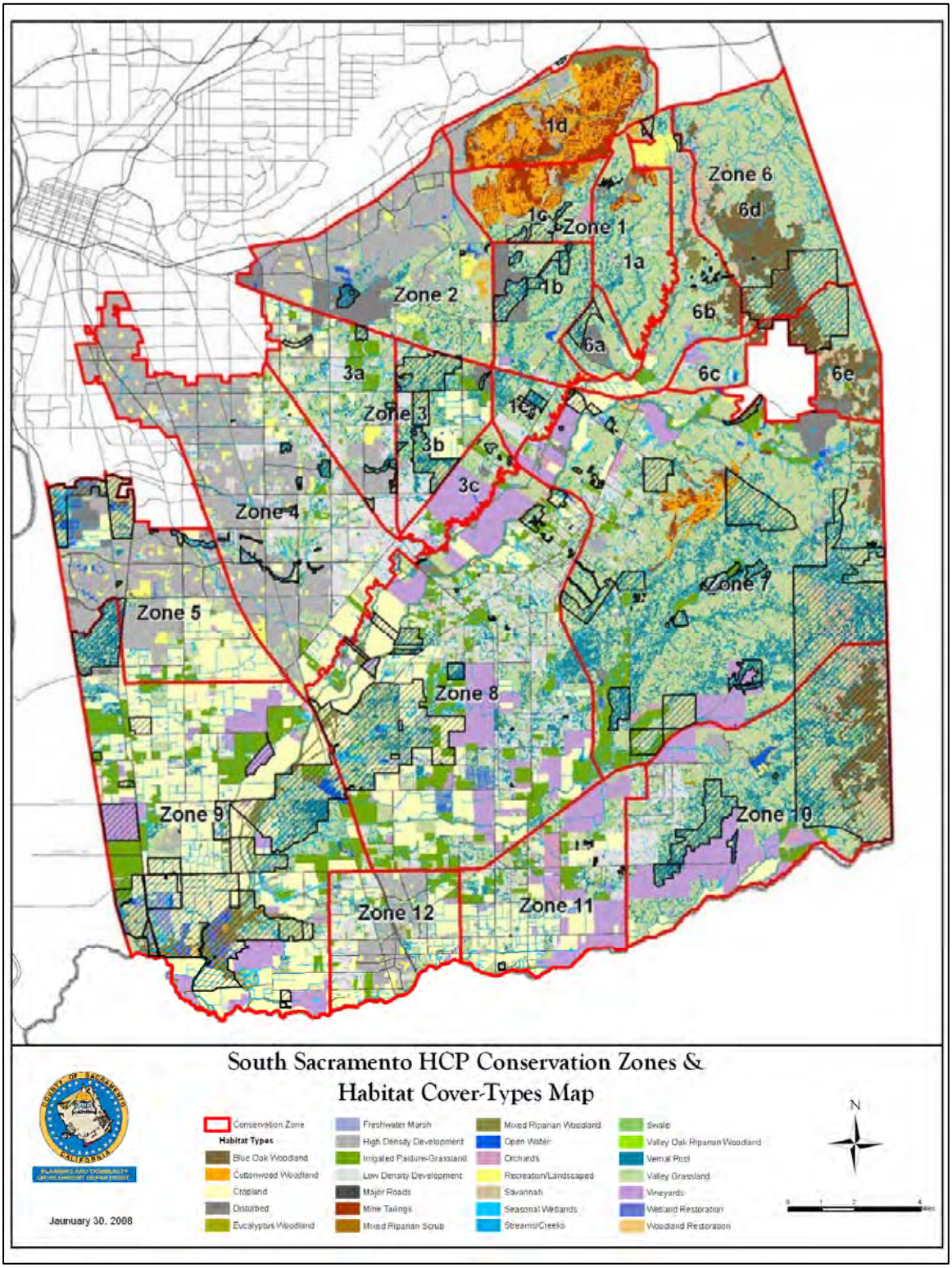


Plate NOP-2 SSHCP Habitat Types[2]



[2] The plan area is divided into 12 zones to assist in implementing and managing habitat conservation.

The plan anticipates larger habitat preserves and linked habitat corridors outside the UDA. Habitat preserves inside the UDA would be smaller, also linked by corridors, and would eventually be a component of the urban/suburban landscape. Specific location of preserves would occur over time during plan implementation. Habitat preserves purchased or conservation easements acquired would be selected based on a number of important biological criteria, including:

- Protect habitat areas that are considered core elements of the SSHCP.
- Add parcels onto existing preserves to increase their size and reduce habitat fragmentation and edge effect.
- Provide connections to existing preserves and/or preserve areas that are currently isolated from each other.

Covered Species

There are 40 wildlife and plant species proposed for coverage under the Plan including 10 state or federally listed species. Table NOP-1 Covered Species lists those species and their current status. Species may be added or deleted from this list as Plan development continues.

Covered Activities

Activities considered under this Plan are wide ranging and may result in incidental take but are primarily related to urban-suburban development. Proposed covered-activities may include the construction, installation, or extension of:

- Private and commercial developments
- Transportation facilities
- Surface and groundwater delivery facilities
- Water treatment facilities
- Solid waste sanitation facilities
- Public facilities (fire station, police stations, hospitals, schools, community centers, cemeteries, and administration centers)
- Indoor and outdoor recreation facilities
- Energy utility facilities
- Aggregate mining activities
- Habitat management activities

Covered activities will continue to be refined as the Plan is developed further.

Incidental Take

Almost all incidental take of SSHCP covered-species is expected to occur inside an area referred to as the urban development area or UDA. The UDA corresponds to land within the County's urban services boundary (USB), and to land within the city limits of Rancho Cordova, Elk Grove and Galt, and Galt's adopted sphere of influence. A limited amount of infrastructure development, such as planned road widening projects and water conveyance pipelines would occur in the SSHCP planning area outside the UDA.

Table NOP-1 Covered Species[3]

Mammals	Invertebrates
American Badger, *Taxidae taxus*	Mid-Valley Fairy Shrimp, *Branchinecta mesovallensis*
Pallid Bat, *Antrozous pallidus*	Ricksecker's Water Scavenger Beetle, *Hydrochara ricksecker*i
Ringtail, *Bassariscus astutas*	Valley Elderberry Longhorn Beetle, *Desmocerus californicus dimorphus*, (FT)
Western Red Bat, *Lasirus blossevillii*	Vernal Pool Fairy Shrimp, *Branchinecta lynch*i, (FT)
Yuma Myotis Bat, *Myotis yumanensis*	Vernal Pool Tadpole Shrimp, *Lepidurus packardi,* (FE)
Birds	**Plants**
American Peregrine Falcon, *Falco peregrinus anatum*	Ahart's Dwarf Rush, *Juncus leiospermus var. ahartii*
Bald Eagle, *Haliaeetus leucocephalus*	Boggs Lake Hedge-Hyssop, *Gratiola heterosepala* (SE)
White-Tailed Kite, *Elanus leucurus*	Dwarf Downingia, *Downingia pusilla*
Cooper's Hawk, *Accipiter cooperii*	Legenere, *Legenere limosa*
Ferruginous Hawk, *Buteo regalis*	Pincushion Navarretia, *Navarretia myertsii*
Golden Eagle, *Aquila chrysaetos*	Sacramento Orcutt Grass, *Orcuttia viscida*, (SE, FE)
Greater Sandhill Crane, *Grus Canadensis tabida* (ST)	Slender Orcutt Grass, *Orcuttia tenuis,* (SE, FE)
Loggerhead Shrike, *Lanius ludovicianus*	Sanford's Arrowhead, Sagittaria sanfortii
Long-Eared Owl, *Asio otus*	
Merlin, *Falco columbarius*	**Amphibians**
Northern Harrier, *Circus cyaneus*	California Tiger Salamander, *Ambystoma californiense* (central valley, DPS*)*, (FT)
Sharp-Shinned Hawk, *Accipiter striatus*	Western Spadefoot Toad, *Scaphiopus hammondii*
Short-Eared Owl, *Asio flammeus*	
Swainson's Hawk, *Buteo swainsoni* (ST)	**Reptiles**
Tricolored Blackbird, *Agelaius tricolor*	Giant Garter Snake, *Thamnophis gigas* (FT)

[3] : F - federal, S – State, E – endangered, T – threatened

Western Burrowing Owl, *Athene cunicularia hypugaea*	Pond Turtle, *Actinemys marmorata marmorata* and *A. m. pallida* (2 sub-species: Western and Northeastern)
White-Faced Ibis, *Plegadis chihi*	
Yellow Breasted Chat, *Icteria virens*	

Current assumptions of take include:

- Take will occur on approximately 43,500 acres within the UDA on land already identified for urbanization.
- Take will occur on approximately 2,000 acres outside the UDA for public roadway or utility projects already identified in master plans or other projections.

Permits

Six permits may be required to implement the proposed SSHCP or any alternative:

- Federal Endangered Species Act (FESA), Section 10(a)(1)(B) permit (incidental take) issued by the US Fish and Wildlife Service
- California Endangered Species Act (CESA), Section 2081 permit (incidental take) issued by the Department of Fish and Game
- Clean Water Act, Section 404 permit (wetland fill) issued by the US Army Corps of Engineers (USACE)[4]
- Clean Water Act, Section 401 compliance (water quality) administered by the Regional Water Quality Control Board
- Fish and Game Code, Section 1600 agreement (stream bed alteration) issued by Department of Fish and Game

POSSIBLE ENVIRONMENTAL EFFECTS OF THE PROPOSED SSHCP

Land Use

Assess how habitat preserves inside the UDA may affect development densities and land use patterns within UDA to accommodate anticipated future population growth. Assess how preserves or easements may also affect existing agricultural use.

Public Facilities

Assess how habitat preserves may affect placement of future public service extensions inside the UDA, such as water, sewer and power lines. Agencies involved in providing public services include Sacramento County Water Agency (SCWA), County Sanitation District-1 (CSD-1), Sacramento Municipal Utility District (SMUD), and Pacific Gas and Electric (PG&E).

Transportation/Circulation

Assess how habitat preserves may affect the placement of future roadways and/or redirect traffic to nearby roadways, potentially increasing congestion.

[4] It is unclear whether or not the USACE can issue a Clean Water Act permit for SSHCP.

Emergency services
Assess how the presence of grassland habitat preserves adjacent to urban development may increase exposure to fire risks or other natural hazards.

Hydrology/Flooding
Assess how habitat protection and enhancement along local stream channels may increase existing habitat values and potentially affect existing floodway capacities and floodwater velocities.

Biological Resources
Assess the effectiveness of habitat conservation as prescribed by the SSHCP for providing long-term habitat protection and population enhancements for 40 covered species inside the plan area. Assess proposed interface between habitat and non-habitat land uses. Consider effectiveness of elements of habitat conservation preserves including preserve size, shape, location, water availability, connectivity, critical habitat designation, vegetation cover, enhancement potential, and other elements.

Water Quality
Assess how proposed habitat enhancement, restoration, and creation of habitat may affect existing stormwater runoff, especially during restoration/creation of wetland habitat. Analysis will consider consistency with various water quality permits, including the National Pollution Discharge Elimination System, and state and local policies and regulations.

Recreational Access
Assess impacts on existing recreation opportunities in the Plan Area. Assess the potential for illicit passive recreation activities on proposed habitat preserves.

Noise
Assess impacts of construction noise associated with proposed habitat enhancement and restoration.

Air Quality
Assess impacts of construction dust and exhaust associated with proposed habitat enhancement and restoration.

Mineral Resource
Assess impacts on existing aggregate resources.

Climate Change
Assess impacts of green house gas emissions in relation to proposed habitat protection, enhancement and restoration.

Cultural/Historical Resources
Assess impacts to cultural resources, especially given general proximity of historical human habitation to water courses.

Agriculture
Assess impacts to agricultural productivity in relation to the conservation or conversion of agricultural lands for wildlife habitat uses. Assess any effect of wildlife habitat lands on adjacent agricultural uses.

Other Studies
Other sections, such as aesthetics, health and human hazards, and vector control may be added.

INTENDED USES OF THE EIR
The County of Sacramento as Lead CEQA Agency, must consider the information provided in the joint EIS/EIR prior to its approval or denial of the proposed SSHCP. The EIS/EIR will also provide environmental information for other agencies that may have permitting authority or an interest in various aspects of the project. Responsible agencies may include, but are not limited to:

- City of Rancho Cordova
- City of Elk Grove
- City of Galt
- Sacramento Regional County Sanitation District, including County Sanitation District-1
- Sacramento County Water Agency
- US Army Corps of Engineers
- US Fish and Wildlife Service
- US Environmental Protection Agency
- California Department of Fish and Game
- California Department of Water Resources
- California Regional Water Quality Control Board
- State Historic Preservation Office

Appendix B

Meeting Announcements

Fliers for Scoping Meetings
Scoping Meetings Postcard
Scoping Meetings Postcard Mailing List
Email Announcement
Online Newspaper Story About Scoping Meeting
Newspaper Advertisement for Scoping Meetings

South Sacramento Habitat Conservation Plan

Help Scope the Environmental Review Process!

What is the SSHCP?

The proposed SSHCP is a regional plan to address issues related to species conservation, agricultural protection, and urban development. The proposed SSHCP will consolidate environmental efforts to protect and enhance wetland and upland habitats to provide ecologically functional conservation areas while also streamlining the permitting process and minimizing regulatory hurdles for future development projects.

The proposed South Sacramento Habitat Conservation Plan (SSHCP) is beginning environmental review. Please join us at one of the four meetings in July to discuss the proposal, alternatives, and scope of issues and impacts to be addressed in the environmental review process:

Galt
Tuesday, July 8 - 6:30 to 8:30 pm
Galt Police Department,
Anthony Pescetti Community Room
455 Industrial Drive
Galt, CA 95632

County of Sacramento
Friday, July 11 - 10:00 am to 12:00 pm
Sacramento County Admin. Building, Sixth Floor Training Room
700 H Street, Sacramento, CA 95814

Rancho Cordova
Tuesday, July 15 - 6:30 to 8:30 pm
Rancho Cordova City Hall,
American River Room
2729 Prospect Park Drive
Rancho Cordova, CA 95670

Elk Grove
Wednesday, July 16 - 6:30 to 8:30 pm
Elk Grove City Council Chambers
8400 Laguna Palms Way
Elk Grove, CA 95758

Following these scoping meetings, the County will host a community workshop in August to help identify alternatives to analyze during the environmental review process. Stay tuned for details!

For more information about the proposed SSHCP visit the SSHCP website at: www.planning.saccounty.net/habitat-conservation/overview.html or contact Vince King at kingv@saccounty.net or (916)874-3257

For more information on the environmental review process, please contact Peter Morse at (916)874-6929, morsep@saccounty.net or visit the DERA web site at: www.dera.saccounty.net and goto the South Sacramento Habitat link

South Sacramento Habitat Conservation Plan

Help Design the South Sac HCP Conservation Alternatives!

What is the SSHCP?

The proposed SSHCP is a regional plan to address issues related to species conservation, agricultural protection, and urban development. The proposed SSHCP will consolidate environmental efforts to protect and enhance wetland and upland habitats to provide ecologically functional conservation areas while also streamlining the permitting process and minimizing regulatory hurdles for future development projects.

The proposed South Sacramento Habitat Conservation Plan (SSHCP) is undergoing environmental review. A significant step in the environmental review process is identifying and analyzing conservation alternatives in the Environmental Impact Statement. The SSHCP must balance the need to conserve sensitive habitat with urban growth. This workshop is designed to allow you to map particular locations within the SSHCP's Urban Development Area (UDA) that you feel are important to sensitive species and habitats in the region. Your maps will be used to help inform the conservation alternatives analyzed during environmental review.

What will you do at the workshop?

* Learn about the proposed plan
* Join a workgroup to map conservation alternatives
* Enjoy food and beverages courtesy of Sacramento County

When and Where?

Tuesday, August 19th
6:00 - 9:00 PM
Florin Service Center
7000 65th Street
Sacramento, CA 95823

For more information about the proposed SSHCP visit the SSHCP website at: www.planning.saccounty.net/habitat-conservation/overview.html or contact Vince King at kingv@saccounty.net or (916)874-3257

For more information on the environmental review process, please contact Tim Hawkins at (916)874-7914, hawkinst@saccounty.net or visit the DERA web site at: www.dera.saccounty.net and goto the South Sacramento Habitat link

The proposed South Sacramento Habitat Conservation Plan (SSHCP) is beginning environmental review. Please join us at one of the following scoping meetings to help us scope issues and impacts you would like analyzed in the environmental document. **Click here** for the EIR/EIS scoping meetings flyer, which provides the following information as well as additional information and links for the proposed SSHCP. A direct link to the Federal Register notice is: **http://edocket.access.gpo.gov/2008/pdf/E8-12963.pdf**

1. **Galt, Tuesday, July 8, 6:30 to 8:30 pm**, Galt Police Department, Anthony Pescetti Community Room, 455 Industrial Dr., Galt, CA. 95632.
2. **County of Sacramento, Friday, July 11, 10:00 am to 12:00 pm**, Sacramento County Administration Building, Sixth Floor Training Room, 700 H Street, Sacramento, CA. 95814
3. **Rancho Cordova, Tuesday, July 15, 6:30 to 8:30 pm**, Rancho Cordova City Hall, American River Room, 2729 Prospect Park Dr., Rancho Cordova, CA. 95670
4. **Elk Grove, Wednesday, July 16, 6:30 to 8:30 pm**, Elk Grove City Council Chambers, 8400 Laguna Palms Way, Elk Grove, CA. 95758

If you are unable to attend one of the scoping meetings, you may provide written comments germane to drafting the environmental document by July 30, 2008. Please submit written comments to:

Peter Morse
County of Sacramento, DERA
827 7th St, Room 220
Sacramento, CA 95814
Email - morsep@saccounty.net
Phone - 916-874-6929

U.S. Fish and Wildlife Service
Sacramento Fish & Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

ADDRESS SERVICE REQUESTED

SSHCP Scoping Meeting Postcard (back and front)

Govt Pubs Section
CA State Library
914 Capitol Mall
Sacramento CA 95814

Dr. Steve Schwarzbach Director, W Ecological Research Ctr
USGS
CSUS-6000 J St, Placer Hall
Sacramento CA 95819-6129

Curt Campion Asst City Manager
Galt Planning Dept
495 Industrial Dr
Galt CA 95632

Robert Grunwald Planning Consultant
Isleton Planning, Grunwald & Associates
350 Rivergate Way
Sacramento CA 95831

Supervisor
UC Coop Extension - Sacto County
4145 Branch Center Rd
Sacramento CA 95827

Jude Lamore
Friends of the Swainson's Hawk
915 L St, Ste C-425
Sacramento CA 95814

Director
Ducks Unlimited
3074 Gold Canal Dr
Rancho Cordova CA 95670-6116

Rhonda Morningstar Pope Spokesperson
Buena Vista Rancheria
PO Box 162283
Sacramento CA 95816

Joseph Sheley Exec VP
CSUS, Sacto President's Office
6000 J St
Sacramento CA 95819

Mayor
City of Rancho Cordova
2729 Prospect Park Drive
Rancho Cordova CA 95670

Aimee Rutledge Exec Dir
SVOSC
3507 13th St
Sacramento CA 95818

David Wright
[redacted]

Eric Hansen
[redacted]

Douglas Bell
CSUS - Dept of Biological Sciences
CA State University
Sacramento CA 95819-6077

Sean Barry
Entrix, Inc
701 University Avenue, Ste 200
Sacramento CA 95825-6757

Kari Dohn
Rosie & Kindel, PA Specialists
915 L St, Ste 1210
Sacramento CA 95814

Carol Witham President
CA Native Plant Society
1141 37th St
Sacramento CA 95816-5415

William Miller President
Villages of Laguna San Luis
2251 Ralston Rd
Sacramento CA 95821

Katz & Associates
1801 I Street, Ste 100
Sacramento CA 95811-3000

Al Wright Executive Director
Wildlife Conservation Board
1807 13th St #103
Sacramento CA 95814-7137

Rex Albright Exec Dir
Rancho Cordova Chamber of Commerce
3328 Mather Field Rd
Rancho Cordova CA 95670

From: SSHCP (MSA) <sshcp@saccounty.net>
Date: Thu, Aug 7, 2008 at 10:05 AM
Subject: South Sacramento Habitat Conservation Plan EIS Scoping Workshop
To:

HELP DESIGN THE SOUTH SAC HCP CONSERVATION ALTERNATIVES!

The proposed South Sacramento Habitat Conservation Plan (SSHCP) is undergoing environmental review. A significant step in the environmental review process is identifying and analyzing conservation alternatives in the Environmental Impact Statement (EIS). The SSHCP must balance the need to conserve sensitive habitat with urban growth. The workshop is designed to allow you to map particular locations within the SSHCP's Urban Development Area (UDA) that you feel are important to sensitive species and habitats in the region. Your maps will be used to help inform the conservation alternatives analyzed during environmental review.

WHAT WILL YOU DO AT THE WORKSHOP?

- Learn about the proposed plan.
- Join a workgroup to map conservation alternatives.
- Enjoy food and beverages courtesy of Sacramento County.

WHEN AND WHERE?

Tuesday, August 19th, 6:00 – 9:00 PM

Florin Service Center
7000 65th Street
Sacramento, CA 95823

Please send RSVP by email or calling Vince King at (916) 874-3257. We look forward to seeing you at the workshop!
To see a flyer on this workshop or to get more information about the SSHCP, please click here.

_____
COUNTY OF SACRAMENTO EMAIL DISCLAIMER:
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sacbee.com
The Web Site of THE SACRAMENTO BEE

Residents can chime in on habitat conservation plan

By Loretta Kalb - lkalb@sacbee.com

Published 3:14 pm PDT Wednesday, August 13, 2008

Urban growth and habitat conservation in the south county will be the topic of a workshop at 6 p.m. Tuesday. Residents can lend their voice to the issue during a discussion of the proposed South Sacramento Habitat Conservation Plan, which is undergoing environmental review.

Participants in the three-hour session will be able to map locations within the plan's urban development area they deem important to sensitive species and habitats. The maps will be used to analyze conservation alternatives during the environmental review.

The workshop will be held at 7000 65th Street.

For information or to reserve a seat, call Vince King at (916) 874-3257. Or e-mail King at kingv@saccounty.net.

For more information on the plan, go to www.planning.saccounty.net and search for "habitat."

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South Sacramento Habitat Conservation Plan

Help Shape the Environmental Review Process!

What is the SSHCP?

The proposed SSHCP is a regional plan to address issues related to species conservation, agricultural protection, and urban development. The proposed SSHCP will consolidate environmental efforts to protect and enhance wetland and upland habitats to provide ecologically functional conservation areas while also streamlining the permitting process and minimizing regulatory hurdles for future development projects.

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For more information on the environmental review process, please contact Peter Morse at (916)874-6929, morsep@saccounty.net or visit the DERA web site at: www.dera.saccounty.net and goto the South Sacramento Habitat link

Appendix C

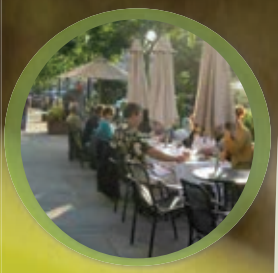
Meeting Materials

Scoping Process Overview Handout
Habitat Conservation Plan Slide Show Presentation
Habitat Conservation Plan Brochure
Covered Activities (poster)
Local Jurisdiction and Boundaries Map (poster)
Conservation Zones and Parcels (poster)
Conservation Zones and Habitat Map (poster)
Conservation/Mitigation Sites Map (poster)
Covered Species (poster)
Species Distribution Map (poster)
Conservation Zones and Wetland Map (poster)
Vernal Pools Map (poster)
Critical Habitat Map (poster)
Habitat Conservation Plan Timeline (poster)
Public Comment Opportunities (poster)
List of Conservation Measures by Zone

South Sacramento Habitat Conservation Plan

Please help us prepare the EIS/EIR for a South Sacramento Habitat Conservation Plan

We need your help. The County of Sacramento and U.S. Fish and Wildlife Service are working together to prepare a joint Environmental Impact Statement/Environmental Impact Report (EIS/EIR) that will analyze impacts of a Habitat Conservation Plan (HCP) proposed for south Sacramento County. The HCP will provide a framework under the Endangered Species Act to help local communities accommodate development while conserving plant and animal species. The Draft EIS/EIR will be published in the summer of 2009.



What is your role during this public scoping process?

Your help is needed to inform the County and the Service of the important issues you want studied in the EIR/EIS. Please focus your comments on:

- Potential impacts that the EIS/EIR should study in depth.
- Problems the proposal may cause, and ways to solve them.
- Better, more effective mitigation measures.
- Suggestions for reasonable alternatives to the proposal.
- Questions you want addressed in the EIS/EIR
- Specific habitat locations inside the Urban Development Area that you think should be preserved.

Please make your comments as specific as you can.

Sometimes participants identify issues during scoping meetings that are too broad to be useful for EIS/EIR analytical purposes - For example, "cultural impacts" - what does this mean? What precisely are the impacts or issues that you want examined? When we encounter a comment as broad as this, we have to guess about what you meant, and you may find that your issues are not covered in the EIS/EIR. Thus, you should refine broad general topics, and specify which issues need evaluation and analysis.

What information will the Draft EIR/EIS contain?

- Descriptions of a proposed HCP and alternative HCPs under consideration.
- A detailed analysis of direct, indirect, and cumulative impacts of all HCP alternatives on the human and environmental resources that you identify in your scoping comments.
- Resources and topics that will be analyzed in the draft EIS/EIR may include, but may not be limited to: Soils, Hydrology, Water Quality, Land Use, Mining, Agriculture, Wildlife and Plants, Wetlands, Cultural Resources, Socio-economics, Public Services, and Transportation

The Proposed South Sacramento Habitat Conservation Plan (SSHCP)

Sacramento County, City of Rancho Cordova, City of Elk Grove, City of Galt, the County Water Agency & Sacramento County Regional Sanitation District

Welcome!

South Sacramento Habitat Conservation Plan (SSHCP) Scoping Meetings:

1. Galt (July 8th)
2. Downtown Sacramento (July 11th - day)
3. Rancho Cordova (July 15th)
4. Elk Grove (July 16th)

Your role at this Meeting

- Tell us about issues you want analyzed in the EIR/EIS
- Tell us your ideas about the SSHCP proposal
  - Potential Impacts
  - Problems/resolutions
  - Reasonable alternatives
  - Specific questions
  - Specific habitat locations

Agenda for Tonight

- Brief overview of the proposed SSHCP
- Information and comment stations

HCP & EIR/EIS Staff

- Rich Radmacher, Sac. County Planning Dept.
- Vince King, Sac. County Planning Dept.
- Peter Morse, Sac. County DERA
- Nina Bicknese, US Fish & Wildlife Service
- Kate Dadey, US Army Corps of Engineers
- Dan Gifford, CA Dept. of Fish & Game

What is a Habitat Conservation Plan?

HCPs are:

- A document that outlines measures to conserve species and their habitats.

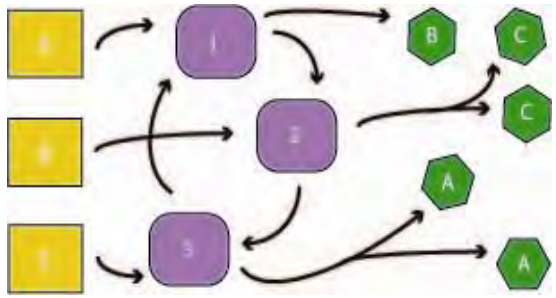
- The document results in the issuance of an incidental take permit to local jurisdictions that can then be extended to a project proponent.

Habitat Conservation Planning

- The Issues

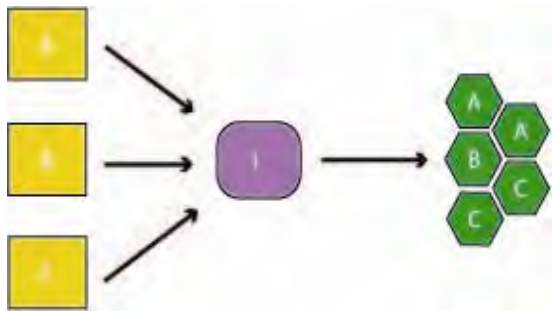
  It is unlawful to "take" listed wildlife species under ESA.

  Desire to avoid time consuming & costly individual negotiations



- The Solution

  Permits development while addressing wetland & endangered species interests in a coordinated & predictable manner



SSHCP

Benefits to:

The Public

Developers

Environmentalists

Agriculture

Landowners

- Preserve floodplains
- Community buffers
- Recreational opportunities
- Attract businesses & jobs
- Protect biological resources
- Reduce development permitting costs & complexity
- Adaptive management specific to species needs
- Create opportunities to seek grants to benefit regional conservation
- Provide assurances & means to voluntarily sell land or conservation easements while continuing agricultural operations

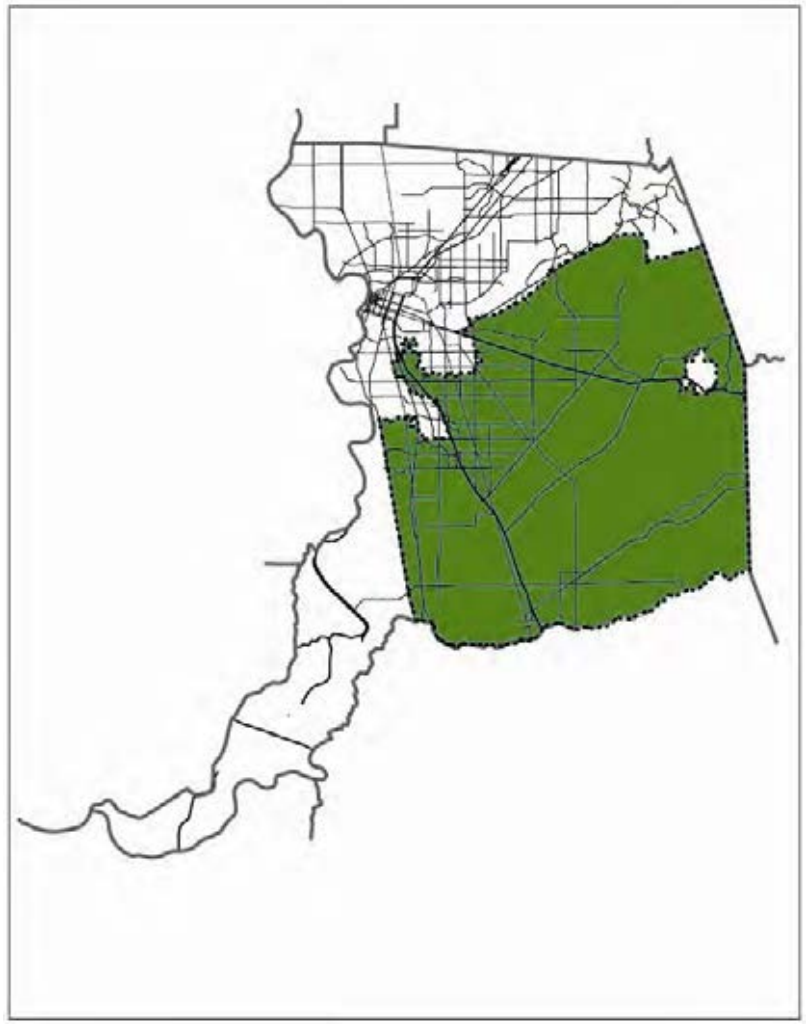
Boundaries:

North - Highway 50

West - Interstate 5

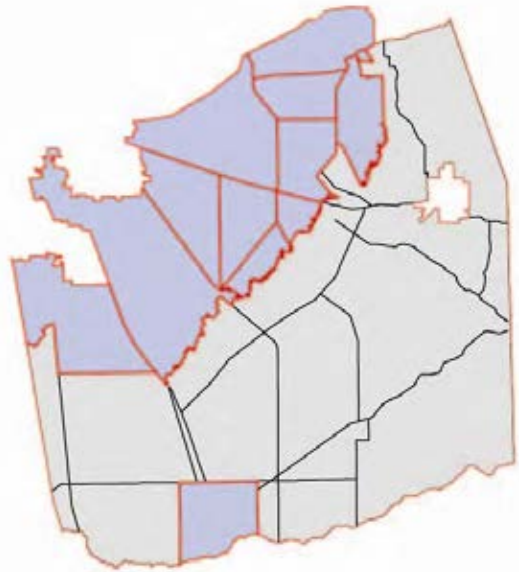
South & East - County Line

Encompasses 341,000 acres



Urban Development Area (UDA)

- Majority of take covered under the plan
- Does not preclude species recovery
- Predictable streamlined permitting process



Outside the UDA

- Some transportation and Infrastructure projects
- Consolidate and direct mitigation
- Contribute to species recovery
- Address adjacent landowner concerns

Covered Species

40 total, 10 State/Federally Listed

- Vernal Pool Fairy Shrimp
- Vernal Pool Tadpole Shrimp
- Swainson's Hawk
- Giant Garter Snake
- California Tiger Salamander
- Sacramento Orcutt Grass
- Slender Orcutt Grass
- Boggs Lake Hedge-Hyssop
- Valley Elderberry Longhorn Beetle
- Greater Sandhill Crane

Habitat Types

- Agricultural Lands
- Riparian / Stream
- Upland Grassland
- Vernal Pool & Associated Uplands
- Wetlands, Ponds & Lakes
- Oak Woodlands

SSHCP

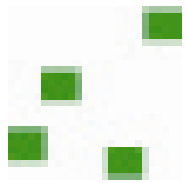
Conservation Principles

- Minimize Fragmentation

  Fragmentation disrupts movement and lowers species diversity.

Good

Poor



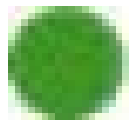
SSHCP

Conservation Principles

- Minimize Edge Effects

  Non-compatible uses adjacent to preserves lowers habitat values and species abundance/diversity

Good



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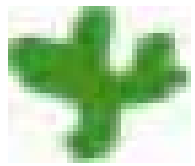


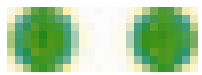
Conservation Principles

- Establish Connectivity

  Linking preserves allows for increased movement amongst interacting landscapes.

Good

Poor



Conservation Principles

- Maximize Heterogeneity

  Preserves with greater mix of habitats tend to support greater biodiversity.

Good

Poor

Conservation Principles

- Protect Watersheds

  Preserving watersheds helps maintain hydrologic stability and water quality.

Good

Poor

HCP Development to date

- Steering Committee:
  - Development Community
  - Environmental Community
  - Agricultural/Ranching Community
  - Regulatory and Resource Agencies
  - Local Governments
    - City of Elk Grove
    - City of Galt
    - City of Rancho Cordova
    - County of Sacramento

Next Steps

- Scoping Meetings
- Public Workshops
- Draft EIR/EIS

www.planning.saccounty.net/habitat-conservation/Environmental_Review.html

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

GROW • ENHANCE • PRESERVE

An Introduction to the Proposed Plan

June
2008

City of Elk Grove • City of Galt • City of Rancho Cordova • Sacramento County
Sacramento County Water Agency • Sacramento Regional County Sanitation District

Introduction

Southern Sacramento County gradually slopes eastward from the rich flat agricultural lands of the untamed Cosumnes River floodplain towards stretching vernal pool landscapes and rolling blue oak woodlands. The interplay between fertile agricultural lands, open rangelands scattered with thousands of vernal pools, and the annual cycle of inundated winters and parched summers provides a key stop for millions of migratory birds, and crucial home to an array of threatened and endangered species.

These features in company with its proximity to the urban capital core and access to the Bay and Tahoe regions have also made the plan area an attractive home for thousands of new residents. Regional estimates predict that by 2050, the area will need to accommodate over 200,000 new housing units. This degree of growth has led local jurisdictions to partner with State and Federal regulatory agencies to develop the proposed South Sacramento Habitat Conservation Plan (SSHCP) to study how to accommodate continued growth while maintaining lasting environmental stewardship.

This brochure outlines some of the key concepts addressed in developing the proposed SSHCP and how the SSHCP may help guide development and conservation in the SSHCP plan area. For further information please contact staff listed on the back of or visit the web site at http://www.planning.saccounty.net/habitat-conservation/overview.html.

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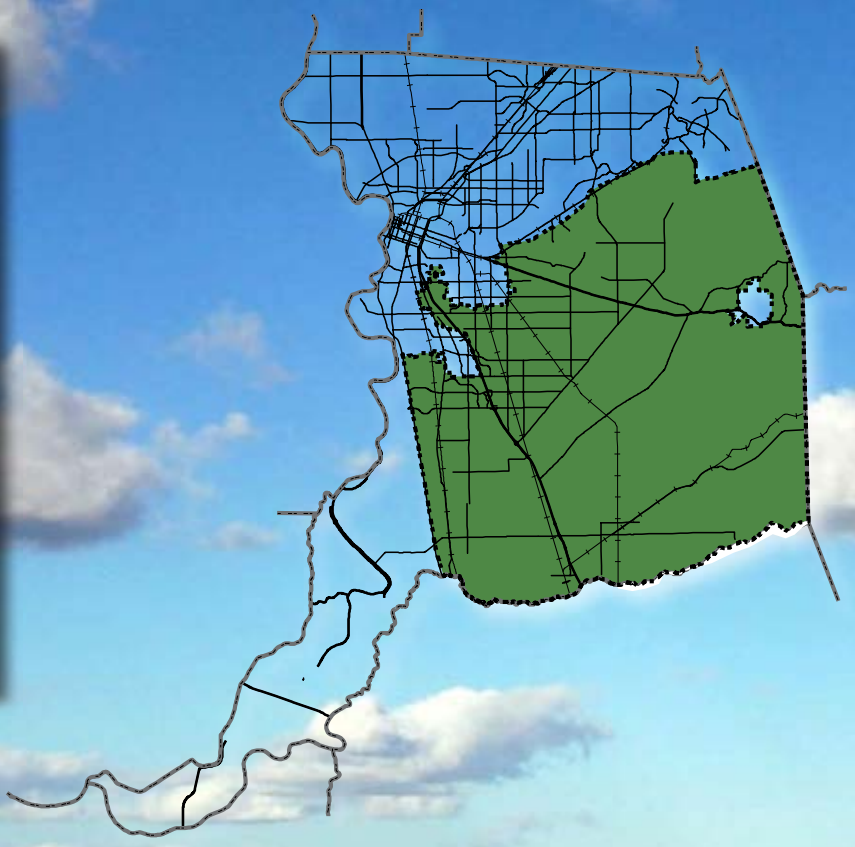
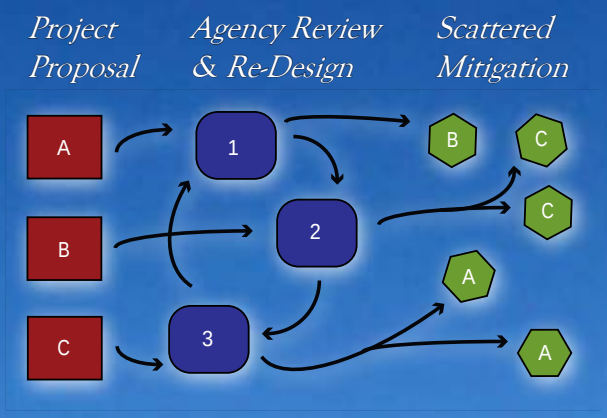
SSHCP Plan Area



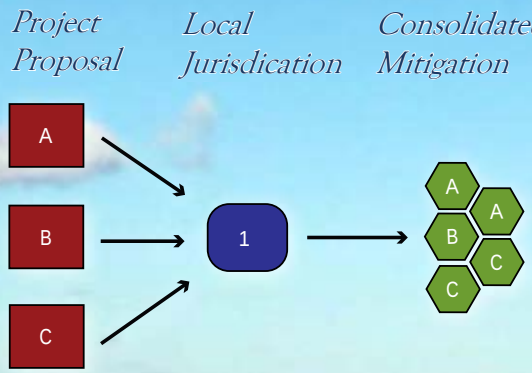
The Need

Currently, individual project proponents must address regulatory agencies on an individual basis when seeking compliance with wetland and species regulations. The resulting process can be confusing, and potentially ineffective. Years of negotiation can result in not only costly expenses and lost time, but also scattered and less than desirable habitat preserves.



The Solution

The proposed SSHCP would consolidate wetland and endangered species interests to address them in a coordinated and predictable manner. Project-by-project permitting would be avoided, which would benefit all interests involved from the project proponents, State, Federal and Local agencies, environmental interests, landowners, agricultural production, to the local residents.



Benefits to:

The Public

A large preserve system will help sustain healthy balanced communities by protecting view sheds, preserving floodplains, buffering distinct communities, increasing recreational opportunities, attracting businesses and jobs, and protecting our biological resources for future generations.

Developers

A single regional conservation plan greatly reduces the cost and complexity of meeting regulatory requirements. It also provides predictable mitigation costs and constraints up-front so that those costs can be anticipated at the onset of a project.

Environmentalists

Large-scale conservation avoids isolated, postage stamp preserves. HCPs also provide for perpetual adaptive management specific to species needs. They can also create opportunities to seek grants to augment HCP funds and to benefit regional conservation.

Agriculturists

The proposed SSHCP provides landowners the opportunity to voluntarily sell land or conservation easements while providing assurances that they can continue their own operations without affecting their neighbors. Landowners and agricultural operators are not subject to increased regulation.

SSHCP Principles

- Involve all stakeholders
- Inform the public
- Build consensus

SSHCP Goals

Aid and enhance the recovery of species. Conservation will be guided by science and expert opinion to link local land use programs. Funding will ensure adaptive management of the preserve system in perpetuity.

Streamline development in appropriate sites. The proposed SSHCP would guide and facilitate growth in a consistent and predictable manner. Mitigation fees are collected for impacts to natural resources.

Protect agricultural lands and operations. The proposed SSHCP would incorporate "safe harbor" agreements to provide assurances to landowners surrounding existing and future preserves.

Fairly consider stakeholder interests. Development and implementation of the proposed SSHCP would rely heavily on all constituents to provide input and comment on document content.

Rely on voluntary participation. The proposed SSHCP is a willing seller plan. Selling land or conservation easements on land also not required, but would be an option to interested landowners.

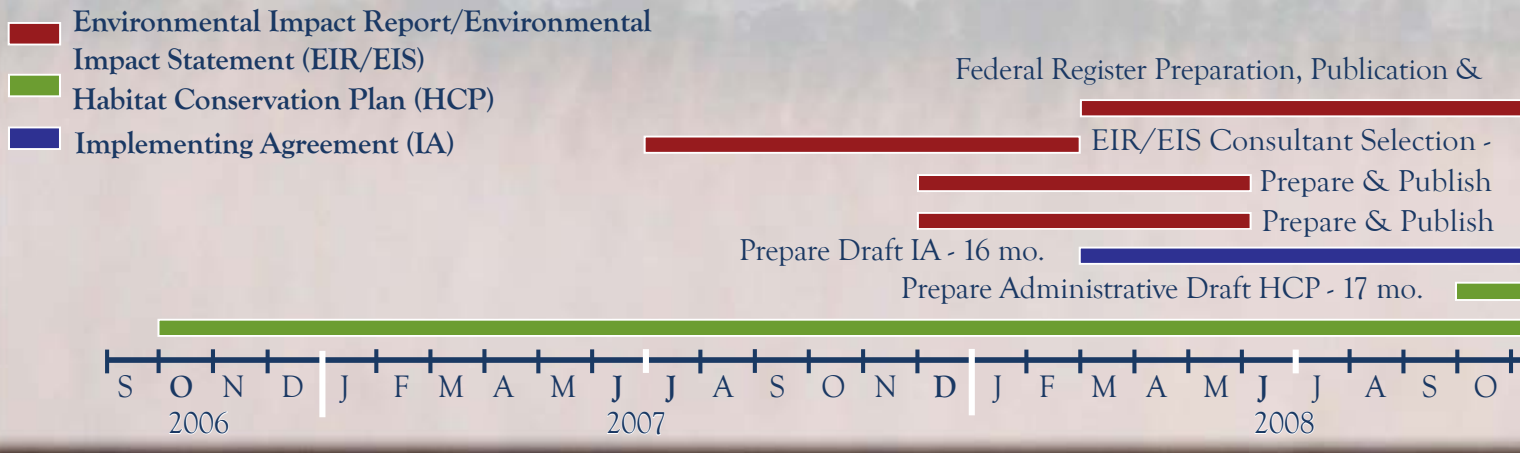
SSHCP Overview

The SSHCP plan area encompasses 341,270 acres of land in south Sacramento County. The area includes the Cities of Rancho Cordova, Elk Grove, Galt, and the unincorporated County. The Plan is a regional approach to addressing urban development, infrastructure improvements, habitat and open space conservation, and agricultural protection. It provides for ecologically viable conservation and minimizes regulatory hurdles for development by streamlining the permitting process.

The proposed SSHCP covers 40 species of plants and animals including 10 that are state or federally listed as threatened or endangered. The Plan is an agreement between state and federal wildlife and wetland regulators and local jurisdictions. The Plan would permit landowners to engage in the "incidental take" of listed species in return for conservation commitments consistent with the Plan goals.

Through the duration of the 30-year plan, the SSHCP may permit approximately 45,000 acres of habitat loss and will protect approximately 60,000 acres. Conservation commitments will be fulfilled through take avoidance, paying per-acre fees, conservation easement dedications, grants and other funding sources. Fees will be directed to public and private mitigation sites that provide large-scale habitat preservation and restoration. Supplementary grants and other monies will be sought to acquire additional preserve lands to support covered species.

SSHCP Timeline



Plan Development

The SSHCP began in 1992 as a watershed study. The regulatory agencies proposed shifting to a more comprehensive plan a year later, which led to investigating the feasibility of the SSHCP. In 1995, the Board of Supervisors approved the Steering Committee composed of members from State and Federal regulatory agencies, local jurisdictions, homebuilders, environmentalists, scientists, landowners, agriculturalists, and business interests to consolidate often polar interests and develop an equitable solution for all parties.

The Committee drafted plan goals, principles, and formed the biological and economic subcommittees in September 1996. In February 1997, the County hired consulting firms to assist with the SSHCP. The consultant, with direction from the committees and the County, researched and wrote text for the SSHCP.

After a hiatus, due to a lack of funding and loss of key personnel, the County reassessed the feasibility of the SSHCP in 2001. Major alterations were made. It was concluded that the County would handle all aspects of project management and document preparation. Individual experts were hired to prepare forty-six specialized documents that County staff have used to prepare various chapters of the SSHCP. Draft HCP chapters were reviewed beginning in November 2006 and a comprehensive draft is expected in the fall of 2008.

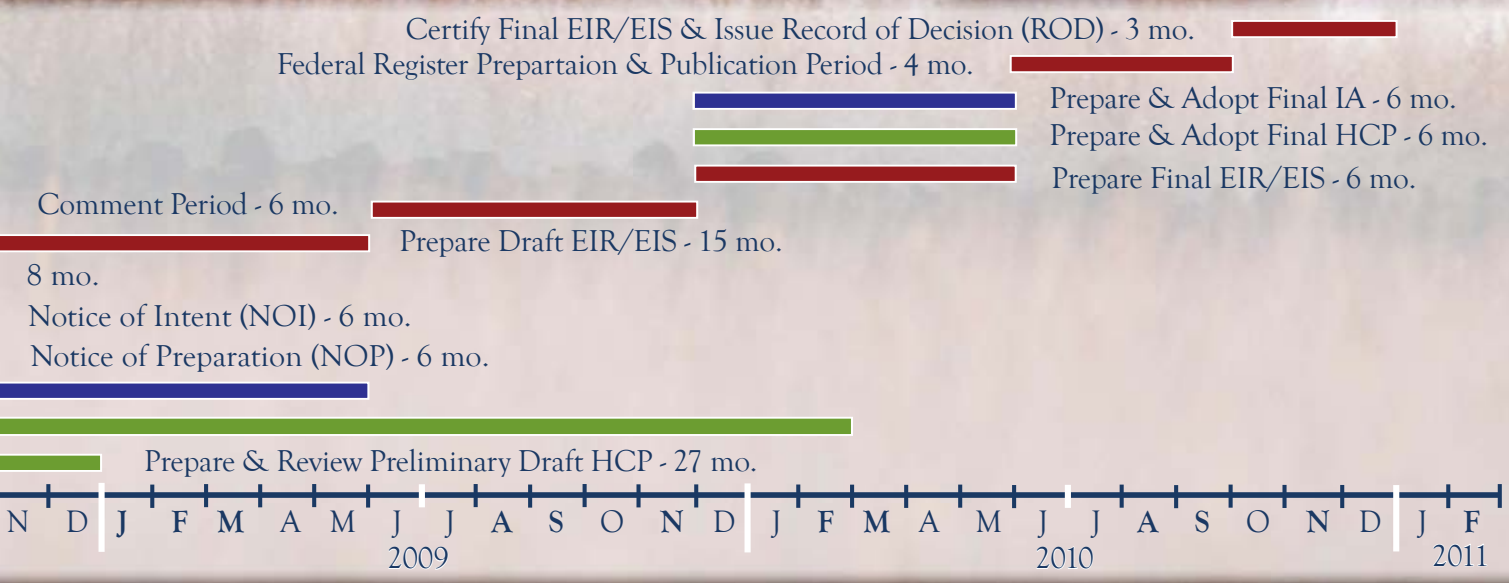
Definitions

HCP - A Habitat Conservation Plan provides regional permitting of species impacts through the Endangered Species Act. Potential impacts to species are authorized in exchange for well-designed preserves.

USB - Sacramento County has established an Urban Services Boundary. Urban growth is not anticipated beyond the USB, which runs roughly west of Scott Rd., along the Cosumnes River floodplain, and across Kammerer Rd.

SOI - A Sphere of Influence is established by a local agency as a probable service area. SOIs are regulated by the Local Agency Formation Commission (LAFCO).

UDA - The Urban Development Area is a term introduced in the SSHCP. It encompasses land where most development and species impacts will occur. The boundary includes the Sacramento County USB, the City limits of Rancho Cordova and Elk Grove, and the City of Galt's adopted SOI.



Conservation Strategy

The SSHCP plan area is home and wintering grounds for an abundance of wildlife, including many threatened and endangered species. One of which, Sacramento Orcutt grass (*Orcuttia tenuis*), is only found in Sacramento County.

The proposed SSHCP approaches conservation on a habitat and landscape scale while considering the specific ecological needs of each species covered by the plan. The strategy guides implementation to preserve important habitat, restore degraded habitat, avoid impacts to species, minimize impacts and enhance habitat to support covered species.

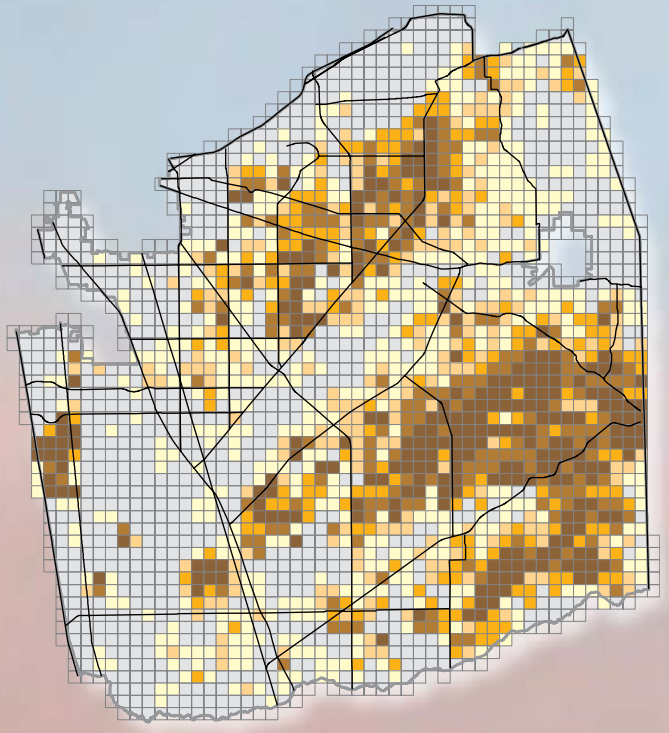
In brief, the proposed SSHCP would preserve 47,000 acres of vernal pool grasslands, blue oak woodlands, agricultural croplands, riparian woodlands, and wetlands as mitigation, and fund preservation of an additional 13,000 acres. The Plan would also include 1,488 acres of compensatory restoration and 1,500 acres of additional restoration.

Adaptive Management

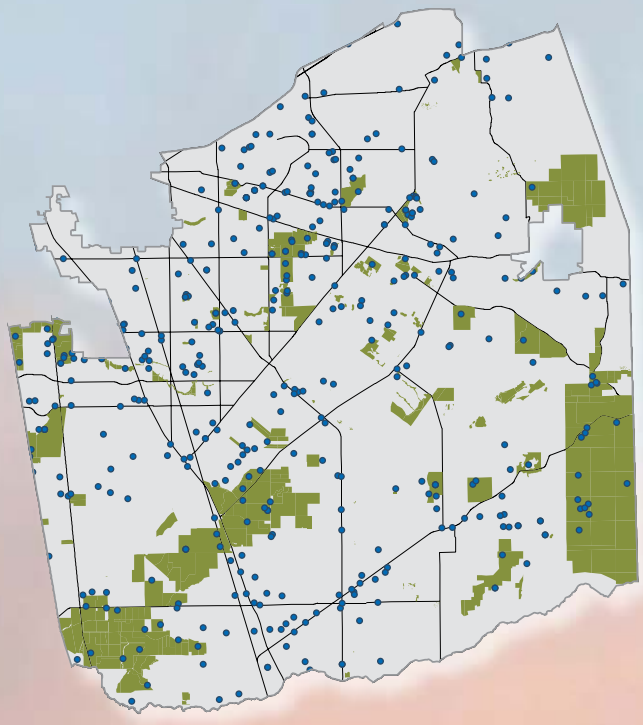
Conventional preserve management often lacks mechanisms to alert managers of any threats to species in due time to save the species. The SSHCP monitoring program would evaluate mitigation compliance, determines if specific biological goals and objectives are being met, and provides feedback information to inform a management strategy. It also provides safeguards against reasonably foreseeable changed circumstances.

Specifically, the proposed SSHCP adaptive management strategy would (1) integrate a monitoring program that ensures compliance; (2) develop management strategies and determines which strategies to implement; (3) identify uncertainty and how to resolve the uncertainty; and (4) incorporate feedback loops to inform preserve management. In this way, the program will monitor the success of conservation strategy and help inform changes to the strategy.

Vernal Pool Wet Acre Density Index



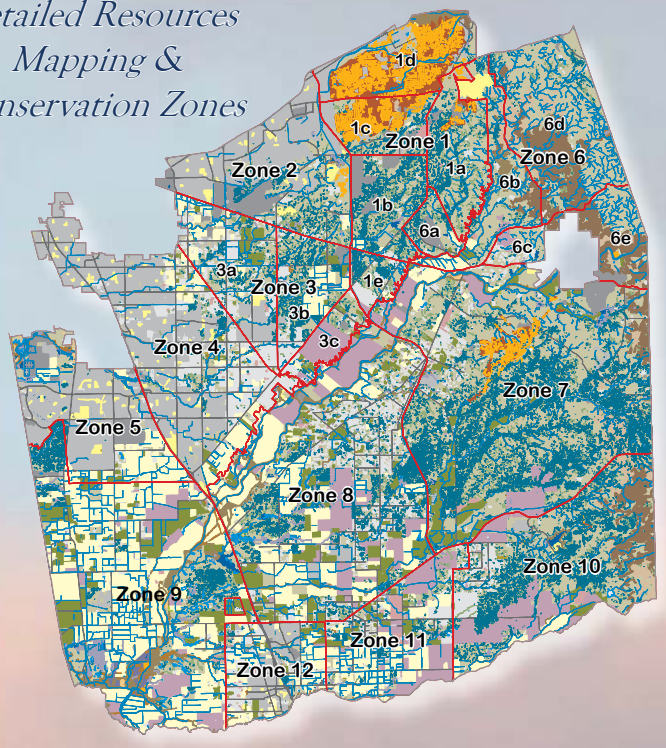
Existing Conservation Sites & Documented Species Occurences



Preserve Design - 8 Guiding Principles

Goal	Effect	Poor	Good	Example
Minimize Fragmentation	Fragmentation disrupts movement and lowers species diversity.			Roads bisecting preserves can prevent movement between preserves.
Minimize Edge Effects	Non-compatible uses adjacent to preserves lowers habitat values and species abundance/diversity.			Feral cats from residential development dramatically reduce song bird populations.
Establish Connectivity	Linking preserves allows for increased movement amongst interacting landscapes.			A corridor between grasslands and a lake allows species to utilize both habitats.
Establish Buffers	Buffers help reduce edge effects to protect preserve integrity.			A vegetated buffer absorbs pollutants to protect waterways.
Maximize Heterogeneity	Preserves with greater mix of habitats tend to support greater biodiversity.			An oak preserve with a stream may support greater biodiversity than an oak preserve without a stream.
Protect Watersheds	Preserving watersheds helps maintain hydrologic stability and water quality.			Nutrients from landscaping upstream flows into the preserve and harms species.
Maximize Population	Larger populations are less vulnerable to disease and local disturbances.			If 10% of a populations is resistant to a disease, 10 individual will not persist, but 20 may.
Maintain Distribution	Allows species to repopulate after disturbances, protects metapopulations and genetic variation.			Individuals in one preserve are able to repopulate another after a fire.

Detailed Resources Mapping & Conservation Zones



Preserve Linkages

The SSHCP planning area was divided into a system of 12 Zones to aid conservation planning. Some Zones are further divided into Subzones. The proposed SSHCP would use these Zones to delineate preserve requirements. In the absence of known willing sellers, the proposed SSHCP does not delineate boundaries of future preserves with hard lines on a map, but rather establishes conservation criteria for each Zone and Subzone. Criteria include securing sufficient acreage and quality habitat for each preserve.

The general area for preserves was determined based on resource mapping, existing conservation sites and known occurrences of covered species within the SSHCP plan area (*see diagrams*).

SSHCP Permitting

In the absence of an HCP, project proponents have to negotiate individually with the federal and state agencies to mitigate for species take and habitat loss. This process has proven expensive and typically requires lengthy negotiations.

The proposed SSHCP offers an expedited and predictable endangered species and wetland permitting process, controlled by local jurisdictions, at a reduced cost. The proposed SSHCP would allow the local jurisdictions to issue permits for up to 43,500 acres inside the urban development area (UDA) in exchange for conservation commitments within and outside the UDA.

Participation in the plan would be voluntary. The regulatory community would benefit from reduced project oversight and the protection of sensitive species.

Local Jurisdiction Permit Holders

• City of Elk Grove • City of Galt • City of Rancho Cordova • County of Sacramento • Sacramento County Water Agency • Sacramento Regional County Sanitation District

Permit Duration

• 30-year incidental take permit

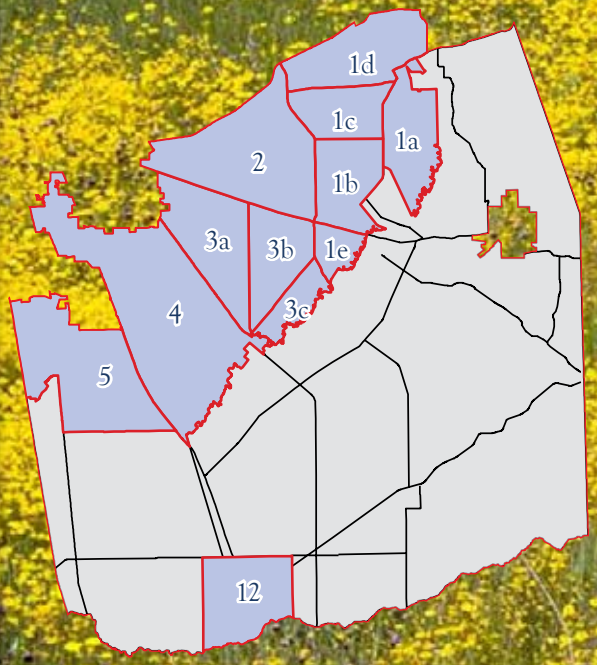
Urban Development Area (UDA)

• Covered activities will primarily be permitted inside the UDA, conservation zones 1-5 and 12. These areas correspond to locations identified for urban development by participating jurisdictions (see diagram).

Permits

• Endangered Species Act (FESA, CESA) - federal Sec. 7 & 10, state Sec. 2081.
• Clean Water Act (CWA) - federal 404, state 401.
• California Fish & Game Code - Sec. 1601 agreement.

Urban Development Area



SSHCP Covered Activities

- Development: Public and private residential, commercial, and industrial construction.
- Transportation: Planned projects by local jurisdictions.
- Water: Projects in adopted master drainage plans.
- Flood Control: Projects adopted in flood control plans.
- Sanitation: Construction, growth and maintenance of landfill, transfer, and recycling stations.
- Public Facilities: Construction of public stations/centers, hospitals, & schools.
- Recreation Facilities: Construction of recreation facilities.
- Utility Services: Construction of stations and gas/transmission lines.
- Mining: Extraction of aggregate resources and construction of roads and facilities.
- Preserve Management: Habitat restoration, creation and enhancement.

Implementation

It is anticipated that a **joint powers authority** (JPA) created from representatives of the local jurisdiction permit holders will ensure project compliance with the SSHCP and conditions of SSHCP permits. The JPA will also oversee the **implementing conservancy**; a non-profit organization established to administer day-to-day preserve operations. The conservancy's duties include acquiring land or easements, monitoring and managing preserved lands, and general administration.

Wetland Permitting

The U.S. Army Corps of Engineers (Corps) has permitting authority pursuant to Section 404 of the Clean Water Act. They are responsible for ensuring no net loss to acres and functions of waters of the U.S. In coordination with the SSHCP planning effort, the Corps is developing a general functional assessment of aquatic resources for the SSHCP plan area. Permit actions must comply with the Section 404(b)(1) Guidelines, which prohibit the Corps from issuing a permit for any project that is not the least environmentally damaging practicable alternative. The Corps is developing a streamlined permitting strategy consistent with the SSHCP conservation strategy. Key elements may include: (1) A Regional General Permit (RGP) for less complex activities with minimal adverse effects to aquatic resources, (2) a Programmatic General Permit (PGP) for projects with small to medium range of impacts, and/or (3) a Letter of Permission (LOP) process for projects with greater impacts that subscribe to the terms of the SSHCP. Non-conformance with the SSHCP will be a consideration in Corps permit decisions.

How it Works

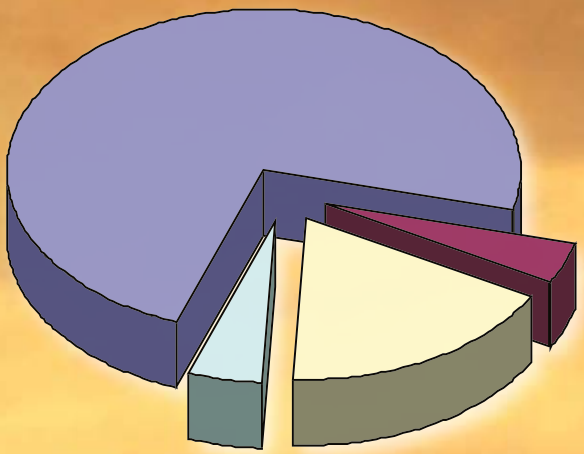
Sensitive Species & Streambed Alteration: Incidental take permits & CDFG streambed alteration agreements will be held by the local jurisdictions. Project proponents will approach the appropriate jurisdiction to identify possible impacts, mitigation needs, and requirements to participate in the SSHCP. Once a project is submitted to the local jurisdiction, participating projects will undergo environmental review and be assessed impacts & costs based on the proposed SSHCP tiered fee structure. Approved projects will be covered under the SSHCP incidental take permits in exchange for mitigation funds. The mitigation funds will be transferred to the SSHCP implementing conservancy for the acquisition of land or conservation easements, the restoration of degraded habitat, the enhancement of existing habitat, and the perpetual adaptive management of the preserves.

Covered Species (Bold indicates state or federal threatened or endangered species)

Birds • Total (18): American Peregrine Falcon, Bald Eagle, Cooper's Hawk, Ferruginous Hawk, Golden Eagle, **Greater Sandhill Crane**, Loggerhead Shrike, Long-Eared Owl, Merlin, Northern Harrier, Sharp-Shinned Hawk, Short Eared-Owl, **Swainson's Hawk**, Tricolored Blackbird, Western Burrowing Owl, White-Faced Ibis, White-Tailed Kite, & Yellow Breasted Chat.
Invertebrates • Total (5): Mid-Valley Fairy Shrimp, Ricksecker's Water Scavenger Beetle, **Valley Elderberry Longhorn Beetle**, **Vernal Pool Fairy Shrimp**, & **Vernal Pool Tadpole Shrimp**.
Plants • Total (8): Ahart's Dwarf Rush, **Boggs Lake Hedge-Hyssop**, Dwarf Downingia, Legenere, Pincushion Navarretia, **Sacramento Orcutt Grass**, Sanford's Arrowhead & **Slender Orcutt Grass**.
Mammals • Total (5): American Badger, Pallid Bat, Ringtail, Western Red Bat & Yuma Myotis Bat.
Reptiles & Amphibians • Total (4): **California Tiger Salamander**, **Giant Garter Snake**, Western Pond Turtle, & Western Spadefoot Toad.

Costs

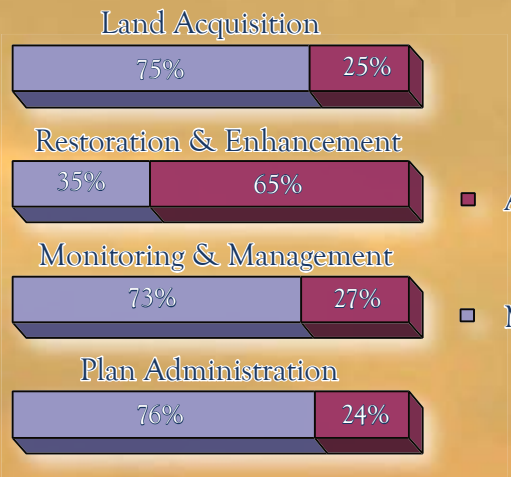
The cost of implementing the SSHCP over the 30-year life of the plan is estimated at $1.6 billion. This includes land & easement acquisition, habitat restoration & enhancements, perpetual management, and administration. The chart below depicts the relative proportion of those costs.



- Land Acquisition 73%
- Restoration & Enhancement 4%
- Monitoring & Management 18%
- Plan Administration 5%

Funding

The SSHCP seeks funding from a variety of sources. Mitigation fees from private development projects and public infrastructure projects will provide the majority of the funds. The adopted SSHCP is also eligible for state and federal grants, which will support the "above-and-beyond" conservation goals of the proposed SSHCP.



Participants

Steering Committee
The SSHCP is overseen by a Steering Committee comprised of representatives from the development, environmental, agricultural, landowner, and regulatory communities. The Steering Committee was formed at the request of the Board of Supervisors, but members do not have the authority to act on behalf of elected officials. The Committee's primary responsibility is to review work products and provide advice to local jurisdictions who are crafting the Plan document.

Biological Subcommittee
The Biological Subcommittee was formed to provide rigorous scientific review of documents. The Committee is made up of members of the Steering Committee, but includes experts in various fields.

Economic Subcommittee
Much like the Biological Subcommittee, the Economic Subcommittee was formed to address complex economic issues and help guide the Plan to make economic sense.

Technical Advisory Committee
The Technical Advisory Committee was formed early on to evaluate and establish species lists, habitat cover-types and biological goals and objectives. The members included professional scientists from relevant disciplines and Agency representatives.

Science Advisors
The SSHCP recognized early on the importance of independent scientific review of plan documents. The County chose to utilize local experts on a case by case basis as they were needed. This method proved useful as it enabled consultants and planners to seek answers to specific questions.

Public Review

The County of Sacramento strives to ensure that the public is afforded every opportunity to be part of the planning process and to provide comments and feedback as the Plan is developed. To ensure public participation every planning meeting was open to the public. The County maintains an e-mail list of interested individuals and posted draft materials on a SSHCP Web site. The County has held a number of outreach meetings for the public, has made many presentations to organizations, and met with many landowners in the plan area. Additional public outreach workshops and presentations to organizations will be conducted including outreach for preparation of the EIS/EIR as required under CEQA and NEPA. Extensive outreach will continue in the fall of 2008.

Partnerships

The SSHCP has been developed with assistance and input from countless individuals and organizations. They have provided expert opinions, time, and resources. Likewise, implementation and realization of the goals set forth within the SSHCP will necessitate continued involvement.

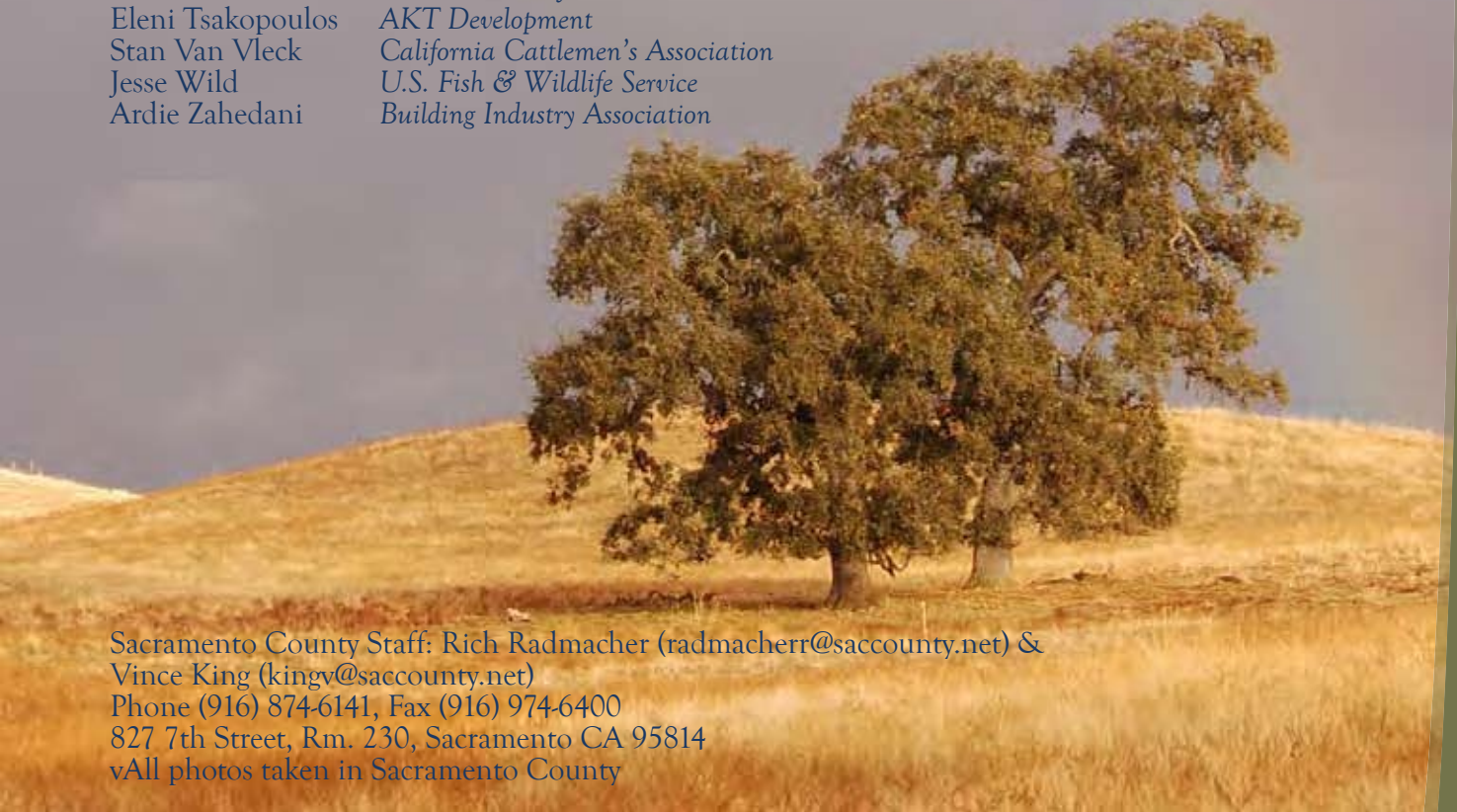
The SSHCP implementing conservancy will work cooperatively with other conservancies and organizations, such as The Nature Conservancy, The Center for Natural Lands Management, and Sacramento Valley Conservancy, to better their management practices through shared knowledge. They will also work cooperatively to help realize the preserve linkage system outlined in the SSHCP. Doing so can better ensure biologically rich preserves are established for future residents to enjoy and appreciate.

The South Sacramento Habitat Conservation Plan

- COMMUNITY DEVELOPMENT
- HABITAT PRESERVATION
- ECONOMIC VITALITY

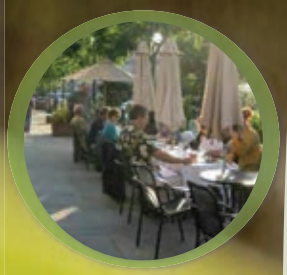
The following individuals contributed to the development of the SSHCP as participants in the SSHCP Steering Committee:

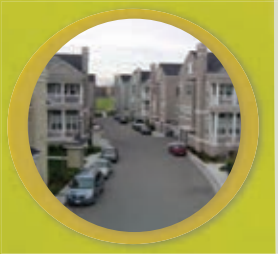
Rick Balazs	*Sacramento County Economic Development*
Eva Butler	*California Native Plant Society*
Curt Campion	*City of Galt*
Kathleen Dadey	*U.S. Army Corps of Engineers*
Mike Eaton	*The Nature Conservancy*
Christine Crawford	*City of Elk Grove*
Dan Gifford	*California Department of Fish & Game*
John Hodgson	*The Hodgson Company*
John Hopkins	*Institute for Ecological Health*
Paul Jones	*U.S. Environmental Protection Agency*
Paul Junker	*City of Rancho Cordova*
Vincent King	*Sacramento County, Planning & Community Development*
John Lane	*Teichert Construction*
Charlotte Mitchell	*Sacramento County Farm Bureau*
Leighann Moffitt	*Sacramento County, Planning & Community Development*
Steve Norris	*Sacramento Regional County Sanitation District*
Richard Radmacher	*Sacramento County, Planning & Community Development*
Bob Shattuck	*Lennar Homes*
Robert Sherry	*Sacramento County, Planning & Community Development*
Alta Tura	*Audubon Society*
Eleni Tsakopoulos	*AKT Development*
Stan Van Vleck	*California Cattlemen's Association*
Jesse Wild	*U.S. Fish & Wildlife Service*
Ardie Zahedani	*Building Industry Association*



Sacramento County Staff: Rich Radmacher (radmacherr@saccounty.net) &
Vince King (kingv@saccounty.net)
Phone (916) 874-6141, Fax (916) 974-6400
827 7th Street, Rm. 230, Sacramento CA 95814
vAll photos taken in Sacramento County

South Sacramento Habitat Conservation Plan





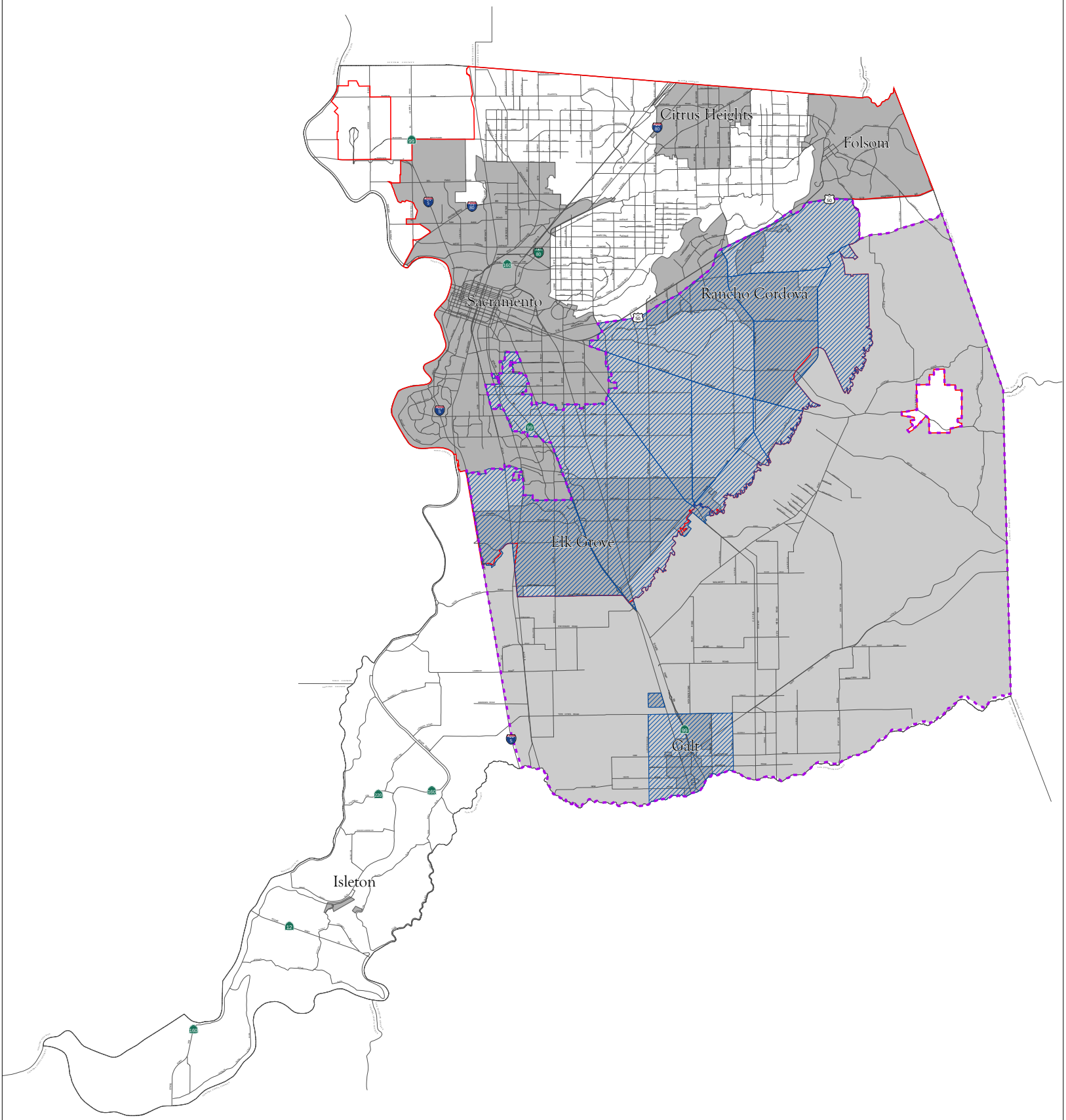
COVERED ACTIVITIES

The activities proposed for coverage in the SSHCP are wide-ranging, but are generally related to urban-suburban development on city and unincorporated lands. Approximately 43,500 acres of the existing natural habitat and agricultural land-cover in the SSHCP Urban Development Area (UDA) would be converted to a developed condition under the proposed SSHCP.

Proposed covered-activities presently include the construction, installation, extension, or removal of:

- Private and public residential, commercial, and industrial developments
- Transportation facilities
- Surface water and groundwater supply and delivery facilities
- Water and Wastewater treatment and delivery facilities
- Flood control facilities
- Sanitation facilities (landfills, transfer stations, recycling stations)
- Public facilities (fire stations, police stations, hospitals, schools, community centers, cemeteries, and administration centers)
- Outdoor and indoor recreation facilities
- Utility facilities
- Aggregate mining activities
- Conservation activities (habitat restoration, creation, and enhancement; preserve management and monitoring)

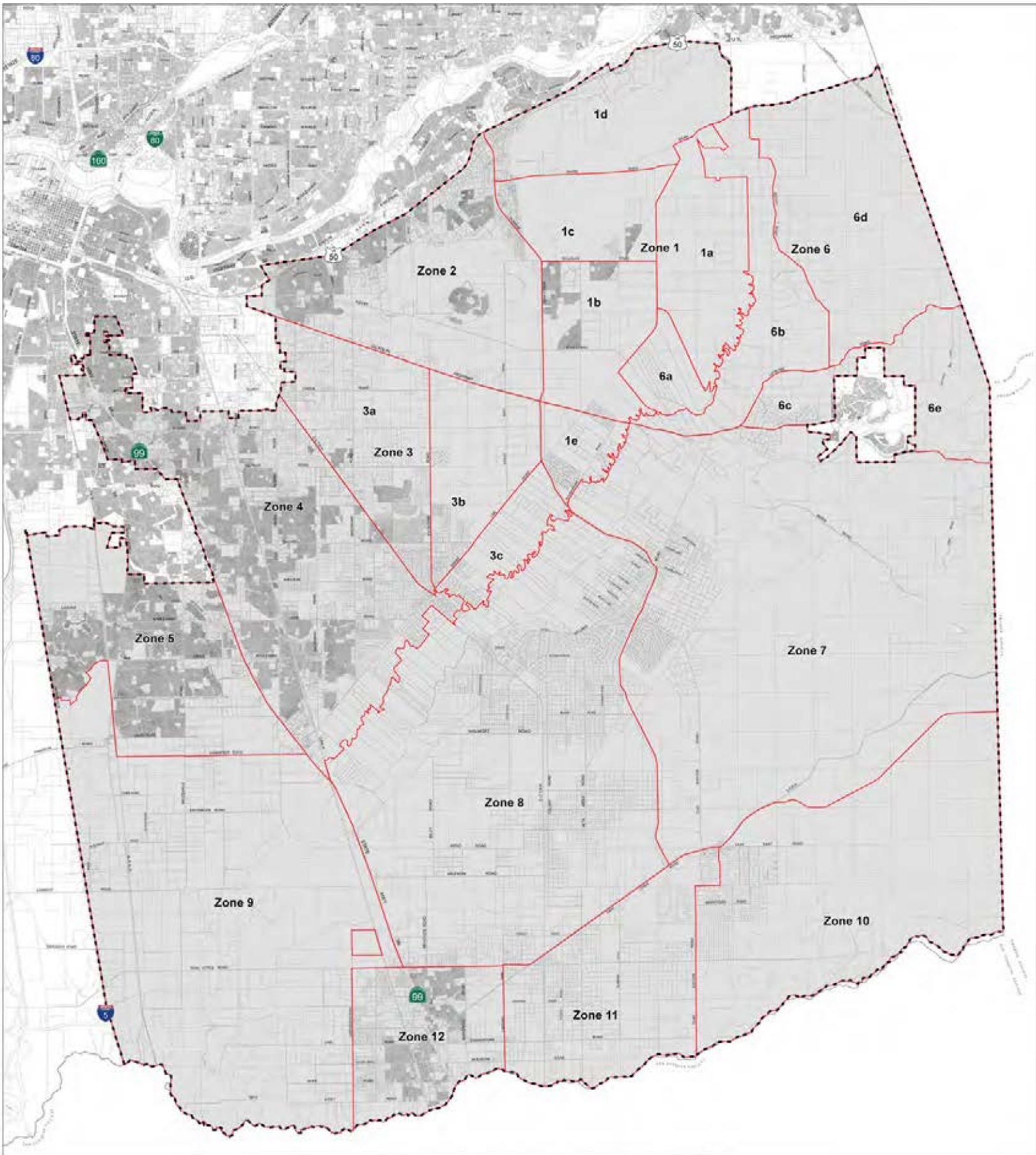
While a majority of the SSHCP Covered Activities occur inside the UDA, certain SSHCP Covered Activities will occur in the Planning Area outside of the UDA. These are limited to the specific public infrastructure improvement projects that have been approved and adopted through various transportation master plans, public infrastructure plans, and local jurisdiction General Plans. Approximately 2,000 acres of the existing natural habitat and agricultural land-cover outside the UDA would be converted to a developed condition under the proposed SSHCP.



Local Jurisdiction & South Sacramento HCP Boundaries

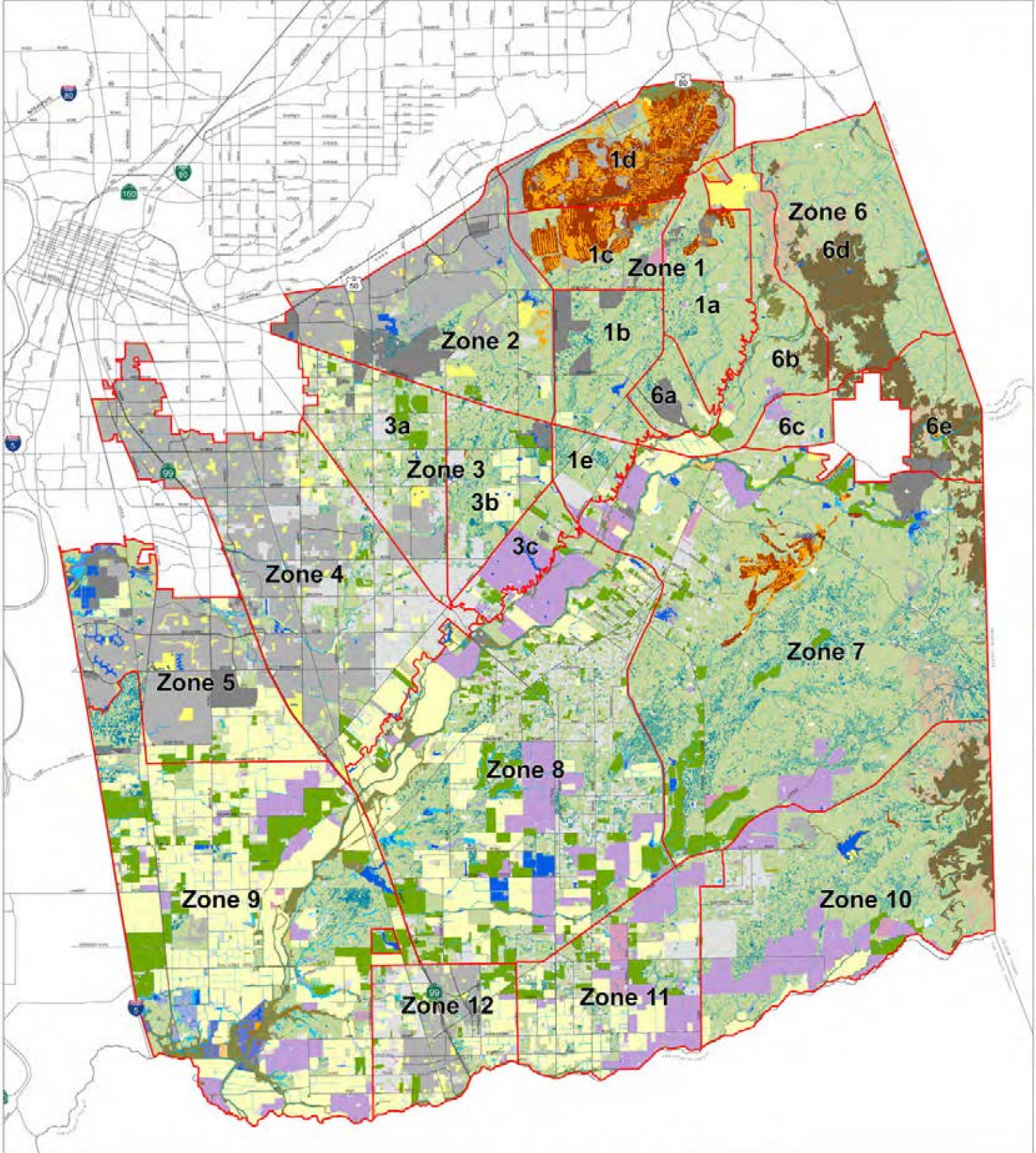
- City Jurisdiction
- County Line
- Urban Services Boundary
- SSHCP Plan Area
- SSHCP Urban Development Area (UDA)

0 2 4 8 Miles



SSHCP Conservation Zones & Parcels

PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT



South Sacramento HCP Conservation Zones & Habitat Cover-Types Map

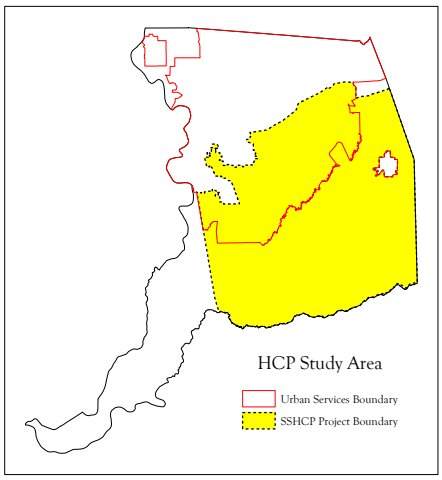
PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

Conservation Zone

Habitat Types

- Blue Oak Woodland
- Cottonwood Woodland
- Cropland
- Disturbed
- Eucalyptus Woodland
- Freshwater Marsh
- High Density Development
- Irrigated Pasture-Grassland
- Low Density Development
- Major Roads
- Mine Tailings
- Mixed Riparian Scrub
- Mixed Riparian Woodland
- Open Water
- Orchards
- Recreation/Landscaped
- Savannah
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Valley Oak Riparian Woodland
- Vernal Pool
- Valley Grassland
- Vineyards
- Wetland Restoration
- Woodland Restoration

0 1 2 4 Miles



Sacramento County Conservation/Mitigation Sites Map

PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

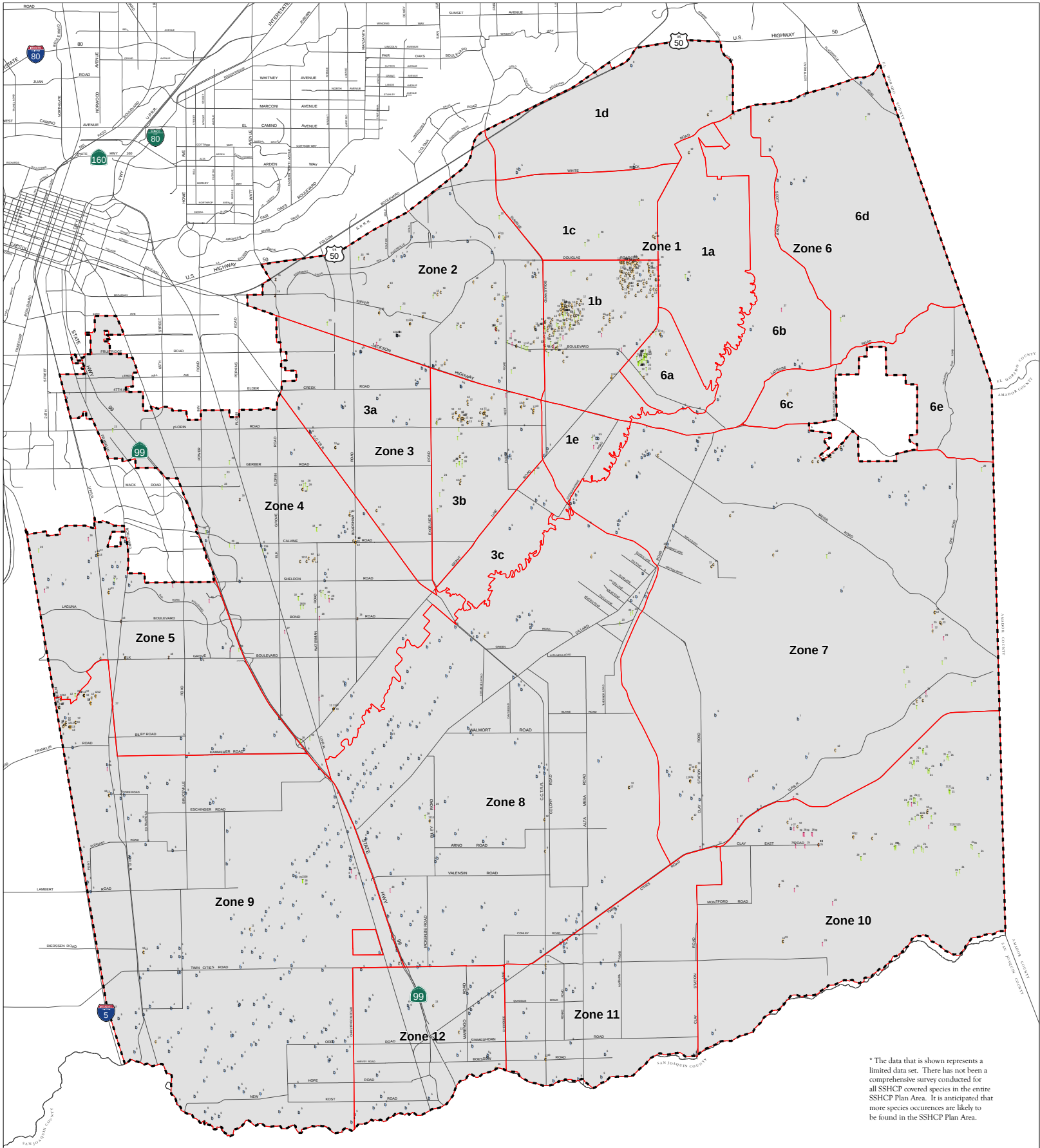
- Sacramento County Urban Services Boundary
- Sacramento County Urban Policy Area
- City Jurisdiction
- Agricultural-Residential Development
- Public, Quasi-public lands
- SSHCP Plan Area
- Stone Lakes NWR Project Boundary
- American River Parkway Boundary
- SVC Vernal Pool Prairie Preserve Project Boundary
- Dry Creek Parkway Boundary
- Protected Easement (Lands protected by a perpetual conservation or agricultural easement or deed restriction)
- Protected Fee Title (Land owned by a conservancy or government entity for purposes of habitat or agricultural protection)
- Protected Policy (Lands protected via set asides required by governmnet jurisdictions for purposes of mitigation)
- Mitigation Bank (Lands within a mitigation bank that have credits remaining to be sold)

0 2 4 8 Miles

South Sacramento Habitat Conservation Plan

COVERED SPECIES

	Blue Oak Woodland	Cottonwood Woodland	Cropland	Eucalyptus Woodland	Freshwater Marsh	Irrigated Pasture	Mixed Riparian Scrub	Mixed Riparian Woodland	Open Water	Orchards	Savannah	Seasonal Impoundment	Seasonal Wetlands	Streams	Swale	Valley Grassland	Valley Oak Riparian	Vernal Pool	Vineyards
American Badger											X					X			
Pallid Bat	X	X	X	X	X	X	X	X	X		X		X	X		X	X		
Ringtail								X									X		
Western Red Bat	X	X					X	X									X		
Yuma Myotis Bat	X	X			X		X	X	X		X		X	X		X	X		
American Peregrine Falcon					X	X			X				X			X			
Bald Eagle									X				X			X			
Cooper's Hawk	X	X					X	X									X		
Ferruginous Hawk			X		X		X				X		X			X			
Golden Eagle	X					X					X					X			
Greater Sandhill Crane			X			X							X			X			
Loggerhead Shrike			X			X	X				X					X			
Long-Eared Owl	X	X					X	X									X		
Merlin	X	X	X		X	X			X		X		X			X		X	
Northern Harrier			X		X	X					X		X		X	X			
Sharp-Shinned Hawk	X	X		X			X	X		X							X		
Short-Eared Owl			X		X	X					X		X			X			
Swainson's Hawk	X	X	X	X		X	X	X			X		X		X	X	X	X	
Tricolored Blackbird	X		X		X	X					X		X		X	X		X	
Western Burrowing Owl			X			X					X					X			
White-Faced Ibis			X		X	X	X						X						
White-tailed Kite	X	X	X		X	X	X	X			X		X			X	X		
Yellow Breasted Chat		X					X	X									X		
Giant Garter Snake					X									X		X			
Northwestern Pond Turtle					X									X		X			
Southwestern Pond Turtle					X									X		X			
California Tiger Salamander											X	X				X		X	
Western Spadefoot											X	X				X		X	
Mid-Valley Fairy Shrimp																		X	
Rickseckers Water Scavenger Beetle																		X	
Valley Elderberry Longhorn Beetle		X					X	X									X		
Vernal Pool Fairy Shrimp																		X	
Vernal Pool Tadpole Shrimp																		X	
Ahart's Dwarf Rush																		X	
Boggs Lake Hedge-Hyssop																		X	
Dwarf Downingia																		X	
Legenere																		X	
Pincushion Navarretia																		X	
Sacramento Orcutt Grass																		X	
Slender Orcutt Grass																		X	



SSHCP Covered Species Distribution*

SSHCP Study Area

SSHCP Conservation Zones

SSHCP Covered Species

BIRDS

- b 1 - COOPER'S HAWK
- b 2 - FERRUGINOUS HAWK
- b 3 - GOLDEN EAGLE
- b 4 - SANDHILL CRANE
- b 5 - SWAINSON'S HAWK
- b 6 - TRICOLORED BLACKBIRD
- b 7 - WESTERN BURROWING OWL
- b 8 - WHITE-TAILED KITE

INVERTEBRATES

- c 9 - MID-VALLEY FAIRY SHRIMP
- c 10 - RICKSECKER'S WATER SCAVENGER BEETLE
- c 11 - VALLEY ELDERBERRY LONGHORN BEETLE
- c 12 - VERNAL POOL FAIRY SHRIMP
- c 13 - VERNAL POOL TADPOLE SHRIMP

MAMMALS

- z 14 - AMERICAN BADGER
- z 15 - WESTERN RED BAT
- z 16 - YUMA MYOTIS

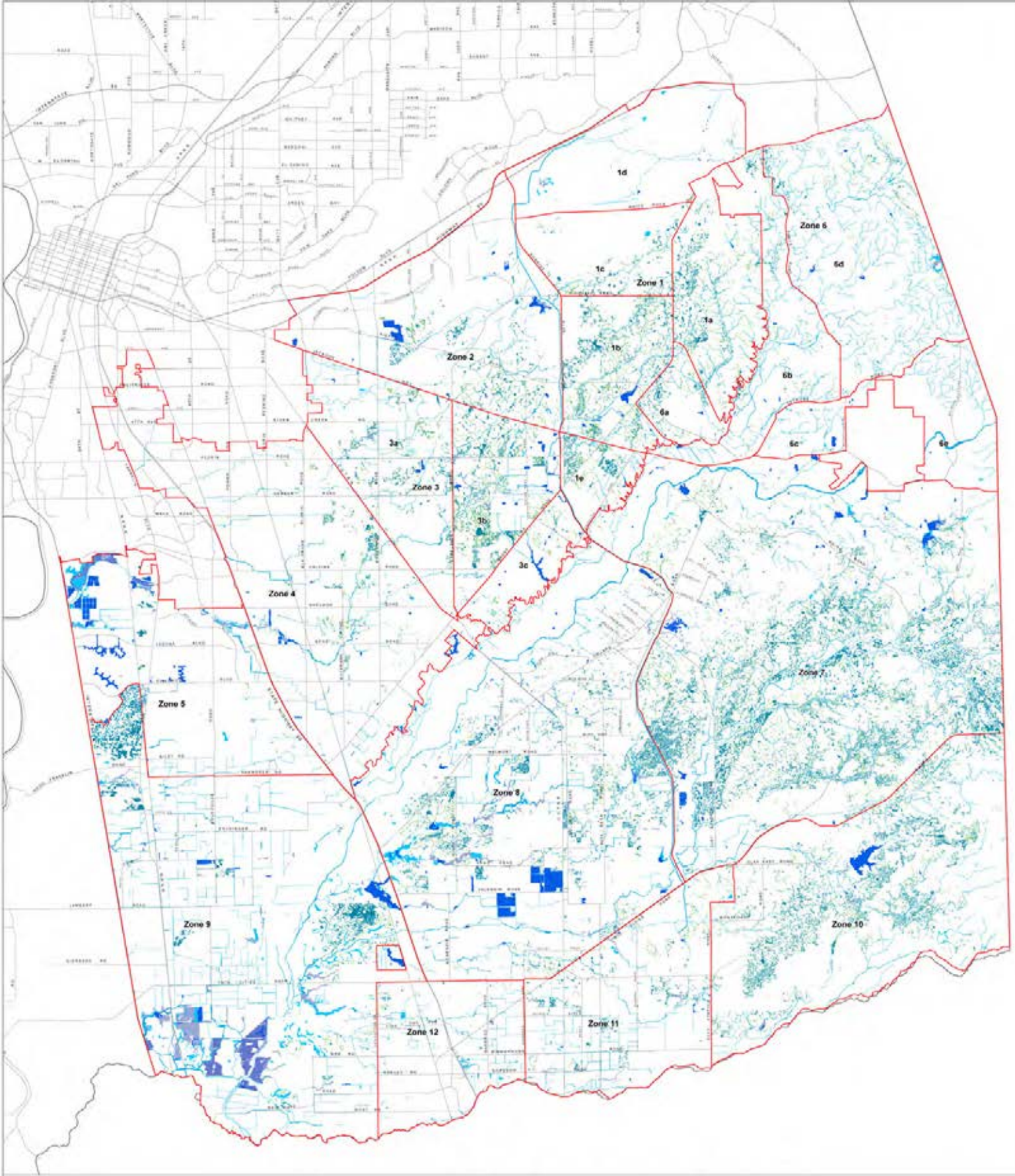
PLANTS

- † 17 - AHART'S DWARF RUSH
- † 18 - BOGG'S LAKE HEDGE-HYSSOP
- † 19 - DWARF DOWNINGIA
- † 20 - LEGENERE
- † 21 - PINCUSHION NAVARRETIA
- † 22 - SACRAMENTO ORCUTT GRASS
- † 23 - SANFORD'S ARROWHEAD
- † 24 - SLENDER ORCUTT GRASS

REPTILES/AMPHIBIANS

- † 25 - CALIFORNIA TIGER SALAMANDER
- † 26 - GIANT GARTER SNAKE
- † 27 - NORTHWESTERN POND TURTLE
- † 28 - WESTERN POND TURTLE
- † 29 - WESTERN SPADEFOOT TOAD

0 1 2 4 Miles



South Sacramento HCP Conservation Zones & Wetland Cover-Types Map

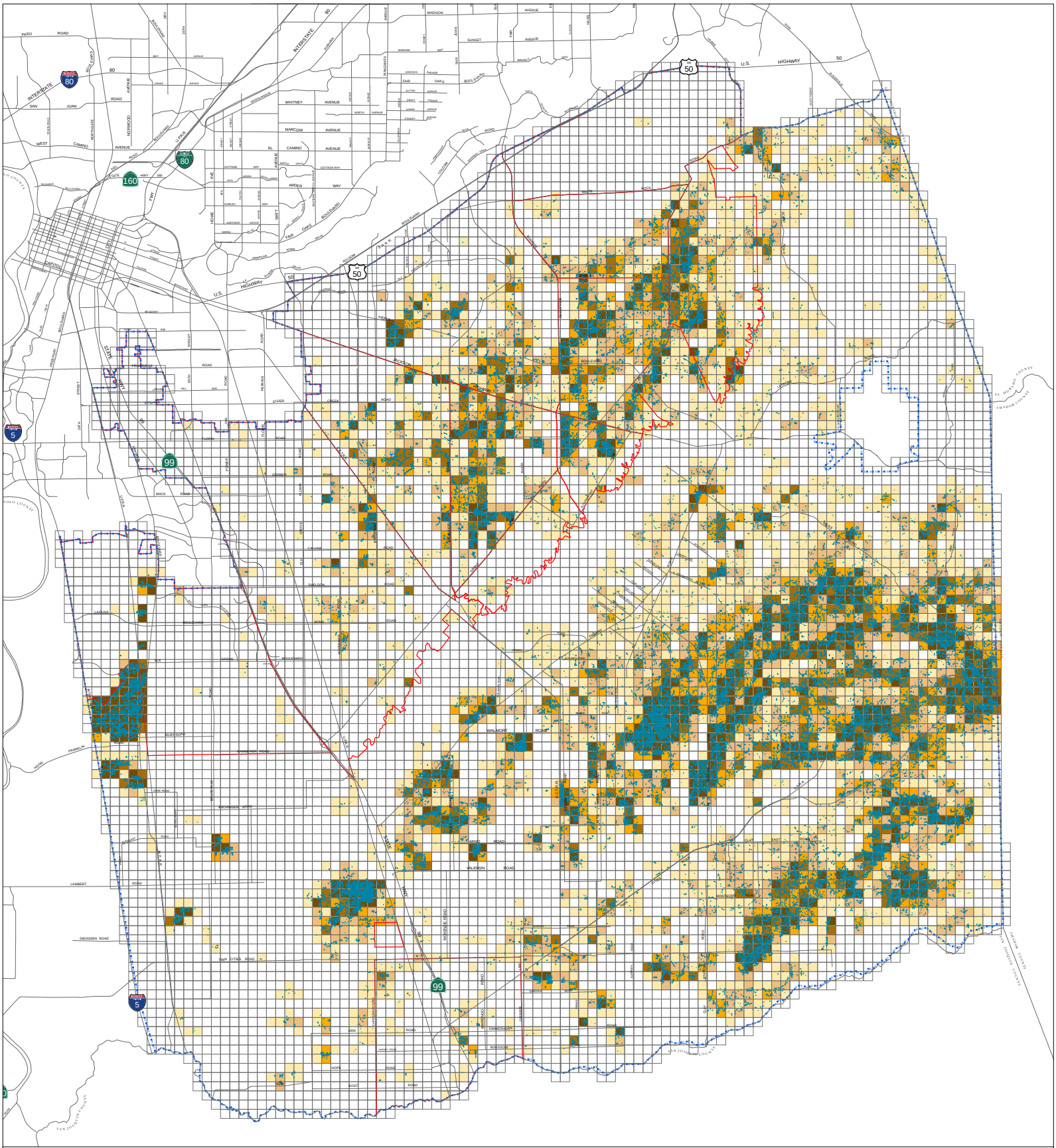
PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

Conservation Zone

Habitat Types

- Freshwater Marsh
- Open Water
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Vernal Pool
- Wetland Restoration

0 1 2 4 Miles



SSHCP Vernal Pool Wet-Acres Density Index Map (WADI)

SSHCP Study Area

SSHCP Urban Development Area

Vernal Pool

Category 1 (A5, B5, C5, D4, D5, E1, E2, E3, E4, & E5)

Category 2 (A4, B4, C4, D1, D2 & D3)

Category 3 (A3, B3, C1, C2 & C3)

Category 4 (A2, B1, & B2)

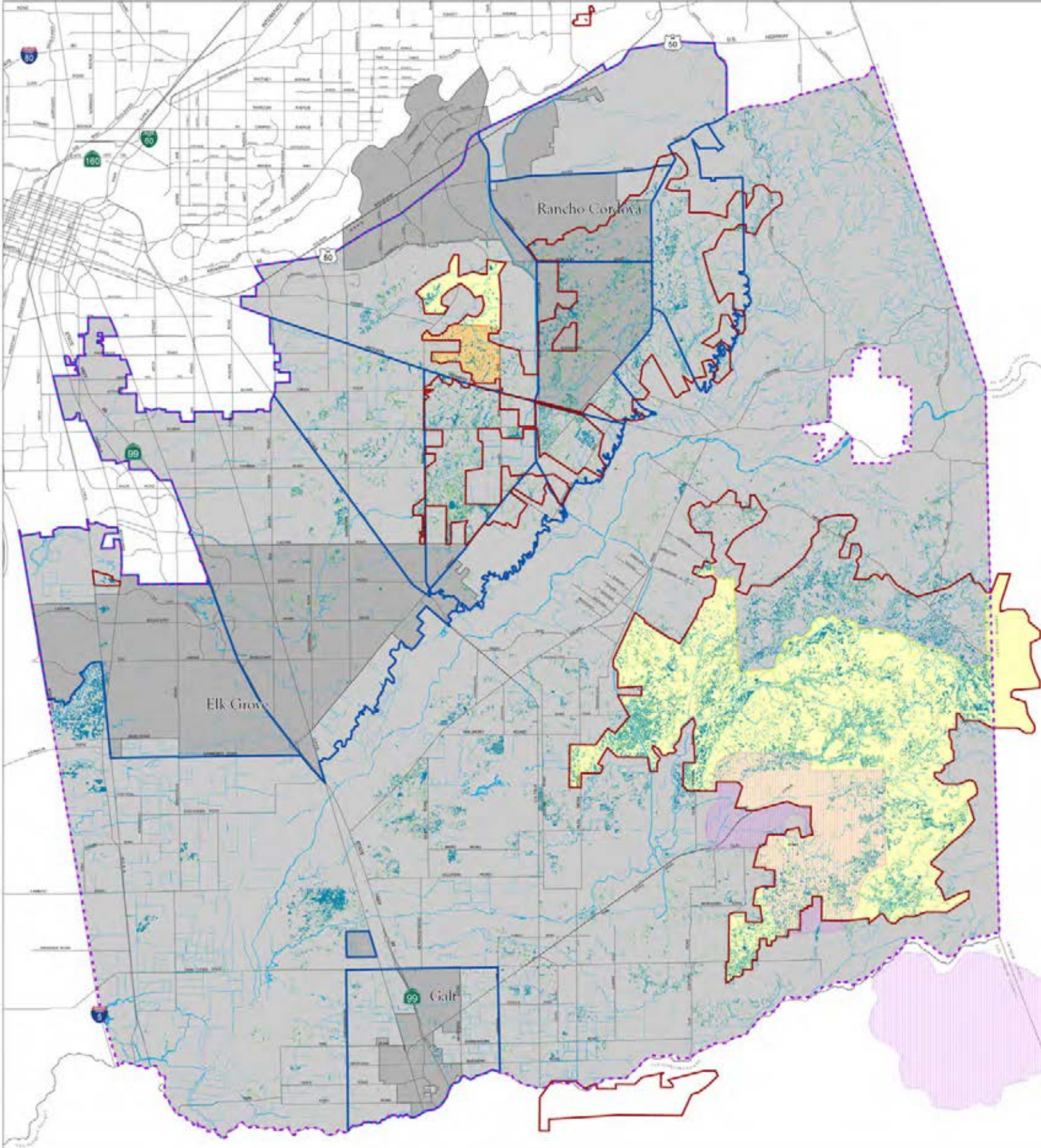
Category 5 (A1)

1 0.5 0 1 2

Scale in Miles

PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

July 7, 2008P:\Shared Folders\Planning GIS\Open Space Team\SSHCP\WADI Revised\WADI_06-11-08.mxd



South Sacramento HCP Boundaries & USFWS Species Recovery Units & Critical Habitat

- City Jurisdiction
- SSHCP Plan Area
- SSHCP Urban Development Area (UDA)
- Streams/Creeks
- Swale
- Vernal Pool
- Vernal Pool Recovery Unit

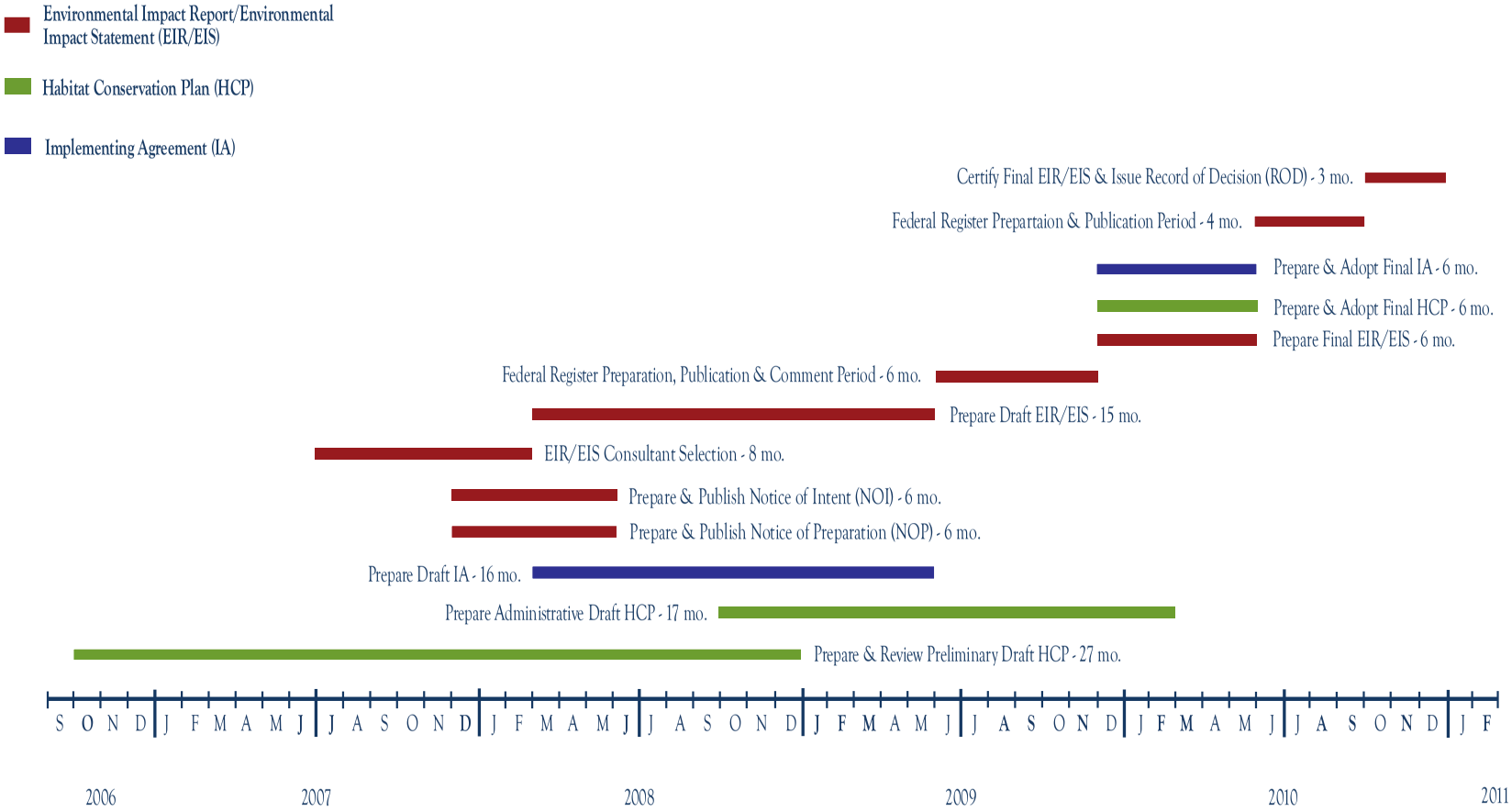
Critical Habitat Areas

- Sacramento & Slender Orcutt Grass
- California Tiger Salamander
- Vernal Pool Fairy & Tadpole Shrimp

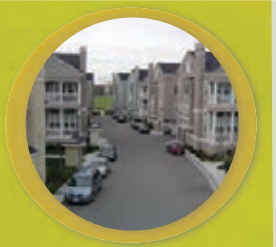
PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

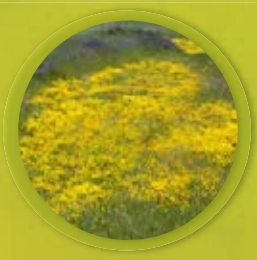
South Sacramento Habitat Conservation Plan

SSHCP TIMELINE



South Sacramento Habitat Conservation Plan





Public Comment Opportunities During the Preparation of the EIR/EIS

Notice of Preparation and *Notice of Intent* Released

Provide Written Comments

June 10 – July 30, 2008

Provide Comments at Scoping Meetings

July 8, 2008 Galt
July 11, 2008 Sacramento
July 15, 2008 Rancho Cordova
July 16, 2008 Elk Grove

Provide Comments at Community Workshops

Locations and Dates to be determined

August 2008

County and Service write the Draft EIR/EIS

- ✓ Consider Public Comments
- ✓ Compare Alternatives
- ✓ Analyze Substantive Effects
- ✓ Evaluate Mitigation Measures

Summer 2008-Summer 2009

Draft EIR/EIS

Provide Comments During the 60-day Public Comment Period

Summer 2009

Provide Comments at Meetings and Public Hearing on the Draft EIR/EIS

Summer 2009

County and Service write the Final EIR/EIS

- ✓ Respond to Substantive Comments
- ✓ Revise Text Based on Comments

Summer 2009-Summer 2010

Final EIR/EIS

Provide Comments During the 30-day Review Period

Summer 2010

Agency Decisions

- ✓ Consider any Public Comments
- ✓ County prepares Findings
- ✓ Service prepares Record of Decision

Fall/Winter 2010

GREEN indicates opportunities to provide input

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 1	Specific Requirements	**1a**	Establish a Core preserve at least 1,000 acres in size that incorporates 60 vernal pool acres, 2 occurrences of Sacramento Orcutt Grass at least 300' from the preserve edge and is no less than 1,500' wide at any given point	1
			Establish two landscape linkages at least 1,000' wide: one to Zone 1b and one to Zone 6a.	1,41,43
			Preserve 80 Vernal Pool Ac on Surficial Alluvial Deposits, Laguna & Mehrten Formations (60 Ac must occur on category 1 or 2 LAU)	1
			Preserve 1,500 Valley Grassland Ac	1
		1b	Establish a Minor preserve at least 750 acres in size that incorporates one occurrence of Western Spadefoot Toad 300' from the preserve edge	2
			Establish two landscape linkages; one to Zone 1e and one to Zone 6a	2
			Preserve 54 Vernal Pool Ac on Surficial Alluvial Deposits, Laguna & Riverbank Formations (44 Ac must occur on category 1 or 2 LAU)	2
		1c	Establish a Satellite preserve that incorporates an occurrence of Slender Orcutt Grass at least 300' from the preserve edge	3
			Preserve 2 Vernal Pool Ac	3
			Preserve 140 Valley Grassland Ac	3
		1d	(none)	
		1e	Establish a Minor preserve at least 466 acres in size that is no less than 2,000' wide at any given point	4
			Establish two landscape linkages at least 700' wide; one to Zone 1b and one to Zone 3b	4
			Preserve 23 Vernal Pool Ac on Laguna & Riverbank Formations (15 Ac must occur on category 1 LAU and 5 Ac must occur on category 1 or 2 LAU)	4
			Preserve 443 Valley Grassland Ac	4
	Shared Requirements	**1**,2,3,4,5,12	Preserve 10 Vernal Pool, 50 Freshwater Marsh, 60 Open Water, 38 Seasonal Impoundment, 8 Seasonal Wetland, 10 Mixed Riparian Scrub, 300 Mixed Riparian Woodland, and 11 Valley Oak Riparian Woodland acres	7,13,14
		1a,**1b**,**1c**,**1e**,2,3b,12	Preserve 161 Swale acres	13
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		1c,**1d**	Preserve 250 Cottonwood Woodland acres	14
		1,3,4,5	Preserve a 600' wide corridor along undeveloped portions of North Laguna Creek	24
		1,2,3,4,5,12	Preserve a 100' wide corridor along undeveloped portions of all remaining Creeks, tributaries and significant swale systems	26
		1c,3b	Preserve all known occurrences of Sacramento and Slender Orcutt Grasses	67
		1,2,3	Preserve six (6) Western Burrowing Owl nesting colonies (at least one in each zone and within 3 miles of 6,000 acres of suitable foraging habitat)	64
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		1,2,3	Restore or Create 12.7 Vernal Pool acres	30
		1,2,3,4,5,6,7,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,7,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		1,2,3,4,5,6,7,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1a,2,3b,7,8,10	Incorporate/establish 2 Western Burrowing Owl nesting areas in all core and landscape preserves and create at least 20 burrows per area	62
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 2	Specific Requirements	**2**	Establish a Core preserve at least 1,040 acres in size that incorporates 40 vernal pool acres, and 1,000 valley grassland acres	5
			Establish one landscape linkages at least 1000' wide to Zone 3b	5
			Preserve 40 Vernal Pool Ac on Surficial Alluvial Deposits, Laguna & Modesto Formations (17 Ac must occur on category 1 or 2 LAU)	5,42
			Preserve 1,000 Valley Grassland Ac	5
	Shared Requirements	1,**2**,3,4,5,12	Preserve 10 Vernal Pool, 50 Freshwater Marsh, 60 Open Water, 38 Seasonal Impoundment, 8 Seasonal Wetland, 10 Mixed Riparian Scrub, 300 Mixed Riparian Woodland, and 11 Valley Oak Riparian Woodland acres	7,13,14
		1a,1b,1c,1e,**2**,3b,12	Preserve 161 Swale acres	13
		1,**2**,3,4,5,6,7,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,**2**,3,4,5,6,7,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		2,3,4	Preserve a 300' wide corridor along undeveloped portions of Elder and Morrison Creeks	25
		1,**2**,3,4,5,12	Preserve a 100' wide corridor along undeveloped portions of all remaining Creeks, tributaries and significant swale systems	26
		1,**2**,3	Preserve six (6) Western Burrowing Owl nesting colonies (at least one in each zone and within 3 miles of 6,000 acres of suitable foraging habitat)	64
		1,**2**,3,4,5,6,7,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,**2**,3,4,5,6,7,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		1,**2**,3	Restore or Create 12.7 Vernal Pool acres	30
		1,**2**,3,4,5,6,7,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,**2**,3,4,5,6,7,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		1,**2**,3,4,5,6,7,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1a,**2**,3b,7,8,10	Incorporate/establish 2 Western Burrowing Owl nesting areas in all core and landscape preserves and create at least 20 burrows per area	62
		1,**2**,3,4,5,6,7,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,**2**,3,4,5,6,7,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,**2**,3,4,5,6,7,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,**2**,3,4,5,6,7,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,**2**,3,4,5,6,7,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 3	Specific Requirements	**3a**	(none)	
		3b	Establish a Core preserve at least 3,000 acres in size that incorporates one occurrence of Slender Orcutt Grass 300' from the preserve edge that is no less than 2,500' wide at any given point.	6
			Establish two landscape linkages; one to Zone 1e that is at least 600' wide and one to Zone 2 that is at least 1,000' wide	6
			Preserve 45 Vernal Pool Ac on Laguna, Riverbank, and Turlock Formations (30 Ac must occur on category 1 or 2 LAU)	6
			Preserve 300 Cropland and/or Irrigated Pasture-Grassland in fee title that incorporates known Tri-colored Blackbird colonies	21
		3c	Establish a landscape linkage that is at least 1,000' wide connecting Zone 3b to Zone 8.	44
	Shared Requirements	1,2,**3**,4,5,12	Preserve 10 Vernal Pool, 50 Freshwater Marsh, 60 Open Water, 38 Seasonal Impoundment, 8 Seasonal Wetland, 10 Mixed Riparian Scrub, 300 Mixed Riparian Woodland, and 11 Valley Oak Riparian Woodland acres	7,13,14
		1a,1b,1c,1e,2,**3b**,12	Preserve 161 Swale acres	13
		1,2,**3**,4,5,6,7,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,**3**,4,5,6,7,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		1,**3**,4,5	Preserve a 600' wide corridor along undeveloped portions of North Laguna Creek	24
		2,**3**,4	Preserve a 300' wide corridor along undeveloped portions of Elder, Gerber and Morrison Creeks	25
		1,2,**3**,4,5,12	Preserve a 100' wide corridor along undeveloped portions of all remaining Creeks, tributaries and significant swale systems	26
		1c,**3b**	Preserve all known occurrences of Sacramento and Slender Orcutt Grasses	67
		1,2,**3**	Preserve six (6) Western Burrowing Owl nesting colonies (at least one in each zone and within 3 miles of 6,000 acres of suitable foraging habitat)	64
		3a,**3b**,6b,6e,7,8	Preserve six (6) Tricolored Blackbird nesting colonies (colonies shall be within 3 miles of 6,000 acres of suitable foraging habitat)	65
		1,**2**,3,4,5,6,7,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,**2**,3,4,5,6,7,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		1,2,**3**	Restore or Create 12.7 Vernal Pool acres	30
		1,2,**3**,4,5,6,7,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,**3**,4,5,6,7,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,7,8,9,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		1,2,**3**,4,5,6,7,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		3,4,5,6,7,8,9,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3,4,5,7,8,9	Restore Valley Elderberry Longhorn Beetle habitat in conjunction with native vegetation along portions of Deer, S. Laguna & N. Laguna Creeks, and the Cosumnes River	49,50,51,52
		3b,6,7,8,9,11	Incorporate/establish 20 Himalayan blackberry sites for Tricolored Blackbird nesting sites within new and existing preserves	61
		1a,2,**3b**,7,8,10	Incorporate/establish 2 Western Burrowing Owl nesting areas in all core and landscape preserves and create at least 20 burrows per area	62
		1,2,**3**,4,5,6,7,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,**3**,4,5,6,7,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,**3**,4,5,6,7,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,**3**,4,5,6,7,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,**3**,4,5,6,7,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 4	Specific Requirements	**4**	(none)	
	Shared Requirements	1,2,3,**4**,5,12	Preserve 10 Vernal Pool, 50 Freshwater Marsh, 60 Open Water, 38 Seasonal Impoundment, 8 Seasonal Wetland, 10 Mixed Riparian Scrub, 300 Mixed Riparian Woodland, and 11 Valley Oak Riparian Woodland acres	7,13,14
		1,2,3,**4**,5,6,7,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,**4**,5,6,7,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		1,3,**4**,5	Preserve a 600' wide corridor along undeveloped portions of North Laguna Creek	24
		2,3,**4**	Preserve a 300' wide corridor along undeveloped portions of Elder and Gerber Creeks	25
		1,2,3,**4**,5,12	Preserve a 100' wide corridor along undeveloped portions of all remaining Creeks, tributaries and significant swale systems	26
		1,2,3,**4**,5,6,7,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,**4**,5,6,7,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		1,2,3,**4**,5,6,7,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,**4**,5,6,7,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,**4**,5,6,7,8,9,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		1,2,3,**4**,5,6,7,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		3,**4**,5,6,7,8,9,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3,**4**,5,7,8,9	Restore Valley Elderberry Longhorn Beetle habitat in conjunction with native vegetation along portions of Deer, S. Laguna & N. Laguna Creeks, and the Cosumnes River	49,50,51,52
		1,2,3,**4**,5,6,7,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,**4**,5,6,7,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,**4**,5,6,7,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,**4**,5,6,7,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,**4**,5,6,7,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 5	Specific Requirements	**5**	(none)	
	Shared Requirements	1,2,3,4,**5**,12	Preserve 10 Vernal Pool, 50 Freshwater Marsh, 60 Open Water, 38 Seasonal Impoundment, 8 Seasonal Wetland, 10 Mixed Riparian Scrub, 300 Mixed Riparian Woodland, and 11 Valley Oak Riparian Woodland acres	7,13,14
		1,2,3,4,**5**,6,7,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,**5**,6,7,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		1,3,4,**5**	Preserve a 600' wide corridor along undeveloped portions of North Laguna Creek	24
		1,2,3,4,**5**,12	Preserve a 100' wide corridor along undeveloped portions of all remaining Creeks, tributaries and significant swale systems	26
		1,2,3,4,**5**,6,7,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,**5**,6,7,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		1,2,3,4,**5**,6,7,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,**5**,6,7,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,**5**,6,7,8,9,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		1,2,3,4,**5**,6,7,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		3,4,**5**,6,7,8,9,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3,4,**5**,7,8,9	Restore Valley Elderberry Longhorn Beetle habitat in conjunction with native vegetation along portions of Deer, S. Laguna & N. Laguna Creeks, and the Cosumnes River	49,50,51,52
		1,2,3,4,**5**,6,7,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,**5**,6,7,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,**5**,6,7,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,**5**,6,7,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,**5**,6,7,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 6	Specific Requirements	**6a**	Establish a Minor preserve at least 400 acres in size that is no less than 1,000' wide at any given point.	8
			Establish two landscape linkages that are at least 1,000' wide; one to Zone 1a and one to Zone 1b	8
			Preserve 10 Vernal Pool Ac on Laguna Formation (10 Ac must occur on category 1, 2, or 3 LAU)	8
		6b	(none)	
		6c	(none)	
		6d	(none)	
		6e	(none)	
		6f	Establish a landscape linkage that is at least 2,640' wide to Zone 7	45
	Shared Requirements	**6**,7,8,9,10,11	Preserve 191 Freshwater Marsh, 182 Open Water, 187 Seasonal Impoundment, 135 Seasonal Wetland, 95 Mixed Riparian Scrub, and 663 Mixed Riparian Woodland acres	13,14
		6a,7,8,9,10,11	Preserve 207 Swale acres	13
		1,2,3,4,5,**6**,7,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,**6**,7,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		6b,**6e**,**6f**	Preserve 48 Blue Oak Woodland acres	15
		6,7,8,9,10,11,12	Preserve 141 linear miles of Stream channel within a habitat corridor (800' wide, 2,000' wide along the Cosumnes R.)	21,22,23,63
		6b,**6e**,**6f**,7	Preserve 2,500 Blue Oak Woodland and 1,500 Savannah acres beyond compensatory mitigation	27
		6,7,8,9,10,11	Preserve 6,500 Valley Grassland acres beyond compensatory mitigation	26
		3a,3b,**6b**,**6e**,7,8	Preserve six (6) Tricolored Blackbird nesting colonies (colonies shall be within 3 miles of 6,000 acres of suitable foraging habitat)	65
		1,2,3,4,5,**6**,7,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,**6**,7,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		1,2,3,4,5,**6**,7,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,**6**,7,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,**6**,7,8,9,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		1,2,3,4,5,**6**,7,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		6b,**6e**,**6f**	Restore 48 Blue Oak Woodland acres	37
		3,4,5,**6**,7,8,9,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		6,7,8,9,10	Incorporate clusters of native shrubs in 20 locations and up to 1,000 hunting perches (100 perches/20Ac) within new and existing preserves for Loggerhead Shrike	59,60
		3b,**6**,7,8,9,11	Incorporate/establish 20 Himalayan blackberry sites for Tricolored Blackbird nesting sites within new and existing preserves	61
		1,2,3,4,5,**6**,7,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,**6**,7,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,**6**,7,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,**6**,7,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,**6**,7,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 7	Specific Requirements	**7**	Establish a Landscape preserve at least 10,242 acres in size that is no less than 2,500' wide at any given point.	9
			Establish two landscape linkages that are at least 1,000' wide; one to Zone 8 (between Wilton & Alta Mesa) and one to Zone 10	9,46
			Preserve 242 Vernal Pool Ac (242 Ac must occur on category 1 or 2 LAU)	9
			Preserve 10,000 valley grassland acres	9
			Preserve a minimum of 200 Cropland Ac in fee title to be maintained in for Alfalfa production (1 plot - 200 Ac/plot)	18,55
	Shared Requirements	6,**7**,8,9,10,11	Preserve 191 Freshwater Marsh, 182 Open Water, 187 Seasonal Impoundment, 135 Seasonal Wetland, 95 Mixed Riparian Scrub, and 663 Mixed Riparian Woodland acres	13,14
		6a,**7**,8,9,10,11	Preserve 207 Swale acres	13
		7,10	Preserve 81 Seasonal Impoundment acres	13
		1,2,3,4,5,6,**7**,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,**7**,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		7,8,9,10,11	Preserve 4,571 Cropland and/or Irrigated Pasture Ac	17
		7,8,9	Preserve 30 Valley Oak Riparian Woodland acres	14
		6,**7**,8,9,10,11,12	Preserve 196 linear miles of Stream channel within a corridor (800' wide, 2,000' wide along the Cosumnes R.) ensuring that 55 linear miles is preserved to support Giant Garter Snake	21,22,23,63
		6b,6e,6f,**7**	Preserve 2,500 Blue Oak Woodland and 1,500 Savannah acres beyond compensatory mitigation	27
		6,**7**,8,9,10,11	Preserve 6,500 Valley Grassland acres beyond compensatory mitigation	26
		7,8,9,10,11	Preserve 2,000 Cropland acres beyond compensatory mitigation	29
		3a,3b,6b,6e,**7**,8	Preserve six (6) Tricolored Blackbird nesting colonies (colonies shall be within 3 miles of 6,000 acres of suitable foraging habitat)	65
		1,2,3,4,5,6,**7**,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,**7**,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		7,8,9,10,11	Restore or Create 241.3 Vernal Pool and 184 Swale acres	31
		1,2,3,4,5,6,**7**,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,**7**,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,**7**,8,9,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		1,2,3,4,5,6,**7**,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1,2,3,4,5,6,**7**,8,9,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3,4,5,**7**,8,9	Restore Valley Elderberry Longhorn Beetle habitat in conjunction with native vegetation along portions of Deer, S. Laguna & N. Laguna Creeks, and the Cosumnes River	49,50,51,52
		6,**7**,8,9,10	Incorporate clusters of native shrubs in 20 locations and up to 1,000 hunting perches (100 perches/20Ac) within new and existing preserves for Loggerhead Shrike	59,60
		3b,6,**7**,8,9,11	Incorporate/establish 20 Himalayan blackberry sites for Tricolored Blackbird nesting sites within new and existing preserves	61
		1a,2,3b,**7**,8,10	Incorporate/establish 2 Western Burrowing Owl nesting areas in all core and landscape preserves and create at least 20 burrows per area	62
		1,2,3,4,5,6,**7**,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,**7**,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,**7**,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,**7**,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,**7**,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 8	Specific Requirements	**8**	Establish a Core preserve at least 1,500 acres in size that is no less than 2,500' wide at any given point.	10
			Establish two landscape linkages that are at least 1,000' wide; one to Zone 3b and one to Zone 7	10
			Preserve 79 Vernal Pool Ac on Laguna and Riverbank formations (55 Ac must occur on category 1 or 2 LAU)	10
			Preserve 2,500 valley grassland acres	10
			Preserve 1,000 Cropland and/or Irrigated Pasture Ac	17
			Preserve a minimum of 1,000 Cropland Ac in fee title to be maintained in for Alfalfa production (5 plots - 200 Ac/plot: 3 north and 2 south of Dillard Rd.)	18,55
	Shared Requirements	6,7,**8**,9,10,11	Preserve 191 Freshwater Marsh, 182 Open Water, 187 Seasonal Impoundment, 135 Seasonal Wetland, 95 Mixed Riparian Scrub, and 663 Mixed Riparian Woodland acres	13,14
		6a,7,**8**,9,10,11	Preserve 207 Swale acres	13
		1,2,3,4,5,6,7,**8**,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,7,**8**,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		7,**8**,9,10,11	Preserve 4,571 Cropland and/or Irrigated Pasture Ac	17
		7,**8**,9	Preserve 30 Valley Oak Riparian Woodland acres	14
		6,7,**8**,9,10,11,12	Preserve 196 linear miles of Stream channel within a corridor (800' wide, 2,000' wide along the Cosumnes R.) ensuring that 55 linear miles is preserved to support Giant Garter Snake	21,22,23,63
		6,7,**8**,9,10,11	Preserve 6,500 Valley Grassland acres beyond compensatory mitigation	26
		7,**8**,9,10,11	Preserve 2,000 Cropland acres beyond compensatory mitigation	29
		3a,3b,6b,6e,7,**8**	Preserve six (6) Tricolored Blackbird nesting colonies (colonies shall be within 3 miles of 6,000 acres of suitable foraging habitat)	65
		1,2,3,4,5,6,7,**8**,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,7,**8**,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		7,**8**,9,10,11	Restore or Create 241.3 Vernal Pool and 184 Swale acres	31
		1,2,3,4,5,6,7,**8**,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,7,**8**,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,7,**8**,9,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		8,9,11	Restore 60 Valley Oak Riparian Woodland acres	35
		1,2,3,4,5,6,7,**8**,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1,2,3,4,5,6,7,**8**,9,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3,4,5,7,**8**,9	Restore Valley Elderberry Longhorn Beetle habitat in conjunction with native vegetation along portions of Deer, S. Laguna & N. Laguna Creeks, and the Cosumnes River	49,50,51,52
		6,7,**8**,9,10	Incorporate clusters of native shrubs in 20 locations and up to 1,000 hunting perches (100 perches/20Ac) within new and existing preserves for Loggerhead Shrike	59,60
		8,9	Incorporate 5,000 linear feet of hedgerows and 500 suitable trees within the agricultural cropland matrix	57,58
		3b,6,7,**8**,9,11	Incorporate/establish 20 Himalayan blackberry sites for Tricolored Blackbird nesting sites within new and existing preserves	61
		1a,2,3b,7,**8**,10	Incorporate/establish 2 Western Burrowing Owl nesting areas in all core and landscape preserves and create at least 20 burrows per area	62
		1,2,3,4,5,6,7,**8**,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,7,**8**,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,7,**8**,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,7,**8**,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,7,**8**,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 9	Specific Requirements	**9**	Establish two Satellite preserves that are no less than 2,500' wide at any given point; one that is 700 Ac and one that is 200 Ac.	11
			Preserve 80 Vernal Pool Ac on Riverbank formation (50 Ac must occur on category 1 or 2 LAU)	11
			Preserve 29 Seasonal Wetland acres	13
			Preserve 7,200 Cropland and/or Irrigated Pasture Ac	17
			Preserve a minimum of 800 Cropland Ac in fee title to be maintained in for Alfalfa production (4 plots - 200 Ac/plot: 2 north and 2 south of Twin Cities Rd.)	18,55
			Preserve a minimum of 200 Cropland Ac in fee title to be maintained in for Greater Sandhill Crane food plots (10 plots - 20 Ac/plot)	19,56
			Restore 29 Seasonal Wetland acres	36
	Shared Requirements	6,7,8,**9**,10,11	Preserve 191 Freshwater Marsh, 182 Open Water, 187 Seasonal Impoundment, 135 Seasonal Wetland, 95 Mixed Riparian Scrub, and 663 Mixed Riparian Woodland acres	13,14
		6a,7,8,**9**,10,11	Preserve 207 Swale acres	13
		1,2,3,4,5,6,7,8,**9**,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,7,8,**9**,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		7,8,**9**,10,11	Preserve 4,571 Cropland and/or Irrigated Pasture Ac	17
		7,8,**9**	Preserve 30 Valley Oak Riparian Woodland acres	14
		6,7,8,**9**,10,11,12	Preserve 196 linear miles of Stream channel within a corridor (800' wide, 2,000' wide along the Cosumnes R.) ensuring that 55 linear miles is preserved to support Giant Garter Snake	21,22,23,63
		6,7,8,**9**,10,11	Preserve 6,500 Valley Grassland acres beyond compensatory mitigation	26
		7,8,**9**,10,11	Preserve 2,000 Cropland acres beyond compensatory mitigation	29
		1,2,3,4,5,6,7,8,**9**,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,7,8,**9**,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		7,8,**9**,10,11	Restore or Create 241.3 Vernal Pool and 184 Swale acres	31
		1,2,3,4,5,6,7,8,**9**,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,7,8,**9**,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,7,8,**9**,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		8,**9**,11	Restore 60 Valley Oak Riparian Woodland acres	35
		1,2,3,4,5,6,7,8,**9**,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1,2,3,4,5,6,7,8,**9**,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3,4,5,7,8,**9**	Restore Valley Elderberry Longhorn Beetle habitat in conjunction with native vegetation along portions of Deer, S. Laguna & N. Laguna Creeks, and the Cosumnes River	49,50,51,52
		6,7,8,**9**,10	Incorporate clusters of native shrubs in 20 locations and up to 1,000 hunting perches (100 perches/20Ac) within new and existing preserves for Loggerhead Shrike	59,60
		8,**9**	Incorporate 5,000 linear feet of hedgerows and 500 suitable trees within the agricultural cropland matrix	57,58
		3b,6,7,8,9,11	Incorporate/establish 20 Himalayan blackberry sites for Tricolored Blackbird nesting sites within new and existing preserves	61
		1,2,3,4,5,6,7,8,**9**,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,7,8,**9**,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,7,8,**9**,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,7,8,**9**,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,7,8,**9**,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 10	Specific Requirements	**10**	Establish a Core preserve at least 3,100 acres in size that is no less than 2,500' wide at any given point.	12
			Establish a landscape linkage to Zone 7 that is at least 1,000' wide	47
			Establish and maintain connectivity to/from Chase Ranch by preserving habitat or establish landscape linkages to new or existing preserves	12
			Preserve 100 Vernal Pool Ac on Surficial Alluvial Deposits, Laguna, Mehrten & Modesto Formations (80 Ac must occur on category 1 or 2 LAU)	12
			Preserve 3,000 valley grassland acres	12
	Shared Requirements	6,7,8,9,**10**,11	Preserve 191 Freshwater Marsh, 182 Open Water, 187 Seasonal Impoundment, 135 Seasonal Wetland, 95 Mixed Riparian Scrub, and 663 Mixed Riparian Woodland acres	13,14
		6a,7,8,9,**10**,11	Preserve 207 Swale acres	13
		7,**10**	Preserve 81 Seasonal Impoundment acres	13
		1,2,3,4,5,6,7,8,9,**10**,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,7,8,9,**10**,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		7,8,9,**10**,11	Preserve 4,571 Cropland and/or Irrigated Pasture Ac	17
		6,7,8,9,**10**,11,12	Preserve 141 linear miles of Stream channel within a habitat corridor (800' wide)	21,22,23,63
		6,7,8,9,**10**,11	Preserve 6,500 Valley Grassland acres beyond compensatory mitigation	26
		7,8,9,**10**,11	Preserve 2,000 Cropland acres beyond compensatory mitigation	29
		1,2,3,4,5,6,7,8,9,**10**,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,7,8,9,**10**,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		7,8,9,**10**,11	Restore or Create 241.3 Vernal Pool and 184 Swale acres	31
		1,2,3,4,5,6,7,8,9,**10**,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,7,8,9,**10**,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,7,8,9,**10**,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		1,2,3,4,5,6,7,8,9,**10**,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1,2,3,4,5,6,7,8,9,**10**,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		6,7,8,9,**10**	Incorporate clusters of native shrubs in 20 locations and up to 1,000 hunting perches (100 perches/20Ac) within new and existing preserves for Loggerhead Shrike	59,60
		1a,2,3b,7,8,**10**	Incorporate/establish 2 Western Burrowing Owl nesting areas in all core and landscape preserves and create at least 20 burrows per area	62
		1,2,3,4,5,6,7,8,9,**10**,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,7,8,9,**10**,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,7,8,9,**10**,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,7,8,9,**10**,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,7,8,9,**10**,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
	Specific Requirements	**11**	Preserve 1,000 Cropland and/or Irrigated Pasture Ac	17
Zone 11	Shared Requirements	6,7,8,9,10,**11**	Preserve 191 Freshwater Marsh, 182 Open Water, 187 Seasonal Impoundment, 135 Seasonal Wetland, 95 Mixed Riparian Scrub, and 663 Mixed Riparian Woodland acres	13,14
		6a,7,8,9,10,**11**	Preserve 207 Swale acres	13
		1,2,3,4,5,6,7,8,9,10,**11**,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,7,8,9,10,**11**,12	Preserve a total of 24,667 Valley Grassland acres	16
		7,8,9,10,**11**	Preserve 4,571 Cropland and/or Irrigated Pasture Ac	17
		6,7,8,9,10,**11**,12	Preserve 196 linear miles of Stream channel within a corridor (800' wide, 2,000' wide along the Cosumnes R.) ensuring that 55 linear miles is preserved to support Giant Garter Snake	21,22,23,63
		6,7,8,9,10,**11**	Preserve 6,500 Valley Grassland acres beyond compensatory mitigation	26
		7,8,9,10,**11**	Preserve 2,000 Cropland acres beyond compensatory mitigation	29
		1,2,3,4,5,6,7,8,9,10,**11**,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,7,8,9,10,**11**,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		7,8,9,10,**11**	Restore or Create 241.3 Vernal Pool and 184 Swale acres	31
		1,2,3,4,5,6,7,8,9,10,**11**,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,7,8,9,10,**11**,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,7,8,9,10,**11**,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		8,9,**11**	Restore 60 Valley Oak Riparian Woodland acres	35
		1,2,3,4,5,6,7,8,9,10,**11**,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1,2,3,4,5,6,7,8,9,10,**11**,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3b,6,7,8,9,**11**	Incorporate/establish 20 Himalayan blackberry sites for Tricolored Blackbird nesting sites within new and existing preserves	61
		1,2,3,4,5,6,7,8,9,10,**11**,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,7,8,9,10,**11**,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,7,8,9,10,**11**,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,7,8,9,10,**11**,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,7,8,9,10,**11**,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

		Applicable Zones	Measure - Abbreviations	Measure - Reference
	Specific Requirements	**12**	(none)	
Zone 12	Shared Requirements	1,2,3,4,5,**12**	Preserve 10 Vernal Pool, 50 Freshwater Marsh, 60 Open Water, 38 Seasonal Impoundment, 8 Seasonal Wetland, 10 Mixed Riparian Scrub, 300 Mixed Riparian Woodland, and 11 Valley Oak Riparian Woodland acres	7,13,14
		1a,1b,1c,1e,2,3b,**12**	Preserve 161 Swale acres	13
		1,2,3,4,5,6,7,8,9,10,11,**12**	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,7,8,9,10,11,**12**	Preserve a total of 24,667 Valley Grassland acres	16
		6,7,8,9,10,11,**12**	Preserve 141 linear miles of Stream channel within a habitat corridor (800' wide)	21,22,23,63
		1,2,3,4,5,**12**	Preserve a 100' wide corridor along undeveloped portions of all remaining Creeks, tributaries and significant swale systems	26
		1,2,3,4,5,6,7,8,9,10,11,**12**	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,7,8,9,10,11,**12**	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		1,2,3,4,5,6,7,8,9,10,11,**12**	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,7,8,9,10,11,**12**	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,7,8,9,10,11,**12**	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		1,2,3,4,5,6,7,8,9,10,11,**12**	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		3,4,5,6,7,8,9,10,11,**12**	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		1,2,3,4,5,6,7,8,9,10,11,**12**	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,7,8,9,10,11,**12**	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,7,8,9,10,11,**12**	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,7,8,9,10,11,**12**	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,7,8,9,10,11,**12**	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

Appendix D

Public Comments

George Waegell Letter
Sam Miller Email
Lynn Wheat Email
William H. Geyer Letter
Jack Sales Letter
Wildlands Inc. Letter
Todd Chambers Letter
Galt Meeting Signin Sheets
Galt Meeting Comment Cards
Sacramento Meeting Signin Sheets
Sacramento Meeting Comment Cards
Rancho Cordova Meeting Signin Sheets
Rancho Cordova Meeting Comment Cards
Elk Grove Meeting Signin Sheets
Elk Grove Meeting Comment Cards

[redacted]

RECEIVED
JUL 22 2008
DEPARTMENT OF ENVIRONMENTAL REVIEW AND ASSESSMENT

July 15, 2002

Attn: Peter Morse
DERA, County of Sacramento
827 7th Street, Room 220
Sacramento, CA 95814

Comment - South Sacramento HCP, Environmental Review Process

MORRISON CREEK SHED JUMP

Historically there was little shed jump from Morrison Creek south across Kiefer Blvd into the Laguna creek watershed at Sunrise Blvd.

There is a1937 aerial photo that shows only swales and not the new channel cutting southeast across the Shalako Property, APN 067-0090-026-0000. On Dec 30, 2005 heavy runoff from the new AKT Sun Ridge development flooded Sunrise Blvd and Folsom South Canal, and eroded a new tributary to Laguna Creek east of Sunrise Barn.

In the fifties and sixties I dry farmed wheat in the swales south of Kiefer Road. In the late 1960's when Sunrise Blvd was built an 18 inch culvert was installed to carry road runoff from the west side to the east side into the swales farmed to wheat. In 2005 with Sun Ridge streets and housing in place this culvert was completely overwhelmed as water backed up and poured across Sunrise. With added flooding from the east side a new 2 ft by 2t channel was cut down these swales to Laguna Creek.

There is currently serious back cutting on both sides of Sunrise near the black walnut tree. This is caused by a 10 ft drop in elevation in a distance of 400 ft. The 2005 unprecedented flooding results from two inadequate flumes across Folsom South Canal and minimal catchment basins on the AKT SunRidge development.

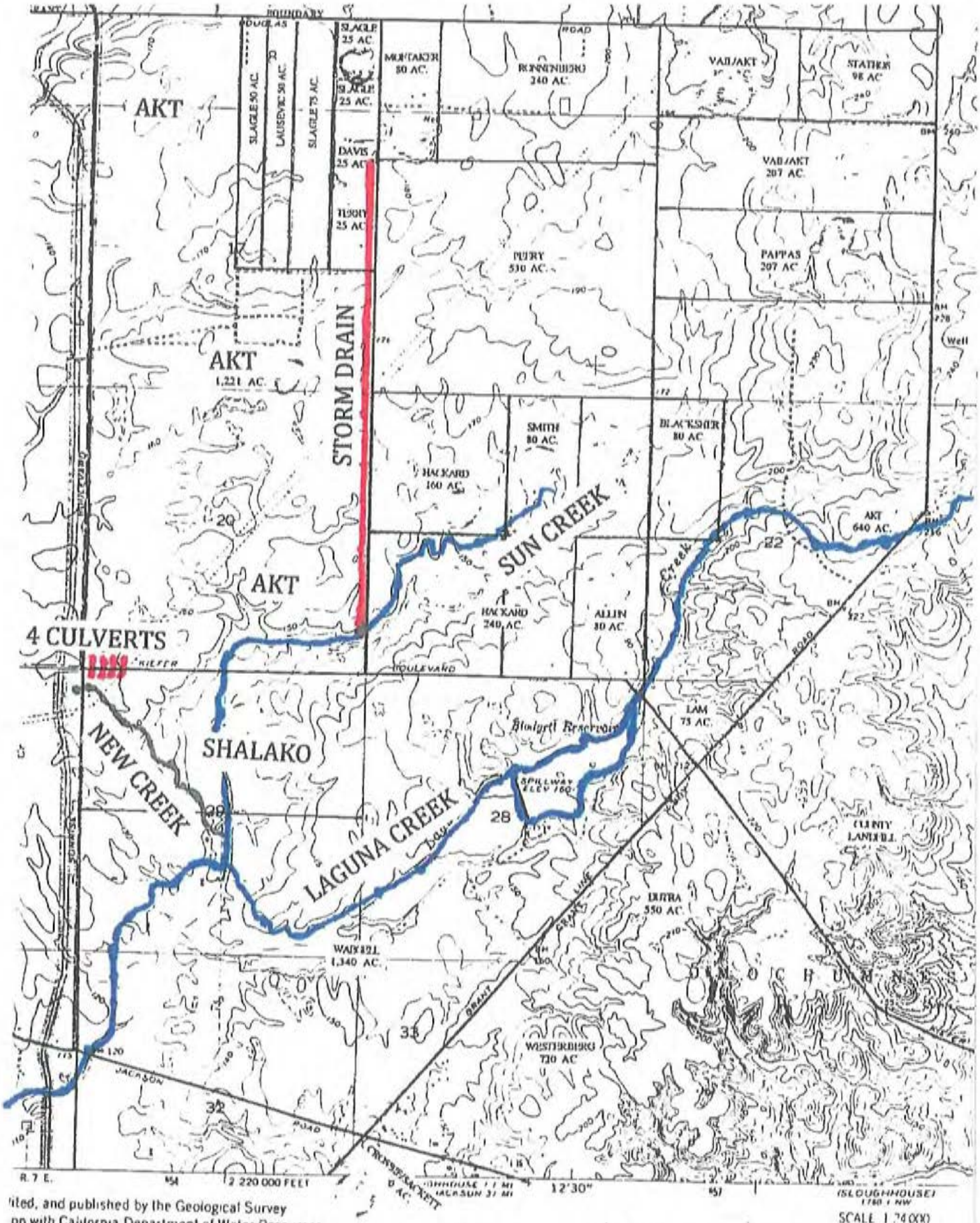
County Drainage is memorializing this untenable situation with a dozen pipes crisscrossing Sunrise and four 30 inch pipes under Kiefer Road. These pipes will flood a vernal pool complex and cause serious erosion compromising the ecological functioning of these pools.

When only minor elevations separate watersheds, shed jump can occur with deeply set storm drains. This is evidenced by the 3 ft diameter storm drain emerging at the Jaeger Road bridge over Sun Creek. Running north along the west side of Jaeger Road this pipe will deliver Morrison Creek water to the Laguna Creek watershed via Sun Creek. It is also possible that storm drains could deliver Morrison water into a tributary of Laguna that drains into Blodgett Reservoir. Sun Ridge storm drains will have a serious impact on the Laguna Creek floodplain.

Shed jump flooding, deep set storm drains, and inadequate catchment basins are causing serious problems for those downstream. These issues must be addressed.

Sincerely,

[redacted]



ited, and published by the Geological Survey
on with California Department of Water Resources

From: Sam Miller
Sent: Thursday, July 17, 2008 1:51 PM
To: Radmacher. Richard (MSA)
Subject: RE: NOP

oooops

Sam Miller

From: Radmacher. Richard (MSA) [mailto:RADMACHERR@saccounty.net]
Sent: Thursday, July 17, 2008 12:13 PM
To: Sam Miller
Subject: RE: NOP

No problem except there was no attachment.

From: Sam Miller
Sent: Thursday, July 17, 2008 11:13 AM
To: Radmacher. Richard (MSA)
Subject: NOP

Richard:

Could you see that the attached comments get to the right persons (unless you believe they should not see the light of day!) for me?

thanks

Sam Miller

Notice of Preparation of an EIR/EIS for the South Sacramento Habitat Conservation Plan.

1. It might be useful to change an element of the plan. The National Academy of Sciences recommendations have been the reference point for definition of compensation for loss of wetlands. Those six recommendations are:

a. Avoid wetlands that cannot be restored
b. Maintain watershed diversity, connectivity, etc.
c. Ensure that mitigation sites become self sustaining
d. Mitigate before or concurrent with impacts
e. Develop clear, enforceable, compliance requirements
f. Give authority and funding to third party stewards.

The plan as written includes a finance section. The first obligation of this effort has been to define the costs of the plan implementation. My consideration is this

It appears to be that a seventh recommendations has been added. The addition is the continuing study of the wetlands set aside in landscape, core, satellite and minor preserves. This commitment appears to go beyond assurance of the accomplishment of the six recommendations, particularly c – e, and to creation of research opportunity.

While there is no question that the continued research of wetlands is a valuable effort, the focus should be clearly upon maintenance and assurance and not upon investigation and assessment of the wetlands. As is true of all environments, the valley floor and margins are dynamic environments. The cost of plan implementation is a significant element of the plan viability. The EIR should address the cost differential for conservation plus research as against conservation only from the perspective of cost being an inhibitor of plan viability. Please address the value of making the long term mitigation and monitoring plan a conservation only effort and not conservation plus research.

2. It has been my understanding for some years now that the Garter Snake is an entirely "timid/asocial critter". The plan at several places would have habitat enhancement/creation in areas near by urban/suburban development. This characteristic of the snake should help to direct the identification of suitable mitigation/restoration locations for this snake. The EIR/EIS should identify and include a list or some presentation of geographic areas where restoration of habitat and/or creation of habitat is likely to be ineffective.

3. The recently distributed General Plan visioning efforts in both the Grant Line and the Jackson area suggest land uses in contradiction of the HCP. The consequence of these alternatives should be discussed.

4. The plan appears to have a strong bias against restoration efforts as a form of mitigation. The EIR/EIS should explore the potential for expansion of the use of restoration. The commonly cited basis for the current threats against Special Status species, particularly vernal pool species, is the over 160 years of farming and urban/suburban development that has occurred throughout the original range of the species. To the extent that significant likelihood of success of restoration is possible within, adjacent to or within or on an annexation basis to a Core or Landscape scale preserve, restoration should have equal value to preservation.

5. The use of terms fundamental to understanding of the EIR/EIS need to be defined up front in the document.

From: lynn wheat
To: morsep@saccounty.net; nina_bicknese@fws.gov
Sent: Friday, July 18, 2008 1:55:18 PM
Subject: SSHCP=public comment for record
To: Peter Morse County of Sacramento DERA
To: Nina Bicknese U.S. Fish and Wildlife NEPA

Regarding: South Sacramento Habitat Conservation Plan. NOP

The following are comments I would like evaluated and placed into the record.

I attended the Public Meeting in Elk Grove on July 16th and at the time shared my concerns regarding property situated within the City limits of Elk Grove located at Bond and Waterman Roads. This area (230 acres) is home to many migratory species, endangered and threatened plant and animal species. Located on the property are high grade quality vernal pools and wetlands that support the local habitat (Considered a preservation site in the 1980's).

It is my opinion after much investigation into this property that this site should not be ignored in evaluating the SSHCP.

This area preserved would be a wonderful site for preservation of species and natural resources.

- Currently Sacramento Area Sewer District owns this property.

- Located on this site of vernal pools and wetlands is Whitehouse Creek that flows into Laguna Creek.

? **What will be the cumulative impacts of channeling the waters of the wetlands and Whitehouse Creek into Laguna Creek?**

? **How will this impact local flood issues?**

? Currently the vernal pool and wetland waters are filtered through the soils renewing local water table levels. **What will this loss do to the water table on residential use by residents of Sheldon area?**

? In a 1993 EIR the vernal pools and wetland were not going to be filled-I suppose because of their importance. **What happened to make this change with the Elk Grove City plans for development? How has this been evaluated with the SSHCP?**

- This site is home to various bird species as identified by a biological consultant of Sacramento Area Sewer District.

? 27 bird species were identified: note in particular White-tailed Kite, Red Winged Blackbird, Tri Colored Blackbird, Snowy egret, Red Tailed Hawk, Kill deer, Western Kingbird, Swallows, Cedar Waxwing, Western Meadowlark.

? How is the area habitat being protected for these species? Where will these species relocate? Are there enough mitigation banks available to support the various bird species? Has is been determined when banks are full? Are the banks accessible to the public? Is reconstructing an area for the species as cost effect as preserving what is already available? Is there documentation available to support either?

- As previously reported/documented this site is home to federally listed species: Vernal Pool Tadpole Shrimp, Vernal Pool Fairy Shrimp, threatened slender Orcutt Grass and Sacramento Orcutt Grass.

? What impact will developing this site have in regards to habitat preservation for the region?

? When do the mitigation banks reach capacity? Will net loss be significantly more than net gain?

? **What documentation information will be used supporting the decisions in the EIR?**

Elk Grove City supposedly supports the habitat conservation plan, however I would suggest with the city's behavior of mitigating away the vernal pools and wetlands and accepting dollars for Swainson Hawk valuable specie habitat has been lost within the city.

Through FOIA I attempted to obtain information regarding vernal pools and wetland mitigation and the amounts filled/lost and the city did not have a record of the totals. The city was able to provide the habitat areas of Swainson Hawk loss only because of dollars accepted.

I requested all records of development that included wetland/vernal pool mitigation. In every recent situation the vernal pools were mitigated away and there was not any onsite preservation.

? **As citizens are there any guarantees when the plan is implemented the cities will be amenable and follow the plan/ guidelines as developed?**

? **Who will be overseeing the implementation of the plan? Will it be individual agencies/cities? How will the coordination look?**

? **Is Elk Grove willing to rezone an area for an urban preserve?** (Elk Grove has rezoned many many areas changing site designations from the approved general plan).

? **How cooperative is the City of Elk Grove in this plan? Are they demonstrating by any actions that habitat preservation is important?**

? **Will this be addressed in the EIR?**

I recommend and suggest the following:

Cities need to have available urban preserves allowing open spaces within the city and allowing wildlife species to remain and continue on their current sites. I was told by the city Swainson Hawk and Kite would not be in this area-to urban….How come the species are here?

Urban preserves with interpretive centers are an excellent resource for youth and adults alike. The preserves provide walkable areas within the city allowing for outdoor exercise and a nature experience. In particular the site at Bond and Waterman would allow natural, undisturbed connectivity between Whitehouse Creek and Laguna Creek.

This property is situated such that the local elementary, middle and high school could use this as a valuable area for science/natural resource studies. I was told by one professional biologist this particular site was one used during her college days for study as an example of quality vernal pools and habitat.

As the life style of Americans change with the change in our natural/ energy resources looking forward and envisioning urban preserves will offer local interaction with nature while providing the exercise of walking or riding a bike and at the same time will prevent car emissions/pollutants as one won't have to drive to experience nature in the outdoors.

Urban Preserves will allow species an opportunity to choose to remain and live in their current environment.

Lynn Wheat

OCT-24-2008 03:01P FROM:

RECEIVED
OCT 27 2008
BOARD OF SUPERVISORS

Fax
874-7593

From: William H. Geyer
To: Don Nottoli, Supervisor, Sacramento County
Date: Oct 24, 2008
Subject: HCP Comments

Dear Don,

Two weeks ago I was unable to attend the session that Herb Garms invited me to, with you and other county officials, to discuss the implementation of the proposed HCP in our area. I understand comments are due today. Here are some preliminary thoughts.

1. I attended one of your community input workshops. Whether they have any value as public comment exercises, I will leave for you to decide. However, regarding HCPs, landowners are far more than a part of the general public, and I believe those workshops are an insufficient and ineffective tool for communicating with them.

2. We spent two years and a lot of time and effort on the East County Open Space Committee earlier this decade, trying to learn what kind of programs the landowners would be willing to consider participating in for open space enhancements and protection. They recommended a smorgasbord approach, and suggested more than a dozen possible approaches. From conversations with them, and personal observations since, I fear the county may have learned little or nothing from that valuable exercise. I suggest you revisit those proposals with the local ranchers, and use them to help shape a viable approach to the HCP if you want any substantial participation.

3. I have had extensive experience with HCPs and NCCPs, primarily in southern California, and have a good grasp of what makes them work or not work for landowners. I also know that neither the state (DFG) nor federal (USFW) wildlife people have ever had a very good approach to dealing with working landscapes (like ranches) other than forcing them into permanent single purpose reserves as urban mitigation. I also know that tying up extensive land areas through regulatory means far ahead of the need for actual mitigation and ahead of the ability of either the governments' or developers' ability to pay for it at prices that reflect its long-term amenity value to the urban community it is designed to serve, is an environmentalist's dream, a landowner's nightmare, and a recipe for gridlock.

4. As a result of my experiences, I am acquainted with a number of environmental and planning consultants with development experience who I think have the capability of suggesting approaches that might help you. I would be willing to impose on some of these people to either meet with you, or to work with both of us, to critique your present situation and help you construct successful real-world approaches that would ultimately allow the ranchers who wished to remain to become compensated stewards, and help those who do not, to control the timing and economics of their exit strategy.

Let me know if I can be of help.

Sincerely, William H. Geyer

Morse. Peter

From:
Sent: Tuesday, June 24, 2008 1:28 PM
To: Morse. Peter
Subject: South Sacramento Habitat Conservation Plan

Dear: Mr. Morse

I am very short on time with up coming travel.
In case I can't make the meetings or respond specifically to the EIR pleas consider this a response.
Understanding that I have not looked at the EIR but will soon.

My response is -

Any EIR or Habitat Conservation Plan plan prepared today or in the future can only be considered incomplete or invalid if it does not address Outdoor Lighting, Light Trespass (into the havitat, and Light Pollution.

For a partial basis of my statement please see my Ecological Light Pollution Page on skykeepers web site.
http://www.skykeepers.org/ecol-lp.html

Many references on that page address the wildlife of the area and the adverse effects of light at night.

Ecological Consequences of Artificial Night Lighting (ECANL) By Catherine Rich, Travis Longcore is a good starting point.

Some of the species noted on that page and ECANL are-

Salmon, Bats, Frogs, Zooplanktion, Moths, Salamanders etc.

In my opinion -
Outdoor Lighting constitute a "taking" under the ESA.

"Harm" includes "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Outdoor Lighting is - a "significant habitat modification or degradation"
Outdoor Lighting can - "significantly impairing essential behavioral patterns"
Outdoor Lighting can - affect breeding
Outdoor Lighting can - affect feeding (reduced foraging)

How much light? Very low levels in the case of Zooplanktion, some Frogs and even fish.
In most cases levels well below that produced by the full moon can have a negative effect on various aspects of breeding, foraging while somewhat higher levels effect predation and navigation.

In closing this is a Habitat Conservation Plan, the natural night time is a part of the "Habitat" and any degradation of the natural levels must be considered.

Regards

---- Original message ----
>Date: Mon, 23 Jun 2008 16:40:34 -0700
>From: "SSHCP (MSA)" <sshcp@SacCounty.NET>

WILDLANDS, INC.

JUL 31 2008

July 30, 2008

Ms. Joyce Horizumi
Environmental Coordinator
Sacramento County Department of Environmental Review and Assessment
827 7th Street, Room 220, Sacramento, CA 95814

Re: South Sacramento Habitat Conservation Plan Notice of Preparation (Control Number 03-PLE-0637)

Dear Ms. Horizumi:

Wildlands, Inc. ("Wildlands") would like to thank you for the ongoing efforts to reach out to stakeholders within Sacramento County and provide an opportunity to participate in the creation of the South Sacramento Habitat Conservation Plan ("HCP"). Wildlands owns and operates several Mitigation and Conservation Banks throughout the HCP Planning Area, and we applaud your efforts to create a document that provides the regulated community with identifiable preservation goals while maintaining adequate organizational flexibility to allow the HCP to adapt to changes in the environment and development outlook for the County.

As a land owner in Sacramento County, an active contributor to the overall environmental health and well-being of the County, and an interested party in the development of the HCP, Wildlands is providing the following general comments for incorporation into the Draft Environmental Impact Report/Environmental Impact Statement ("EIR/EIS").

Incorporation of Existing Tools to Guarantee Restoration and Protection.
Private and non-profit Conservation and Mitigation Organizations such as Wildlands have been pursuing restoration and preservation goals within Sacramento County for over 15 years, and have protected thousands of acres within the County through the establishment of Mitigation and Conservation Banks ("Banks").

The maintenance and protection of these Bank habitats are guaranteed through Agency-reviewed cost models for endowment requirements, formalization of legally defensible Conservation Easement templates, and standardization of monitoring and reporting programs for long term management activities which are designed to ensure protection of environmental resources in perpetuity. Through almost two decades of fine tuning and regulatory oversight, these Banks are now able to allocate costs for land acquisition, endowment funding, and long term management through the sale of credits within each individual preserve. We suggest incorporation of these same tools into the HCP will provide a mechanism to determine HCP costs, and therefore habitat fees, in a manner which ensures a sustainable program.

We therefore believe a discussion of these items needs to be included in the scope and content of the environmental information provided in the EIR/EIS such that Agencies and Interested Parties

may understand the mechanisms by which fees will be established, the HCP program will be made sustainable, and mitigation for impacts will be generated and protected in perpetuity.

Use of Existing Restoration Resources.
Conservation and Mitigation Bank market-ready credits within the HCP Planning Area represent fully entitled, restored, and/or protected habitats which can be used by the HCP as a front loading mechanism upon initiation of the HCP, or can be used to achieve the HCP "get ahead and stay ahead" goals.

We therefore believe that a discussion of the role which market ready credits in entitled bank properties may play in the achievement of HCP goals needs to be included in the scope and content of the environmental information provided in the EIR/EIS.

Consistency with the Federal Final Rule on Compensatory Mitigation.
Effective June 2008, the U.S. Army Corps of Engineers ("Corps") and Environmental Protection Agency ("EPA") adopted 33 CFR Part 332 and 40 CFR Part 230, which established their Final Rule on mitigation for impacts to wetlands and aquatic resources. The Rule applies equivalent standards to permittee-responsible compensatory mitigation, mitigation banks and in-lieu fee mitigation. Since Banks must have approved management plans and long term financial assurances in place before all of their credits can be used to offset permitted impacts, Sections 332.3 and 230.93 of the Rule establish a priority preference for the use of Banks for compensatory mitigation. Simply put, the Rule recognizes that the use of Banks requires successful mitigation prior to permitting an impact, while an HCP may allow impacts prior to successful mitigation. The Rule also recognizes deferred mitigation can increase the risks and uncertainties associated with successful mitigation as well as create inconsistency with the Corps "no net loss policy".

We therefore believe that a discussion needs to be provided in the EIR/EIS on the consistency of the HCP mitigation policy with the Final Rule priority preferences and requirements for HCP – Bank biological equivalency, as well as the national policy of "no net loss" of wetlands.

We look forward to continuing to work with your office during the development of the EIR/EIS and the HCP documents. If you have any questions on these comments, do not hesitate to contact me at (916) 435-3555.

Regards,

Paul Sherman
Wildlands, Inc.

August 29, 2008

Ms. Joyce Horizumi
Environmental Coordinator
Department of Environmental Review and Assessment
County of Sacramento
827 7th Street, Room 220
Sacramento, CA 95814

Re: Notice of Preparation of a Joint Draft Environmental Impact Report and Environmental Impact Statement for South Sacramento Habitat Conservation Plan (Control Number 03-PLE-0637)

Dear Ms. Horizumi:

Please accept the following comments and suggestions submitted on behalf of the Harry Family, the owners of approximately 700 acres (Harry Ranch) located within the South Sacramento Habitat Conservation Plan (SSHCP) Zone 9. More specifically, Harry Ranch is located directly south of Eschinger Road and west of State Route 99 (see attached Exhibit 1).

The Harry Ranch property is a working cattle ranch, of which this land use is defined in the SSHCP as "irrigated pasture". In addition, the property provides habitat value for Swainson's Hawk, Greater Sandhill Crane, Tricolored Blackbird, Western Burrowing Owl, White-faced Ibis, and White-tailed Kite to name a few.

We have reviewed the subject Notice of Preparation and offer the following comments.

Land Use

Harry Ranch is located outside the Urban Development Area (UDA), just south of Eschinger Road, which is the southern boundary of the City of Elk Grove's proposed Sphere of Influence (SOI) Amendment application currently on file with Sacramento County LAFCo. As such, future urban development is being considered to move south of Kammerer Road (the current city limits of Elk Grove and Urban Services Boundary) to Eschinger Road. The SOI Amendment application should be considered when identifying strategic properties for permanent preservation as part of the SSHCP. Given this scenario, the Harry Ranch property is strategically located to provide permanent conservation land between potential future development and existing preserve land contiguous to and located directly southeast. A 700 acre irrigated pasture / farmland preserve in this location is consistent with the Conservation Principals of the SSHCP, including 1) minimizing fragmentation, 2) minimizing edge effects, 3) establishing connectivity, and 4) maximizing heterogeneity. Establishing a permanent conservation area directly south of Eschinger Road should be addressed in the SSHCP Draft EIR / EIS as the Elk Grove SOI Amendment application should be considered a reasonably foreseeable project under CEQA.

Agriculture

The Harry Ranch property and other similar properties in the area should be analyzed in the SSHCP Draft EIR/EIS as the first areas to be targeted for mitigation of impacts to irrigated pasture and farmland in order to establish a buffer line where future urban development in this area cannot occur south of this boundary. In addition, The SSHCP Draft EIR/EIS should analyze a requirement for future development

occurring within Zone 5 and impacting irrigated pasture and farmland in Zone 5, to mitigate for the loss of agricultural land impacts in Zone 9. As more irrigated pasture and farmland with "like" habitat is developed to the north of Harry Ranch, the more critical it becomes to preserve the Harry Ranch property and other properties with similar value in the immediate area. Having this area under permanent conservation early on in the implementation of the SSHCP will set a precedent for establishing other conversation land in this area of Sacramento County.

Economic Analysis

The SSHCP Draft EIR/EIS should include an Economic Analysis Section that analyzes a provision for additional credit beyond one acre of impact equals one acre of mitigation for irrigated pasture and farmland. The SSHCP Draft EIR/EIS should analyze a requirement for providing 3 acres of credit for every one acre of land on those properties extending ½ mile south of Eschinger Road, including Harry Ranch (see attached Exhibit 2). The additional credit consideration would provide an incentive for landowners in this area to voluntarily participate in the SSHCP program, thus directly assisting in meeting the established Conservation Principals and providing a clear buffer or boundary between urban development to the north and permanent preservation land. The value of having a permanent conservation buffer on the edge of future urban development in this area of the County should be recognized in the SSHCP as this concept is strongly desired by the local community and environmental stakeholders. This provides the County an opportunity to implement this buffer concept. In addition, future development should be required to directly acquire needed habitat mitigation land in lieu of simply paying a established fee for the land acquisition component of the program. This will ensure that the land acquisition fee component of the program is not outpaced by land values.

In summary, we believe that the properties located south of Eschinger Road including Harry Ranch provide a strategic aspect of establishing a permanent preserve boundary between future urban development and existing / future open space habitat. Therefore, providing additional economic incentive in the form of enhanced credit value for landowners in this area to place their land under permanent conservation is warranted.

Thank you for the opportunity to comment on the subject NOP. If you have any questions regarding this information, please contact me at (916) 837-2266

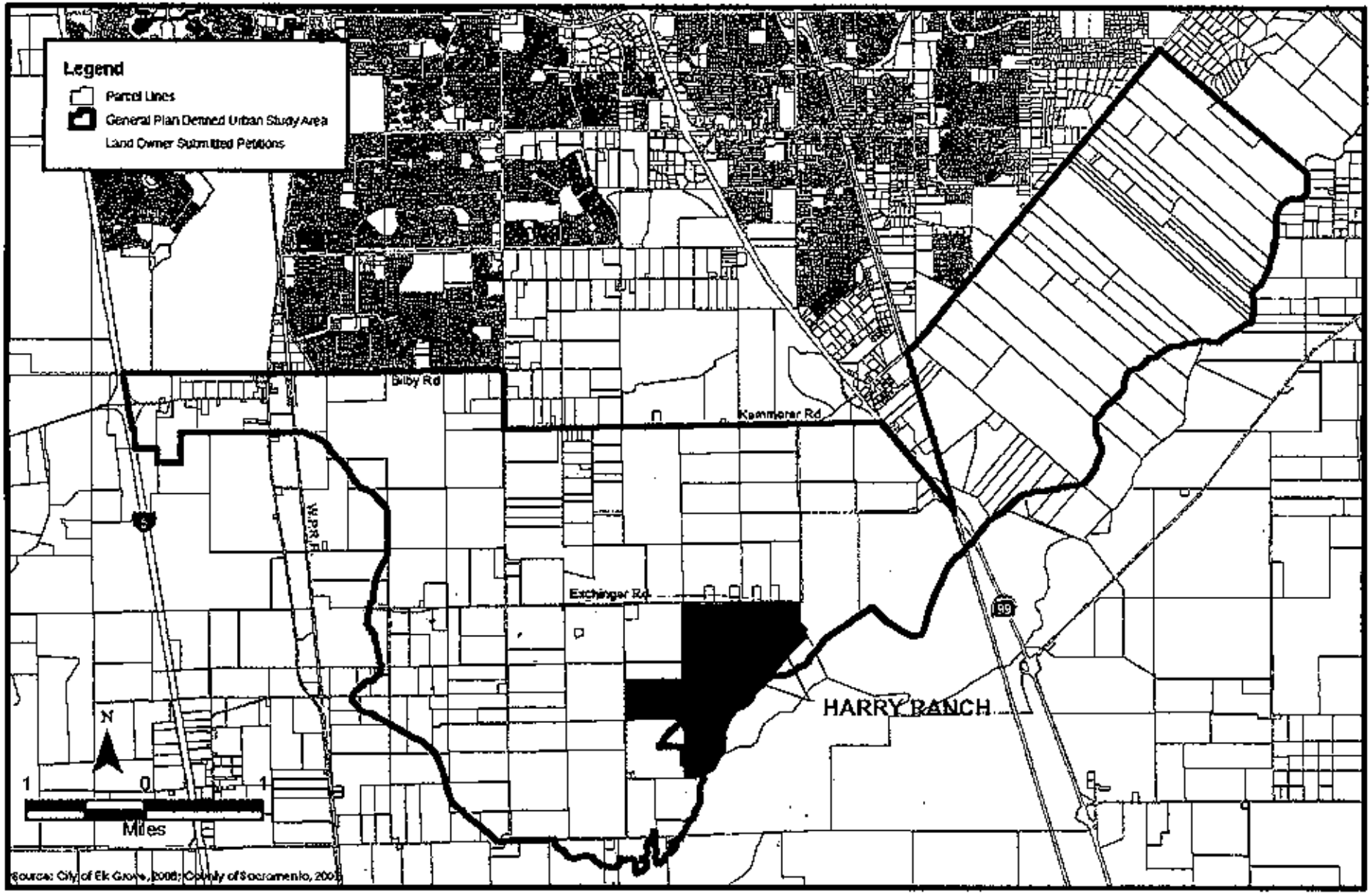
Sincerely,

Todd Chambers
The Chambers Company

Attachments

Cc: Richard Radmacher, County of Sacramento Planning
Tom Harry, Harry Ranch

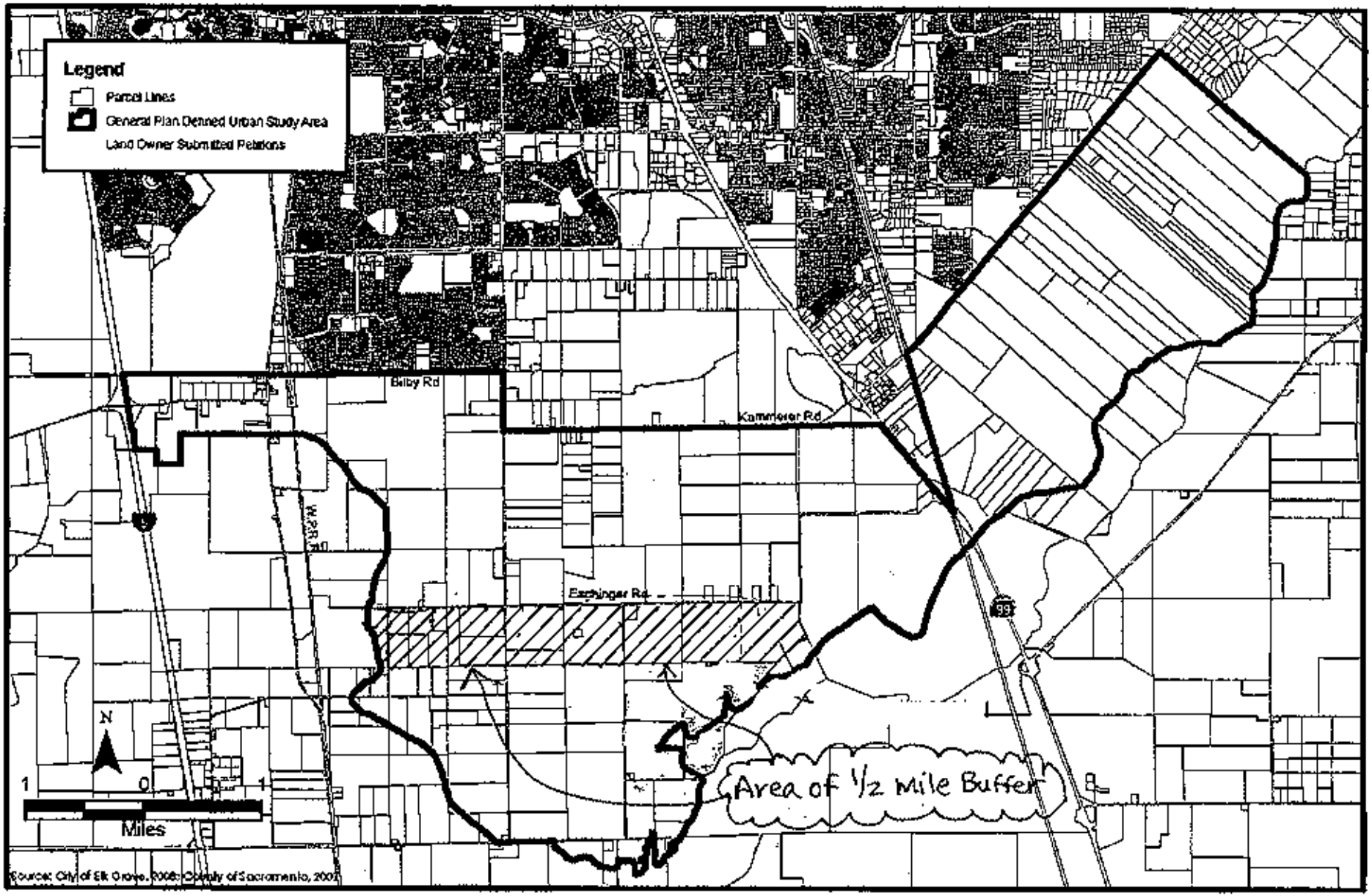
EXHIBIT 1



City of Elk Grove
Development Services

Property Owner Petition for Inclusion in the Sphere of Influence

EXHIBIT 2



ELK GROVE

City of Elk Grove
Development Services

Property Owner Petition for Inclusion in the Sphere of Influence

South Sacramento Habitat Conservation Plan

July 8, 2008 SSHCP EIR/EIS SCOPING MEETING (GALT)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
Lisa Stallings				
JERRY STALLING	RANCHER			

080708-GALT-01

South Sacramento Habitat Conservation Plan

July 8, 2008 SSHCP EIR/EIS SCOPING MEETING (GALT)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
PATTI RANSDELL	MMC Comm			
JAMES NAVICKY - DFG				
JENNIFER NAVICKY - DFG				
~~RICHARD SMITH PGF~~				
RICHARD SMITH PGF				
Curt Compton				
Carl Bona				

080708-GALT-02

South Sacramento Habitat Conservation Plan

July 8, 2008 SSHCP EIR/EIS SCOPING MEETING (GALT)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
Nancy King	JBR			
Ronald Addison	GAHS: MA			
Lee Baldwin	CITIZEN			
GARY PATTERSON	VESTOR ENTERPRISES			
Patty and Doug Trimble	self			
Thom Smith	C.P.A.C.			
Kathleen Amos	Parks & Rec, Galt			
Tina Holt	Herald Area Civic Assc			
11655 Clay Station Rd Herald				

080708-GALT-03

080708_GALT_04

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

the "current" water consumption depletes the Mehrten aquifer by 8" a year without further development. A mining operation will consume as much water a day as a family of 4 can use in a year. The roads are not up to D.O.T. code. These specifications have a cost of 800,000.00 a mile to construct: 30' across; 6 foot shoulders on each side; 15" sub grade w/ 4" asphaltic overlay.

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Tina Holt

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080708_GALT-05

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

The Herald Area in South East Sacramento County are open agricultural and flood plain lands. Rich with diverse species such as Swainsons Hawk; Tiger Salamader, Bald Eagle, Elderberry Beetle. Cheifly the Borden Ranch is the most preservable land in the area consisting of Riparian Creek, Oaks, Cotton Wood, Elderberry, prime ag land when it is not in flood stage during winter & early spring. The land is 400 acres on a historic family ranch 'Borden'. The rest of the area approx. 1200 acres is in productive vineyards.

Would you like to be added to the SSHCP mailing list? X Yes ☐ No

If so, please provide your contact information.

Name: TINA B. HOLT

Title and Org/Business (if applicable): Herald Area Civic Association B.O.P.

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080708_GALT_06

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

I want this E.I.R. to address the specific impacts of surface gravel mining and its related activities i.e. blacktop, concrete production, Topsoil removal etc.. Impacts on all listed species and impacts on the local communities must be addressed in in this E.I.R. Impacts of water supply to adjacent properties, traffic on these rural roads, dust on adjacent agricultural operations, noise impacts on neighbors, etc. ALSO THE impact on public utilities like roads & drainages.
I also want the E.I.R. to address the specific right to farm ordinances in Sac. County and those rights in relation to its neighbors.

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: GARY PATTERSON

Title and Org/Business (if applicable): GEN MGR Nestor Enterprises

Email address: [redacted]

Mailing address: [redacted]

Phone: [redacted]

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080708-GALT-07

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

I BELIEVE THIS E.I.R. NEEDS TO SPECIFICALLY ADDRESS THE AREA OF DRY CREEK AT THE SOUTH EDGE OF THE COUNTY. IMPACTS ON ALL SPECIES LISTED AND THE LOCAL COMMUNITIES BY OPERATIONS OTHER THAN WHAT ~~2006~~ 2010 ALLOWS.

THIS E.I.R. NEEDS TO ADDRESS THE CUMULATIVE IMPACTS OF THESE SPECIES PROTECTIONS ON ADJACENT COUNTIES. SPECIFICALLY THE BORDEN GRAVEL MINING PROPOSAL ALONG DRY CREEK AT THE SOUTH EAST SIDE OF THE COUNTY.

THIS EIR NEEDS TO ADDRESS THE IMPACTS OF AGRICULTURE/URBAN INTERACTION

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: GARY PATTERSON

Title and Org/Business (if applicable): GEN. MGR. NESTOR ENTERPRISES

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080708_GALT_08

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

What Habitat issues are involved in the area just west of Hwy 99 (in Zone 9) along Twin Cities Rd.? (a group wants to put a senior housing project there - the group is called, "Citizens to Protect the Future of Galt" even tho the land is OUTSIDE the city limits of Galt). We @ Galt Parks & Rec want to support as large a regional area for "passive rec" activities (like hiking, bird-watching etc.) around the city of Galt.

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Kathleen Amos

Title and Org/Business (if applicable): Attorney at Law

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080708-GALT_10

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

ARNO & VALENSIN RD & RILY IS NOT VERNAL POOL IT VINEYARD

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: DOUG TRIMBLE

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080708_GALT_11

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

traffic noise from increased activity in Herald where a mining proposal threatens the community; Suggesting 285 rock trucks would use the narrow roads. This is the equivalent of 12,000 cars a day. The air quality & noise would be unbearable.

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: Tina Hott

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080708_GALT_12

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

As a resident of the rural community of HERALD my concerns are about mining and the negative cumulative impacts that increased ROCK-TRUCK traffic will have. Also I fear the loss of important Ag land on BORDEN RANCH. The damage to DRY CREEK watershed on BORDEN Ranch would be an ENVIRONMENTAL DISASTER. Also the amount of water consumption by a mining operation on BORDEN Ranch would be devasting to the residential wells in the neighborhood I know of 4 wells that have been depleated. The air quality would be degraded by mining Borden Ranch. The Road damages from ROCK TRUCK traffic is a costly negative impact: over $600,000.00 a mile to replace. OVER→

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: Tina Holt

Title and Org/Business (if applicable): Herald Area Civic Association B.O.D.

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

< CONTINUED;

Mining of BORDEN RANCH and the increased truck traffic, noise, pollution is not wanted in the rural residential community of HERALD.
While the loss of prime ag land on BORDEN RANCH would be most unfortunate; if mining were to occur; a railroad spur line must be developed for the efficient removal of mined materials to a Hi Way 104 location that will in no way a Burden HERALD residents.

PLEASE FOLD ALONG THIS LINE FOR MAILING

PLACE STAMP HERE

County of Sacramento
Department of Environmental Review and Assessment
ATTN: Peter Morse
827 7th Street, Room 220
Sacramento, CA 95814

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: Tony Ceccarini

Title and Org/Business (if applicable): Owner L. Ceccarini & Son

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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WE HAVE LAND SPECULATORS, AND DEVELOPERS WHO OWN PROPERTY WEST and SOUTH OF OUR WASTEWATER TREATMENT PLANT. PLEASE DO NOT ALLOW THESE LANDS TO BE DEVELOPED.

A GREEN ZONE BETWEEN ELK GROVE and GALT IS AN EXCELLANT IDEA, AND SHOULD BE PURSUED!

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: RICK WALTERS

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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HERE IN GALT, WE HAVE A CERTAIN CONTINGENT OF FOLKS AND DEVELOPERS, ATTEMPTING TO RAM DOWN OUR THROATS A SO-CALLED SR. COMPLEX CALLED DELTA GREENS/DELL-WEB – THIS WOULD BORDER THE NATURE CONSERVE ON HWY. 104 – AKA TWIN CITIES ROAD. IT IS TOO CLOSE TO THE SEWER W.W. PLANT CONTAIN A 9 HOLE GOLF COURSE – CREATE TRAFFIC, ETC. – – WHAT IS NEEDED TO STOP THIS IS A STRONG ENHANCEMENT OF A "GREEN BUFFER BELT TO BRACE UP THE ONE WE ALREADY HAVE IN PLACE. OF ALL THE ITEMS THAT NEED YOUR ATTENTION, THIS PROJECT, IF IT GOES THRU, WILL HAVE A HELL OF AN IMPACT IN THIS AREA – ALL BAD. PLEASE LOOK AT THIS THROUGH A MICROSCOPE – – – THESE STEEL AND CONCRETE ADVOCATES ARE OUT FOR ONE THING – – BUCKS! P.S. PLEASE SEE ENCLOSED ARTICLE.

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: DAVID L. DAHLGREN – RET.

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Lodi News-Sent

WEDNESDAY, July 23, 2008 www.lodinews.com

Recall effort underway in Galt

Group seeks to unseat City Council members Meredith, Haines

By Chris Nichols
NEWS-SENTINEL STAFF WRITER

A long-threatened campaign to unseat two slow-growth Galt City Council members is now underway.

Members of Protect Galt's Future, a political action committee formed to push a pro-growth agenda, said Tuesday they plan to file a notice of intent to recall Mayor Andrew Meredith and Councilman Don Haines.

"They have not provided good stewardship ... they have stymied any real development," said Jim Ferguson, a retired Galt resident and PGF member.

"We've been (speaking) in front of the City Council for about a year, talking about Delta Greens and other projects, (and) it's become very, very obvious that they're simply not listening to us," added Dick Smith, another PGF member.

Andrew Meredith

Delta Greens is a senior living center proposed off Twin Cities Road west of Galt. An earlier version of the project, backed by the Del Webb company, was nixed from city growth plans in January 2007 by a majority of the current council, including Meredith and Haines.

Advocates continue to argue the senior project would generate millions in revenue and hundreds of jobs for Galt.

Haines and Meredith had been elected the previous fall on campaign promises to scale back Galt's growth plans.

Don Haines

Reached for comment, the two city leaders said they've followed the community's vision for responsible growth.

"I don't think the public is going to let them steal these seats from us," Haines noted. "This isn't going to go far."

Meredith said he wasn't surprised hear of the recall effort. noted he has heard threats a recall from members of t group since he was elected November 2006.

The earliest a recall vo could be held is during March 2009 special electio City Clerk Liz Aguire sai Several requirements — i cluding the collection roughly 1,800 signatures fro registered Galt voters — mu be met before a recall vote can be set motion.

Please see Galt, Page 8

Jerry Stribling (verbal comments)

- Livestock grazing needs to be preserved in Sacramento County

- Concerned that the SSHCP will place additional limitations on grazing/farming.

- Leased land—Concerned the Conservation Strategy of purchasing land in fee title will HCP reduce availability of land for lease. Many farmers, in particular ranchers, lease land. These ranchers may be impacted if the land is taken off the market.

- Native pasture—concerned about the management of native pasture. Will the SSHCP understand how to manage grazing land.

- Concerned about urban sprawl impact to agriculture throughout Sacramento County.

South Sacramento Habitat Conservation Plan

July 11, 2008 SSHCP EIR/EIS SCOPING MEETING (SAC COUNTY)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
Judy Wargell	Wargell Family			
Keith DeVore	County of Sacramento			
John Lane	Teichert			
Don Lockhart	LAFCo			
Dalia Fadl	County of Sac			
Edward Hand	Private Citizen			

080712_SAC-05

South Sacramento Habitat Conservation Plan

July 11, 2008 SSHCP EIR/EIS SCOPING MEETING (SAC COUNTY)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
Ron Bertoline	AKT Development			
George Woegel	Landowner			
Michele McCormick	MMC Communities			
Todd Chambers	The Chambers Company			
Paul Jones	USEPA			
Ginger-Forlje	Gibson+Scordal			
Peter Brundage	LAFCo			
GLEN HOLSTEIN	CALIFORNIA NATIVE PLANT SOCIETY			

080712 - SAC - 06

South Sacramento Habitat Conservation Plan

July 11, 2008 SSHCP EIR/EIS SCOPING MEETING (SAC COUNTY)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
John Weech	Farm Bureau			
Joel Buettner	Sac-Yolo Mosquito & Vector Control Dist			
GEORGE HUNSON	SAC COUNTY AIRPORT SYSTEM			
Michael Devereaux	Law Offices of Gregory Thatch			
James Morrell	Taylor & Wiley			
Jo [illegible]	[illegible]			
Kate Daley	USACE			
Brian Williams	STA			

0907R-SAC-07

080712-SAC-01

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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Will the Corps of Engineers consider the new South Sacramento Habitat conservation Plan ~~s~~ an approved:

(1) mitigation bank; or

(2) an in lieu fee program; or

(3) a permittee-responsible mitigation project

for purposes of the new Corps mitigation rulemaking issued earlier this year?

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: Michael Devereaux

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080712-SAC-02

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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Did the team consider involving the Regional Water Quality Control Board. Most of the time, the CORP requirements are in-line with NPDES requirem., but there maybe additional measures that applicants should know about.

Thanks.

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: _____

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

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080712-SAC-03

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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Will the SSHCP have a feature that would allow it to incorporate private wetland preserve areas into the preserve system managed by the SSHCP?

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: Michael Devereaux

Title and Org/Business (if applicable): Law offices of Gregory Thatch

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080712-SAC-04

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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Waegell Home Rand ~~of~~ map designations corrections
- We have no vineyards
- Some parcels that are cropland are designated as grassland
- Pond South of Florin Road not colored Blue = Tri Colored Blackbird habitat

Judy Waegell

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: _____

Title and Org/Business (if applicable): _____

Email address: already on list

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

South Sacramento Habitat Conservation Plan

July 15, 2008 SSHCP EIR/EIS SCOPING MEETING (RANCHO CORDOVA)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
Tami Tollenaar	landowner			
ELSIE MACHADO	landowner			
Kellie Berry	Placer Arnold			
Mike Devereaux	Law Offices of Gregory Thatch			
James Mizell	Taylor & Wiley			
Mark Hanson	cordova Hills			
Danny Young				
BILL MARTIN	CVFT			
Sandra Wiseman	Rep. Lungren			
Sam Miller	Lewis Planned Com			
Wendy Hall	Hall Consulting			
John J Tracy	Rancher.			
Stacey McKinley	SACOG			

South Sacramento Habitat Conservation Plan

July 15, 2008 SSHCP EIR/EIS SCOPING MEETING (RANCHO CORDOVA)

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER	MAILING ADDRESS
Bob Wilcox	DFG			
Jeff Schaffl	"			

080715-03

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please tell us of any potential impacts that should be studied, any alternatives or mitigating measures that offer promise, any problems or issues the proposed plan may cause, or your recommendations for improving the proposed plan. It helps us if you are specific.

Regarding Cordova Hills, the impacts outside the UDA for roadway, sewer, water, dry utilities (covered activities) should be taken into account. Cordova Hills project is 2,419 acres all within the USB, but will require a 4-6 lane roadway crossing & possibly other infrastructure through the northern & eastern side of the Kiefer landfill's bufferlands. Cordova Hills will require 3 access points & due to spacing requirements the southern entrance into Cordova Hills must traverse through the bufferlands outside the UDA. Cordova Hills owns this portion of the bufferlands & no [redacted] uses requiring urban services are proposed but construction of necessary project infrastructure outside the UDA will be needed.

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No I think already on list

If so, please provide your contact information.

Name: Mark Hanson

Title and Org/Business (if applicable): Cordova Hills

Email address:

Mailing address.

Phone

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080715-04

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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(1) The EIR/EIS needs to cover the impacts on the South Sac HCP of the proposed Highway 50 to Highway 99 connector road, for which a joint powers agency was just created; The HCP also needs to provide permit coverage for the connector.

(2) The EIR/EIS needs to include development in the City of Elk Grove's "South of Kammerer Road" area as a future development area covered by the permits to be issued for the South Sac HCP.

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: Michael Devereaux

Title and Org/Business (if applicable): Law Offices of Gregory D. Thatch

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080716_1

ELK CREEK SKAMANIA SHEET

NAME	EMAIL OR STREET ADDRESS
1. Charlotte Mitchell	
2. Marilyn Waegell	
3. Bob Dotson	
4. Ginger Fudge	
5. Tony Ceccarini	
6. Maureen Casey	
7. Lynn Wheat	
8. Ralph Pavey	
9. Mike Winn	
10. Bill Kuter	
11. John Ferguson	
12. Karen Buhr	
13. Dan Taverner	
14. Pablo Garza	
15. Wendel Fleisch	
16. KATHERINE MAESTAS	
17 Richard Rival	
18. Craig Ledbetter	
19. Betty Robinson	
20 Gene Robinson	
21. Don Smith	
22. Don & BARBARA HACKFORD	
23 STEVE DETRICK	
24 Laura Keister	
25 Kevin & Sherita Normington	

080716-2

NAME	EMAIL / OR / ST ADDRESS
Stan Mette	[redacted]

080716-3

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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Continue to look at City of Elk Grove Sphere of Influence and annexation proposal. Area should be addressed in EIR. Potential for future growth should be assessed. Avenues for EG to blend these areas into the plan should be kept open. A "50 year" plan should clearly look to the future & the reality that growth will occur. We trust you'll continue to listen with an open mind and include the City of Elk Grove & it's current & future residents in the decision making process

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: _____

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: D Wackford

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

0807 16-4

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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With the City of Elk Grove's formal application to amend the city's sphere of influence, the SSHCP environmental review should address that acreage for future development (or "take" habitat).
The EIR/EIS should also evaluate the mitigation type and quantity for these proposed SOI areas.

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: Michael Winn

Title and Org/Business (if applicable): Michael Winn Associates

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080716-5

South Sacramento Habitat Conservation Plan

Environmental Review Process – EIS/EIR

Comment Card

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We are very concerned about protecting the resources of the Cosumnes River floodplain area. Specifically Riparian habitat protection in zones ~~10, 11, 12~~ 3c, 1a, 8, 9 near Grantline Road ~~and~~, Highway 99 and Kammerer Road. At a minimum the area within the 200 year floodplain of Cosumnes River. & Deer Creek

It is a sensitive area with wetlands, vernal pools ~~[illegible]~~ endangered species habitat. It is being threatened by the development and expansion of the City of Elk Grove. The analysis should consider the impacts of expansion of the City of Elk Grove. Identification of resources in the sensitive areas and mitigation (if any).

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Don Smith

Title and Org/Business (if applicable):

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

080716-6

		Applicable Zones	Measure - Abbreviations	Measure - Reference
Zone 8	Specific Requirements	8	[illegible]	10
			[illegible]	10
			Preserve 79 Vernal Pool Ac on Laguna and Riverbank formations (55 Ac must occur on category 1 or 2 LAU)	10
			Preserve 2,500 valley grassland acres	10
			Preserve 1,000 Cropland and/or Irrigated Pasture Ac	17
			Preserve a minimum of 1,000 Cropland Ac in fee title to be maintained in for Alfalfa production (5 plots - 200 Ac/plot: 3 north and 2 south of Dillard Rd.)	18,55
	Shared Requirements	6,7,8,9,10,11	Preserve 191 Freshwater Marsh, 182 Open Water, 187 Seasonal Impoundment, 135 Seasonal Wetland, 95 Mixed Riparian Scrub, and 663 Mixed Riparian Woodland acres	13,14
		6a,7,8,9,10,11	Preserve 207 Swale acres	13
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve 88 Freshwater Marsh acres along select stream reaches for Giant Garter Snake	13
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve a total of 24,667 Valley Grassland acres	16
		7,8,9,10,11	Preserve 4,571 Cropland and/or Irrigated Pasture Ac	17
		7,8,9	Preserve 30 Valley Oak Riparian Woodland acres	14
		6,7,8,9,10,11,12	Preserve 196 linear miles of Stream channel within a corridor (800' wide, 2,000' wide along the Cosumnes R.) ensuring that 55 linear miles is preserved to support Giant Garter Snake	21,22,23,63
		6,7,8,9,10,11	Preserve 6,500 Valley Grassland acres beyond compensatory mitigation	26
		7,8,9,10,11	Preserve 2,000 Cropland acres beyond compensatory mitigation	29
		3a,3b,6b,6e,7,8	Preserve six (6) Tricolored Blackbird nesting colonies (colonies shall be within 3 miles of 6,000 acres of suitable foraging habitat)	65
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve all newly discovered occurrences of Sacramento and Slender Orcutt Grasses in as large a preserve as possible	68
		1,2,3,4,5,6,7,8,9,10,11,12	Preserve up to 10 occurrences of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia (5 occurrences must be protected before permitting take of the species and shall be located within a core/landscape preserve	66
		7,8,9,10,11	Restore or Create 241.3 Vernal Pool and 184 Swale acres	31
		1,2,3,4,5,6,7,8,9,10,11,12	Restore 242 Open Water and 153 Seasonal Impoundment acres	33
		1,2,3,4,5,6,7,8,9,10,11,12	Restore 79 Freshwater Marsh Ac ensuring that 50 acres are preserved to support Giant Garter Snake	34
		3,4,5,6,7,8,9,10,11,12	Restore 35 Mixed Riparian Scrub and 120 Mixed Riparian Woodland ensuring that 30 MRS and 95 MRW acres are preserved in zones 8, 9, and/or 11, and 20 MRW are restored along North Laguna Creek	35
		8,9,11	Restore 60 Valley Oak Riparian Woodland acres	35
		1,2,3,4,5,6,7,8,9,10,11,12	Restore 57 Seasonal Wetlands acres ensuring 36 acres occur outside the UDA and specifically 29 acres in zone 9.	36
		1,2,3,4,5,6,7,8,9,10,11,12	Restore 1,000 Mixed Riparian Woodland and 500 Valley Oak Riparian Woodland beyond compensatory mitigation	38
		3,4,5,7,8,9	Restore Valley Elderberry Longhorn Beetle habitat in conjunction with native vegetation along portions of Deer, S. Laguna & N. Laguna Creeks, and the Cosumnes River	49,50,51,52
		6,7,8,9,10	Incorporate clusters of native shrubs in 20 locations and up to 1,000 hunting perches (100 perches/20Ac) within new and existing preserves for Loggerhead Shrike	59,60
		8,9	Incorporate 5,000 linear feet of hedgerows and 500 suitable trees within the agricultural cropland matrix	57,58
		3b,6,7,8,9,11	Incorporate/establish 20 Himalayan blackberry sites for Tricolored Blackbird nesting sites within new and existing preserves	61
		1a,2,3b,7,8,10	Incorporate/establish 2 Western Burrowing Owl nesting areas in all core and landscape preserves and create at least 20 burrows per area	62
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate three (3) outlier populations of Sacramento and Slender Orcutt Grasses from populations in Zones 1, 2, & 3 into preserves no smaller than 500 acres in size	70
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate five (5) outlier populations of Ahart's Dwarf Rush, Bogg's Lake Hedge-Hyssop, Dwarf Downingia, and Pincushion Navarretia from populations in Zones 2, 3 & 4 into core/landscape preserves	69
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate 400 bat roost structures within new and existing preserves (one structure per 60 preserved acres), bat roosting structures into new bridges and culverts and retrofit 10 existing bridges/culverts with bat roosts	53,54
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate management plans and assess the current biological value for all preserves	39,40
		1,2,3,4,5,6,7,8,9,10,11,12	Incorporate avoidance and minimization measures while performing covered activities to prevent impacts to covered species	71,72,73,74,75,76,78,79

I believe that keeping City of Elk Grove Expansion outside the 200 year floodplain will cover the Zone 8 concerns

Dan Smith

EIS/EIR APPENDIX B

Summary of Process to Determine the Scope of the EIS/EIR (Scoping) (Part 2 of 2)

Appendix E

Agency Comments

U.S. Environmental Protection Agency Letter
Department of Transportation (Caltrans) Letter
Department of Conservation Letter
Department of Fish and Game Letter
Sacramento County Airport System Letter
Sacramento County Farm Bureau Letter
Sacramento Regional County Sanitation District Letter
Southgate Recreation & Park District

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

July 30, 2008

Ms. Nina Bicknese
Conservation Planning Branch
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

Subject: Notice of Intent to Prepare an Environmental Impact Statement (EIS) for the South Sacramento Habitat Conservation Plan, Sacramento County, California.

Dear Ms. Bicknese:

The U.S. Environmental Protection Agency (EPA) has reviewed the U.S. Fish and Wildlife Service (Service) Notice of Intent to Prepare an Environmental Impact Statement (EIS) for the South Sacramento Habitat Conservation Plan (HCP) pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act. These comments were also prepared under the authority of, and in accordance with, the provisions of the Federal Guidelines (Guidelines) promulgated at 40 CFR 230 under Section 404(b)(1) of the Clean Water Act (CWA). Our detailed comments are enclosed.

The proposed HCP would result in a 30-year permit, issued by the Service that would authorize incidental take of 40 covered species due to ground disturbing activities implemented under the HCP. Sacramento County, the cities of Elk Grove, Rancho Cordova, Galt, the Sacramento Regional County Sanitation District, and the Sacramento County Water Agency (Local Partners) would apply to the Service for incidental take authorization under the HCP. Incidental take would occur from a wide range of activities but would generally be related to urban and suburban development and supporting infrastructure, including roads, water supply, water and sewage treatment, flood control, utilities, land fills, police, fire and medical services, open space and recreation, as well as mining operations, and conservation activities. The local partners are facilitating the preparation of the HCP in coordination with the Service. The U.S.

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Army Corps of Engineers (Corps), as a cooperating agency, will consider using the EIS to inform their discretionary decision to issue a programmatic general permit (PGP) for certain components proposed under the HCP.

EPA recognizes the level of effort that has gone into the HCP thus far; however, we remain concerned with various impacts to environmental resources. We have been involved with the development of the HCP since its inception, both through our direct participation and through awarding of a $750,000 grant. Since that time, we note that the HCP development process has benefited from the efforts of Richard Radmacher, Senior Planner with the Sacramento County Planning Department. We acknowledge Richard's good efforts and look forward to continued coordination with him, the Service, Corps, and other participants in this process.

Significant impacts would occur to many acres of vernal pools and other aquatic resources in the HCP area. This is in addition to a long history of direct and indirect impacts, as well as impacts from future planned development near the HCP area. The EIS should clearly describe the cumulative impacts to these resources, impacts to the species that depend on them, and how they will be adequately mitigated through the HCP conservation strategy. EPA recognizes the level of effort that has gone into the mapping, species accounts, and review of biological resources in the HCP area and we anticipate the EIS will clearly disclose how this information has informed the conservation strategy. The EIS should also assess a reasonable range of alternatives that maximize avoidance of aquatic resources and comply with Clean Water Act Section 404 (b)(1) Guidelines. EPA is concerned with the significant amount of fill that would occur as a result of development plans approved by the Local Partners and authorized under the HCP.

The EIS should also provide a science-based discussion of vernal pool mitigation in the HCP area and describe how vernal pool mitigation predominantly in the southern portion will provide adequate mitigation for impacts to the north. EPA is especially concerned that this approach could compromise biological and genetic diversity in the area.

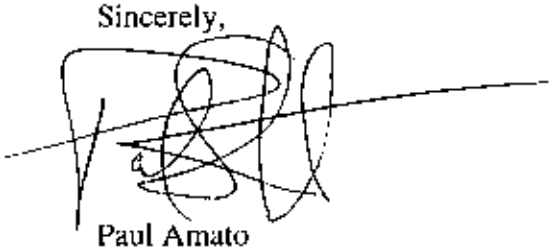
EPA encourages the Service and Local Partners to integrate Smart Growth, Low Impact Development (LID), and Green Building principles into the conservation strategy of the HCP to reduce impacts to environmental resources and improve living conditions for future residents. We are concerned that the planning and developments that would occur in the HCP area would be a continuation of urban and suburban sprawl that has been shown to result in greater environmental impacts than Smart Growth, LID, and Green Building alternatives. The HCP is an opportunity to demonstrate how these principles can be used to design developments that have reduced impacts and improved living conditions for future occupants.

The EIS should also provide a detailed analysis of groundwater impacts, water availability, impacts to air quality and traffic, and the potential impacts from induced growth that would result from projects approved under the HCP.

Due to the potential significant impacts from projects likely seeking approval under the HCP, and a possible Corps PGP, EPA encourages the Corps and Local Partners to continue to coordinate with EPA and other environmental resource agencies prior to the release of the EIS for public review. When the EIS is released for review, please send one hard copy and two CD

copies to the address above (mailcode: CED-2) at the same time the EIS is formally filed with EPA Headquarters. If you have any questions, please contact me at 415-972-3847 or amato.paul@epa.gov.

Sincerely,



Paul Amato
Environmental Protection Specialist
Environmental Review Office

Enclosure:
EPA's Detailed Comments

Cc:
Mr. Richard Radmacher, Sacramento County Planning Department
Mr. Patrick Gillum, Central Valley Regional Water Quality Control Board
Mr. Jeff Finn, California Department of Fish and Game

ENVIRONMENTAL PROTECTION AGENCY'S (EPA) DETAILED COMMENTS ON THE NOTICE OF INTENT (NOI) TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE SOUTH SACRAMENTO HABITAT CONSERVATION PLAN PROJECT (HCP), JULY 30, 2008

Waters of the US

Though not described in the NOI, EPA is very concerned with the amount of direct and indirect impacts to vernal pools and other aquatic resources that would occur under the HCP. The EIS should describe the potential direct, indirect, and cumulative impacts to these resources that could result from HCP approved projects. Mitigation for these impacts should also be described. Continued urban and suburban development in South Sacramento and surrounding regions have had a significant impact on vernal pool habitat and species, and insufficient opportunities to adequately mitigate for these impacts is an ongoing and increasing concern for EPA. EPA recommends the Service and Local Partners reduce impacts to all aquatic resources, including vernal pools, to the maximum extent feasible. For further discussion of these concerns, the Service should contact Paul Jones, EPA Water Division at (415) 972-3470, or by email at jones.paul@epa.gov.

Conservation Strategy

The EIS should clearly demonstrate how the HCP will contribute to the recovery of the covered species and provide adequate conservation of their habitats. The NOI states that the HCP would provide a regional approach for the conservation of the 40 covered species and their 18 habitat types so as to aid in the recovery of the species. Key to this is the protection of approximately 47,000 acres and creation or restoration of approximately 1,500 acres, out of the 341,000 acre HCP area. This would result in the protection of less that 14% and creation or restoration of approximately 0.4% of the total HCP area. Of this, approximately 8,000 acres would be spread throughout the Urban Development Area (UDA) and eventually be surrounded by development, resulting in fragmentation, increased edge effects, and habitat degradation. EPA is concerned with the small percentage of larger protected areas, and the creation and restoration components of the HCP conservation strategy. We recommend increasing these areas and providing a clear analysis in the EIS that demonstrates how they will provide adequate conservation and aid in the recovery of the 40 covered species.

The EIS should demonstrate how the conservation and mitigation areas selected to protect and compensate for high quality habitats will adequately benefit the species in the development areas that have been identified through on-the-ground species accounts. While not stated in the NOI, we understand that a significant amount of mitigation for development in the northern portion of the HCP area will occur in the south. This redistribution of habitat and species could result in reduced genetic integrity for various vernal pool species. The EIS should provide a scientific basis for the adequacy and appropriateness of the conservation strategy and mitigation measures. The EIS should also clarify whether any activities, such as agriculture, are expected to occur in the conservation areas and if so, what their impacts would be.

Statements in the NOI regarding acres conserved and developed are contradictory and should be clarified in the EIS. Page 32730 of the Federal Register states that approximately 43,500 acres within the 123,000 acre UDA and 2,000 acres outside the UDA would be developed, for a total of 45,500 acres developed under the HCP. Page 32731 states that approximately 43,500 acres of land would be developed within the 341,000 acre Planning Area.

The NOI states that components of the proposed HCP conservation program are under consideration and that "...these components may include monitoring, adaptive management, species avoidance measures, and species mitigation measures including preservation, restoration, and enhancement of suitable habitat" (emphasis added). The EIS should include these components, at a minimum, and describe how they will aid to the recovery of the 40 species.

Finally, as stated above, the Service and Local Sponsors should commit to implementing Smart Growth, LID, and Green Building principles as part of the conservation strategy for the HCP.

Alternatives

The EIS should clearly describe and equally assess a reasonable range of alternatives, including the no action alternative. Alternatives previously considered but not carried forward in the EIS should be described, and reasons to not be considered further explained. Because of the large area of the proposed HCP and the potential for significant impacts from covered actions to several environmental resources, including 7 listed and 33 nonlisted species under the Federal Endangered Species Act (ESA), the Service and Local Partners should consider a range of alternatives that includes avoiding impacts to resources to the maximum extent practicable. We note that the NOI anticipates the development of several alternatives for analysis in the EIS.

As stated in the NOI, the Corps will be a NEPA cooperating agency and may use the EIS to inform their discretionary decision to issue a programmatic general permit (PGP) for certain components of the HCP involving fill and dredging activities. EPA supports efforts to properly integrate the Corps' Clean Water Act (CWA) Section 404 authority into the HCP; however, the EIS should analyze alternatives that avoid, minimize, and mitigate impacts to waters of the US (WOUS), identify the least damaging practical alternative (LEDPA) consistent with CWA Section 404 (b)(1) Guidelines, and conduct a robust comparative analysis of these alternatives. This information is necessary to inform the decision maker as to which alternative is the LEDPA prior to integration of Corps 404 authority. EPA also recommends the County of Sacramento adopt an ordinance that would protect conservation and mitigation areas within the HCP area from impacts to WOUS in.

As part of the alternatives analysis, EPA strongly encourages the HCP proponents to conduct a detailed, accurate, and comprehensive assessment of the environmental resources at the proposed HCP site. Areas with higher functions and values should be preserved in perpetuity, including protection of WOUS through the HCP, 404 integration, and a County ordinance. The results of this analysis should be described in the EIS, including how this

information has been used to inform development of alternatives that avoid and protect environmental resources identified at the site.

Smart Growth, Low Impact Development, and Green Building Principles

The NOI states that activities covered by the HCP are wide-ranging, but generally will be urban and suburban development, supporting infrastructure and services. EPA strongly encourages the Service, Corps and Local Partners to commit to implementing Smart Growth, Low Impact Development (LID), and Green Building principles as conservation measure that will avoidance and minimize impacts to covered species and their habitats, including aquatic resources. Urban and suburban sprawl continues to contribute significant negative impacts to terrestrial and aquatic habitats, air quality, traffic, water supply, water quality, archeological resources, agriculture, and other environmental and human resources. Smart Growth, LID, and Green Building principles provide opportunities to design and construct urban and suburban developments in a way that minimizes these impacts. The Service and Corps, along with the Local Partners should seize the opportunity to integrate these principles as conservation and impact minimization measures for covered species, WOUS, and to enhance the daily lives of future residents.

By implementing Smart Growth, LID, and Green Building principles, environmental impacts of the projects covered under the HCP can be reduced within and beyond the HCP Area. For example, high density, transit oriented and bicycle and pedestrian-friendly villages reduce the need for residents to drive to services and amenities thus reducing the amount of tailpipe emissions like nitrogen oxides, and other ozone precursors, that compromise respiratory function in Sacramento County. In addition to reduced vehicle emissions, integrating solar power and other sources of renewable energy generation can reduce greenhouse gas emissions and help improve efforts to stem climate change impacts. Project footprints can also be configured to avoid impacts to terrestrial and aquatic habitat and preserve more open space. Building materials selected from sustainable sources such as lumber from sustainably managed forests, lumber alternatives, and building products made from recycled materials reduce the impacts from natural resource demands. EPA encourages the Service, Corps and Local Partners to commit to maximizing the implementation of these principles.

More information on Smart Growth, LID, and Green Building can be found in publications at EPA's websites at www.epa.gov/smartgrowth, http://www.epa.gov/nps/lid/, and www.epa.gov/greenbuilding/index.htm. Information about the Leadership in Energy and Environmental Design (LEED) for Neighborhood Development Rating System can be found at the US Green Building Council website at http://www.usgbc.org/.

Groundwater

Development and water supply projects approved for incidental take under the HCP have the potential to result in significant impacts to groundwater in the HCP area. The EIS should clearly describe existing groundwater conditions, potential cumulative impacts to groundwater

quantity and quality, and avoidance measures to prevent impacts. EPA is especially concerned with groundwater in the HCP area due to the relationship between existing conditions and vernal pools, and other aquatic resources that exist due to these conditions. Any direct, indirect and cumulative impacts to groundwater that may occur as a result of the HCP should be clearly assessed in the EIS in light of these relationships.

Water Availability

The EIS should describe existing and/or proposed sources of water supply for projects that would be covered under the HCP and include direct, indirect and cumulative impacts to water resources that may occur. Projects approved under the HCP and actions potentially approved under a Corps programmatic general permit could result in thousands of new residences, businesses, and services in the area, resulting in significant increases in water demands for an indefinite period of time. EPA strongly encourages the Service and Local Partners include in the EIS a description of all water conservation measures that will be implemented to reduce water demands for projects that would be covered under the HCP. Project designs should maximize conservation measures such as appropriate use or recycled water for landscaping and industry, xeric landscaping, a water pricing structure that accurately reflects the economic and environmental costs of water use, and water conservation education. Water saving strategies can be found in the EPA's publications *Protecting Water Resources with Smart Growth* at www.epa.gov/piedpage/pdf/waterresources_with_sg.pdf, and *USEPA Water Conservation Guidelines* at www.epa.gov/watersense/docs/app_a508.pdf.

In addition, the EIS should describe water reliability for development projects approved under the HCP and clarify how existing and/or proposed sources will be affected by climate change. At a minimum, EPA expects a qualitative discussion of impacts to water supply and adaptability of the projects to these changes, as part of the EIS impacts analysis.

Air Quality and Traffic

Projects approved under the HCP will result in increased impacts to air quality in Sacramento County; an area designated nonattainment for 8-hour ozone and particulate matter smaller than 10 microns (PM_{10}). Specifically, the air basin is designated serious nonattainment for 8-hour ozone and moderate nonattainment for PM_{10}. The EIS should provide a discussion of the baseline air quality conditions in the HCP area and a description of federal and state air quality regulations, and a rigorous assessment of direct, indirect, and cumulative effects of the projects authorized under the HCP on air quality. The analysis of air quality impacts should include direct, indirect and cumulative impacts from construction and post construction conditions, including increased traffic. The Service should describe in the EIS specific commitments to mitigate emissions that will prevent further degradation of air quality in the basin. In short, the cumulative impacts analysis should consider all new sources of emissions that are likely to result from the federal action of issuing the proposed HCP. The EIS should also describe coordination with EPA, California Air Resources Board, and the Sacramento Metropolitan Air Quality Management District to reduce air quality impacts in the air basin.

The EIS should describe whether emissions from projects approved under the HCP will or will not meet general conformity requirements with the associated state implementation plans for the air basin. If the federal action is determined to potentially interfere with the attainment of Clean Air Act national ambient air quality standards (NAAQS), the Service is required to conduct a conformity analysis to determine the likelihood and extent of interference. For conformity-related questions, the Corps is encouraged to consult with EPA and should contact Ms. Karina O'Connor at (775) 833-1276 or by email at oconnor.karina@epa.gov.

To prevent degradation of air quality from construction-caused PM_{10} in Sacramento County, we suggest the following fugitive dust control measures be committed to in the EIS to reduce impacts to existing air quality conditions:

Fugitive Dust Source Controls:

- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate. This applies to both inactive and active sites, during workdays, weekends, holidays, and windy conditions.
- Install wind fencing and phase grading operations where appropriate, and operate water trucks for stabilization of surfaces under windy conditions.
- When hauling material and operating non-earthmoving equipment, prevent spillage and limit speeds to 15 miles per hour (mph). Limit speed of earth-moving equipment to 10 mph.

Mobile and Stationary Source Controls:

- Reduce use, trips, and unnecessary idling from heavy equipment.
- Maintain and tune engines per manufacturer's specifications to perform at EPA certification levels and to perform at verified standards applicable to retrofit technologies. Employ periodic, unscheduled inspections to limit unnecessary idling and to ensure that construction equipment is properly maintained, tuned, and modified consistent with established specifications.
- Prohibit any tampering with engines and require continuing adherence to manufacturers recommendations
- If practicable, lease newer and cleaner equipment meeting the most stringent of applicable Federal or State Standards.
- Utilize EPA-registered particulate traps and other appropriate controls where suitable to reduce emissions of diesel particulate matter and other pollutants at the construction site.

Administrative controls:

- Identify where implementation of mitigation measures is rejected based on economic infeasibility.
- Prepare an inventory of all equipment prior to construction and identify the suitability of add-on emission controls for each piece of equipment before groundbreaking. (Suitability of control devices is based on: whether there is reduced normal availability of the construction equipment due to increased downtime and/or power output, whether there may be significant damage caused to the construction equipment engine, or whether there may be a significant risk to nearby workers or the public.)

- Utilize cleanest available fuel engines in construction equipment and identify opportunities for electrification. Use low sulfur fuel (diesel with 15 parts per million or less) in engines where alternative fuels such as biodiesel and natural gas are not possible.
- Develop a construction traffic and parking management plan that minimizes traffic interference and maintain traffic flow.

The EIS should identify sensitive receptors in the project area, such as schools, daycare centers, nursing homes, and hospitals and specify the means by which impacts to these receptors will be minimized due to both construction and long term land use associated with the new development . For example, locate construction equipment and staging zones away from sensitive receptors away from fresh air intakes and buildings and design neighborhoods such that activity centers (ball fields, etc.) and sensitive receptors are not proximate to emissions sources, such as highways.

Due to the scale of the proposed HCP area and the amount of new residents, businesses, and services that could occur, it is reasonable to anticipate increased traffic and congestion in the local surface streets, freeways and highways. The EIS should include a traffic analysis to determine how the proposed projects will affect traffic in the region and contribute to cumulative air quality impacts.

Cumulative Effects

The proposed HCP would issue incidental take permits for the construction of several developments, in addition to several in the area that have occurred in the recent past or are proposed and under various stages of development. As a result, it is critical that the cumulative effects analysis be comprehensive and rigorous, and that it consider an appropriate scope of activities, and spatial and temporal scales when assessing project effects. EPA suggests referring to the Council on Environmental Quality 1997, guidance *Considering Cumulative Effects Under the National Environmental Policy Act* found at http://www.nepa.gov/nepa/ccenepa/ccenepa.htm, and 1999 EPA guidance, *Consideration of Cumulative Impacts in EPA Review of NEPA Documents* found at http://www.epa.gov/compliance/resources/policies/nepa/cumulative.pdf. In addition, we recommend referring to the EPA, California Department of Transportation, and Federal Highway Administration Guidance for Preparers of Cumulative Impact Analysis found at http://www.dot.ca.gov/ser/cumulative_guidance/purpose.htm. While this guidance was developed for transportation projects, the principles and the 8-step process in this guidance can be applied to other types of projects, both within and outside of California. We recommend the principles and steps in this guidance to other agencies as a systematic way to analyze cumulative impacts for their projects.

Induced Growth

The EIS should describe how the proposed HCP could result in environmental impacts due to induced-growth. New development and anticipated population growth that could occur

from projects covered under the HCP could result in increased pressure for more development, increased transportation infrastructure and other essential services in the area. Taken into account with the other proposed projects in the project area, induced growth impacts could be significant. EPA's recommendation is to make both the methodology and the assumptions in the growth inducing analysis as transparent as possible to the public and decision makers. To do this, EPA recommends that Service and Local Sponsors:

(1) Identify which land use model will be used, discuss its strengths and weaknesses, and describe why it was selected.

(2) Identify the assumptions used in the model and why those assumptions were selected. For example, describe which method will be used to allocate growth to analysis zones, its strengths and weaknesses, and why that method was selected.

(3) Ground truth the results of the land use model by enlisting local expertise involved in land use issues, such as local government officials, land use and transportation planners, home loan officers, and real estate representatives. Use their collective knowledge to validate or modify the results of the land use model.

(4) Use the results of the growth inducing analysis to inform transit options, neighborhood design, and recommendations for land use as well as mitigation measures to reduce environmental impacts.

Covered Species

The NOI states that species may be added or deleted from the HCP during the course of the 30-year permit. The EIS should clearly describe the process, criteria, and authority under which adding or deleting species would occur.

Project Purpose and Need

The purpose and need statement in the EIS should be clearly stated and briefly describe the underlying purpose and need to which Service is responding in proposing alternatives, including the proposed action (40 C.F.R. 1502.13.) The statement of purpose and need should explain why the Service and Local Partners are undertaking the proposed South Sacramento Habitat Conservation Plan (HCP) and the objectives that the action is intended to achieve. A clear purpose and need statement is important under the National Environmental Policy Act (NEPA) and to EPA's review in that it should be directly linked to the proposed alternative designs and clarify the potential impacts of a range of reasonable alternatives for the proposed HCP.

DEPARTMENT OF TRANSPORTATION
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Flex your power!
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July 10, 2008

08SAC0122
03 SAC-VARIOUS
South Sacramento Habitat Conservation Plan
Notice of Preparation
SCH#2008062030

Ms. Joyce Horizumi
County of Sacramento
Department of Environmental Review and Assessment
827 7th Street, Room 220
Sacramento, CA 95814

Dear Ms. Horizumi:

Thank you for the opportunity to review and comment on the South Sacramento Habitat Conservation Plan Notice of Preparation document. Our comments are as follows:

- Caltrans would like to coordinate with Sacramento County and other participants regarding the South Sacramento Habitat Conservation Plan as it is being developed. Please include Caltrans on any inter-agency working group that may be formed.

- A buffer between land designated as habitat conservation areas in the Plan and existing transportation facility right of way should be considered to avoid conflict between transportation facility operation or improvements and the long term viability of habitat conservation areas.

If you have any questions regarding these comments, please contact Ken Champion at (916) 274-0615.

Sincerely,

ALYSSA BEGLEY, Chief
Office of Transportation Planning – South

c: Scott Morgan, State Clearinghouse

STATE OF CALIFORNIA, RESOURCES AGENCY ARNOLD SCHWARZENEGGER, GOVERNOR

DEPARTMENT OF CONSERVATION

DIVISION OF LAND RESOURCE PROTECTION

801 K STREET • MS 18-01 • SACRAMENTO, CALIFORNIA 95814

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July 9, 2008

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JUL 9 2008
DEPARTMENT OF CONSERVATION
ENVIRONMENTAL REVIEW AND ASSESSMENT

VIA FACSIMILE (916) 874-8343
Peter Morse
Joint Sacramento County/USFWS
827 7th Street, Room 220
Sacramento, CA 95818

Subject: South Sacramento Habitat Conservation Plan Notice of Preparation
SCH# 2008062030

Dear Mr. Morse:

The Department of Conservation's (Department) Division of Land Resource Protection (Division) has reviewed the Notice of Preparation (NOP) for the referenced project. The Division monitors farmland conversion on a statewide basis and administers the California Land Conservation (Williamson) Act and other agricultural land conservation programs. We offer the following comments and recommendations with respect to the project's impacts on agricultural land and resources.

Project Description

The South Sacramento Habitat Conservation Plan (SSHCP) project is a regional plan to conserve species and address issues related to urban development, habitat conservation, open space protection and agricultural protection. The Division recommends that the Environmental Impact Report (EIR) address the following items to provide a comprehensive discussion of potential impacts of the project on agricultural land and activities.

Agricultural Setting of the Project

- Location and extent of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and other types of farmland in and adjacent to the project area.
- Current and past agricultural use of the project area. Please include data on the types of crops grown, and crop yields and farm gate sales values.

To help describe the full agricultural resource value of the soils on the site, the Department recommends the use of economic multipliers to assess the total contribution of the site's potential or actual agricultural production to the local, regional

and state economies. Two sources of economic multipliers can be found at the University of California Cooperative Extension Service and the United States Department of Agriculture (USDA).

Project Impacts on Agricultural Land

- Type, amount, and location of farmland conversion resulting directly and indirectly from project implementation and growth inducement, respectively.
- Impacts on current and future agricultural operations; e.g., land-use conflicts, increases in land values and taxes, vandalism, etc.
- Incremental project impacts leading to cumulative impacts on agricultural land. This would include impacts from the proposed project, as well as impacts from past, current, and likely projects in the future.

Under California Code of Regulations Section 15064.7, impacts on agricultural resources may also be both quantified and qualified by use of established thresholds of significance. As such, the Division has developed a California version of the USDA Land Evaluation and Site Assessment (LESA) Model. The California LESA model is a semi-quantitative rating system for establishing the environmental significance of project-specific impacts on farmland. The model may also be used to rate the relative value of alternative project sites. The LESA Model is available on the Division's website at:

http://www.consrv.ca.gov/DLRP/qh_lesa.htm

Williamson Act Lands

Under California Code of Regulations Section 15206(b)(3), a project is deemed to be of statewide, regional or area-wide significance if it will result in cancellation of a Williamson Act contract for a parcel of 100 or more acres. If lands under Williamson Act contracts and/or in agricultural preserves exist in the project area, the Department recommends that the following information be discussed and/or provided in the EIR:

- A map detailing the location of agricultural preserves and contracted land within each preserve. The EIR should also tabulate the number of Williamson Act acres, according to land type (e.g., prime or non-prime agricultural land), which could be impacted directly or indirectly by the project.
- A discussion of Williamson Act contracts that may be terminated in order to implement the project. The EIR should discuss the probable impacts on nearby properties resulting from the termination of adjacent Williamson Act contracts. For example, a termination of a Williamson Act contract may have a growth-inducing impact. In other words, a termination may not only lift a barrier to development, but also result in higher property taxes, and thus, an incentive to shift to a more intensive land use, such as urban development.

- As a general rule, land can only be withdrawn from a Williamson Act contract through the nine-year non-renewal process. Immediate termination via cancellation is reserved for "extraordinary circumstances" (See Sierra Club v. City of Hayward (1981) 28 Cal.3d 840, 852-855). Under Government Code Section 51282, the city or county must approve a request for cancellation and base that approval on specific findings that are supported by substantial evidence. When cancellation is proposed, the Department recommends that a discussion of the findings be included in the EIR. Finally, a notice of the hearing to approve the tentative cancellation and a copy of the landowner's petition must be mailed to the Director of the Department ten working days prior to the hearing. (The notice should be mailed to Bridgett Luther, Director, Department of Conservation, c/o Division of Land Resource Protection, 801 K Street MS 18-01, Sacramento, CA 95814-3528.)
- Under Government Code Section 51243, if a city annexes land under a Williamson Act contract, the city must succeed to all rights, duties, and powers of the county under the contract. However, under Section 51243.5, a city may exercise its option not to succeed to the contract if certain conditions are met. LAFCO must notify the Department within 10 days of a city's proposal to annex land under a contract (Government Code Section 56753.5). Additionally, LAFCO must not approve a change to a sphere of influence or annexation of contracted land to a city unless certain conditions are met (see Government Code Sections 51296.3, 56426, 56426.5, 56749 and 56856.5).
- If portions of the planning area are under Williamson Act contracts (and will continue to be under contract after project implementation) the EIR should discuss the proposed uses for those lands. Uses of contracted land must meet compatibility standards identified in Government Code Sections 51238 - 51238.3. Otherwise, contract termination (see paragraph above) must occur prior to the initiation of the land use.
- An agricultural preserve is a zone authorized by the Williamson Act and established by the local government to designate qualified land to be placed under the Williamson Act's 10-year contracts. Preserves are also intended to create a setting for contract-protected lands that is conducive to continuing agricultural use. Under Government Code Section 51230, "An agricultural preserve may contain land other than agricultural land, but the use of any land within the preserve and not under contract shall within two years of the effective date of any contract on land within the preserve be restricted by zoning, including appropriate minimum parcel sizes that are at a minimum consistent with this chapter, in such a way as not to be incompatible with the agricultural use of the land." Therefore, the EIR should also discuss any proposed general plan designation or zoning within agricultural preserves affected by the project.

Thank you for giving us the opportunity to comment on this NOP. If you have questions regarding our comments, or require technical assistance or information on agricultural land conservation, please contact Elliott Lum, Environmental Planner, at 801 K Street, MS 18-01, Sacramento, California 95814; or, phone (916) 324-0869.

Sincerely,

Brian Leahy
Assistant Director

cc: State Clearinghouse

State of California - The Resources Agency ARNOLD SCHWARZENEGGER, Governor
DEPARTMENT OF FISH AND GAME
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RECEIVED
JUN 30 2008
DEPARTMENT OF ENVIRONMENTAL REVIEW AND ASSESSMENT

June 24, 2008

Mr. Peter Morse
Joint Sacramento County/USFWS
827 Seventh Street, Room 220
Sacramento, CA 95818

Dear Mr. Morse:

The Department of Fish and Game (DFG) has reviewed the Notice of Preparation of a draft Environmental Impact Report (DEIR) for the South Sacramento Habitat Conservation Plan (SSHCP), (SCH #2008060230). The project consists of a regional approach to conserving species and addressing issues related to urban development, habitat conservation, open space and agricultural protection. The SSHCP will authorize Sacramento County, and the cities of Elk Grove, Rancho Cordova, and Galt, and two public utility agencies to issue permits allowing landowners to engage in specific development activities that could result in incidental take of listed species. The SSHCP plan area includes the Cities of Elk Grove, Rancho Cordova, and Galt, and the portion of Sacramento County south of the American River and east of Highway I-5 all the way to the County-line boundaries with Amador and San Joaquin Counties.

Wildlife habitat resources consist of a wide variety of habitats including vernal pool grasslands, oak woodlands, agricultural lands, and riparian and other wetland habitats. Significant natural resources of the project include habitat for sensitive species including 10 species listed under either the State or Federal Endangered Species Act.

We recommend that the DEIR discuss and provide adequate mitigation for the following concerns:

1. The project's impact upon fish and wildlife and their habitat. The SSHCP will replace actions previously taken to protect wildlife and their habitat. Examples include: individual project review under CEQA, individual incidental take permits issued under State and Federal Endangered Species Acts, individual permits under section 404 of the River and Harbors Act, Streambed Alteration Agreements (1600 permits), etc. The DEIR should discuss the value of the SSHCP in comparison with existing or alternative strategies for conserving wildlife and habitat in the SSHCP plan area.

2. The DEIR should identify and discuss potential areas of conflict in conservation planning. Examples may include conserving one species or group of species at the expense of other species of wildlife, SSHCP Preserve designs which differ significantly from USFWS critical habitat or recovery units, or conflicts with the conservation efforts of private organizations like The Nature Conservancy, or Sacramento Valley Conservancy.

3. The project's impact upon wetlands including vernal pools and riparian habitat. The SSHCP's Conservation Strategy will likely effect the location and amount of the remaining wetland habitat in south Sacramento County. The DEIR should discuss the impact of the SSHCP's Conservation Strategy on wetlands and wetland dependant species. Among other things, the analysis should center on whether the proposed configuration of preserved habitat will permit long-term viability of habitats and species.

4. The SSHCP Covered Species list includes endemic species that have a narrow distribution (Sacramento Orcutt grass), as well as species which have important parts of their range within the plan area (vernal pool tadpole shrimp). The DEIR should discuss the potential for the project to impact these species, or other species, such that their populations might drop below a self-sustaining level.

5. The SSHCP affords Incidental Take coverage for infrastructure projects like roads, water conveyance, etc., both inside and outside the Urban Development Area. These types of projects may act as barriers to the movement of wildlife across the landscape, or between preserves. The DEIR should contain a discussion of, and provide mitigation for, any adverse effects that these barriers may have upon wildlife.

6. The DEIR will form the basis for DFG's issuance of a 2081(b) Incidental Take Permit for the SSHCP. Therefore, mitigation for State-listed species must meet DFG's full mitigation standard contained in California Code of Regulation Title 14, Section 783.4.

7. The DEIR should contain an evaluation of the SSHCP's consistency with applicable land use plans (General Plans, Specific Plans, etc.), as well as other habitat conservation plans (San Joaquin HCP, Natomas HCP).

This project will have an impact to fish and/or wildlife habitat. Assessment of fees under Public Resources Code Section 21089 and as defined by Fish and Game Code Section 711.4 is necessary. Fees are payable by the project applicant upon filing the Notice of Determination by the lead agency.

Pursuant to Public Resources Code Sections 21092 and 21092.2, the DFG requests written notification of proposed actions and pending decisions regarding this project. Written notifications should be directed to this office.

Thank you for the opportunity to review this project. If the DFG can be of further assistance, please contact Mr. Dan Gifford, Staff Environmental Scientist, telephone (209) 369-8851 or, Mr. Jeff Drongesen, Supervising Environmental Scientist, telephone (916) 358-2382.

Sincerely,

Sandra Morey
for Regional Manager

cc. Mr. Jeff Drongesen
Department of Fish and Game
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Mr. Dan Gifford
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County Executive
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Sacramento County
Airport System
G. Hardy Acree, Director of Airports

County of Sacramento

Sacramento International Airport
Mather Airport
Executive Airport
Franklin Field

RECEIVED
JUL 14 2008
DEPARTMENT OF ENVIRONMENTAL REVIEW AND ASSESSMENT

July 9, 2008

Joyce Horizumi
Director/ Environmental Coordinator
Department of Environmental Review
and Assessment (DERA)
827 Seventh Street, Room 220
Sacramento, CA 95814-2922

Nina Bicknese
Conservation Planning Branch
Sacramento Fish and Wildlife Office
U.S. Fish and Wildlife Service
2800 Cottage Way, Room W-2605
Sacramento, CA 95825

Subject: Comments – Notice of Preparation (NOP) of a Joint DEIR and DEIS for South Sacramento Habitat Conservation Plan (SSHCP)
DERA Control Number 03-PLE-0637

Dear Ms. Horizumi and Ms. Bicknese:

This letter conveys the comments and recommendations of the Sacramento County Airport System (County Airport System) in response to the NOP issued by the Sacramento County Department of Environmental Review and Assessment (DERA) on June 11, 2008, and published in the *Federal Register* on June 10, 2008 by the United States Fish and Wildlife Service (Service). In summary, we strongly recommend that the Joint DEIR/DEIS consider current and future projected aircraft operational requirements at three airports operated by the County Airport System in the southern portion of the County: Executive Airport (SAC), Mather Airport (MHR), and Franklin Field (F72). In particular, the goal of the SSHCP to protect and conserve 40 wildlife species could increase the areal extent and concentration of habitat for avian species particularly hazardous to commercial aircraft operations.

Our comments begin with an overview of the three airports. Mather Airport and Franklin Field are located within the SSHCP Study Area depicted in Figure 2-1 of Chapter 2 (Physical Resources) of the Draft SSHCP. In addition, the western boundary of the Study Area appears to be within one mile or less of Executive Airport. We then summarize the requirements of the Federal Aviation Administration (FAA) relative to wildlife hazards near airports, and the involvement of the County Airport System in efforts that resulted in approval by the Sacramento County Board of Supervisors of changes in County land use plans for South Mather (Resolution 2006-0210, February 26, 2006).

(1) Overview of Mather Airport

Mather Airport is one of four airports operated by the County Airport System. (The aviation operations at McClellan Airport are managed by the County Airport System on behalf of the County's Department of Economic Development and Intergovernmental Affairs.) MHR is the County Airport System's designated cargo airport, and it also supports a significant number of general aviation operations. During 2007, MHR supported 87,617 flight operations, including cargo, general aviation, air taxi, and military. (An "operation" is either an aircraft landing or take-off.) As an indication of Mather Airport's regional economic importance, during the first five months of 2008, MHR accommodated 69,401,179 pounds of freight, almost evenly divided between arriving and departing shipments. The total represents an increase of 8.6 percent over the same five-month period in 2007.

The County Airport System initiated a Master Plan for Mather Airport in April 2001. On February 17, 2004, the Sacramento County Board of Supervisors accepted the draft Master Plan and directed that DERA initiate preparation of environmental review, a process that is ongoing. The draft MHR Master Plan forecast update projects an annual average growth rate in operations of 1.3 percent for the period between 2007 and 2025, resulting in annual operations growth from 87,617 in 2007 to 110,634 in 2025. In addition to existing available commercial space at MHR, over 200 acres of land is planned for new construction once the Mather Airport Master Plan is complete. The Mather Airport Master Plan may be viewed on the County Airport System website, by accessing the Planning and Development tab:
http://www.sacairports.org/mather/planning/index.html.

(2) Overview of Executive Airport

Located on 540 acres in the City of Sacramento on Freeport Boulevard, Executive Airport (SAC) is the County Airport System's designated General Aviation airport. For the five months ending May 2008, SAC had a total of 39,144 flight operations, consisting of 38,691 general aviation operations and 453 military operations, or a monthly average of 7,829. Over 30 businesses operate at SAC, offering a wide variety of aviation related services including flight schools, aircraft maintenance, avionics, insurance, and aerial photography. Both MHR and SAC have been designated as reliever airports for Sacramento International Airport pursuant to the Federal Aviation Administration (FAA) National Plan of Integrated Airport Systems (NPIAS).

(3) Overview of Franklin Field

Franklin Field Airport (F 72) is currently a public use airport owned and operated by the County of Sacramento. The facility is considered an "uncontrolled airport" because it does not have an operating air traffic control tower.. There are approximately 36,000

annual flight operations at F72, including flight training. In 1947 the airport was acquired by the County of Sacramento from the federal government. It is located at 12480 Bruceville Road, Elk Grove.

(4) Executive Airport/Franklin Field Master Plan Update

The County Airport System is preparing Master Plan Updates (MPUs) for Executive Airport and Franklin Field Airport. The MPUs will establish guidelines for improving the facilities at each airport over a 20-year period. It will also represent a vision for each airport in the future, recognizing the operational, economic, and environmental factors likely to influence physical development. The MPUs will identify the type and extent of facilities required to meet forecast aviation demand, and will evaluate a range of alternatives for improving facilities consistent with forecast requirements. We recommend that the SSHCP and the Joint DEIR/DEIS take into account that the MPUs, when completed, may encompass physical and operational expansion parameters that will need to be reconciled with the conservation goals of the SSHCP.

(5) Hazardous Wildlife Implications and Concerns

The FAA establishes, updates and enforces policies and guidance relative to the placement of hazardous wildlife attractants on and near airports, in particular with regard to projects within a five-mile radius of airports subject to FAA grant assurances. The FAA Wildlife Hazards Advisory Circular (AC) referenced herein specifies two geographic areas of concern relative to hazardous wildlife:

- The "Critical Zone," which is defined as a 10,000-foot radius from the runway centerline for airports serving turbine-powered (jet) aircraft, and a 5,000-foot radius for airports serving piston-powered aircraft; and
- A five-mile radius from the outer edge of the Airport Operating Area (AOA).

The FAA strongly discourages hazardous wildlife attractants within the Critical Zone, and requires airport operators such as the County Airport System to evaluate all proposed development projects within a five-mile radius for potential hazardous wildlife attractants. Exhibits depicting the Critical Zone and Five-Mile radius for MHR are enclosed. Certain aquatic components of the habitat preserves contemplated in the SSHCP, when implemented, could attract avian species that can inflict significant damage to aircraft, in addition to endangering passengers and crew members.
We therefore request that the environmental analysis of the draft EIR/EIS for the SSHCP include a detailed analysis of the HCP's potential to increase hazardous wildlife activity within the five-mile radius of MHR, in addition to potential impacts to SAC and F72 in consideration of the projected increases in aviation activity at the three facilities.

(6) Federal Aviation Administration Policies Addressing Hazardous Wildlife

The FAA is the federal agency responsible for the safe design, operation and maintenance of airports. As the human population and number of aircraft operations have increased in the United States, collisions involving avian species and aircraft have become more common, costly, and threatening to human safety. Aquatic features such as wetlands, golf course ponds, water and sewage treatment plants and compensatory wetland mitigation projects are among the landscape characteristics most likely to attract waterfowl and other birds that have a high likelihood of inflicting damage to aircraft. The FAA is therefore understandably concerned with minimizing hazardous wildlife attractants near airports. Pursuant to FAA policy, airport operators such as the County Airport System are responsible for monitoring proposed developments that could lessen airport viability. A few of the FAA hazardous wildlife policies and guidance documents are described below.

- Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D.
- "Hazardous Wildlife Attractants On Or Near Airports," FAA Advisory Circular (AC) No. 150/5200-33B, August 28, 2007 (enclosed). Please note that the 2007 revision replaces all previous versions of this AC.
- *Memorandum of Agreement Between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes* (hereinafter "Interagency MOA"), executed by the six agencies between December 9, 2002 and May 2, 2003 (enclosed).
- *Wildlife Hazard Management At Airports – A Manual for Airport Personnel,* FAA and USDA, Second Edition - July 2005.

Environmental staff specialists assigned to the FAA's San Francisco Airports District Office (ADO) recently clarified the "guidance" and "advisory" nature of the first two documents listed above: "Although the term 'guidance' is used to refer to the hazardous wildlife criteria, Part 139 airport operators, such as the Sacramento County Airport System, are **required** (emphasis added) to comply with the standards provided." Attachment 1 comprises a more complete list of FAA policies and requirements. The County Airport System strongly recommends that DERA and the U.S. Fish and Wildlife Service (Service) incorporate those documents into the environmental analysis for the SSHCP. Moreover, pursuant to the Interagency MOA, the Service has an affirmative obligation to consult with the FAA during preparation of the DEIS, and to collaborate in reducing the likelihood of bird-aircraft strikes that may result from implementation of the SSHCP.

(7) Regional Commercial Aviation Considerations

The County Airport System also requests that the DEIR and DEIS include consideration of the following factors.

Temporary Relocation of Commercial Service

As stated above, MHR is the County Airport System's designated cargo airport. However, a "Continuity of Operations Plan" (Continuity Plan) is now in the initial stages of preparation for Sacramento International Airport (SMF). The lessons learned during Hurricane Katrina warrant such a contingency plan. It is contemplated that the Continuity Plan will address means by which limited commercial passenger service operations could be temporarily transferred to MHR in the event of a levee breach or other natural disaster that could cause commercial passenger operations to be temporarily interrupted at SMF. (No permanent facilities or related developments at MHR are contemplated to address the temporary relocation of operations to that facility.)

Although the number of flights diverted to MHR would be limited to those necessary to sustain the Sacramento region's access to the national air transportation system, the passengers and crews aboard such aircraft could be confronted with unnecessary risk of collision with birds as a result of implementing the SSHCP. The County Airport System therefore recommends that the potential for temporary relocation of commercial passenger aviation activity to MHR be thoroughly considered in the environmental analysis.

Potential Expansion and/or Relocation of Aviation Activity

As noted, the Master Plan Update process for SAC and F72 was recently begun. At this stage of the master plan studies, it is impossible to predict the roles and functions for the two airports that will ultimately be recommended for approval by the Board of Supervisors. Given the continued population growth and economic development of the Sacramento - Stockton region, it is quite possible that over time Franklin Field Airport could experience a substantial increase in general aviation, ground support services such as aircraft maintenance and flight training, and as a base of operations for entities such as the California Division of Forestry (CDF). No actions, therefore, should be taken near F72 under the auspices of the SSHCP if those measures could constrain expansion of aviation activity. An example of a constraining action would be establishment of conservation easements near the airport, which could reduce the County Airport System's ability to carry out FAA-mandated hazardous wildlife control activities. The potential interaction of the SSHCP and potential increases at F72 should be evaluated in the DEIR/DEIS.

(8) Mather-Related General Plan Amendments

Efforts begun in late 2005, among a number of County agencies and a diverse stakeholders group, resulted in the above referenced directive by the Sacramento County Board of Supervisors to proceed with County General Plan amendments and federal

wetland fill permits at South Mather. Those efforts are described in the February 22, 2006, Board report that recommended approval of Resolution 2006-0210. During the stakeholder process the County Airport System emphasized the need for flexibility in the designation of wetland features in the MHR Airport Operations Area (AOA). The result was the attached exhibit titled "South Mather Draft Master Plan Wetlands & Land Uses," which comprised Attachment A to the February 22, 2006 Board report. As noted on the exhibit, vernal pools at the airport are designated as "Protected" rather than "Preserved." This distinction is articulated on Page 3 of Attachment B to the Board report (enclosed), which makes clear that while no development may occur in those vernal pools, operations and development consistent with the Mather Airport Master Plan may occur.

Despite the efforts made by the stakeholder group to accommodate both aviation activity and wetland habitat protection, the FAA subsequently indicated concern regarding variance from FAA policy with respect to federally obligated land, and potential hazardous wildlife attractants. The County Airport System therefore recommends that DERA and the Service take the FAA's enclosed March 29, 2006 letter into account in preparing the DEIR/DEIS, which will no doubt require close coordination with the FAA's San Francisco ADO.

(9) Recommendations

The Sacramento County Airport System recommends that the Draft EIR/EIS for the SSHCP include the following:

- A complete and thorough evaluation of the hazardous wildlife implications associated with the proposed project, as identified in Sections 5 and 6 of this letter, and any project alternatives that may be considered.
- Based on the federal "Interagency MOA" described in Section 6, we believe the Service has an affirmative obligation to actively consult with the FAA regarding measures to minimize hazardous wildlife attractants associated with the proposed project and any alternatives that may be considered. Such consultation should be initiated immediately.

Project Review by FAA and California Department of Transportation (Caltrans)

The FAA wildlife Advisory Circular obligates commercial airports to a number of responsibilities related to nearby changes in land-use practices (Section 4-3-a of AC 150/5200-33B). Pursuant to the AC, the County Airport System will submit this project to the FAA San Francisco ADO for review and comment, utilizing FAA Form 7460-1, "Notice of Proposed Construction or Alteration." In addition, the Caltrans Division of Aeronautics will typically comment on proposed projects, such as the SSHCP, which are located near airports.

CEQA Requirements

The County Airport System also requests that the DEIR fully address the potential for the wetland components of the SSHCP to create a safety hazard for aircraft operations. Please refer to CEQA Guideline 15154 – Projects Near Airports (below).[1]

> 15154. Projects Near Airports
>
> (a) When a lead agency prepares an EIR for a project within the boundaries of a comprehensive airport land use plan or, if a comprehensive airport land use plan has not been adopted for a project within two nautical miles of a public airport or public use airport, the agency shall utilize the Airport Land Use Planning Handbook published by Caltrans' Division of Aeronautics to assist in the preparation of the EIR relative to potential airport-related safety hazards and noise problems.
>
> (b) A lead agency shall not adopt a negative declaration or mitigated negative declaration for a project described in subdivision (a) unless the lead agency considers whether the project will result in a safety hazard or noise problem for persons using the airport or for persons residing or working in the project area.

Thank you for the opportunity to provide scoping comments in response to the NOP for the South Sacramento Habitat Conservation Plan. Questions may be directed to me at the telephone number below. Alternatively, information on the Mather Master Plan CEQA/NEPA process may be obtained by contacting Airport Planner George Munson at 874-0767. Information on hazardous wildlife may be obtained by contacting Senior Natural Resource Specialist Janae Scruggs at 874-0820.

Sincerely,

J. Glen Rickelton
Manager – Planning and Environment (P&E)
916-874-0482

C: Robert B. Leonard, Assistant to the County Executive
Lisa J. Stanton, Airports Chief Administrative Officer
Michael La Pier, Airports Chief Operating Officer
Frederick Greco, Deputy Director – Maintenance
Barry Rondinella, Deputy Director - Operations
George Munson, Airport Planner – Planning and Environment

[1] Title 14 CCR, Chapter 3 - CEQA Guidelines, Article 10 - Considerations in Preparing EIRs and Negative Declarations.

Greg Rowe, Senior Environmental Analyst – Planning and Environment
Janae R. Scruggs, Senior Natural Resource Specialist – P&E
Gregg Weissenfluh, Manager – Mather Airport
John Downey, Manager – Sacramento Executive Airport and Franklin Field
Peter Morse, Associate Environmental Analyst - DERA
Richard Radmacher, Senior Planner – Planning and Community Development, County of Sacramento Municipal Services Agency (MSA)
Robin K. Hunt, Manager – FAA San Francisco Airports District Office (ADO)
Douglas Pomeroy, Environmental Protection Specialist/Biologist – FAA San Francisco Airports District Office (ADO)

Enclosures:

- Hazardous Wildlife Attractants On Or Near Airports," FAA Advisory Circular (AC) No. 150/5200-33B, August 28, 2007.
- *Memorandum of Agreement Between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes* (hereinafter "Interagency MOA"), executed by the six agencies between December 9, 2002 and May 2, 2003.
- Drawing No. 1, MHR Critical Zone
- Mather Airport 5-Mile Radius exhibit
- Exhibit - South Mather Draft Master Plan Wetlands & Land Uses.
- Attachment 1 – FAA Regulations & Related Requirements – Hazardous Wildlife
- Board of Supervisors Report and Resolution 2006-0210, February 22, 2006. "Initiation of Mather-Related General Plan Amendments And Approval To Proceed With Application For Federal Wetland Fill Permits At South Mather."
- "Initiation of Mather-Related General Plan Amendment." FAA letter dated March 29, 2006.

U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS	Date: 8/28/2007	AC No: 150/5200-33B
	Initiated by: AAS-300	Change:

1. PURPOSE. This Advisory Circular (AC) provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. It also discusses airport development projects (including airport construction, expansion, and renovation) affecting aircraft movement near hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. APPLICABILITY. The Federal Aviation Administration (FAA) recommends that public-use airport operators implement the standards and practices contained in this AC. The holders of Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D (Part 139), may use the standards, practices, and recommendations contained in this AC to comply with the wildlife hazard management requirements of Part 139. Airports that have received Federal grant-in-aid assistance must use these standards. The FAA also recommends the guidance in this AC for land-use planners, operators of non-certificated airports, and developers of projects, facilities, and activities on or near airports.

3. CANCELLATION. This AC cancels AC 150/5200-33A, *Hazardous Wildlife Attractants on or near Airports*, dated July 27, 2004.

4. PRINCIPAL CHANGES. This AC contains the following major changes, which are marked with vertical bars in the margin:

a. Technical changes to paragraph references.

b. Wording on storm water detention ponds.

c. Deleted paragraph 4-3.b, *Additional Coordination.*

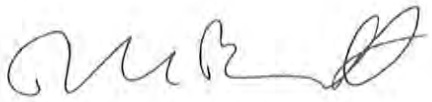
5. BACKGROUND. Information about the risks posed to aircraft by certain wildlife species has increased a great deal in recent years. Improved reporting, studies, documentation, and statistics clearly show that aircraft collisions with birds and other wildlife are a serious economic and public safety problem. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. Table 1

ranks the wildlife groups commonly involved in damaging strikes in the United States according to their relative hazard to aircraft. The ranking is based on the 47,212 records in the FAA National Wildlife Strike Database for the years 1990 through 2003. These hazard rankings, in conjunction with site-specific Wildlife Hazards Assessments (WHA), will help airport operators determine the relative abundance and use patterns of wildlife species and help focus hazardous wildlife management efforts on those species most likely to cause problems at an airport.

Most public-use airports have large tracts of open, undeveloped land that provide added margins of safety and noise mitigation. These areas can also present potential hazards to aviation if they encourage wildlife to enter an airport's approach or departure airspace or air operations area (AOA). Constructed or natural areas—such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, agricultural or aquaculture activities, surface mining, or wetlands—can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife.

During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, as well as billions of dollars in aircraft damage. Hazardous wildlife attractants on and near airports can jeopardize future airport expansion, making proper community land-use planning essential. This AC provides airport operators and those parties with whom they cooperate with the guidance they need to assess and address potentially hazardous wildlife attractants when locating new facilities and implementing certain land-use practices on or near public-use airports.

6. MEMORANDUM OF AGREEMENT BETWEEN FEDERAL RESOURCE AGENCIES. The FAA, the U.S. Air Force, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture - Wildlife Services signed a Memorandum of Agreement (MOA) in July 2003 to acknowledge their respective missions in protecting aviation from wildlife hazards. Through the MOA, the agencies established procedures necessary to coordinate their missions to address more effectively existing and future environmental conditions contributing to collisions between wildlife and aircraft (wildlife strikes) throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety while protecting the Nation's valuable environmental resources.



DAVID L. BENNETT
Director, Office of Airport Safety
and Standards

Table 1. Ranking of 25 species groups as to relative hazard to aircraft (1=most hazardous) based on three criteria (damage, major damage, and effect-on-flight), a composite ranking based on all three rankings, and a relative hazard score. Data were derived from the FAA National Wildlife Strike Database, January 1990–April 2003.[1]

Species group	Ranking by criteria			Composite ranking[2]	Relative hazard score[3]
	Damage[4]	Major damage[5]	Effect on flight[6]		
Deer	1	1	1	1	100
Vultures	2	2	2	2	64
Geese	3	3	6	3	55
Cormorants/pelicans	4	5	3	4	54
Cranes	7	6	4	5	47
Eagles	6	9	7	6	41
Ducks	5	8	10	7	39
Osprey	8	4	8	8	39
Turkey/pheasants	9	7	11	9	33
Herons	11	14	9	10	27
Hawks (buteos)	10	12	12	11	25
Gulls	12	11	13	12	24
Rock pigeon	13	10	14	13	23
Owls	14	13	20	14	23
H. lark/s. bunting	18	15	15	15	17
Crows/ravens	15	16	16	16	16
Coyote	16	19	5	17	14
Mourning dove	17	17	17	18	14
Shorebirds	19	21	18	19	10
Blackbirds/starling	20	22	19	20	10
American kestrel	21	18	21	21	9
Meadowlarks	22	20	22	22	7
Swallows	24	23	24	23	4
Sparrows	25	24	23	24	4
Nighthawks	23	25	25	25	1

[1] Excerpted from the *Special Report for the FAA, "Ranking the Hazard Level of Wildlife Species to Civil Aviation in the USA: Update #1, July 2, 2003".* Refer to this report for additional explanations of criteria and method of ranking.

[2] Relative rank of each species group was compared with every other group for the three variables, placing the species group with the greatest hazard rank for ≥ 2 of the 3 variables above the next highest ranked group, then proceeding down the list.

[3] Percentage values, from Tables 3 and 4 in Footnote 1 of the *Special Report*, for the three criteria were summed and scaled down from 100, with 100 as the score for the species group with the maximum summed values and the greatest potential hazard to aircraft.

[4] Aircraft incurred at least some damage (destroyed, substantial, minor, or unknown) from strike.

[5] Aircraft incurred damage or structural failure, which adversely affected the structure strength, performance, or flight characteristics, and which would normally require major repair or replacement of the affected component, or the damage sustained makes it inadvisable to restore aircraft to airworthy condition.

[6] Aborted takeoff, engine shutdown, precautionary landing, or other.

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SECTION 1.

GENERAL SEPARATION CRITERIA FOR HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1. INTRODUCTION. When considering proposed land uses, airport operators, local planners, and developers must take into account whether the proposed land uses, including new development projects, will increase wildlife hazards. Land-use practices that attract or sustain hazardous wildlife populations on or near airports can significantly increase the potential for wildlife strikes.

The FAA recommends the minimum separation criteria outlined below for land-use practices that attract hazardous wildlife to the vicinity of airports. Please note that FAA criteria include land uses that cause movement of hazardous wildlife onto, into, or across the airport's approach or departure airspace or air operations area (AOA). (See the discussion of the synergistic effects of surrounding land uses in Section 2-8 of this AC.)

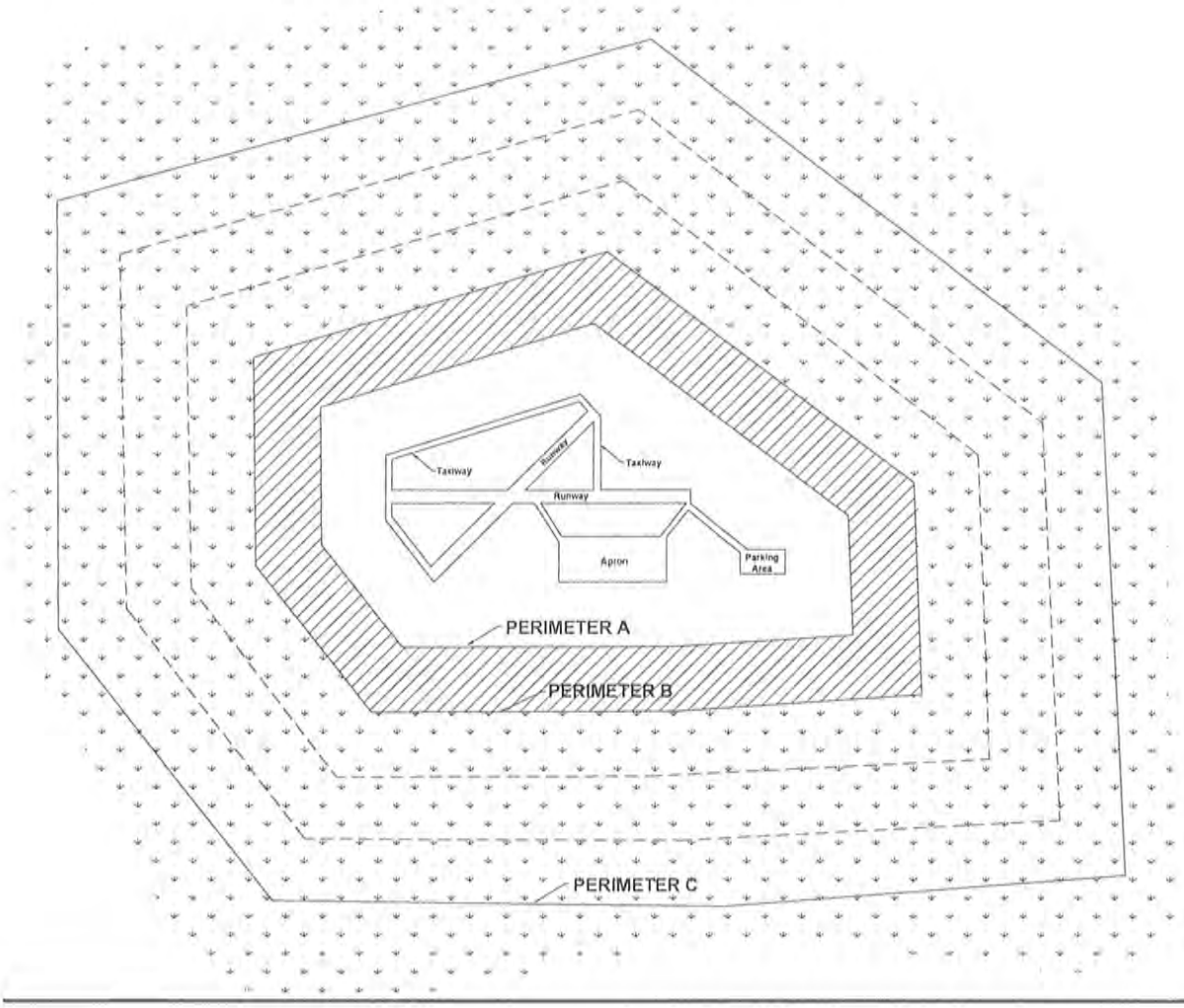
The basis for the separation criteria contained in this section can be found in existing FAA regulations. The separation distances are based on (1) flight patterns of piston-powered aircraft and turbine-powered aircraft, (2) the altitude at which most strikes happen (78 percent occur under 1,000 feet and 90 percent occur under 3,000 feet above ground level), and (3) National Transportation Safety Board (NTSB) recommendations.

1-2. AIRPORTS SERVING PISTON-POWERED AIRCRAFT. Airports that do not sell Jet-A fuel normally serve piston-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 5,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance measured from the nearest aircraft operations areas.

1-3. AIRPORTS SERVING TURBINE-POWERED AIRCRAFT. Airports selling Jet-A fuel normally serve turbine-powered aircraft. Notwithstanding more stringent requirements for specific land uses, the FAA recommends a separation distance of 10,000 feet at these airports for any of the hazardous wildlife attractants mentioned in Section 2 or for new airport development projects meant to accommodate aircraft movement. This distance is to be maintained between an airport's AOA and the hazardous wildlife attractant. Figure 1 depicts this separation distance from the nearest aircraft movement areas.

1-4. PROTECTION OF APPROACH, DEPARTURE, AND CIRCLING AIRSPACE. For all airports, the FAA recommends a distance of 5 statute miles between the farthest edge of the airport's AOA and the hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across the approach or departure airspace.

Figure 1. Separation distances within which hazardous wildlife attractants should be avoided, eliminated, or mitigated.



PERIMETER A: For airports serving piston-powered aircraft, hazardous wildlife attractants must be 5,000 feet from the nearest air operations area.

PERIMETER B: For airports serving turbine-powered aircraft, hazardous wildlife attractants must be 10,000 feet from the nearest air operations area.

PERIMETER C: 5-mile range to protect approach, departure and circling airspace.

SECTION 2.

LAND-USE PRACTICES ON OR NEAR AIRPORTS THAT POTENTIALLY ATTRACT HAZARDOUS WILDLIFE.

2-1. GENERAL. The wildlife species and the size of the populations attracted to the airport environment vary considerably, depending on several factors, including land-use practices on or near the airport. This section discusses land-use practices having the potential to attract hazardous wildlife and threaten aviation safety. In addition to the specific considerations outlined below, airport operators should refer to *Wildlife Hazard Management at Airports*, prepared by FAA and U.S. Department of Agriculture (USDA) staff. (This manual is available in English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.FAA.gov.). And, *Prevention and Control of Wildlife Damage,* compiled by the University of Nebraska Cooperative Extension Division. (This manual is available online in a periodically updated version at: ianrwww.unl.edu/wildlife/solutions/handbook/.)

2-2. WASTE DISPOSAL OPERATIONS. Municipal solid waste landfills (MSWLF) are known to attract large numbers of hazardous wildlife, particularly birds. Because of this, these operations, when located within the separations identified in the siting criteria in Sections 1-2 through 1-4, are considered incompatible with safe airport operations.

a. **Siting for new municipal solid waste landfills subject to AIR 21.** Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) (AIR 21) prohibits the construction or establishment of a new MSWLF within 6 statute miles of certain public-use airports. Before these prohibitions apply, both the airport and the landfill must meet the very specific conditions described below. These restrictions do not apply to airports or landfills located within the state of Alaska.

   The airport must (1) have received a Federal grant(s) under 49 U.S.C. § 47101, et. seq.; (2) be under control of a public agency; (3) serve some scheduled air carrier operations conducted in aircraft with less than 60 seats; and (4) have total annual enplanements consisting of at least 51 percent of scheduled air carrier enplanements conducted in aircraft with less than 60 passenger seats.

   The proposed MSWLF must (1) be within 6 miles of the airport, as measured from airport property line to MSWLF property line, and (2) have started construction or establishment on or after April 5, 2001. Public Law 106-181 only limits the construction or establishment of some new MSWLF. It does not limit the expansion, either vertical or horizontal, of existing landfills.

   NOTE: Consult the most recent version of AC 150/5200-34, *Construction or Establishment of Landfills Near Public Airports,* for a more detailed discussion of these restrictions.

b. **Siting for new MSWLF not subject to AIR 21.** If an airport and MSWLF do not meet the restrictions of Public Law 106-181, the FAA recommends against locating MSWLF within the separation distances identified in Sections 1-2 through 1-4. The separation distances should be measured from the closest point of the airport's AOA to the closest planned MSWLF cell.

c. **Considerations for existing waste disposal facilities within the limits of separation criteria.** The FAA recommends against airport development projects that would increase the number of aircraft operations or accommodate larger or faster aircraft near MSWLF operations located within the separations identified in Sections 1-2 through 1-4. In addition, in accordance with 40 CFR 258.10, owners or operators of existing MSWLF units that are located within the separations listed in Sections 1-2 through 1-4 must demonstrate that the unit is designed and operated so it does not pose a bird hazard to aircraft. (See Section 4-2(b) of this AC for a discussion of this demonstration requirement.)

d. **Enclosed trash transfer stations.** Enclosed waste-handling facilities that receive garbage behind closed doors; process it via compaction, incineration, or similar manner; and remove all residue by enclosed vehicles generally are compatible with safe airport operations, provided they are not located on airport property or within the Runway Protection Zone (RPZ). These facilities should not handle or store putrescible waste outside or in a partially enclosed structure accessible to hazardous wildlife. Trash transfer facilities that are open on one or more sides; that store uncovered quantities of municipal solid waste outside, even if only for a short time; that use semi-trailers that leak or have trash clinging to the outside; or that do not control odors by ventilation and filtration systems (odor masking is not acceptable) do not meet the FAA's definition of fully enclosed trash transfer stations. The FAA considers these facilities incompatible with safe airport operations if they are located closer than the separation distances specified in Sections 1-2 through 1-4.

e. **Composting operations on or near airport property.** Composting operations that accept only yard waste (e.g., leaves, lawn clippings, or branches) generally do not attract hazardous wildlife. Sewage sludge, woodchips, and similar material are not municipal solid wastes and may be used as compost bulking agents. The compost, however, must never include food or other municipal solid waste. Composting operations should not be located on airport property. Off-airport property composting operations should be located no closer than the greater of the following distances: 1,200 feet from any AOA or the distance called for by airport design requirements (see AC 150/5300-13, *Airport Design*). This spacing should prevent material, personnel, or equipment from penetrating any Object Free Area (OFA), Obstacle Free Zone (OFZ), Threshold Siting Surface (TSS), or Clearway. Airport operators should monitor composting operations located in proximity to the airport to ensure that steam or thermal rise does not adversely affect air traffic. On-airport disposal of compost by-products should not be conducted for the reasons stated in 2-3f.

f. **Underwater waste discharges.** The FAA recommends against the underwater discharge of any food waste (e.g., fish processing offal) within the separations identified in Sections 1-2 through 1-4 because it could attract scavenging hazardous wildlife.

g. **Recycling centers.** Recycling centers that accept previously sorted non-food items, such as glass, newspaper, cardboard, or aluminum, are, in most cases, not attractive to hazardous wildlife and are acceptable.

h. **Construction and demolition (C&D) debris facilities.** C&D landfills do not generally attract hazardous wildlife and are acceptable if maintained in an orderly manner, admit no putrescible waste, and are not co-located with other waste disposal operations. However, C&D landfills have similar visual and operational characteristics to putrescible waste disposal sites. When co-located with putrescible waste disposal operations, C&D landfills are more likely to attract hazardous wildlife because of the similarities between these disposal facilities. Therefore, a C&D landfill co-located with another waste disposal operation should be located outside of the separations identified in Sections 1-2 through 1-4.

i. **Fly ash disposal.** The incinerated residue from resource recovery power/heat-generating facilities that are fired by municipal solid waste, coal, or wood is generally not a wildlife attractant because it no longer contains putrescible matter. Landfills accepting only fly ash are generally not considered to be wildlife attractants and are acceptable as long as they are maintained in an orderly manner, admit no putrescible waste of any kind, and are not co-located with other disposal operations that attract hazardous wildlife.

   Since varying degrees of waste consumption are associated with general incineration (not resource recovery power/heat-generating facilities), the FAA considers the ash from general incinerators a regular waste disposal by-product and, therefore, a hazardous wildlife attractant if disposed of within the separation criteria outlined in Sections 1-2 through 1-4.

2-3. WATER MANAGEMENT FACILITIES. Drinking water intake and treatment facilities, storm water and wastewater treatment facilities, associated retention and settling ponds, ponds built for recreational use, and ponds that result from mining activities often attract large numbers of potentially hazardous wildlife. To prevent wildlife hazards, land-use developers and airport operators may need to develop management plans, in compliance with local and state regulations, to support the operation of storm water management facilities on or near all public-use airports to ensure a safe airport environment.

a. **Existing storm water management facilities.** On-airport storm water management facilities allow the quick removal of surface water, including discharges related to aircraft deicing, from impervious surfaces, such as pavement and terminal/hangar building roofs. Existing on-airport detention ponds collect storm water, protect water quality, and control runoff. Because they slowly release water

after storms, they create standing bodies of water that can attract hazardous wildlife. Where the airport has developed a Wildlife Hazard Management Plan (WHMP) in accordance with Part 139, the FAA requires immediate correction of any wildlife hazards arising from existing storm water facilities located on or near airports, using appropriate wildlife hazard mitigation techniques. Airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

Where possible, airport operators should modify storm water detention ponds to allow a maximum 48-hour detention period for the design storm. The FAA recommends that airport operators avoid or remove retention ponds and detention ponds featuring dead storage to eliminate standing water. Detention basins should remain totally dry between rainfalls. Where constant flow of water is anticipated through the basin, or where any portion of the basin bottom may remain wet, the detention facility should include a concrete or paved pad and/or ditch/swale in the bottom to prevent vegetation that may provide nesting habitat.

When it is not possible to drain a large detention pond completely, airport operators may use physical barriers, such as bird balls, wires grids, pillows, or netting, to deter birds and other hazardous wildlife. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office.

The FAA recommends that airport operators encourage off-airport storm water treatment facility operators to incorporate appropriate wildlife hazard mitigation techniques into storm water treatment facility operating practices when their facility is located within the separation criteria specified in Sections 1-2 through 1-4.

b. New storm water management facilities. The FAA strongly recommends that off-airport storm water management systems located within the separations identified in Sections 1-2 through 1-4 be designed and operated so as not to create above-ground standing water. Stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period after the design storm and remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap lined, narrow, linearly shaped water detention basins. When it is not possible to place these ponds away from an airport's AOA, airport operators should use physical barriers, such as bird balls, wires grids, pillows, or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages

the use of underground storm water infiltration systems, such as French drains or buried rock fields, because they are less attractive to wildlife.

c. **Existing wastewater treatment facilities.** The FAA strongly recommends that airport operators immediately correct any wildlife hazards arising from existing wastewater treatment facilities located on or near the airport. Where required, a WHMP developed in accordance with Part 139 will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should encourage wastewater treatment facility operators to incorporate measures, developed in consultation with a wildlife damage management biologist, to minimize hazardous wildlife attractants. Airport operators should also encourage those wastewater treatment facility operators to incorporate these mitigation techniques into their standard operating practices. In addition, airport operators should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

d. **New wastewater treatment facilities.** The FAA strongly recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in Sections 1-2 through 1-4. Appendix 1 defines wastewater treatment facility as "any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes." The definition includes any pretreatment involving the reduction of the amount of pollutants or the elimination of pollutants prior to introducing such pollutants into a publicly owned treatment works (wastewater treatment facility). During the site-location analysis for wastewater treatment facilities, developers should consider the potential to attract hazardous wildlife if an airport is in the vicinity of the proposed site, and airport operators should voice their opposition to such facilities if they are in proximity to the airport.

e. **Artificial marshes.** In warmer climates, wastewater treatment facilities sometimes employ artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking birds, such as blackbirds and waterfowl, for breeding or roosting activities. The FAA strongly recommends against establishing artificial marshes within the separations identified in Sections 1-2 through 1-4.

f. **Wastewater discharge and sludge disposal.** The FAA recommends against the discharge of wastewater or sludge on airport property because it may improve soil moisture and quality on unpaved areas and lead to improved turf growth that can be an attractive food source for many species of animals. Also, the turf requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw, both of which can attract hazardous wildlife. In addition, the improved turf may attract grazing wildlife, such as deer and geese. Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

2-4. WETLANDS. Wetlands provide a variety of functions and can be regulated by local, state, and Federal laws. Normally, wetlands are attractive to many types of wildlife, including many which rank high on the list of hazardous wildlife species (Table 1).

NOTE: If questions exist as to whether an area qualifies as a wetland, contact the local division of the U.S. Army Corps of Engineers, the Natural Resources Conservation Service, or a wetland consultant qualified to delineate wetlands.

a. **Existing wetlands on or near airport property.** If wetlands are located on or near airport property, airport operators should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations. At public-use airports, the FAA recommends immediately correcting, in cooperation with local, state, and Federal regulatory agencies, any wildlife hazards arising from existing wetlands located on or near airports. Where required, a WHMP will outline appropriate wildlife hazard mitigation techniques. Accordingly, airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a wildlife damage management biologist.

b. **New airport development.** Whenever possible, the FAA recommends locating new airports using the separations from wetlands identified in Sections 1-2 through 1-4. Where alternative sites are not practicable, or when airport operators are expanding an existing airport into or near wetlands, a wildlife damage management biologist, in consultation with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the state wildlife management agency should evaluate the wildlife hazards and prepare a WHMP that indicates methods of minimizing the hazards.

c. **Mitigation for wetland impacts from airport projects.** Wetland mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects or projects required to correct wildlife hazards from wetlands. Wetland mitigation must be designed so it does not create a wildlife hazard. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4.

   (1) Onsite mitigation of wetland functions. The FAA may consider exceptions to locating mitigation activities outside the separations identified in Sections 1-2 through 1-4 if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge, which cannot be replicated when moved to a different location. Using existing airport property is sometimes the only feasible way to achieve the mitigation ratios mandated in regulatory orders and/or settlement agreements with the resource agencies. Conservation easements are an additional means of providing mitigation for project impacts. Typically the airport operator continues to own the property, and an easement is created stipulating that the property will be maintained as habitat for state or Federally listed species.

Mitigation must not inhibit the airport operator's ability to effectively control hazardous wildlife on or near the mitigation site or effectively maintain other aspects of safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife must be avoided. The FAA will review any onsite mitigation proposals to determine compatibility with safe airport operations. A wildlife damage management biologist should evaluate any wetland mitigation projects that are needed to protect unique wetland functions and that must be located in the separation criteria in Sections 1-2 through 1-4 before the mitigation is implemented. A WHMP should be developed to reduce the wildlife hazards.

(2) Offsite mitigation of wetland functions. The FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations identified in Sections 1-2 through 1-4 unless they provide unique functions that must remain onsite (see 2-4c(1)). Agencies that regulate impacts to or around wetlands recognize that it may be necessary to split wetland functions in mitigation schemes. Therefore, regulatory agencies may, under certain circumstances, allow portions of mitigation to take place in different locations.

(3) Mitigation banking. Wetland mitigation banking is the creation or restoration of wetlands in order to provide mitigation credits that can be used to offset permitted wetland losses. Mitigation banking benefits wetland resources by providing advance replacement for permitted wetland losses; consolidating small projects into larger, better-designed and managed units; and encouraging integration of wetland mitigation projects with watershed planning. This last benefit is most helpful for airport projects, as wetland impacts mitigated outside of the separations identified in Sections 1-2 through 1-4 can still be located within the same watershed. Wetland mitigation banks meeting the separation criteria offer an ecologically sound approach to mitigation in these situations. Airport operators should work with local watershed management agencies or organizations to develop mitigation banking for wetland impacts on airport property.

2-5. DREDGE SPOIL CONTAINMENT AREAS. The FAA recommends against locating dredge spoil containment areas (also known as Confined Disposal Facilities) within the separations identified in Sections 1-2 through 1-4 if the containment area or the spoils contain material that would attract hazardous wildlife.

2-6. AGRICULTURAL ACTIVITIES. Because most, if not all, agricultural crops can attract hazardous wildlife during some phase of production, the FAA recommends against the used of airport property for agricultural production, including hay crops, within the separations identified in Sections 1-2 through 1-4. . If the airport has no financial alternative to agricultural crops to produce income necessary to maintain the viability of the airport, then the airport shall follow the crop distance guidelines listed in the table titled "Minimum Distances between Certain Airport Features and Any On-Airport Agricultural Crops" found in AC 150/5300-13, *Airport Design*, Appendix 17. The cost of wildlife control and potential accidents should be weighed against the income produced by the on-airport crops when deciding whether to allow crops on the airport.

a. **Livestock production.** Confined livestock operations (i.e., feedlots, dairy operations, hog or chicken production facilities, or egg laying operations) often attract flocking birds, such as starlings, that pose a hazard to aviation. Therefore, The FAA recommends against such facilities within the separations identified in Sections 1-2 through 1-4. Any livestock operation within these separations should have a program developed to reduce the attractiveness of the site to species that are hazardous to aviation safety. Free-ranging livestock must not be grazed on airport property because the animals may wander onto the AOA. Furthermore, livestock feed, water, and manure may attract birds.

b. **Aquaculture.** Aquaculture activities (i.e. catfish or trout production) conducted outside of fully enclosed buildings are inherently attractive to a wide variety of birds. Existing aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4 must have a program developed to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should also oppose the establishment of new aquaculture facilities/activities within the separations listed in Sections 1-2 through 1-4.

c. **Alternative uses of agricultural land.** Some airports are surrounded by vast areas of farmed land within the distances specified in Sections 1-2 through 1-4. Seasonal uses of agricultural land for activities such as hunting can create a hazardous wildlife situation. In some areas, farmers will rent their land for hunting purposes. Rice farmers, for example, flood their land during waterfowl hunting season and obtain additional revenue by renting out duck blinds. The duck hunters then use decoys and call in hundreds, if not thousands, of birds, creating a tremendous threat to aircraft safety. A wildlife damage management biologist should review, in coordination with local farmers and producers, these types of seasonal land uses and incorporate them into the WHMP.

2-7. GOLF COURSES, LANDSCAPING AND OTHER LAND-USE CONSIDERATIONS.

a. **Golf courses.** The large grassy areas and open water found on most golf courses are attractive to hazardous wildlife, particularly Canada geese and some species of gulls. These species can pose a threat to aviation safety. The FAA recommends against construction of new golf courses within the separations identified in Sections 1-2 through 1-4. Existing golf courses located within these separations must develop a program to reduce the attractiveness of the sites to species that are hazardous to aviation safety. Airport operators should ensure these golf courses are monitored on a continuing basis for the presence of hazardous wildlife. If hazardous wildlife is detected, corrective actions should be immediately implemented.

b. **Landscaping and landscape maintenance.** Depending on its geographic location, landscaping can attract hazardous wildlife. The FAA recommends that airport operators approach landscaping with caution and confine it to airport areas not associated with aircraft movements. A wildlife damage management biologist should review all landscaping plans. Airport operators should also monitor all landscaped areas on a continuing basis for the presence of hazardous wildlife. If

hazardous wildlife is detected, corrective actions should be immediately implemented.

Turf grass areas can be highly attractive to a variety of hazardous wildlife species. Research conducted by the USDA Wildlife Services' National Wildlife Research Center has shown that no one grass management regime will deter all species of hazardous wildlife in all situations. In cooperation with wildlife damage management biologist, airport operators should develop airport turf grass management plans on a prescription basis, depending on the airport's geographic locations and the type of hazardous wildlife likely to frequent the airport

Airport operators should ensure that plant varieties attractive to hazardous wildlife are not used on the airport. Disturbed areas or areas in need of re-vegetating should not be planted with seed mixtures containing millet or any other large-seed producing grass. For airport property already planted with seed mixtures containing millet, rye grass, or other large-seed producing grasses, the FAA recommends disking, plowing, or another suitable agricultural practice to prevent plant maturation and seed head production. Plantings should follow the specific recommendations for grass management and seed and plant selection made by the State University Cooperative Extension Service, the local office of Wildlife Services, or a qualified wildlife damage management biologist. Airport operators should also consider developing and implementing a preferred/prohibited plant species list, reviewed by a wildlife damage management biologist, which has been designed for the geographic location to reduce the attractiveness to hazardous wildlife for landscaping airport property.

c. **Airports surrounded by wildlife habitat.** The FAA recommends that operators of airports surrounded by woodlands, water, or wetlands refer to Section 2.4 of this AC. Operators of such airports should provide for a Wildlife Hazard Assessment (WHA) conducted by a wildlife damage management biologist. This WHA is the first step in preparing a WHMP, where required.

d. **Other hazardous wildlife attractants.** Other specific land uses or activities (e.g., sport or commercial fishing, shellfish harvesting, etc.), perhaps unique to certain regions of the country, have the potential to attract hazardous wildlife. Regardless of the source of the attraction, when hazardous wildlife is noted on a public-use airport, airport operators must take prompt remedial action(s) to protect aviation safety.

2-8. SYNERGISTIC EFFECTS OF SURROUNDING LAND USES. There may be circumstances where two (or more) different land uses that would not, by themselves, be considered hazardous wildlife attractants or that are located outside of the separations identified in Sections 1-2 through 1-4 that are in such an alignment with the airport as to create a wildlife corridor directly through the airport and/or surrounding airspace. An example of this situation may involve a lake located outside of the separation criteria on the east side of an airport and a large hayfield on the west side of an airport, land uses that together could create a flyway for Canada geese directly across the airspace of the airport. There are numerous examples of such situations;

therefore, airport operators and the wildlife damage management biologist must consider the entire surrounding landscape and community when developing the WHMP.

SECTION 3.

PROCEDURES FOR WILDLIFE HAZARD MANAGEMENT BY OPERATORS OF PUBLIC-USE AIRPORTS.

3.1. INTRODUCTION. In recognition of the increased risk of serious aircraft damage or the loss of human life that can result from a wildlife strike, the FAA may require the development of a Wildlife Hazard Management Plan (WHMP) when specific triggering events occur on or near the airport. Part 139.337 discusses the specific events that trigger a Wildlife Hazard Assessment (WHA) and the specific issues that a WHMP must address for FAA approval and inclusion in an Airport Certification Manual.

3.2. COORDINATION WITH USDA WILDLIFE SERVICES OR OTHER QUALIFIED WILDLIFE DAMAGE MANAGEMENT BIOLOGISTS. The FAA will use the Wildlife Hazard Assessment (WHA) conducted in accordance with Part 139 to determine if the airport needs a WHMP. Therefore, persons having the education, training, and expertise necessary to assess wildlife hazards must conduct the WHA. The airport operator may look to Wildlife Services or to qualified private consultants to conduct the WHA. When the services of a wildlife damage management biologist are required, the FAA recommends that land-use developers or airport operators contact a consultant specializing in wildlife damage management or the appropriate state director of Wildlife Services.

NOTE: Telephone numbers for the respective USDA Wildlife Services state offices can be obtained by contacting USDA Wildlife Services Operational Support Staff, 4700 River Road, Unit 87, Riverdale, MD, 20737-1234, Telephone (301) 734-7921, Fax (301) 734-5157 *(http://www.aphis.usda.gov/ws/)*.

3-3. WILDLIFE HAZARD MANAGEMENT AT AIRPORTS: A MANUAL FOR AIRPORT PERSONNEL. This manual, prepared by FAA and USDA Wildlife Services staff, contains a compilation of information to assist airport personnel in the development, implementation, and evaluation of WHMPs at airports. The manual includes specific information on the nature of wildlife strikes, legal authority, regulations, wildlife management techniques, WHAs, WHMPs, and sources of help and information. The manual is available in three languages: English, Spanish, and French. It can be viewed and downloaded free of charge from the FAA's wildlife hazard mitigation web site: http://wildlife-mitigation.tc.FAA.gov/. This manual only provides a starting point for addressing wildlife hazard issues at airports. Hazardous wildlife management is a complex discipline and conditions vary widely across the United States. Therefore, qualified wildlife damage management biologists must direct the development of a WHMP and the implementation of management actions by airport personnel.

There are many other resources complementary to this manual for use in developing and implementing WHMPs. Several are listed in the manual's bibliography.

3-4. WILDLIFE HAZARD ASSESSMENTS, TITLE 14, CODE OF FEDERAL REGULATIONS, PART 139. Part 139.337(b) requires airport operators to conduct a Wildlife Hazard Assessment (WHA) when certain events occur on or near the airport.

Part 139.337 (c) provides specific guidance as to what facts must be addressed in a WHA.

3-5. WILDLIFE HAZARD MANAGEMENT PLAN (WHMP). The FAA will consider the results of the WHA, along with the aeronautical activity at the airport and the views of the airport operator and airport users, in determining whether a formal WHMP is needed, in accordance with Part 139.337. If the FAA determines that a WHMP is needed, the airport operator must formulate and implement a WHMP, using the WHA as the basis for the plan.

The goal of an airport's Wildlife Hazard Management Plan is to minimize the risk to aviation safety, airport structures or equipment, or human health posed by populations of hazardous wildlife on and around the airport.

The WHMP must identify hazardous wildlife attractants on or near the airport and the appropriate wildlife damage management techniques to minimize the wildlife hazard. It must also prioritize the management measures.

3-6. LOCAL COORDINATION. The establishment of a Wildlife Hazards Working Group (WHWG) will facilitate the communication, cooperation, and coordination of the airport and its surrounding community necessary to ensure the effectiveness of the WHMP. The cooperation of the airport community is also necessary when new projects are considered. Whether on or off the airport, the input from all involved parties must be considered when a potentially hazardous wildlife attractant is being proposed. Airport operators should also incorporate public education activities with the local coordination efforts because some activities in the vicinity of your airport, while harmless under normal leisure conditions, can attract wildlife and present a danger to aircraft. For example, if public trails are planned near wetlands or in parks adjoining airport property, the public should know that feeding birds and other wildlife in the area may pose a risk to aircraft.

Airport operators should work with local and regional planning and zoning boards so as to be aware of proposed land-use changes, or modification of existing land uses, that could create hazardous wildlife attractants within the separations identified in Sections 1-2 through 1-4. Pay particular attention to proposed land uses involving creation or expansion of waste water treatment facilities, development of wetland mitigation sites, or development or expansion of dredge spoil containment areas. At the very least, airport operators must ensure they are on the notification list of the local planning board or equivalent review entity for all communities located within 5 miles of the airport, so they will receive notification of any proposed project and have the opportunity to review it for attractiveness to hazardous wildlife.

3-7 COORDINATION/NOTIFICATION OF AIRMEN OF WILDLIFE HAZARDS. If an existing land-use practice creates a wildlife hazard and the land-use practice or wildlife hazard cannot be immediately eliminated, airport operators must issue a Notice to Airmen (NOTAM) and encourage the land–owner or manager to take steps to control the wildlife hazard and minimize further attraction.

SECTION 4.

FAA NOTIFICATION AND REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS

4-1. FAA REVIEW OF PROPOSED LAND-USE PRACTICE CHANGES IN THE VICINITY OF PUBLIC-USE AIRPORTS.

a. The FAA discourages the development of waste disposal and other facilities, discussed in Section 2, located within the 5,000/10,000-foot criteria specified in Sections 1-2 through 1-4.

b. For projects that are located outside the 5,000/10,000-foot criteria but within 5 statute miles of the airport's AOA, the FAA may review development plans, proposed land-use changes, operational changes, or wetland mitigation plans to determine if such changes present potential wildlife hazards to aircraft operations. The FAA considers sensitive airport areas as those that lie under or next to approach or departure airspace. This brief examination should indicate if further investigation is warranted.

c. Where a wildlife damage management biologist has conducted a further study to evaluate a site's compatibility with airport operations, the FAA may use the study results to make a determination.

4-2. WASTE MANAGEMENT FACILITIES.

a. **Notification of new/expanded project proposal.** Section 503 of the Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (Public Law 106-181) limits the construction or establishment of new MSWLF within 6 statute miles of certain public-use airports, when both the airport and the landfill meet very specific conditions. See Section 2-2 of this AC and AC 150/5200-34 for a more detailed discussion of these restrictions.

The Environmental Protection Agency (EPA) requires any MSWLF operator proposing a new or expanded waste disposal operation within 5 statute miles of a runway end to notify the appropriate FAA Regional Airports Division Office and the airport operator of the proposal (40 CFR 258, *Criteria for Municipal Solid Waste Landfills*, Section 258.10, *Airport Safety*). The EPA also requires owners or operators of new MSWLF units, or lateral expansions of existing MSWLF units, that are located within 10,000 feet of any airport runway end used by turbojet aircraft, or within 5,000 feet of any airport runway end used only by piston-type aircraft, to demonstrate successfully that such units are not hazards to aircraft. (See 4-2.b below.)

When new or expanded MSWLF are being proposed near airports, MSWLF operators must notify the airport operator and the FAA of the proposal as early as possible pursuant to 40 CFR 258.

b. **Waste handling facilities within separations identified in Sections 1-2 through 1-4.** To claim successfully that a waste-handling facility sited within the separations identified in Sections 1-2 through 1-4 does not attract hazardous wildlife and does not threaten aviation, the developer must establish convincingly that the facility will not handle putrescible material other than that as outlined in 2-2.d. The FAA strongly recommends against any facility other than that as outlined in 2-2.d (enclosed transfer stations). The FAA will use this information to determine if the facility will be a hazard to aviation.

c. **Putrescible-Waste Facilities.** In their effort to satisfy the EPA requirement, some putrescible-waste facility proponents may offer to undertake experimental measures to demonstrate that their proposed facility will not be a hazard to aircraft. To date, no such facility has been able to demonstrate an ability to reduce and sustain hazardous wildlife to levels that existed before the putrescible-waste landfill began operating. For this reason, demonstrations of experimental wildlife control measures may not be conducted within the separation identified in Sections 1-2 through 1-4.

4-3. OTHER LAND-USE PRACTICE CHANGES. As a matter of policy, the FAA encourages operators of public-use airports who become aware of proposed land use practice changes that may attract hazardous wildlife within 5 statute miles of their airports to promptly notify the FAA. The FAA also encourages proponents of such land use changes to notify the FAA as early in the planning process as possible. Advanced notice affords the FAA an opportunity (1) to evaluate the effect of a particular land-use change on aviation safety and (2) to support efforts by the airport sponsor to restrict the use of land next to or near the airport to uses that are compatible with the airport.

The airport operator, project proponent, or land-use operator may use FAA Form 7460-1, *Notice of Proposed Construction or Alteration*, or other suitable documents similar to FAA Form 7460-1 to notify the appropriate FAA Regional Airports Division Office. Project proponents can contact the appropriate FAA Regional Airports Division Office for assistance with the notification process.

It is helpful if the notification includes a 15-minute quadrangle map of the area identifying the location of the proposed activity. The land-use operator or project proponent should also forward specific details of the proposed land-use change or operational change or expansion. In the case of solid waste landfills, the information should include the type of waste to be handled, how the waste will be processed, and final disposal methods.

a. **Airports that have received Federal grant-in-aid assistance.** Airports that have received Federal grant-in-aid assistance are required by their grant assurances to take appropriate actions to restrict the use of land next to or near the airport to uses that are compatible with normal airport operations. The FAA recommends that airport operators to the extent practicable oppose off-airport land-use changes or practices within the separations identified in Sections 1-2 through 1-4 that may attract hazardous wildlife. Failure to do so may lead to noncompliance with applicable grant assurances. The FAA will not approve the placement of airport

development projects pertaining to aircraft movement in the vicinity of hazardous wildlife attractants without appropriate mitigating measures. Increasing the intensity of wildlife control efforts is not a substitute for eliminating or reducing a proposed wildlife hazard. Airport operators should identify hazardous wildlife attractants and any associated wildlife hazards during any planning process for new airport development projects.

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APPENDIX 1. DEFINITIONS OF TERMS USED IN THIS ADVISORY CIRCULAR.

1. **GENERAL.** This appendix provides definitions of terms used throughout this AC.

    1. **Air operations area.** Any area of an airport used or intended to be used for landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved areas or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiways, or apron.

    2. **Airport operator.** The operator (private or public) or sponsor of a public-use airport.

    3. **Approach or departure airspace.** The airspace, within 5 statute miles of an airport, through which aircraft move during landing or takeoff.

    4. **Bird balls.** High-density plastic floating balls that can be used to cover ponds and prevent birds from using the sites.

    5. **Certificate holder.** The holder of an Airport Operating Certificate issued under Title 14, Code of Federal Regulations, Part 139.

    6. **Construct a new MSWLF.** To begin to excavate, grade land, or raise structures to prepare a municipal solid waste landfill as permitted by the appropriate regulatory or permitting agency.

    7. **Detention ponds.** Storm water management ponds that hold storm water for short periods of time, a few hours to a few days.

    8. **Establish a new MSWLF.** When the first load of putrescible waste is received on-site for placement in a prepared municipal solid waste landfill.

    9. **Fly ash.** The fine, sand-like residue resulting from the complete incineration of an organic fuel source. Fly ash typically results from the combustion of coal or waste used to operate a power generating plant.

    10. **General aviation aircraft.** Any civil aviation aircraft not operating under 14 CFR Part 119, Certification: Air Carriers and Commercial Operators.

    11. **Hazardous wildlife.** Species of wildlife (birds, mammals, reptiles), including feral animals and domesticated animals not under control, that are associated with aircraft strike problems, are capable of causing structural damage to airport facilities, or act as attractants to other wildlife that pose a strike hazard

    12. **Municipal Solid Waste Landfill (MSWLF).** A publicly or privately owned discrete area of land or an excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under 40 CFR § 257.2. An MSWLF may receive

other types wastes, such as commercial solid waste, non-hazardous sludge, small-quantity generator waste, and industrial solid waste, as defined under 40 CFR § 258.2. An MSWLF can consist of either a stand alone unit or several cells that receive household waste.

13. **New MSWLF.** A municipal solid waste landfill that was established or constructed after April 5, 2001.

14. **Piston-powered aircraft.** Fixed-wing aircraft powered by piston engines.

15. **Piston-use airport.** Any airport that does not sell Jet-A fuel for fixed-wing turbine-powered aircraft, and primarily serves fixed-wing, piston-powered aircraft. Incidental use of the airport by turbine-powered, fixed-wing aircraft would not affect this designation. However, such aircraft should not be based at the airport.

16. **Public agency.** A State or political subdivision of a State, a tax-supported organization, or an Indian tribe or pueblo (49 U.S.C. § 47102(19)).

17. **Public airport.** An airport used or intended to be used for public purposes that is under the control of a public agency; and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft is publicly owned (49 U.S.C. § 47102(20)).

18. **Public-use airport.** An airport used or intended to be used for public purposes, and of which the area used or intended to be used for landing, taking off, or surface maneuvering of aircraft may be under the control of a public agency or privately owned and used for public purposes (49 U.S.C. § 47102(21)).

19. **Putrescible waste.** Solid waste that contains organic matter capable of being decomposed by micro-organisms and of such a character and proportion as to be capable of attracting or providing food for birds (40 CFR §257.3-8).

20. **Putrescible-waste disposal operation.** Landfills, garbage dumps, underwater waste discharges, or similar facilities where activities include processing, burying, storing, or otherwise disposing of putrescible material, trash, and refuse.

21. **Retention ponds.** Storm water management ponds that hold water for several months.

22. **Runway protection zone (RPZ).** An area off the runway end to enhance the protection of people and property on the ground (see AC 150/5300-13). The dimensions of this zone vary with the airport design, aircraft, type of operation, and visibility minimum.

23. **Scheduled air carrier operation.** Any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier or commercial

operator for which the air carrier, commercial operator, or their representative offers in advance the departure location, departure time, and arrival location. It does not include any operation that is conducted as a supplemental operation under 14 CFR Part 119 or as a public charter operation under 14 CFR Part 380 (14 CFR § 119.3).

24. **Sewage sludge.** Any solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment process; and a material derived from sewage sludge. Sewage does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings generated during preliminary treatment of domestic sewage in a treatment works. (40 CFR 257.2)

25. **Sludge.** Any solid, semi-solid, or liquid waste generated form a municipal, commercial or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect. (40 CFR 257.2)

26. **Solid waste.** Any garbage, refuse, sludge, from a waste treatment plant, water supply treatment plant or air pollution control facility and other discarded material, including, solid liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in domestic sewage, or solid or dissolved material in irrigation return flows or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or by product material as defined by the Atomic Energy Act of 1954, as amended, (68 Stat. 923). (40 CFR 257.2)

27. **Turbine-powered aircraft.** Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft rotary-wing aircraft.

28. **Turbine-use airport.** Any airport that sells Jet-A fuel for fixed-wing turbine-powered aircraft.

29. **Wastewater treatment facility.** Any devices and/or systems used to store, treat, recycle, or reclaim municipal sewage or liquid industrial wastes, including Publicly Owned Treatment Works (POTW), as defined by Section 212 of the Federal Water Pollution Control Act (P.L. 92-500) as amended by the Clean Water Act of 1977 (P.L. 95-576) and the Water Quality Act of 1987 (P.L. 100-4). This definition includes any pretreatment involving the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater prior to or in lieu of discharging or otherwise introducing such pollutants into a POTW. (See 40 CFR Section 403.3 (q), (r), & (s)).

30. **Wildlife.** Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring thereof (50 CFR 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this AC, wildlife includes feral animals and domestic animals out of the control of their owners (14 CFR Part 139, Certification of Airports).

31. **Wildlife attractants.** Any human-made structure, land-use practice, or human-made or natural geographic feature that can attract or sustain hazardous wildlife within the landing or departure airspace or the airport's AOA. These attractants can include architectural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquaculture activities, surface mining, or wetlands.

32. **Wildlife hazard.** A potential for a damaging aircraft collision with wildlife on or near an airport.

33. **Wildlife strike.** A wildlife strike is deemed to have occurred when:

    a. A pilot reports striking 1 or more birds or other wildlife;

    b. Aircraft maintenance personnel identify aircraft damage as having been caused by a wildlife strike;

    c. Personnel on the ground report seeing an aircraft strike 1 or more birds or other wildlife;

    d. Bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified;

    e. The animal's presence on the airport had a significant negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal) (Transport Canada, Airports Group, *Wildlife Control Procedures Manual*, Technical Publication 11500E, 1994).

2. RESERVED.

Memorandum of Agreement Between the Federal Aviation Administration, the U.S. Air Force, the U.S. Army, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes

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PURPOSE

The signatory agencies know the risks that aircraft-wildlife strikes pose to safe aviation.

This Memorandum of Agreement (MOA) acknowledges each signatory agency's respective missions. Through this MOA, the agencies establish procedures necessary to coordinate their missions to more effectively address existing and future environmental conditions contributing to aircraft-wildlife strikes throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety, while protecting the Nation's valuable environmental resources.

BACKGROUND

Aircraft-wildlife strikes are the second leading causes of aviation-related fatalities. Globally, these strikes have killed over 400 people and destroyed more than 420 aircraft. While these extreme events are rare when compared to the millions of annual aircraft operations, the potential for catastrophic loss of human life resulting from one incident is substantial. The most recent accident demonstrating the grievous nature of these strikes occurred in September 1995, when a U.S. Air Force reconnaissance jet struck a flock of Canada geese during takeoff, killing all 24 people aboard.

The Federal Aviation Administration (FAA) and the United States Air Force (USAF) databases contain information on more than 54,000 United States civilian and military aircraft-wildlife strikes reported to them between 1990 and 1999[1]. During that decade, the FAA received reports indicating that aircraft-wildlife strikes, damaged 4,500 civilian U.S. aircraft (1,500 substantially), destroyed 19 aircraft, injured 91 people, and killed 6 people. Additionally, there were 216 incidents where birds struck two or more engines on civilian aircraft, with damage occurring to 26 percent of the 449 engines involved in these incidents. The FAA estimates that during the same decade, civilian U.S. aircraft sustained $4 billion worth of damages and associated losses and 4.7 million hours of aircraft downtime due to aircraft-wildlife strikes. For the same period,

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[1] FAA estimates that the 28,150 aircraft-wildlife strike reports it received represent less than 20% of the actual number of strikes that occurred during the decade.

USAF planes colliding with wildlife resulted in 10 Class A Mishaps[2], 26 airmen deaths, and over $217 million in damages.

Approximately 97 percent of the reported civilian aircraft-wildlife strikes involved common, large-bodied birds or large flocks of small birds. Almost 70 percent of these events involved gulls, waterfowl, and raptors (Table 1).

About 90 percent of aircraft-wildlife strikes occur on or near airports, when aircraft are below altitudes of 2,000 feet. Aircraft-wildlife strikes at these elevations are especially dangerous because aircraft are moving at high speeds and are close to or on the ground. Aircrews are intently focused on complex take-off or landing procedures and monitoring the movements of other aircraft in the airport vicinity. Aircrew attention to these activities while at low altitudes often compromises their ability to successfully recover from unexpected collisions with wildlife and to deal with rapidly changing flight procedures. As a result, crews have minimal time and space to recover from aircraft-wildlife strikes.

Increasing bird and wildlife populations in urban and suburban areas near airports contribute to escalating aircraft-wildlife strike rates. FAA, USAF, and Wildlife Services (WS) experts expect the risks, frequencies, and potential severities of aircraft-wildlife strikes to increase during the next decade as the numbers of civilian and military aircraft operations grow to meet expanding transportation and military demands.

SECTION I.

SCOPE OF COOPERATION AND COORDINATION

Based on the preceding information and to achieve this MOA's purpose, the signatory agencies:

A. Agree to strongly encourage their respective regional and local offices, as appropriate, to develop interagency coordination procedures necessary to effectively and efficiently implement this MOA. Local procedures should clarify time frames and other general coordination guidelines.

B. Agree that the term "airport" applies only to those facilities as defined in the attached glossary.

C. Agree that the three major activities of most concern include, but are not limited to:

    1. airport siting and expansion;

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[2] See glossary for the definition of a Class A Mishap and similar terms.

2. development of conservation/mitigation habitats or other land uses that could attract hazardous wildlife to airports or nearby areas; and

3. responses to known wildlife hazards or aircraft-wildlife strikes.

D. Agree that "hazardous wildlife" are those animals, identified to species and listed in FAA and USAF databases, that are most often involved in aircraft-wildlife strikes. Many of the species frequently inhabit areas on or near airports, cause structural damage to airport facilities, or attract other wildlife that pose an aircraft-wildlife strike hazard. Table 1 lists many of these species. It is included solely to provide information on identified wildlife species that have been involved in aircraft-wildlife strikes. It is not intended to represent the universe of species concerning the signatory agencies, since more than 50 percent of the aircraft-wildlife strikes reported to FAA or the USAF did not identify the species involved.

E. Agree to focus on habitats attractive to the species noted in Table 1, but the signatory agencies realize that it is imperative to recognize that wildlife hazard determinations discussed in Paragraph L of this section may involve other animals.

F. Agree that not all habitat types attract hazardous wildlife. The signatory agencies, during their consultative or decisionmaking activities, will inform regional and local land use authorities of this MOA's purpose. The signatory agencies will consider regional, local, and site-specific factors (e.g., geographic setting and/or ecological concerns) when conducting these activities and will work cooperatively with the authorities as they develop and implement local land use programs under their respective jurisdictions. The signatory agencies will encourage these stakeholders to develop land uses within the siting criteria noted in Section 1-3 of FAA Advisory Circular (AC) 150.5200-33 (Attachment A) that do not attract hazardous wildlife. Conversely, the agencies will promote the establishment of land uses attractive to hazardous wildlife outside those siting criteria. Exceptions to the above siting criteria, as described in Section 2.4.b of the AC, will be considered because they typically involve habitats that provide unique ecological functions or values (e.g., critical habitat for federally-listed endangered or threatened species, ground water recharge).

G. Agree that wetlands provide many important ecological functions and values, including fish and wildlife habitats; flood protection; shoreline erosion control; water quality improvement; and recreational, educational, and research opportunities. To protect jurisdictional wetlands, Section 404 of the Clean Water Act (CWA) establishes a program to regulate dredge and/or fill activities in these wetlands and navigable waters. In recognizing Section 404 requirements and the Clean Water Action Plan's goal to annually increase the Nation's net wetland acreage by 100,000 acres through 2005, the signatory agencies agree to resolve aircraft-wildlife conflicts. They will do so by

avoiding and minimizing wetland impacts to the maximum extent practicable, and will work to compensate for all associated unavoidable wetland impacts. The agencies agree to work with landowners and communities to encourage and support wetland restoration or enhancement efforts that do not increase aircraft-wildlife strike potentials.

H. Agree that the: U.S. Army Corps of Engineers (ACOE) has expertise in protecting and managing jurisdictional wetlands and their associated wildlife; U.S. Environmental Protection Agency (EPA) has expertise in protecting environmental resources; and the U.S. Fish and Wildlife Service (USFWS) has expertise in protecting and managing wildlife and their habitats, including migratory birds and wetlands. Appropriate signatory agencies will cooperatively review proposals to develop or expand wetland mitigation sites, or wildlife refuges that may attract hazardous wildlife. When planning these sites or refuges, the signatory agencies will diligently consider the siting criteria and land use practice recommendations stated in FAA AC 150/5200-33. The agencies will make every effort to undertake actions that are consistent with those criteria and recommendations, but recognize that exceptions to the siting criteria may be appropriate (see Paragraph F of this section).

I. Agree to consult with airport proponents during initial airport planning efforts. As appropriate, the FAA or USAF will initiate signatory agency participation in these efforts. When evaluating proposals to build new civilian or military aviation facilities or to expand existing ones, the FAA or the USAF, will work with appropriate signatory agencies to diligently evaluate alternatives that may avoid adverse effects on wetlands, other aquatic resources, and Federal wildlife refuges. If these or other habitats support hazardous wildlife, and there is no practicable alternative location for the proposed aviation project, the appropriate signatory agencies, consistent with applicable laws, regulations, and policies, will develop mutually acceptable measures, to protect aviation safety and mitigate any unavoidable wildlife impacts.

J. Agree that a variety of other land uses (e.g., storm water management facilities, wastewater treatment systems, landfills, golf courses, parks, agricultural or aquacultural facilities, and landscapes) attract hazardous wildlife and are, therefore, normally incompatible with airports. Accordingly, new, federally-funded airport construction or airport expansion projects near habitats or other land uses that may attract hazardous wildlife must conform to the siting criteria established in the FAA Advisory Circular (AC) 150/5200-33, Section 1-3.

K. Agree to encourage and advise owners and/or operators of non-airport facilities that are known hazardous wildlife attractants (See Paragraph J) to follow the siting criteria in Section 1-3 of AC 150/5200-33. As appropriate, each signatory agency will inform proponents of these or other land uses about the land use's potential to attract hazardous species to airport areas.

The signatory agencies will urge facility owners and/or operators about the critical need to consider the land uses' effects on aviation safety.

L. Agree that FAA, USAF, and WS personnel have the expertise necessary to determine the aircraft-wildlife strike potentials of various land uses. When there is disagreement among signatory agencies about a particular land use and its potential to attract hazardous wildlife, the FAA, USAF, or WS will prepare a wildlife hazard assessment. Then, the appropriate signatory agencies will meet at the local level to review the assessment. At a minimum, that assessment will:

   1. identify each species causing the aviation hazard, its seasonal and daily populations, and the population's local movements;

   2. discuss locations and features on and near the airport or land use attractive to hazardous wildlife; and

   3. evaluate the extent of the wildlife hazard to aviation.

M. Agree to cooperate with the airport operator to develop a specific, wildlife hazard management plan for a given location, when a potential wildlife hazard is identified. The plan will meet applicable FAA, USAF, and other relevant requirements. In developing the plan, the appropriate agencies will use their expertise and attempt to integrate their respective programmatic responsibilities, while complying with existing laws, regulations, and policies. The plan should avoid adverse impacts to wildlife populations, wetlands, or other sensitive habitats to the maximum extent practical. Unavoidable impacts resulting from implementing the plan will be fully compensated pursuant to all applicable Federal laws, regulations, and policies.

N. Agree that whenever a significant aircraft-wildlife strike occurs or a potential for one is identified, any signatory agency may initiate actions with other appropriate signatory agencies to evaluate the situation and develop mutually acceptable solutions to reduce the identified strike probability. The agencies will work cooperatively, preferably at the local level, to determine the causes of the strike and what can and should be done at the airport or in its vicinity to reduce potential strikes involving that species.

O. Agree that information and analyses relating to mitigation that could cause or contribute to aircraft-wildlife strikes should, whenever possible, be included in documents prepared to satisfy the National Environmental Policy Act (NEPA). This should be done in coordination with appropriate signatory agencies to inform the public and Federal decision makers about important ecological factors that may affect aviation. This concurrent review of environmental issues will promote the streamlining of the NEPA review process.

P. Agree to cooperatively develop mutually acceptable and consistent guidance, manuals, or procedures addressing the management of habitats attractive to

hazardous wildlife, when those habitats are or will be within the siting criteria noted in Section 1-3 of FAA AC 5200-33. As appropriate, the signatory agencies will also consult each other when they propose revisions to any regulations or guidance relevant to the purpose of this MOA, and agree to modify this MOA accordingly.

SECTION II.
GENERAL RULES AND INFORMATION

A. Development of this MOA fulfills the National Transportation Safety Board's recommendation of November 19, 1999, to form an inter-departmental task force to address aircraft-wildlife strike issues.

B. This MOA does not nullify any obligations of the signatory agencies to enter into separate MOAs with the USFWS addressing the conservation of migratory birds, as outlined in Executive Order 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, dated January 10, 2001 (66 *Federal Register*, No. 11, pg. 3853).

C. This MOA in no way restricts a signatory agency's participation in similar activities or arrangements with other public or private agencies, organizations, or individuals.

D. This MOA does not alter or modify compliance with any Federal law, regulation or guidance (e.g., Clean Water Act; Endangered Species Act; Migratory Bird Treaty Act; National Environmental Policy Act; North American Wetlands Conservation Act; Safe Drinking Water Act; or the "no-net loss" policy for wetland protection). The signatory agencies will employ this MOA in concert with the Federal guidance addressing wetland mitigation banking dated March 6, 1995 (60 *Federal Register*, No. 43, pg. 12286).

E. The statutory provisions and regulations mentioned above contain legally binding requirements. However, this MOA does not substitute for those provisions or regulations, nor is it a regulation itself. This MOA does not impose legally binding requirements on the signatory agencies or any other party, and may not apply to a particular situation in certain circumstances. The signatory agencies retain the discretion to adopt approaches on a case-by-case basis that differ from this MOA when they determine it is appropriate to do so. Such decisions will be based on the facts of a particular case and applicable legal requirements. Therefore, interested parties are free to raise questions and objections about the substance of this MOA and the appropriateness of its application to a particular situation.

F. This MOA is based on evolving information and may be revised periodically without public notice. The signatory agencies welcome public comments on this MOA at any time and will consider those comments in any future revision of this MOA.

G. This MOA is intended to improve the internal management of the Executive Branch to address conflicts between aviation safety and wildlife. This MOA does not create any right, benefit, or trust responsibility, either substantively or procedurally. No party, by law or equity, may enforce this MOA against the United States, its agencies, its officers, or any person.

H. This MOA does not obligate any signatory agency to allocate or spend appropriations or enter into any contract or other obligations.

I. This MOA does not reduce or affect the authority of Federal, State, or local agencies regarding land uses under their respective purviews. When requested, the signatory agencies will provide technical expertise to agencies making decisions regarding land uses within the siting criteria in Section 1-3 of FAA AC 150/5200-33 to minimize or prevent attracting hazardous wildlife to airport areas.

J. Any signatory agency may request changes to this MOA by submitting a written request to any other signatory agency and subsequently obtaining the written concurrence of all signatory agencies.

K. Any signatory agency may terminate its participation in this MOA within 60 days of providing written notice to the other agencies. This MOA will remain in effect until all signatory agencies terminate their participation in it.

SECTION III. PRINCIPAL SIGNATORY AGENCY CONTACTS

The following list identifies contact offices for each signatory agency.

Federal Aviation Administration
Office Airport Safety and Standards
Airport Safety and
Compliance Branch (AAS-310)
800 Independence Ave., S.W.
Washington, D.C. 20591
V: 202-267-1799
F: 202-267-7546

U.S. Air Force
HQ AFSC/SEFW
9700 Ave., G. SE, Bldg. 24499
Kirtland AFB, NM 87117
V: 505-846-5679
F: 505-846-0684

U.S. Army
Directorate of Civil Works
Regulatory Branch (CECW-OR)
441 G St., N.W.
Washington, D.C. 20314
V: 202-761-4750
F: 202-761-4150

U.S. Environmental Protection Agy.
Office of Water
Wetlands Division
Ariel Rios Building, MC 4502F
1200 Pennsylvania Ave., SW
Washington, D.C. 20460
V: 202-260-1799
F: 202-260-7546

U.S. Fish and Wildlife Service
Division of Migratory Bird Management
4401 North Fairfax Drive, Room 634
Arlington, VA 22203
V: 703-358-1714
F: 703-358-2272

U.S. Department of Agriculture
Animal and Plant Inspection Service
Wildlife Services
Operational Support Staff
4700 River Road, Unit 87
Riverdale, MD 20737
V: 301-734-7921
F: 301-734-5157

Signature Page

Associate Administrator for Airports,
Federal Aviation Administration

12/17/02
Date

Chief of Safety,
U. S. Air Force

27 May 2003
Date

Acting Assistant Secretary of the Army
(Civil Works)
Department of the Army

December 9, 2002
Date

Assistant Administrator, Office of Water,
U.S. Environmental Protection Agency

1/17/03

Assistant Director, Migratory Birds
and State Programs,
U.S. Fish and Wildlife Service

7/29/03
Date

Acting Deputy Administrator, Wildlife Services
U.S. Department of Agriculture

09 January 2003
Date

GLOSSARY

This glossary defines terms used in this MOA.

Airport. All USAF airfields or all public use airports in the FAA's National Plan of Integrated Airport Systems (NPIAS). Note: There are over 18,000 civil-use airports in the U.S., but only 3,344 of them are in the NPIAS and, therefore, under FAA's jurisdiction.

Aircraft-wildlife strike. An aircraft-wildlife strike is deemed to have occurred when:

1. a pilot reports that an aircraft struck 1 or more birds or other wildlife;
2. aircraft maintenance personnel identify aircraft damage as having been caused by an aircraft-wildlife strike;
3. personnel on the ground report seeing an aircraft strike 1 or more birds or other wildlife;
4. bird or other wildlife remains, whether in whole or in part, are found within 200 feet of a runway centerline, unless another reason for the animal's death is identified; or
5. the animal's presence on the airport had a significant, negative effect on a flight (i.e., aborted takeoff, aborted landing, high-speed emergency stop, aircraft left pavement area to avoid collision with animal)

(Source: *Wildlife Control Procedures Manual*, Technical Publication 11500E, 1994).

Aircraft-wildlife strike hazard. A potential for a damaging aircraft collision with wildlife on or near an airport (14 CFR 139.3).

Bird Sizes. Title 40, Code of Federal Regulations, Part 33.76 classifies birds according to weight:

small birds weigh less than 3 ounces (oz).
medium birds weigh more than 3 oz and less than 2.5 lbs.
large birds weigh greater than 2.5 lbs.

Civil aircraft damage classifications. The following damage descriptions are based on the *Manual on the International Civil Aviation Organization Bird Strike Information System*:

Minor: The aircraft is deemed airworthy upon completing simple repairs or replacing minor parts and an extensive inspection is not necessary.

Substantial: Damage or structural failure adversely affects an aircraft's structural integrity, performance, or flight characteristics. The damage normally requires major repairs or the replacement of the entire affected component. Bent fairings or cowlings; small dents; skin punctures; damage to wing tips, antenna, tires or brakes, or engine blade damage not requiring blade replacement are specifically excluded.

Destroyed: The damage sustained makes it inadvisable to restore the aircraft to an airworthy condition.

Significant Aircraft-Wildlife Strikes. A significant aircraft-wildlife strike is deemed to have occurred when any of the following applies:

1. a civilian, U.S. air carrier aircraft experiences a multiple aircraft-bird strike or engine ingestion;
2. a civilian, U.S. air carrier aircraft experiences a damaging collision with wildlife other than birds; or
3. a USAF aircraft experiences a Class A, B, or C mishap as described below:

    A. **Class A Mishap:** Occurs when at least one of the following applies:
        1. total mishap cost is $1,000,000 or more;
        2. a fatality or permanent total disability occurs; and/or
        3. an Air Force aircraft is destroyed.
    B. **Class B Mishap:** Occurs when at least one of the following applies:
        1. total mishap cost is $200,000 or more and less than $1,000,000; and/or
        2. a permanent partial disability occurs and/or 3 or more people are hospitalized;
    C. **Class C Mishap:** Occurs when at least one of the following applies:
        1. cost of reported damage is between $20,000 and $200,000;
        2. an injury causes a lost workday (i.e., duration of absence is at least 8 hours beyond the day or shift during which mishap occurred); and/or
        3. an occupational illness causing absence from work at any time.

Wetlands. An ecosystem requiring constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or

near the surface and the presence of physical, chemical, and biological features indicating recurrent, sustained inundation, or saturation. Common diagnostic wetland features are hydric soils and hydrophytic vegetation. These features will be present, except where specific physiochemical, biotic, or anthropogenic factors have removed them or prevented their development.

(Source the 1987 Delineation Manual; 40 CFR 230.3(t)).

Wildlife. Any wild animal, including without limitation any wild mammal, bird, reptile, fish, amphibian, mollusk, crustacean, arthropod, coelenterate, or other invertebrate, including any part, product, egg, or offspring there of (50 CFR 10.12, *Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants*). As used in this MOA, "wildlife" includes feral animals and domestic animals while out of their owner's control (14 CFR 139.3, *Certification and Operations: Land Airports Serving CAB-Certificated Scheduled Air Carriers Operating Large Aircraft (Other Than Helicopters)*)

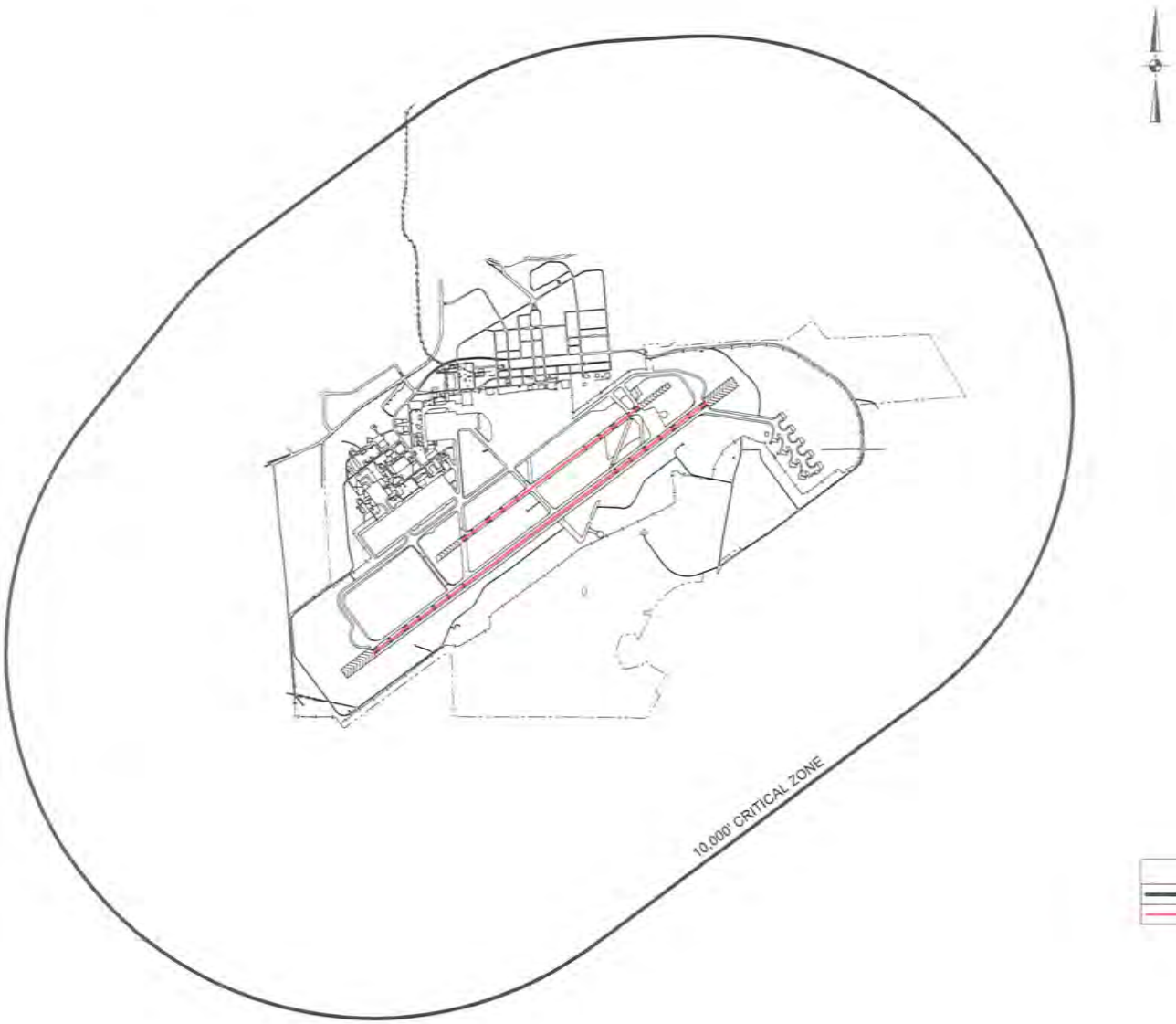
Table 1. Identified wildlife species, or groups, that were involved in two or more aircraft-wildlife strikes, that caused damage to one or more aircraft components, or that had an adverse effect on an aircraft's flight. Data are for 1990-1999 and involve only civilian U.S. aircraft.

Birds	No. reported strikes
Gulls (all spp.)	874
Geese (primarily, Canada geese)	458
Hawks (primarily, Red-tailed hawks)	182
Ducks (primarily Mallards.)	166
Vultures (primarily, Turkey vulture)	142
Rock doves	122
Doves (primarily, mourning doves)	109
Blackbirds	81
European starlings	55
Sparrows	52
Egrets	41
Shore birds (primarily, Killdeer & Sandpipers)	40
Crows	31
Owls	24
Sandhill cranes	22
American kestrels	15
Great blue herons	15
Pelicans	14
Swallows	14
Eagles (Bald and Golden)	14
Ospreys	13
Ring-necked pheasants	11
Herons	11
Barn-owls	9
American robins	8
Meadowlarks	8
Buntings (snow)	7
Cormorants	6
Snow buntings	6
Brants	5
Terns (all spp.)	5
Great horned owls	5
Horned larks	4
Turkeys	4
Swans	3
Mockingbirds	3
Quails	3
Homing pigeons	3
Snowy owls	3
Anhingas	2

Ravens	2
Kites	2
Falcons	2
Peregrine falcons	2
Merlins	2
Grouse	2
Hungarian partridges	2
Spotted doves	2
Thrushes	2
Mynas	2
Finches	2
Total known birds	2,612

Mammals	**No. reported strikes**
Deer (primarily, White-tailed deer)	285
Coyotes	16
Dogs	10
Elk	6
Cattle	5
Bats	4
Horses	3
Pronghorn antelopes	3
Foxes	2
Raccoons	2
Rabbits	2
Moose	2
Total known mammals	340

Ring-billed gulls were the most commonly struck gulls. The U.S. ring-billed gull population increased steadily at about 6% annually from 1966-1988. Canada geese were involved in about 90% of the aircraft-goose strikes involving civilian, U.S. aircraft from 1990-1998. Resident (non-migratory) Canada goose populations increased annually at 13% from 1966-1998. Red-tailed hawks accounted for 90% of the identified aircraft-hawk strikes for the 10-year period. Red-tailed hawk populations increased annually at 3% from 1966 to 1998. Turkey vultures were involved in 93% of he identified aircraft-vulture strikes. The U.S. Turkey vulture populations increased at annually at 1% between 1966 and 1998. Deer, primarily white-tailed deer, have also adapted to urban and airport areas and their populations have increased dramatically. In the early 1900's, there were about 100,000 white-tailed deer in the U.S. Current estimates are that the U.S. population is about 24 million.



LEGEND

	10,000' Critical Zone
	Runway Centerline

SACRAMENTO
COUNTY AIRPORT SYSTEM
6900 AIRPORT BLVD.
SACRAMENTO, CA 95837

REVISIONS

NO.	DATE	DESCRIPTION

FILE NAME:	MHR 10000 Crit Zone
DRAWN BY:	WILSONDS
DATE:	4/23/07
DESIGNED BY:	
CHECKED BY:	
SCALE:	AS SHOWN

LINE IS ONE INCH
ATTEST SIZE
(IF NOT 1" SCALE ACCORDINGLY)

SACRAMENTO INTERNATIONAL AIRPORT

SHEET TITLE:

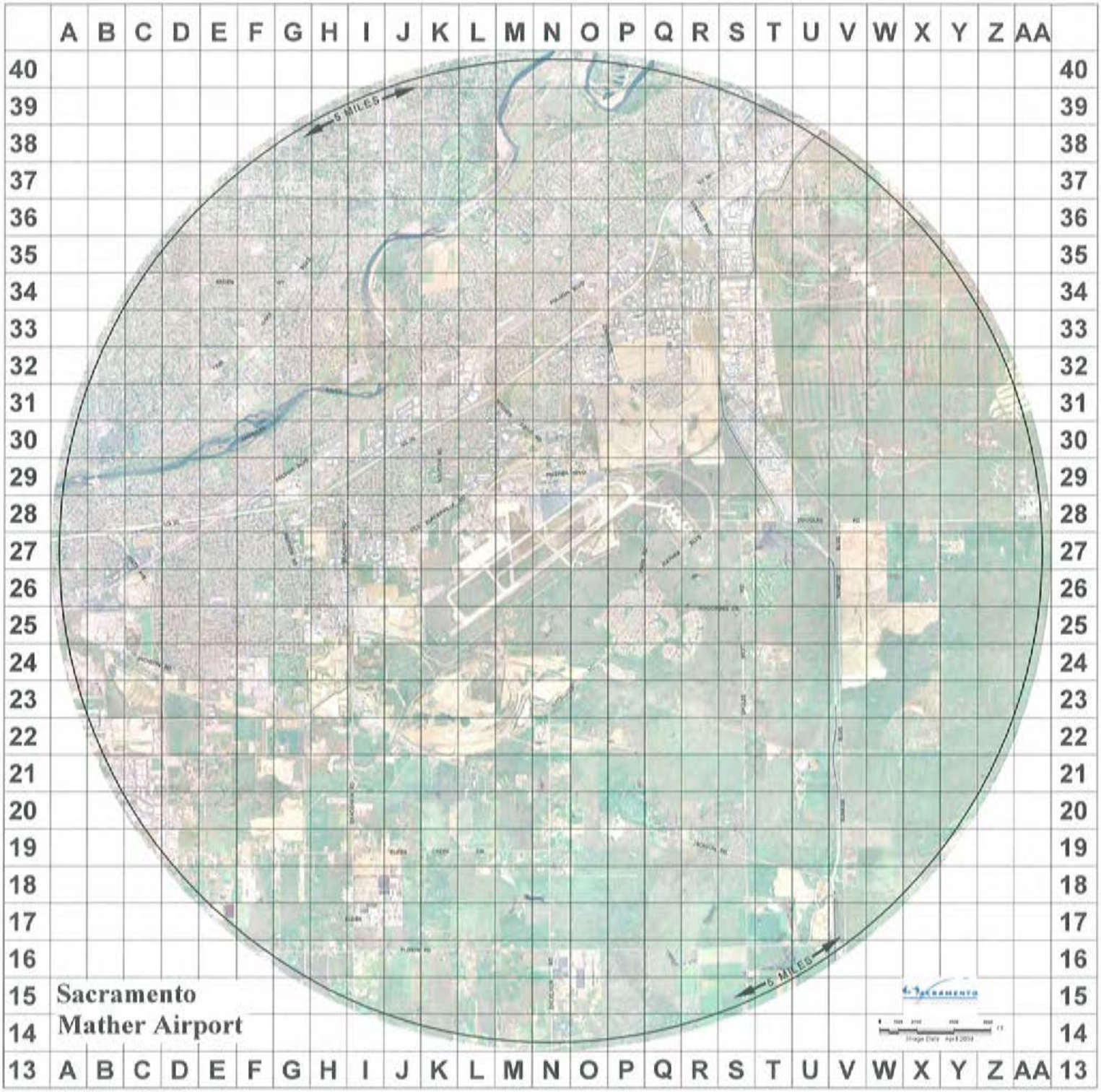
10,000 Foot Critical Zone

DRAWING NO.

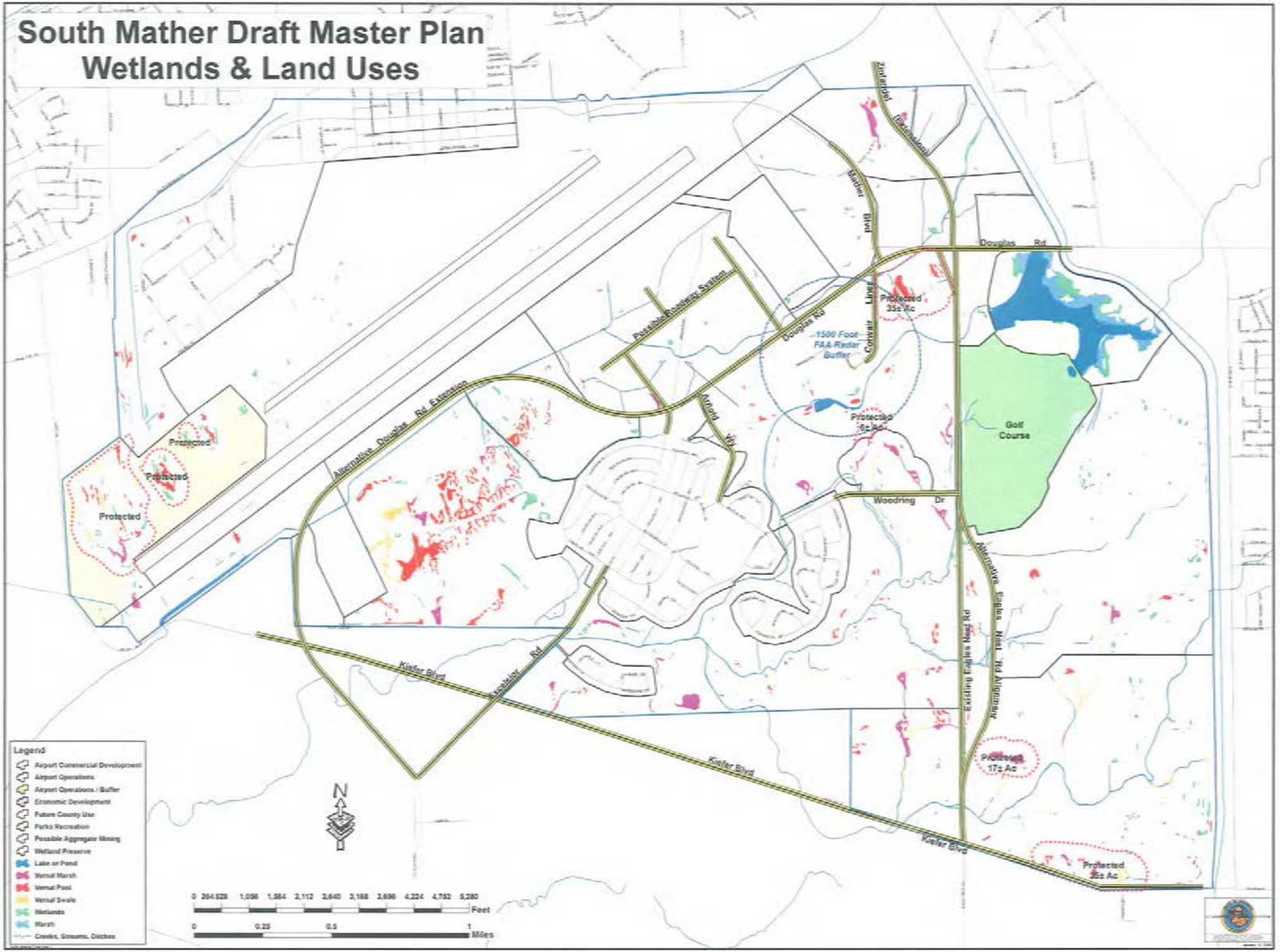
1

SHEET NO. 1 of 1

SACRAMENTO MATHER AIRPORT
5 MILE RADIUS



South Mather Draft Master Plan
Wetlands & Land Uses



Attachment 1

Federal Aviation Administration (FAA) Regulations and Related Requirements - Hazardous Wildlife

The FAA has developed a number of regulations, policies and guidance documents related to the minimization of bird strike hazards and to habitat restoration and management on airport lands. These documents include:

- Federal Aviation Regulation (FAR), CFR Part 139 (as amended February 2004); in particular Part 139.337 *Wildlife Hazard Management*.
- Advisory Circular 50/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*, August 28, 2007 (replaces 33A published July 27, 2004, and all previous versions).
- FAA Certification Alert 06-07, *Requests by State Wildlife Agencies to Facilitate and Encourage Habitat for State-Listed Threatened and Endangered Species and Species of Special Concern on Airports*, November 21, 2006.
- FAA Advisory Circular 150/5200-32A, *Reporting Wildlife Aircraft Strikes*, December 22, 2004.
- FAA Advisory Circular 150/5200-36, *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculum for Airport Personnel in Controlling Wildlife Hazards at Airports*. June 28, 2006.
- *Wildlife Hazard Management at Airports – A Handbook for Airport Personnel.* FAA Office of Airport Safety and Standards and United States Department of Agriculture (USDA), Animal and Plant Health Inspection Services (APHIS) - Wildlife Services, 2nd Edition July 2005.
- FAA Advisory Circular 150/5200-34 *Construction or Establishment of Landfills Near Public Airports*, August 26, 2000.
- FAA Advisory Circular 150/5300-13 *Airport Design*, Appendix 19, "Minimum Distances Between Certain Airport Features and Any On-Airport Agriculture Crops." Amended periodically.
- FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, April 28, 2006. Section 209.a – Wildlife Hazard Management Plans (WHMP) specifies that when the FAA Administrator determines that an airport must prepare a WHMP to address wildlife hazards, the airport must submit the WHMP to the FAA for approval prior to implementation. Order 5050.4B further specifies that FAA approval of a WHMP is a "federal action" requiring a NEPA analysis.
- *Memorandum of Agreement Between the FAA, U.S. Air Force, U.S. Army, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and U.S. Department of Agriculture to Address Aircraft-Wildlife Strikes.* Signed by the six agencies between December 2002 and July 2003.
- Animal Damage Control Act, 7 USC, Section 426-426c, enacted in 1931 and amended in 19378 and 1991; grants the Secretary of Agriculture broad authority to investigate and control certain predatory and wild animals and nuisance mammals and birds.
- FAA Office of Airport Safety and Standards – Program Policies and Guidance, Airport Certification – 14 CFR 130; Policies 77, 78,79 and 82 specify procedures with regard to wildlife hazard management, waste disposal, and coordination with regard to the federal Endangered Species Act. These policies comprise Appendix D of the 2005 FAA-USDA Hazard Wildlife Management handbook referenced above.

In general, these documents direct airport operators, in this case the Sacramento County Airport System (SCAS), to discourage wildlife usage of airport lands by managing vegetation to decrease wildlife attractiveness. Additionally, these policy documents generally discourage habitat restoration activities and the creation of wetlands, waste disposal facilities and open bodies of water on and adjacent to airports unless it can be shown that those activities will not increase bird strike hazards. The FAA may revoke an airport's operating certificate if the FAA determines that the airport has created or failed to vigorously oppose the creation of such hazards on or near the airport. FAA safety certification personnel conduct periodic inspections of public airports to ascertain compliance with the above regulations, policies and guidance documents.

APPROVED
BOARD OF SUPERVISORS
by Reso. No. 2006-0210
FEB 22 2006
Clerk of the Board

COUNTY OF SACRAMENTO
CALIFORNIA

28

For the Agenda of:
February 22, 2006
Timed: 2:00 p.m.

To: Board of Supervisors

From: Department of Economic Development and Intergovernmental Affairs

Subject: **Initiation Of Mather-Related General Plan Amendments And Approval To Proceed With Application For Federal Wetland Fill Permits At South Mather**

Contact: Paul Lake, Special Projects Manager (874-8537)
David Norris, Senior Civil Engineer (874-5049)

Overview

This report recommends changes to the land use plans for South Mather. These include: new boundaries for a Wetlands Preserve of approximately 1,070 acres; designating certain vernal pools outside of the Wetlands Preserve for protection, new routes for extensions of Douglas Road and Eagles Nest Road, and to accommodate future development which may include a university. To accomplish these plans, staff is recommending initiating amendments to the General Plan, Mather Specific Plan, and Mather Special Planning Area.

On December 5, 2005, a group of stakeholders representing thirteen outside entities and seven county departments endorsed the proposed boundaries, pending official review and approval by regulatory federal and state agencies. The Board's approval of these recommendations would initiate CEQA (California Environmental Quality Act) review. It would also initiate preparation of applications to regulatory agencies for fill permits of identified wetlands, stream bed alteration permits, and other necessary permits and authorizations.

Recommendations

Staff recommends that the Board of Supervisors:

1. **Receive And File** information on the proposed initiation of Mather-Related General Plan and Specific Plan Amendments;

2. **Accept** testimony from the general public;

3. **Conceptually Endorse** the use map for South Mather presented in Attachment A, including the boundaries for a Wetlands Preserve, future County land use for economic development and parks, protected vernal pools, airport commercial development, and airport operations. This endorsement will allow staff to move forward with seeking fill permits from federal regulators. It does not create definitive boundaries or finalize protected pools, which will depend on future mutual agreement on local, state, and federal mitigation requirements.

4. **Conceptually Endorse** the realignments of Eagles Nest and Douglas Roads as shown on the map in Attachment A.

5. **Adopt** the attached resolution initiating General Plan, Mather Specific Plan, and Mather Special Planning Area amendments to change the designation of the Economic Development Conveyance area and the munitions area at South Mather, and to modify the locations of Douglas Road and Eagles Nest Road. This will allow for a possible university and accompanying development. The attached resolution initiates General Plan amendments to change designations from Recreational to Commercial-Office for areas that may be developed for a university and accompanying residential and retail development. It also initiates an amendment to the Mather Field Specific Plan to permit the same uses listed above. Finally, it initiates an amendment to the Mather Field Special Planning Area to allow mixed-use development and a University without need for conditional use permits. Development Plan Review to the Board of Supervisors will be required.

6. **Endorse** the language in Attachment B that proscribes activities and development within preserved, protected, and developed areas;

7. **Direct** the Department of Economic Development and Intergovernmental Affairs (DEDIA) to apply for federal Clean Water Act Section 404 and related state and federal permits associated with the proposed land uses.

Fiscal Impact
General Plan: The proposed actions to initiate General and Specific Plans amendments, including CEQA review, and preparing an application package for federal and state permits will not result in a net County (general fund) cost. DEDIA costs related to the proposed actions will be funded with Mather funds in DEDIA's budget. Expenditures for the Department's staff time dedicated to this effort have been anticipated and sufficient funding is available. Estimated costs for amending the General and Specific Plans, including CEQA review, are in the low- to mid-$100,000s.

Potential Mitigation: The proposed plan would fill approximately sixteen acres of vernal wetlands, approximately seventeen acres of seasonal wetlands, and approximately six acres of lakes and ponds. The permitting process will determine the exact mitigation requirements for these fills. Precise mitigation costs and funding sources are therefore unknown at this time, but staff estimates it could be in excess of $4 million.

BACKGROUND:
In December 1988, the Department of Defense officially announced the decision to close Mather Air Force Base. The Air Force issued a Record of Decision (ROD) for the disposal of the base in March 1993. The Base closed in September 1993.

In May 1997, the Board of Supervisors adopted a Specific Plan to facilitate the conversion of Mather from a base to public and private uses. (See Attachment C for Specific Plan map) The Plan established (1) the location, intensity, and character of land uses; (2) circulation patterns and necessary infrastructure improvements to support development (Attachment D); (3) the location and general configuration of parks and open space; (4) community facilities necessary to support

new development and contribute to the quality and livability of the region as a whole; and (5) implementing actions required to realize the Plan's objectives.

In March 1999, the United States Fish and Wildlife Service issued a Biological Opinion (BO) relating to water service contracts to deliver water out of the American River for utilization within Sacramento County Water Agency's Zone 40 Service Area, which includes Mather. The Board of Supervisors approved the Water Contract, thereby agreeing to the BO conditions. The BO requires, in part, the County to develop a vernal pool management plan and to dedicate conservation easements over vernal pools on the County airport and park properties at Mather.

In April 2004, the Board of Supervisors conceptually endorsed creation of a Wetlands Preserve at Mather. The Board directed staff to work with stakeholders to develop a plan for creating the Wetlands Preserve and for addressing other uses, including roadways, economic development, parks, and easement restrictions for conservation and resource protection.

CONSENSUS-BUILDING PROCESS:

In June 2005, staff brought together representatives of key stakeholders interested in the future of South Mather. Attachment E provides a full list of the stakeholder group, including environmental advocates, park supporters, community residents, the City of Rancho Cordova, the Air Force, federal regulators, County departments, and others.

Using an interest-based approach, the stakeholders group developed alternatives for the boundaries of the Wetlands Preserve, identified other vernal pools to be protected, and discussed the alignments of Eagles Nest and Douglas Roads. After several meetings, the group unanimously voted to support staff presenting the current plan to the Board to initiate the General and Specific Plan Amendment process and the federal permitting processes.*

RECOMMENDED CHANGES TO MATHER MAP AND LAND USE AREAS:

Attachment B describes the land use areas presented in this report These descriptions summarize intended and allowed uses in the Wetlands Preserve, Protected Pool Areas, and Future County Land Use Areas. In general, the designations are:

- Preserve Area: Development limited to controlled public access for observing and viewing pools by pedestrians and bicyclists, including some trails. One important unresolved issue is the location of a "staging" area for the Wetlands Preserve. This will provide a location for bus and other parking that viewers of the Wetlands Preserve will need. Regulators and some environmental advocates may request that the County locate the staging area within parks or economic development areas, while County staff suggests that it be located within the Wetlands Preserve, in an area that would not impact vernal habitat. The stakeholders did not discuss this issue in detail and their endorsement of the plan on December 5 did not include any agreement to a location for the staging area.

* The Institute for Ecological Health (IEH) and the Army Corps of Engineers were not present at the final meeting. A separate meeting with IEH garnered its endorsement. Efforts to meet with the Corps were not successful, due to the Corps' staffing limitations.

- Future County Use: The County would seek fill permits for most of the pools in these areas. To the extent that some pools are compatible with approved development, we would not impact them. Nonetheless, staff recommends seeking maximum flexibility for filling these pools to meet the County's economic and parks development objectives at South Mather.

- Protected Pool Areas (including Ahart's Dwarf Rush Area and Spadefoot Toad Pool): These are pools that we would not fill nor develop within buffered zones. The public would not have access to these areas other than for viewing from outside the zones. We would limit other access to stipulated maintenance activities and emergencies. (Note difference in access to Airport Protected Pools below.)

- Airport: These are designated for airport operations, commercial development, or both. The Mather Airport Master Plan specifies activities that will occur. Except for necessary maintenance or other airport operations, no one would access protected pools within the Airport. Maintenance in these pools would be different than maintenance activities outside of Airport areas, due to FAA regulations and air traffic safety needs.

ROAD ALIGNMENTS:

- Roadway Sizing: The Department of Transportation contracted with Fehr & Peers Associates to evaluate the transportation needs related to future development in South Mather, including the projected need along Eagles Nest and Douglas Roads through 2030. In summary, the study (Attachment F) found a definite need for both roads to be four-lane arterials. The most pressing need is for the Douglas Road extension, to take pressure off Excelsior Road, which now runs directly through Independence at Mather. Many commuters are using this as a "short-cut" through Mather, creating potential hazards for residents.

- Douglas Road Extension: Attachment D shows the proposed alternative alignment of the extension of Douglas Road from Sunrise Boulevard. Currently, the General Plan shows the extension running near the western edge of Independence at Mather. Many of the stakeholders expressed concern about a four-lane road running close to homes and through the Wetlands Preserve.

A subcommittee of the stakeholders group analyzed alternatives to the General Plan route and selected the proposed alignment as optimal. The proposed route would take Douglas away from the residential areas and keep it away from habitat in the proposed preserve. The Department of Transportation has determined that this alignment will meet the future traffic needs and can be designed adequately to move commuter traffic away from Independence at Mather.

The table below compares estimated costs of the original (straight) Douglas Road alignment and the proposed alignment.

Project Limit	Length (miles)	Estimated Construction Cost (millions)
Original Alignment	2.43	$ 11.5
Proposed Alignment	3.09	$ 15.5
Difference	0.66	$ 4.0

* Note: Costs do not reflect potential right-of-way or contingency costs, only estimated construction costs.

- Eagles Nest Road: Attachment D shows the proposed alternative alignment of Eagles Nest Road. Currently, the General Plan shows Eagles Nest Road as a straight road between Douglas Road and Kiefer Boulevard. Many of the stakeholders expressed concern about a four-lane "straightaway" in the community and its potential for impacting the vernal pools that are just north of Kiefer Boulevard, considered important by the group to protect.

The stakeholders subcommittee analyzed alternatives to the General Plan route (see Attachment G showing the options that the subcommittee considered). The challenge was to find a route that would minimize impact on the pools and still meet the road standards for curves that would connect Eagles Nest at its intended point on Kiefer. The proposed route would meet these interests.

Eagles Nest will also be relatively close to a pool that contains the Western Spadefoot Toad (shown as "Protected", right next to the proposed road curve). DEDIA is funding a study to recommend measures to protect the Spadefoot from the traffic hazards of Eagles Nest, such as an elevated road, curbing, or expanded buffers around the pool. The results of the study and the recommendations for the pool will be part of discussions with the federal regulators who are concerned about this species.

The table below compares estimated costs of the original (straight) Eagles Nest alignment and the proposed alignment.

Project Limit	Length (miles)	Estimated Total Project Cost (millions)
Original Alignment	2.16	$ 12.0
Proposed Alignment	2.23	$ 12.2
Difference	0.07	$ 0.2

* Note: Costs do not reflect potential right-of-way or contingency costs, only estimated construction costs.

The proposed realignment of Eagles Nest shifts more land area into the proposed wetlands preserve and protected areas. Staff recommends including this property in the Wetlands Preserve in order to save habitat and species.

WETLANDS PRESERVE:
The Wetlands Preserve as shown in Attachment A would serve some critical functions.

1. It would be one of the largest set-asides of natural habitat in Sacramento County and an important anchor to the South Sacramento Habitat Conservation Plan (HCP).

2. It would ensure a large open space area south of Highway 50 to be enjoyed by current and future generations.

3. It would provide educational opportunities for the public to learn about and appreciate wildlife and water resources.

4. It would provide potential areas for mitigation of restoration of vernal features and wetlands that proposed development outside of the Wetlands Preserve at South Mather could damage.

The proposed preserve encompasses 1,070 total acres of land and protects nearly 56 acres of vernal wetlands and 33 acres of seasonal wetlands. Changes to the boundary of the Wetlands Preserve from that proposed in April 2004 include the area to the west of proposed Eagles Nest Road alignment (discussed above) and some habitat north of Woodring Road (Attachment H). The recommended boundary represents a compromise between the land needs for future County use and environmental needs.

The County would own the Wetlands Preserve and the Parks Department would oversee management and maintenance. A combination of development-related activities on the economic development, park and airport properties at Mather, and the HCP would fund the management and maintenance of the Wetlands Preserve.

FUTURE COUNTY USE:
Areas identified in Attachment A as "Future County Use" are for the Department of Regional Parks, Recreation, and Open Space ("Parks") and DEDIA. Parks would use the area north of Woodring for soccer and rugby fields and festival grounds. Future parks master planning will recommend specific uses for the remaining areas.

This plan identifies four sets of vernal pools for protection within the Future County Land Use areas (shown with red circles and as "Protected" in Attachment A).

- North of Woodring, just south of Morrison Creek: Protecting this pool would provide some connectivity between the creek and the northernmost portion of the proposed Wetland Preserve. The only reason it is not in the Wetlands Preserve is that Parks needs connectivity between the proposed soccer and rugby fields, which may include pedestrian and bicycle throughways. Parks would limit development near this pool to what would be necessary and to minimize impact to the pool.

- Southwest corner of Douglas Road and Eagles Nest: These large pools would serve as an entryway into the Regional Park. Protecting vernal pools at the entry would be appropriate, representing an important aspect of the regional park site.

- Western Spadefoot Toad (WST) Pool: This 1.7 acre pool is south of Mather Golf Course and just east of the proposed alternative Eagles Nest alignment. Although the WST is not a federally protected species, the Planning Department will likely write the HCP to protect it as a species of interest.

  At this time, staff cannot determine how much land would be used for this pool set aside, for two reasons:

  1. The map in Attachment A shows a 250-foot buffer around the pool, taking up approximately 17 acres of land. It is not known whether this is an appropriate buffer for the WST. DEDIA is funding a study to help answer that question, pending review and approval from regulators.

  2. The pool's close location to Eagles Nest may not be the best location for long-term survivability of the WST, even with protection measures. DEDIA is funding an additional survey to identify other pools at Mather and elsewhere within the HCP boundaries that have WST that have stronger chances at survival. If this succeeds, we will re-visit these pools in the Mather Plan.

- Ahart's Dwarf Rush (ADR) pools: This cluster of pools lies just north of Kiefer Boulevard. They include 1.9 acres of vernal features, with approximately 35 acres set aside for protection (including buffers).

  The HCP will also be targeting this plant species for protection. This pool cluster is one of the few identified locations of ADR in the County. DEDIA is funding a survey to identify ADR pools at Mather and elsewhere within the HCP boundaries that might have stronger chances at survival. If this succeeds, we will re-visit these pools in the Mather Plan. (Note: The market value of the 35 acres protected could be worth $18 million or more in today's real estate market.)

AIRPORT USES:

The Airport Development Areas as shown in Attachment A would be for future airport commercial development and airport operations. Staff proposes seeking fill permits for most of these pools, as necessary to carry out the Mather Airport Master Plan. The management and maintenance (M&M) of pools noted as "Protected" at the end of the runway will be substantively different from M&M of protected pools elsewhere at South Mather, because the practices cannot conflict with Federal Aviation Administration (FAA) regulations governing operations of Mather Airport. Specifically:

1. The restrictions must not impede aircraft operations (including the ability to retrieve/rescue aircraft that may leave the runway or taxiways and end up in such preserves).

2. The maintenance and management requirements, including vegetation maintenance requirements, must be acceptable to the FAA as well as the Fish and Wildlife Service and other regulators.
3. Conditions must not penalize the County for any aircraft leaving the runway and damaging pools.

In total, we are recommending applying for fill permits impacting approximately 18 wet acres for Airport uses.

MATHER LAKE:
Staff is making no recommendations to change the current uses or plans for Mather Lake. The County will not be seeking fill permits for the wetland and marsh features around the lake. We will however seek approval for appropriate construction that allows use of the lake without damaging the habitat, such as some minor trails and piers. Mather Lake and ponds at Mather total 130 acres.

POSSIBLE FUTURE MINING:
Natural Resource studies show that the area marked "Possible Future Mining" in Attachment A could be a valuable source of aggregate, which could generate substantial revenues for the County. There remain questions however whether mining could pose a threat to the adjacent wetlands. The stakeholders group agreed to support mining as one possible use only if it can be shown that the mining would not directly or indirectly endanger the wetlands. The stakeholders also asked that the County consider using the area for potential wetlands restoration or for appropriate economic development use compatible with adjacent uses.

TOTAL IMPACT AND PRESERVATION:
The tables below summarize the total take proposed in this plan.

Jurisdictional – Overall				
Wetlands/Water Type	**Acres Avoided**	**Acres Impacted**	**Total**	**Avoidance**
Vernal (Pool, Swale, Marsh)	53.9	16.3	70.3	77%
Seasonal Wetlands/Ditches	32.0	12.5	44.6	72%

Critical Habitat Designation Only				
Wetlands/Water Type	**Acres Avoided**	**Acres Impacted**	**Total**	**Avoidance**
Vernal (Pool, Swale, Marsh)	36	3.7	39.7	91%

Non-Jurisdictional – Overall				
Wetlands/Water Type	**Acres Avoided**	**Acres Impacted**	**Total**	**Avoidance**
Vernal (Pool, Swale, Marsh)	0.014	0.74	0.75	2%
Seasonal Wetlands/Ditches	0.6	6.3	7.0	9%

FEDERAL PERMITTING PROCESS:
Attachment I provides an estimated time table for completing the federal regulatory process and having approvals that will allow the County to move forward with appropriate development. Two key factors will play a major role in this process.

- Management Plan: The Fish and Wildlife Service will require a management plan as part of the conveyance of the Mather property from the Air Force. It will detail how the County will ensure preservation of the protected pools, including maintenance, construction, allowable uses, etc. Approval of the Management Plan will require sign-off by the United States Environmental Protection Agency, Fish and Wildlife Service, Army Corps of Engineers, and the State Department of Fish and Game. Staff will also seek review and approval from the FAA, due to the proximity of the airport and potential regulatory restrictions regarding maintenance regimens.

- Programmatic Permit for Infrastructure and EIS: The Army Corps of Engineers will not issue a blanket permit for filling wetlands at Mather. Their interpretation of regulations requires a specific project (not a master project) in order to grant a fill permit. For this reason, staff is following two parallel paths that will position us to seek expedited individual project permits at the end of the process. The first path is to seek a Programmatic Environmental Impact Statement (EIS). This allows for review of environmental impacts of a large, master-planned project as a whole. The EIS will establish conditions and mitigation requirements for all areas within the project area. The second path is to seek a Programmatic Permit for Infrastructure, a fill permit based on the plan's road and utility needs. All other permits, for individual parks and economic development projects, will tier off the conditions established by the EIS and Infrastructure Permit.

To the extent that federal regulators are satisfied that the project is consistent with the EIS and Infrastructure Permit, they will grant the individual permit in relatively rapid fashion. Where possible, staff will also attempt to process individual permits simultaneously with efforts to obtain the larger infrastructure permit. This will expedite projects now under consideration.

LOCAL LAND USE PLAN UPDATES:
- General Plan: The General Plan for South Mather designates the area east of Eagles Nest Road as Recreation, which does not permit a university or residential uses that are contemplated for the EDC property in the southeast corner (as discussed above). Staff is seeking a redesignation to Commercial-Office, which would permit the university. Additionally, staff is seeking the Board's approval to initiate the process to amend the

General Plan to include the new proposed routes of Eagles Nest Road and Douglas Boulevard, as discussed earlier in this report.

- Mather Specific Plan: The Mather Specific Plan also regulates uses in this portion of South Mather. The EDC parcel is designated by the Special Plan as a Commercial-Recreation District, with the property to the north designated as a Recreation District. Part of the property in the Recreation District is the former munitions area of Mather Air Force Base. This area may be unsuitable for the regional park due to demolition and development costs. Staff is seeking flexibility to include this in the Commercial-Recreation District, which would still allow for parks use as well as the economic development uses under consideration (e.g., the University of Sacramento). To attain the desired flexibility, staff is seeking to move the boundary of the current Commercial-Recreation District to the northern edge of the munitions area and including that in the General Plan Commercial-Office designation.

- Special Planning Area: Staff is also seeking amendments to the Special Planning Area to allow mixed-use development in the Commercial-Recreation District. The university and its related uses would be allowed without need for conditional use permits, but Development Plan Review to the Board of Supervisors would be required. It would not permit residential other than dormitories without a use permit approved by the Board of Supervisors.

MITIGATION IMPLICATIONS:
Staff has met with federal regulators to get a general idea of the mitigation requirements that might come out of this plan. While no specific mitigation requirements can be established until the environmental process is completed, it appears we will be required to mitigate approximately 30 acres of filled wetlands on a 1:1 basis, through either restoration, enhancement, creation, or purchasing banked acreage.

Respectfully submitted,

Paul J. Hahn
Department of Economic Development
and Intergovernmental Affairs

APPROVED

TERRY SCHUTTEN
County Executive

Attachments:
Resolution
A – Proposed Master Plan Map for South Mather
B – Land Use Designations and Definitions
C – General Plan Land Use Map
D – Circulation Plan Map
E – Stakeholder Attendees, December 5, 2005, meeting
F – Fehr and Peers Traffic Study for Eagles Nest and Douglas Roads
G – Map of Eagles Nest options considered by stakeholder subcommittee
H – April 2004 Preserve Map
I – Estimated Regulatory Time Line for South Mather

PL:jw
sr Mather GPA&Federal Wetland Fill Permits

RESOLUTION NO. 2006-0210

RESOLUTION OF THE BOARD OF SUPERVISORS OF THE COUNTY OF SACRAMENTO, STATE OF CALIFORNIA INITIATING AMENDMENTS TO THE GENERAL PLAN, MATHER SPECIFIC PLAN, AND MATHER SPECIAL PLANNING AREA:

MODIFY LAND USE ZONING AND PROTECTION OF WETLANDS AND VERNAL POOLS AT THE FORMER MATHER AIR FORCE BASE

WHEREAS, the United States Air Force has issued a Record of Decision to transfer ownership of property at the former Mather Air Force Base, and,

WHEREAS, the Sacramento County Board of Supervisors approved the Mather Specific Plan and Special Planning Area in 1997 to direct development at Mather as envisioned at that time; and,

WHEREAS, the County desires to integrate vernal habitat preservation with development at Mather, and,

WHEREAS, the County's intended uses at Mather have changed since the Board adopted the Mather Specific Plan and Special Planning Area;

THEREFORE, BE IT RESOLVED that the Board of Supervisors of the County of Sacramento does hereby initiate General Plan amendments to change the designation of the Economic Development Conveyance area and the munitions area at South Mather from Recreational to Commercial-Office for areas that may be developed for a university and accompanying residential and retail development, and to modify the locations of Douglas Road and Eagles Nest Road..

BE IT FURTHER RESOLVED that the Board of Supervisors of the County of Sacramento does hereby initiate an amendment to the Mather Field Specific Plan to permit the same uses listed above and to initiate an amendment to the Mather Field Special Planning Area to allow mixed-use development and a University without need for conditional use permits.

On a motion by Supervisor Nottoki, Seconded by Supervisor Dickinson, the foregoing resolution was passed and adopted by the Board of Supervisors of the County of Sacramento, State of California, at a regular meeting thereof this 22nd day of February, 2006, by the following vote, to wit:

AYES: Supervisors: Collin, Dickinson, Nottoli, Peters, MacGlashan

NOES: Supervisors: None

ABSENT: Supervisors: None

ABSTAIN: Supervisors: None

(SEAL)

Roberta MacGlashan
Chair, Board Of Supervisors

ATTEST: Cindy A. Turner
Clerk, Board of Supervisors

In accordance with Section 25103 of the Government Code of the State of California a copy of this document has been delivered to the Chairman of the Board of Supervisors, County of Sacramento

FEB 22 2006
By Faith Turnwall
Deputy Clerk, Board of Supervisors

FILED
FEB 22 2006
BOARD OF SUPERVISORS
BY Cindy A. Turner
CLERK OF THE BOARD

PL:jw
rs Mather GPA&Federal Wetland Fill Permits

Attachment B - Mather Area Designations

These designations correspond to areas identified on the map in Attachment A. The table below generally describes activities and facilities allowable in each area. The terms in parenthesis under "Type of Area" are terms that will be used in the South Sacramento Habitat Conservation Plan. Future versions of the Mather map will include the SSHCP nomenclature.

Area	Purpose	Activities	Permitted Facilities
PRESERVE AREA **(SSHCP - Preserve Area)**	☐ To allow minimal public use that does not disturb environmentally sensitive areas. ☐ Intended for study of the natural environment and interpretive education ☐ Scientific study	☐ Individuals permitted on designated trails. ☐ Groups may use areas only under supervision. ☐ Science experiments ☐ Monitoring, maintenance, and management activities ☐ Activities must be authorized by preserve management entity ☐ Maintenance of existing infrastructure ☐ Emergency & Fire response	☐ Minor trail improvements ☐ Trail stops ☐ Observation points ☐ Interpretive signs
PRESERVE AREA – STAGING AREA	☐ An as-yet-to-be-determined location within the preserve will be designated for access and staging areas for public tours in the preserve. This area will in a location that is convenient and will not disturb the vernal habitat.	Staging activities	☐ Parking lots ☐ Bus turn-around ☐ Restrooms ☐ Drinking fountains ☐ Remediation Facilities
PROTECTED AHART'S DWARF RUSH POOLS (Within "Future County Use" Area East of Eagles Nest Road) (SSHCP - Protected)	☐ Avoidance areas with no public access ☐ To preserve value of areas in their present state. ☐ Requires measures to remain undeveloped.	☐ Human activity prohibited except for maintenance & management activities. Some scientific study allowed. ☐ Existing infrastructure maintenance ☐ Emergency response and fire control	☐ None, except as required for public health, safety, and welfare. ☐ Does not allow buildings, trails, etc.

Area	Purpose	Activities	Permitted Facilities
PROTECTED – SPADEFOOT TOAD POOL (Within "Future County Use" Area East of Eagles Nest Road) **(SSHCP - Protected)**	☐ Avoidance area with no public access ☐ To preserve value of area in its present state. ☐ Requires measures to remain undeveloped.	☐ Human activity prohibited except for maintenance & management activities. ☐ Some scientific study. ☐ Existing infrastructure maintenance ☐ Emergency response and fire control	☐ None, except as required for public health, safety, and welfare. ☐ Does not allow buildings, trails, etc.
PROTECTED POOL AREAS (Within "Future County Use" Area West of Eagles Nest Road) **(SSHCP – Nature Study Area)**	☐ Areas that can sustain light to moderate use, but not heavy use. ☐ Intended for general public access and use, while still preserving natural areas. ☐ Generally applied to large areas that can sustain public use.	☐ Individuals and small groups, with occasional large groups. ☐ Limited picnicking along trails. ☐ Monitoring, maintenance, and management activities	☐ Drinking fountains ☐ Portable restrooms ☐ Trails (surfaced and un-surfaced) ☐ Trail stops ☐ Observation points ☐ Interpretive signs ☐ Some family picnic tables ☐ Roads and/or parking only if no other alternatives in less restrictive areas. ☐ Facilities that provide for preserve maintenance & management. ☐ Education facilities ☐ Fishing pier
FUTURE COUNTY USE **(SSHCP – Same)**	☐ Set-aside land for future park or economic development use.	Can be used for immediate use if project meets uses listed in Mather Specific Plan and Mather Park Master Plan. All permitted active and passive recreation as well as urban development.	Park facilities or urban development. Not limited to, but could include the following: ☐ Caretaker facilities ☐ Trails for maintenance and emergency access ☐ Many, including interpretive centers, trails, large picnic areas, playgrounds, etc. ☐ Utilities ☐ Economic development

Area	Purpose	Activities	Permitted Facilities
AIRPORT **(SSHCP – Sacramento Mather Airport)**	☐ To support the regional economy by providing air cargo hub operations and ancillary commercial facilities	Operations and commercial development consistent with the Mather Airport Master Plan	Commercial and general aviation operations combined with supportive infrastructure (including commercial buildings and offices)
PROTECTED POOL AREAS WITHIN "AIRPORT" AREAS **(SSHCP – Protected Mather Airport)**	☐ Avoidance areas with no public access ☐ To preserve value of areas in their present state. ☐ Requires measures to remain undeveloped, but minor work maybe be needed periodically for installation or upgrading of aircraft navigational equipment, etc. ☐ Land use compatible with aircraft operations	☐ Human activity prohibited except for maintenance and management activities, including mowing and vegetation control on airport property necessary to comply with Federal Aviation Regulation (FAR) Part 139 and FAA Advisory Circular 150/5200-33A "Hazardous Wildlife Attractants On Or Near Airports." Such activities are typically conducted during dry periods. Due to safety and security requirements, scientific study will not be allowed within the Airport Operations Area (AOA) ☐ Emergency response and fire control ☐ Biological monitoring	☐ None, except as required for public health, safety, and welfare, including those required for safe aircraft operations. ☐ Any installation of navigational and related equipment will be done in accordance with FAA requirements and will be subject to environmental assessments pursuant to CEQA and NEPA

Area	Purpose	Activities	Permitted Facilities
POSSIBLE AGGREGATE MINING AREA **(SSHCP – Future County Use – Subarea)**	□ For uses approved by County that are compatible with uses on adjacent properties including aggregate mining, economic development uses, park uses or creation/restoration of vernal feature for mitigation purposes	Available for immediate use if project is consistent with uses authorized in Mather Specific Plan. All permitted mining, urban development, recreation and vernal pool creation/restoration uses. Aggregate mining will only be considered if mining activities will not impact vernal pools on adjacent vernal pool preserve.	All facilities that will support the use(s) that are approved by County for this area provided the facilities are consistent with the Mather Specific Plan development standards and guidelines.

U.S. Department
of Transportation
Federal Aviation
Administration

San Francisco Airports District Office
831 Mitten Road, Room 210
Burlingame, California 94010-1303

March 29, 2006

RECEIVED
APR 11 2006
AIRPORT FACILITIES

Mr. Paul Lake, Special Projects Manager
County of Sacramento California
Department of Economic Development and Intergovernmental Affairs
700 H. Street, Room 7650
Sacramento, California 95814-1280

Dear Mr. Lake:

Subject: Initiation Of Mather-Related General Plan Amendment And Approval To Proceed With Application For Federal Wetland Fill Permits At South Mather

This letter is regarding the contents of the above referenced document that was on the County of Sacramento, Board of Supervisors Meeting Agenda for February 22, 2006. The document, or report, discussed plans to change land uses for South Mather that appears to affect Sacramento Mather Airport. The Federal Aviation Administration (FAA) San Francisco Airports District (ADO) Office reviewed the contents of that document and provides the following comments.

Sacramento Mather Airport is a federally funded obligated airport, having received Airport Improvement Program (AIP) funds for maintenance and the safe operation of the airport. As such, the airport is required to comply with all of its signed Airport Sponsor Assurances, which includes compliance with certain compatible land use assurances. Compatible land uses are uses of airport property that provide the greatest amount of safety to persons and property using the airport. The airport sponsor is also required to reasonably maintain, through zoning, outright ownership, or other avenues, control of adjacent land areas where incompatible land use could affect the safe operation of aircraft using the airport, such as uses that attract large numbers of people. Of concern, also, is the environmental impact that any land use may have on airport property. Any action that might affect the operation of the airport must be reviewed and approved by the Federal Aviation Administration (FAA).

The document makes reference to a Wetlands Preserve, pools, protected species of wildlife (Western Spadefoot Toad), recreational land-use of dedicated airport property and possibly, some sort of university environment. We have also concerns regarding to operation of landfill sites on airport property. Having not seen the complete "Plan", inclusive of maps and attachments, showing proposed road realignments, and the location of these wildlife areas and possible university, our analysis of this plan from an aviation

compatibility standpoint is incomplete. Also, it is not know whether the airport sponsor supports this plan. However, it must be noted that any use that introduces wildlife, or wildlife attractants, to the airport environment is incompatible with safe airport operations.

Prior FAA approval, the ADO needs to review the Airport Development Areas, contained in Attachment A, as well as, the entire plan, complete with attachments. It is the responsibility of the airport sponsor to coordinate with FAA proposed projects affecting the airport. Information on this project can be sent to my attention at the following address:

Racior R. Cavole
Airports Compliance Specialist
San Francisco Airports District Office
831 Mitten Road, Room 210
Burlingame, CA 94010-1303

Please contact our office at (650) 876-2778, extension 677, should you have any questions.

Sincerely,

Racior R. Cavole
Airports Compliance Specialist

Cc: Robert B. Leonard, SCAS
Assistant Director of Airports
Administration & Planning
6900 Airport Road
Sacramento, CA 95837

Antonia Barry, Senior Environmental Analyst
Manager, Public Projects Division
Department of Environmental Review & Assessment
827 7th St., Room 220
Sacramental, CA 95814

Sacramento County Farm Bureau

8970 Elk Grove Boulevard Elk Grove, California 95624-1946

Phone (916) 685-6958 Fax (916) 685-7125

Ms. Joyce Horizumi, Environmental Coordinator
Department of Environmental Review and Assessment
827 7th Street, Room 220, Sacramento, CA 95814

Sent via e-mail: DERA@saccounty.net.

RE: SSHCP EIR/EIS Scoping Comments - DERA Control Number (03-PLE-0637)

Dear Ms. Horizumi;

On behalf of the **Sacramento County Farm Bureau and the Amador, El Dorado, Sacramento Cattlemen's Association**, we wish to express our concern regarding the joint draft environmental impact report and environmental impact statement for South Sacramento Habitat Conservation Plan (SSHCP).

Farm Bureau is California's largest farm organization representing roughly 91,000 members throughout the state. Farm Bureau strives to protect and improve the ability of farmers and ranchers engaged in production agriculture to provide a reliable supply of food and fiber through responsible stewardship of the land's resources. The Sacramento County Farm Bureau's purpose is to protect and promote agricultural interest throughout Sacramento County and to find solutions to farm, farm home and rural community problems.

Agriculture provides society with not only open space, wildlife habitat, and flood protection but also food and fiber. Sacramento County agriculture represents more than a $365 million industry in farm gate sales. The SSHCP must fully acknowledge the importance of production agriculture for the sake of producing food and fiber. Not just for its ability to provide habitat. The conservation easements that will be offered by the implementing agency to a willing seller must provide for the continuance of farming practices. Agriculture must have the ability to move from one crop to the other without any additional restrictions beyond state or federal law. All agricultural practices must be covered and provided for its continuation for easements established pursuant to the SSHCP. Activities covered should include but are not limited to discing, spraying, planting, harvesting, irrigating, ditch cleaning, etc. Without the ability of an agricultural landowner to perform the tasks of normal farming practices; the SSHCP will have little benefit to anyone in agriculture.

With climate change, changing soil conditions, and the varying supply of water, farmers must often plant new types of crops in order to continue farming. For example, the conditions may make it more efficient and profitable for a farmer to change from row crops to vineyards. The SSHCP must not impose additional requirements that would prevent this from occurring.

In addition, the SSHCP must integrate a non-participating neighboring landowner assurance ("Good Neighbor") Policy. The "Good Neighbor" policies and "Safe Harbor" policies established under state or federal law must be incorporated into the SSHCP so that participants can work directly with the implementing SSCHP authority instead of having to work with multiple agencies for approval.

Furthermore, the SSHCP must include a provision that use of land that does NOT have an easement on it can not be limited by the County because it is "targeted" or "desirable" land for habitat mitigation.

To conclude, the EIR/EIS must assess impacts to agricultural productivity given the conservation easements provided to landowners. The SSHCP must also include a 'Good Neighbor Policy' and a 'Safe Harbor Agreement'. These must be clearly defined and provided for those who are enrolled in the SSHCP and to their neighbors not enrolled into the SSHCP.

Thank you for your consideration.

Sincerely,

Ken Oneto

Mark Wilson

Ken Oneto
President, Sacramento County Farm Bureau

Mark Wilson
President, Amador, El Dorado, Sacramento Cattlemen's Association

10545 Armstrong Avenue
Mather, CA 95655
Tele: [916] 876-6000
Fax: [916] 876-6160
Website: www.srcsd.com

Board of Directors
Representing:

County of Sacramento

County of Yolo

City of Citrus Heights

City of Elk Grove

City of Folsom

City of Rancho Cordova

City of Sacramento

City of West Sacramento

Mary K. Snyder
District Engineer

Stan R. Dean
Plant Manager

Wendell H. Kido
District Manager

Marcia Maurer
Chief Financial Officer

JUL 21 2008

July 16, 2008

Joyce Horizumi
Environmental Coordinator
Department of Environmental Review and Assessment
827 7th Street, Room 220
Sacramento, CA 95814

Subject: **Notice of Preparation of a Joint Draft Environmental Impact Report and Environmental Impact Statement for the South Sacramento Habitat Conservation Plan (Control Number 03-PLE-0637)**

Dear Ms. Horizumi:

Sacramento Regional County Sanitation District (SRCSD) and Sacramento Area Sewer District (formerly known as CSD-1) have reviewed the Notice of Preparation of a Draft Environmental Impact Report for the South Sacramento Habitat Conservation Plan and have the following comments:

The Sacramento Area Sewer District (SASD) provides local wastewater collection and conveyance to the urbanized, unincorporated areas of Sacramento County, the cities of Rancho Cordova, Elk Grove and Citrus Heights as well as portions of the City of Sacramento and Folsom. These local pipelines are designed to carry peak wet weather flows of less than 10 million gallons per day (MGD).

Wastewater from local collection agencies (SASD, the City of Sacramento and City of Folsom) is discharged into the SRCSD interceptor system and treated at SRCSD's Sacramento Regional Wastewater Treatment Plant (SRWTP) in Elk Grove. SRCSD facilities (interceptor pipelines and pump stations) are designed to carry peak wet weather flows of greater than 10 MGD.

SASD's *Draft Sewerage Facilities Expansion Master Plan Update 2006* (Master Plan Update 2006) and its associated Supplemental Environmental Impact Review (SEIR) is expected to be adopted by the SASD Board of Directors in August 2008.

SRCSD is currently working on an Interceptor Sequencing Study to evaluate the *Interceptor Master Plan 2000* (MP 2000) and determine when its next master planning document will be developed.

SRCSD and SASD are two separate agencies. Each should be listed separately under "Project Permittees (Partners)" and under the section "Intended Uses of the EIR."

Under **Covered Activities**, sanitary sewer facilities for both SASD and SRCSD (i.e. lift stations, pipelines and pump stations) as well as recycled water facilities should be included along with wastewater treatment facilities.

Under the section **Possible Environmental Effects of the Proposed SSHCP** Public Facilities, assessment of how habitat preserves may affect placement of future public service extensions should be expanded to include recycled water along with water, sewer and power lines. Agencies involved in providing public services should include SRCSD as well as SASD.

If you have any questions regarding these comments please contact me at (916) 876.9994.

Sincerely,

Sarenna Deeble

Sarenna Deeble
SRCSD/SASD
Policy and Planning

CC: Ruben Robles
Michael Meyer
SASD Development Services
SRCSD Development Services

RECEIVED
AUG 21 2008
DEPARTMENT OF ENVIRONMENTAL
REVIEW AND ASSESSMENT

August 20, 2008

Ms. Joyce Horizumi, Environmental Coordinator
Department of Environmental Review and Assessment
827 – 7th Street, Room 220
Sacramento, CA 95814

SUBJECT: Comments on the Notice of Preparation of a Joint Draft Environmental Impact Report and Environmental Impact Statement for the South Sacramento Habitat Conservation Plan (Control Number 03-PLE-0637)

Dear Ms. Horizumi;

Thank you for the opportunity to review and comment on the Joint Draft Environmental Impact Report (DEIR) and Environmental Impact Statement (DEIS) for the South Sacramento Habitat Conservation Plan (SSHCP). The SSHCP will provide for the conservation of 40 covered species and their associated habitat types. The plan identifies 18 different habitat types including vernal pool aquatic and upland habitat, other wetland habitats, oak woodland, and rural agricultural crops. The SSHCP project area is approximately 341,000 acres within south Sacramento County (unincorporated area) and includes the cities of Rancho Cordova, Elk Grove, and Galt. Southgate Recreation and Park District lies entirely within the SSHCP project area and is included within the following SSHCP Conservation Zones: 1e, 3a, 3b, and 4 (Attachment A).

The District is responsible for the planning of parkland, open space and recreational facilities and the ownership and maintenance of existing and planned facilities within the District boundaries. The District is committed to providing recreational opportunities, and safe and attractive parks and open spaces that make a positive contribution to the quality of life in the South Sacramento area. It may be helpful for you to review the District map of the District boundaries and the respective facilities, which would potentially be impacted by the South Sacramento Habitat Conservation Plan (Attachment B).

The District requests that the following comments, which were approved by the Southgate Board of Directors at their August 19, 2008 meeting, be considered and included in the DEIR/DEIS where applicable.

LAND USE

The proposed SSHCP conservation strategy will protect approximately 8,000 acres of habitat inside the Urban Development Area (UDA). The UDA corresponds to land within the County's Urban Services Boundary (USB), and to land within the city limits of Rancho Cordova, Elk Grove, Galt, and Galt's adopted sphere of influence.

SOUTHGATE
RECREATION & PARK DISTRICT

Sheldon
Administrative Headquarters
6000 Orange Avenue
Sacramento, CA 95823-3225
Phone 916-428-1171
Facsimile 916-428-7334
www.southgaterecandpark.net

Board of Directors
Rolfe P. Appel
John E. Cockerham
Edwin A. Smith
Christine Thompson
Shirley J. Wirth

General Manager
Ward Winchell

Assistant General Manager
Maureen Casey

Of the 8,000 acres of habitat to be preserved within the UDA, a measure to establish a core preserve of at least 3,000 acres has been identified within the District's Boundaries as part of Conservation Zone 3b.

The District requests that the DEIR/DEIS assess how the establishment of habitat preserves and mitigation measures proposed for Zones 3a and 3b will affect the land use plans for the following County Planning Areas: Florin-Vineyard "GAP", North Vineyard Station, and Vineyard Springs. The District has cooperated with Developers and the County to identify park sites and open space, using smart-growth principles, within these adopted land use plans.

In addition, the SSHCP has measures to preserve a 600 foot wide habitat corridor along Laguna Creek and a 300 foot wide habitat corridor with variances along Morrison, Elder and Gerber Creeks. These creeks are within the District's boundaries and are part of multiple planning efforts for open space corridors including a recreational trail system.

The District requests that the DEIR/DEIS also assess how the establishment of habitat preserves and mitigation measures proposed for these creekways will affect the District's planning efforts. The District is an active participant in the Upper Laguna Creek Collaborative (ULCC) and is planning to provide a recreational trail through the Laguna Creek Open Space Corridor. The District is also working with the County to provide recreational trails within the Gerber/Elder Creek Open Space Corridors and the Morrison Creek Open Space Corridor.

The District wants to ensure that the SSHCP is not in conflict with the District's Master Plan. If it is determined that the SSHCP will impact the District's existing facilities or its opportunities to acquire parkland and open space, the District requests to work with the County to resolve any differences and to jointly plan any preserves that will be adjacent to the District's existing and/or future facilities.

PUBLIC FACILITIES

State laws authorize recreation and park districts to provide recreation programs, local parks, and open spaces. (Public Resources Code Section 5780) The District's Level of Service goal is to provide 5 acres of parkland per 1,000 people and to maintain a balance of open space and recreation facility development. The District accepts, through its planning process, the responsibility of stewardship and habitat conservation of these open space areas in cooperation with the County and other regulatory agencies.

The District is concerned that the SSHCP's Conservation Strategy and Plan Implementation may affect the District's opportunities to own and manage open space properties with established habitat preserves and requests that the DEIR/DEIS evaluate the organizational structure and criteria of the SSHCP and the restrictions that it may place on local recreation and park district's authority to own and manage such properties.

As mentioned in the previous section, the District is also concerned about the effects that the SSHCP's may have on parkland and open space acquisition by the District. The SSHCP may affect the placement of future park sites, recreational trails and public facilities, thereby limiting the District's ability to provide recreational opportunities to the residents of the community.

TRANSPORTATION/CIRCULATION

As roadways become more congested the need for alternative transportation options increases; bicycle and pedestrian recreational trails can serve as commuter routes and provide community linkages that may decrease the number of personal vehicle trips for residents. The District is planning recreational trails within the Laguna Creek and Gerber/Elder Creek Corridors that will serve the residents of the Vineyard Springs, Florin-Vineyard GAP, and North Vineyard Station communities. These trails will serve as alternate transportation routes and will provide linkages to parks, schools, offices and shopping centers.

The District requests that the DEIR/DEIS assess the impacts on the Districts ability to provide these recreational trails and evaluate the possible loss of alternate transportation routes in these communities.

BIOLOGICAL RESOURCES

The District currently manages approximately 195 acres of open space which includes the Laguna Creek Parkway, Dunmore Preserve, and Kingsbridge Open Space Preserve (Attachment B). The District is also expected to acquire an additional 210 acres of open space within the North Vineyard Station Specific Plan Area and will be the designated Preserve Manager for the Gerber/Elder Creek Preserve. These open space areas include habitats and biological resources that are identified within the SSHCP for preservation.

Currently, the Laguna Creek Parkway offers a recreational trail within the creek's open space corridor and the Kingsbridge Open Space Preserve is adjacent to the Tillotson Parkway and Churchill Downs Community Park. The District successfully manages these open spaces and minimizes the impacts and edge effects of the active and passive recreational activities that occur within or adjacent to these properties.

Providing passive recreational opportunities such as bicycle and pedestrian trails, interpretative signage and nature viewing areas can offer environmental education experiences, promote stewardship and increase public awareness and support for natural preserve areas.

The District requests that the DEIR/DEIS consider passive recreational land-uses compatible with the conservation goals of the SSHCP. The District also encourages the establishment of preserve buffers and requests the DEIR/DEIS evaluate the benefits of allowing passive recreational activities within established preserve buffers.

RECREATIONAL ACCESS

The District offers passive recreational access to open space areas by creating bicycle and pedestrian trails with minimal landscaping around the perimeter of open space preserves or within open space creek corridors. Public access to open space areas with sensitive habitat is limited by post and cable fencing and signage. The District also minimizes the edge effects of active and passive recreational land use by managing and maintaining open space preserves in accordance with Operations and Management Plans developed by regulatory agencies.

The SSHCP considers passive recreational activities such as hiking, bicycling, equestrian, and bird watching generally compatible with conservation goals. The District supports this consideration and requests that the DEIR/DEIS assess the potential to allow limited active and passive recreational activities within or adjacent to habitat preserves.

Once again the District would like to thank the County of Sacramento Department of Environmental Review and Assessment for the opportunity to comment on the Notice of Preparation of a Joint Draft Environmental Impact Report and Environmental Impact Statement for the South Sacramento Habitat Conservation Plan. The District appreciates the County's consideration of the comments and requests in this letter. The District shall coordinate with the County and all related agencies to minimize the effects of significant impacts and maximize the availability of parkland, open space and recreational facilities throughout the project area for the community.

Please continue to forward documentation related to this project to the District. If you require additional information or assistance please do not hesitate to contact me at (916) 428-1171, ext. 29, or via e-mail at mcasey@southgaterecandpark.net.

Sincerely,

Maureen Casey

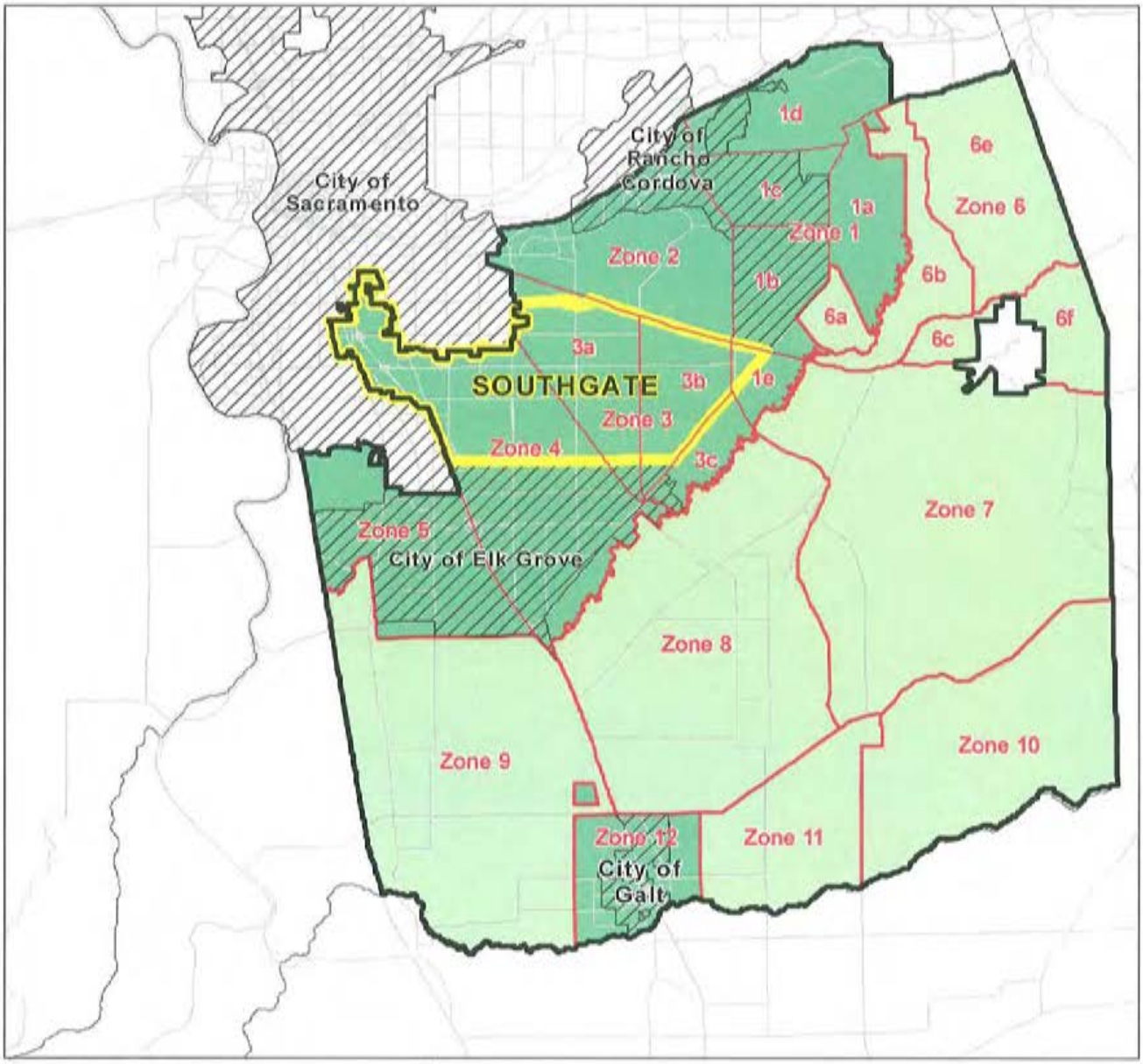
Maureen Casey
Assistant General Manager

Attachment:

A. District Boundary & South Sacramento Habitat Conservation Plan Boundaries
B. District Map and Facilities

Attachment A

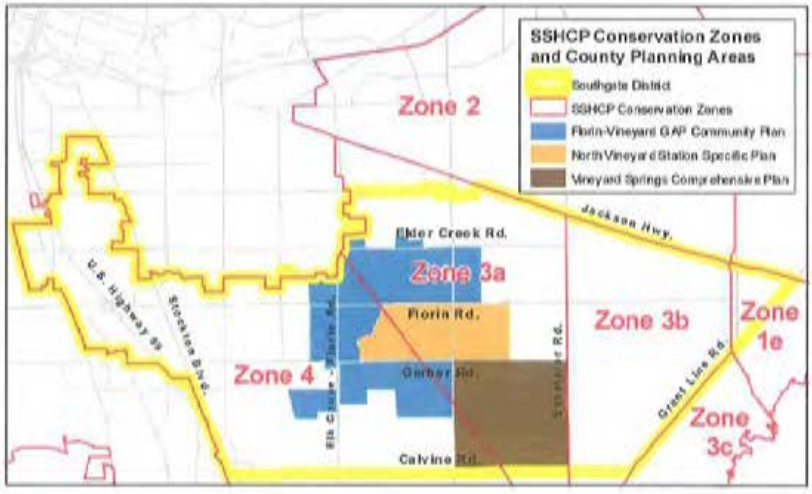
South Sacramento Habitat Conservation Plan and Southgate Recreation and Park District Boundaries



Southgate District
City Boundaries
SSHCP Plan Area
SSHCP Conservation Zones
SSHCP Study Area
Urban Development Area (UDA) Permit Area

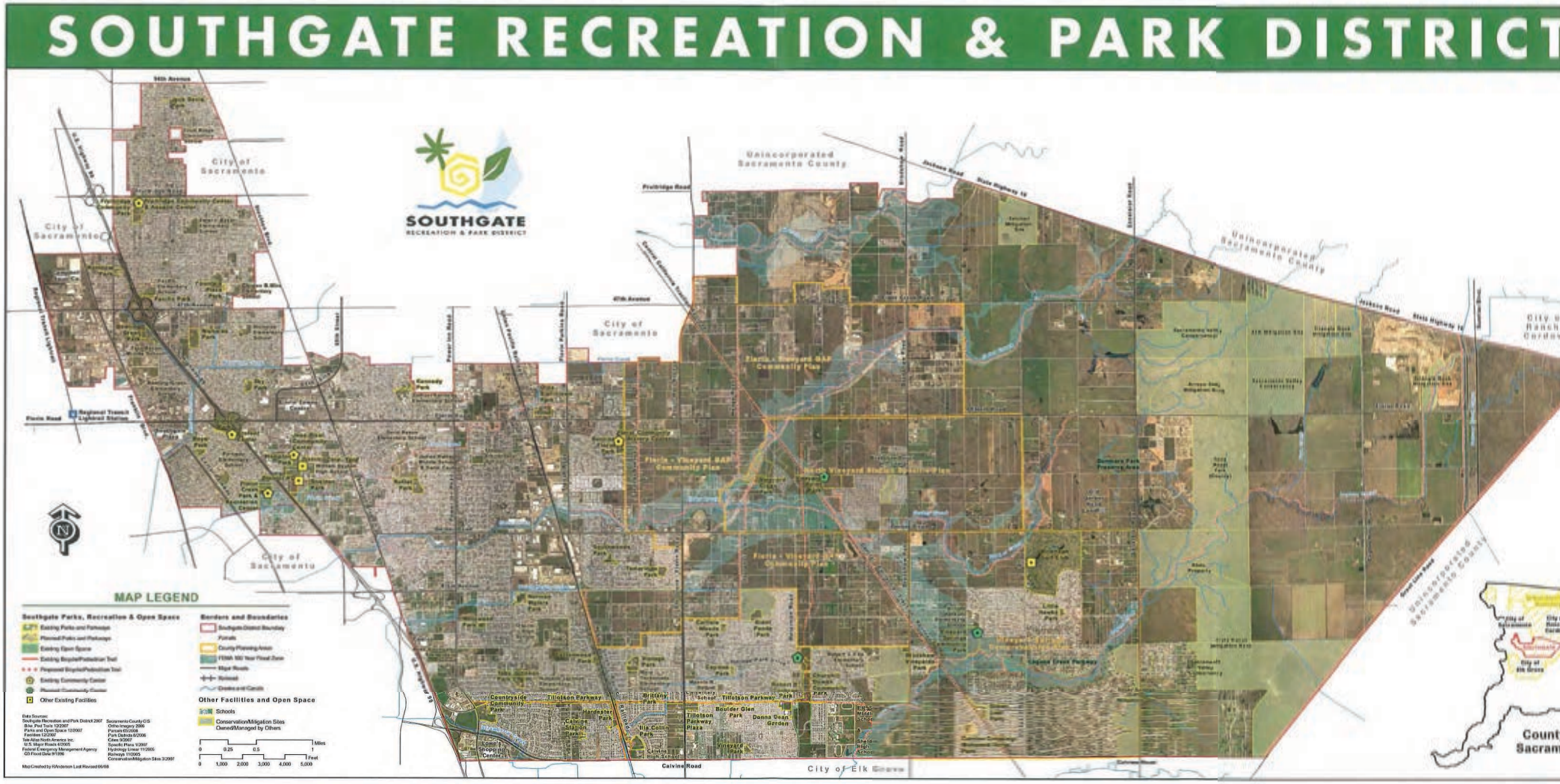
Data Source:
County Planning and Community Development Department

Miles
0 2 4 6 8 10



Attachment B

SOUTHGATE RECREATION & PARK DISTRICT



Appendix F

Workshop

Workshop Script
Signin Sheets
SSHCP Conservation Zones
Conservation Zone 1 (representative map)
Conservation Zone 2 (representative map)
Conservation Zone 3 (representative map)
Conservation Zone 4 (representative map)
Conservation Zone 5 (representative map)
Conservation Zone 12 (representative map)
Comment Cards

Workshop Script

South Sacramento Habitat Conservation Plan
UDA Conservation Strategy Alternatives Workshop
August 19, 2008

Following is the draft script for the August 19 UDA Conservation Strategy Alternatives Workshop as outlined at the August 8 Dry Run meeting.

1. Upon arrival workshop attendees will sign in and receive a numbered nametag, comment card/map packet and numbered stickers.
    a. Attendees will be directed to the refreshment area and then to the workshop tables.

The workshop will begin with a brief introduction by Michele McCormick. She will describe the evenings' workshop activities. The introduction will provide attendees with the following information:

- Why are we here tonight?
    i. We are going to begin mapping conservation alternatives for six zones within the Urban Development Area (UDA). This information will be considered in the EIR/EIS.

- What are we doing?
    i. Each attendee has been given numbered comment sheets and stickers to coincide with their numbered nametags.
    ii. The stickers are green and red. Please use the green stickers to indicate areas where you would like to see habitat conserved. Use the red stickers to indicate where you do not feel are appropriate for a preserve or you may have a particular concern with a preserve in a given area.
    iii. It is essential to provide a brief explanation of your selections that correlate to the sticker number ("sticker 17-a: …there is an occurrence of Orcutt grasses at this location…sticker 17-b"). You can provide written descriptions of the habitats or species populations you would like to conserve and/or indicate habitat areas that might not be highlighted.

    iv. Please try to provide fairly specific geographic information of where you placed your stickers and do not overlap stickers with other participants ("…north of intersection of Grantline at Sunrise…"). We will be collecting the comment cards tonight and collating them with the stickers on the maps.

    v. Each table will have staff available to assist with the exercise and moderate the group.

vi. Towards the end of the mapping exercise, **if we have time** (about 30 minutes) we will re-convene and briefly review the maps. We should be able to see some obvious preferences after the exercise is complete.

- How will the data obtained tonight be used?
  i. The information obtained tonight will be used to help identify conservation alternatives for the EIR/EIS.
  ii. A summary of the results will be published to in a scoping report due for release towards the end of September or early October.

II. After the workshop format is explained, Rich Radmacher is introduced and gives a very brief explanation of the SSHCP.
- UDA
- Riparian
- Vernal Pools
- Grasslands

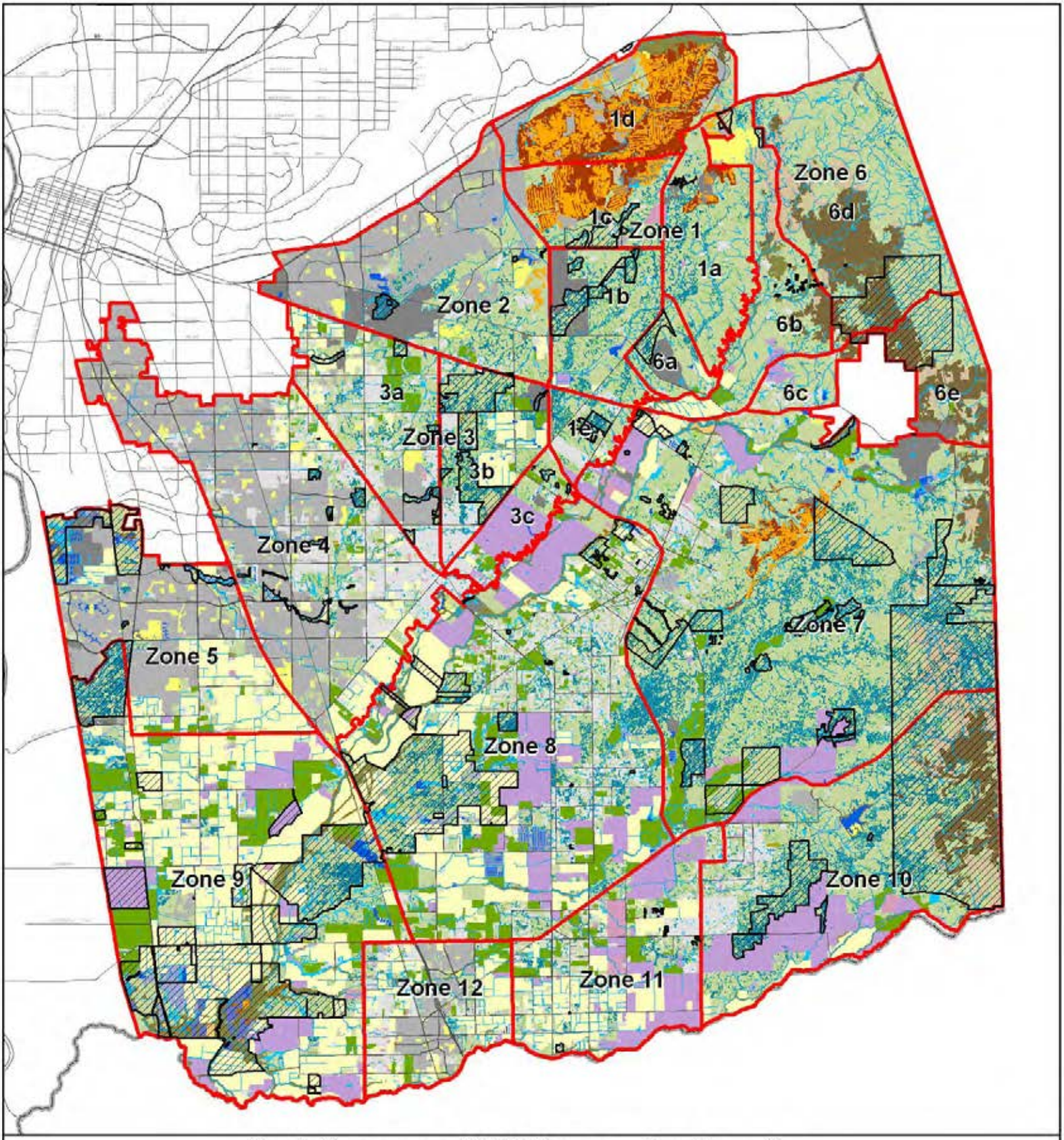
III. After Rich's explanation, meeting attendees are released to begin the mapping exercise.

AUGUST 19, 2008 SSHCP EIR/EIS ALTERNATIVES WORKSHOP

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER
John Newman			
Kathy Newman			
Bill Louie			
Doug Williams			
Larry Larsen			
Rick Bettis			
Pam Keen			
Tori Chambers			
Judy Waegell			
George Waegell			
Justin Carney			
Don Barnett			
Kate Wheatley			
Paul Sherman			
David Shabazian			
Alex Lajewski			
Rod Kies			
Kelly Cohen			
Mita Tura			
Jim Pachl			

AUGUST 19, 2008 SSHCP EIR/EIS ALTERNATIVES WORKSHOP

NAME	ORGANIZATION	E-MAIL	PHONE NUMBER
Kris Steward			
Karen Buhr			
Lynn Wheat			
Dave Ghirardelli			
Dale W Mahan			
Carol Witham			
Jeff Rorabaugh			
GLEN HOLSTEN			
MIKE CARNET			
MARILYN CARNEY			
Kim Schwab			
FRED HEGE			
Jim Perrin			
BILL GEYER			
Steve Greco			
FRANCES KNIGHT			
STACEY MCKINLEY			
Antonio Gonzalez			



South Sacramento HCP Conservation Zones & Habitat Cover-Types Map

PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

Jaunuary 30, 2008

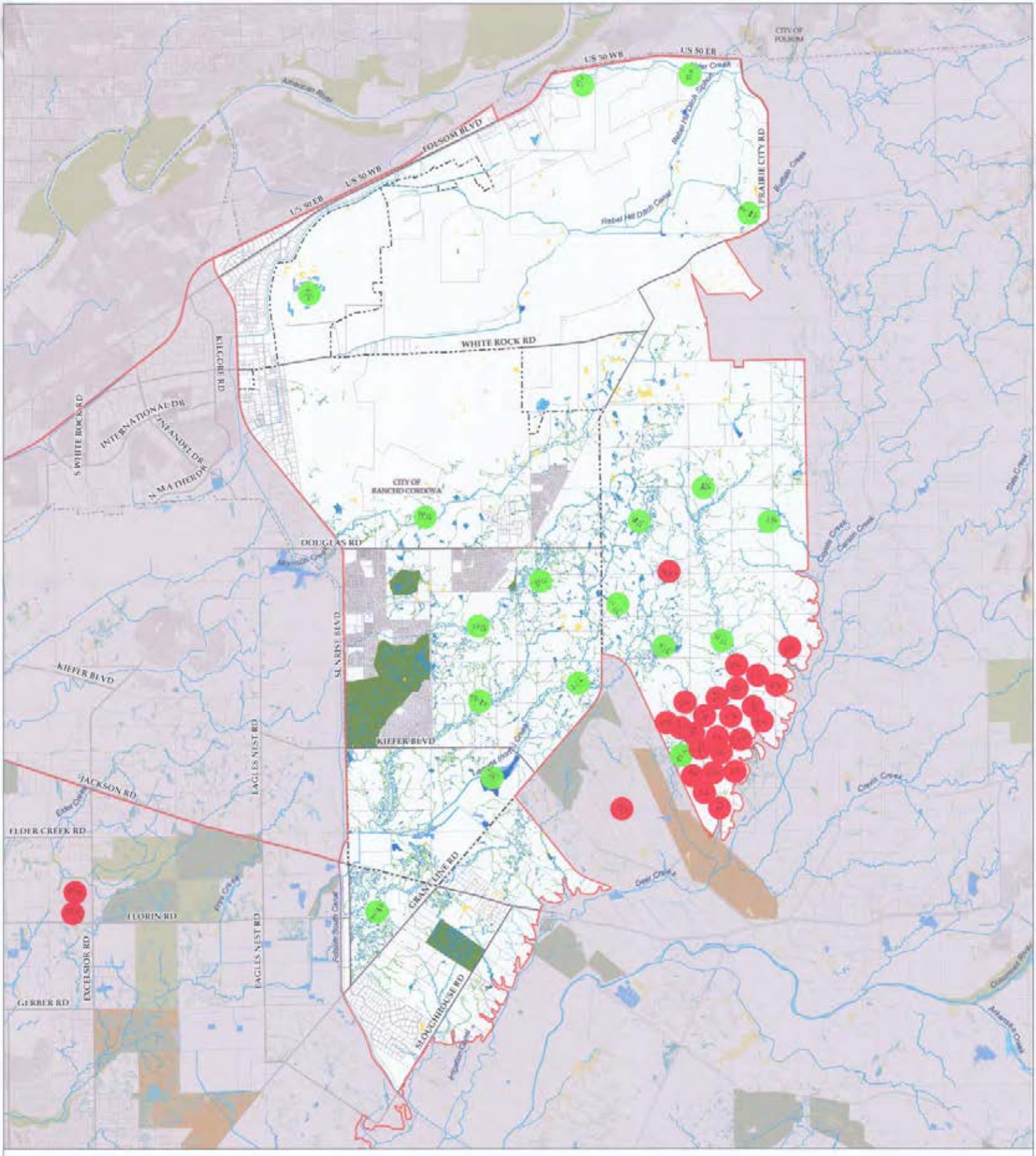
- Conservation Zone

Habitat Types

- Blue Oak Woodland
- Cottonwood Woodland
- Cropland
- Disturbed
- Eucalyptus Woodland
- Freshwater Marsh
- High Density Development
- Irrigated Pasture-Grassland
- Low Density Development
- Major Roads
- Mine Tailings
- Mixed Riparian Scrub
- Mixed Riparian Woodland
- Open Water
- Orchards
- Recreation/Landscaped
- Savannah
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Valley Oak Riparian Woodland
- Vernal Pool
- Valley Grassland
- Vineyards
- Wetland Restoration
- Woodland Restoration

N

0 1 2 4 Miles



Zone 1

Urban Development Area Conservation Zone

Protected Easement

Protected Fee Title

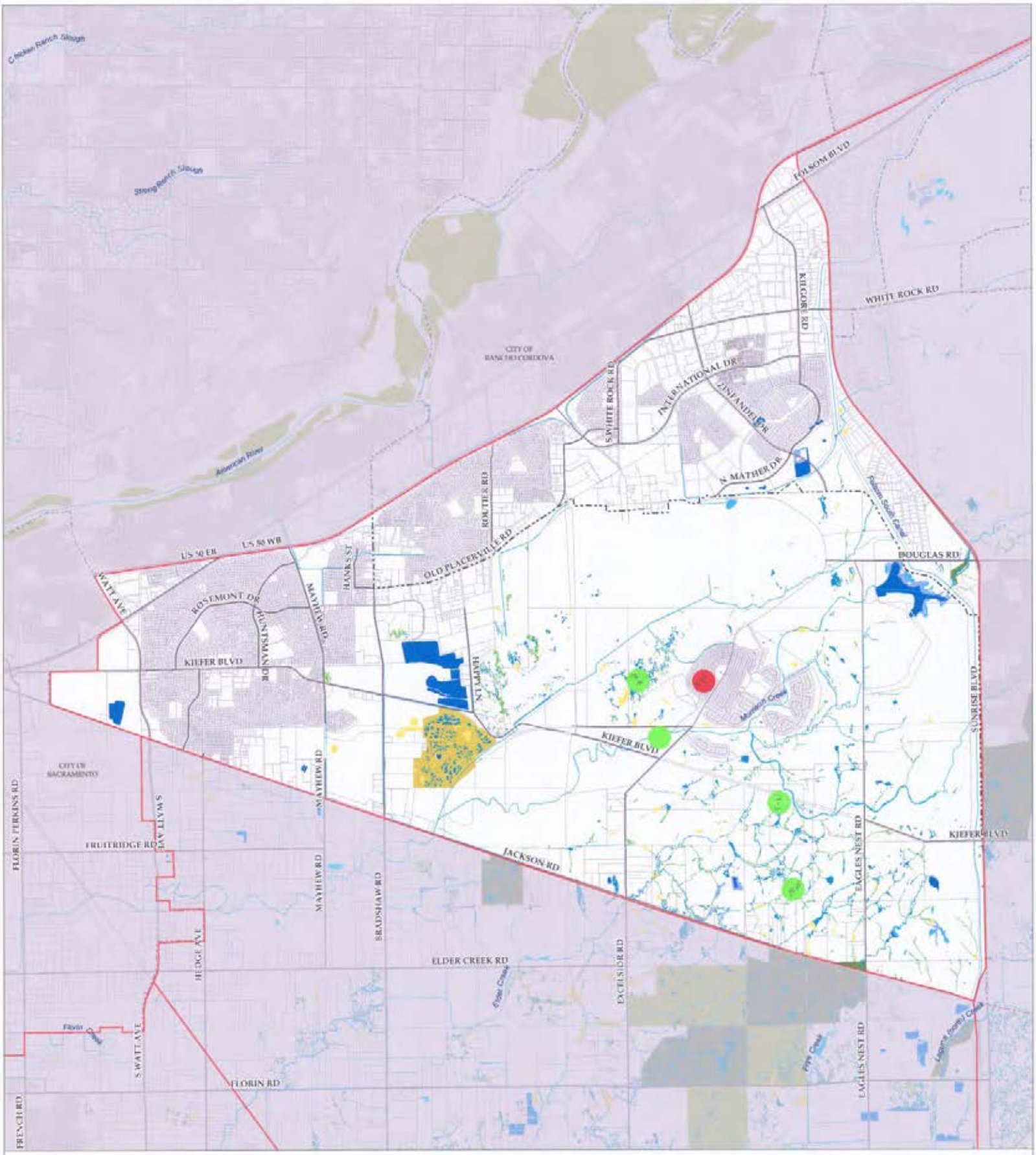
Protected Policy

Mitigation Bank

Wetland Cover Type

- Incorporated Areas
- Freshwater Marsh
- Open Water
- Seasonal Impoundment
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Vernal Pool
- Wetland Restoration

N



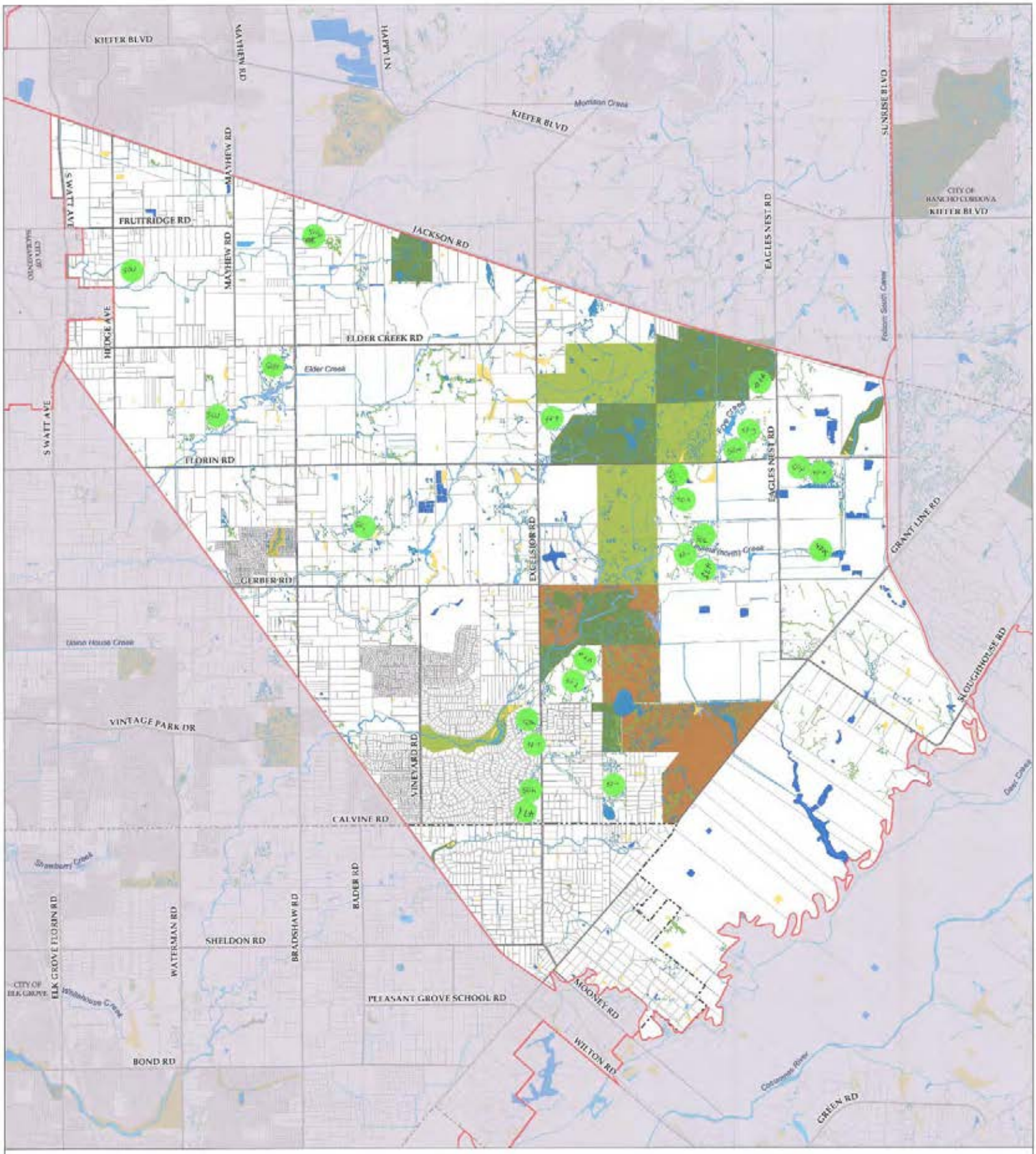
Zone 2

- Urban Development Area Conservation Zone
- Protected Easement
- Protected Fee Title
- Protected Policy
- Mitigation Bank

Wetland Cover Type

- Freshwater Marsh
- Open Water
- Seasonal Impoundment
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Vernal Pool
- Wetland Restoration
- Incorporated Areas

N



Zone 3

Urban Development Area Conservation Zone

Protected Easement
(Lands protected by a perpetual conservation or agricultural easement or deed restriction)

Protected Fee Title
(Land owned by a conservancy or government entity for purposes of habitat or agricultural protection)

Protected Policy
(Lands protected via but ancillary required by government protections for purposes of mitigation)

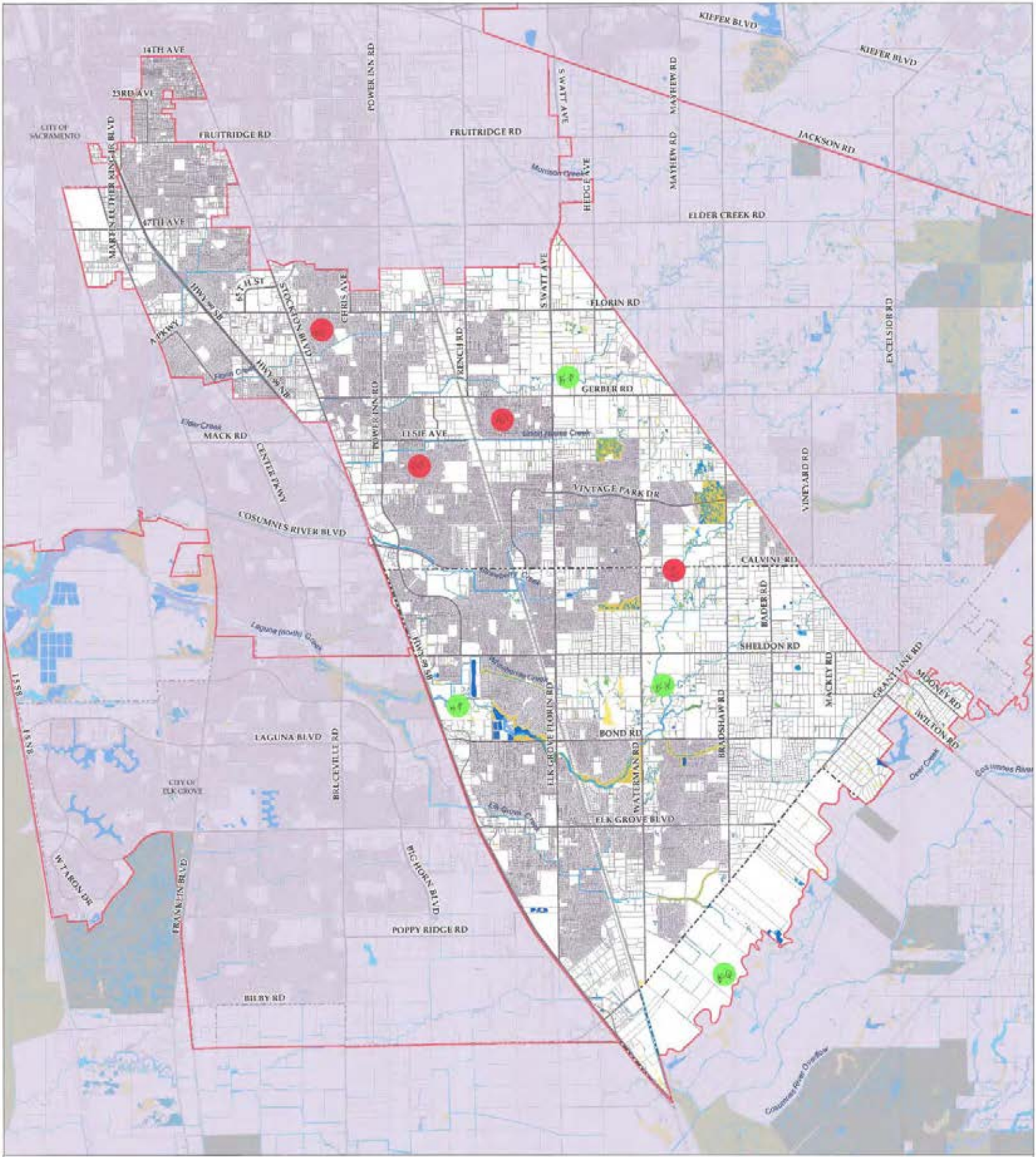
Mitigation Bank
(Lands within a mitigation bank that have credits remaining to be sold)

Wetland Cover Type

- Incorporated Areas
- Freshwater Marsh
- Open Water
- Seasonal Impoundment
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Vernal Pool
- Wetland Restoration

N

0 0.25 0.5 1
Scale in Miles



Zone 4

Urban Development Area Conservation Zone

Protected Easement

Protected Fee Title

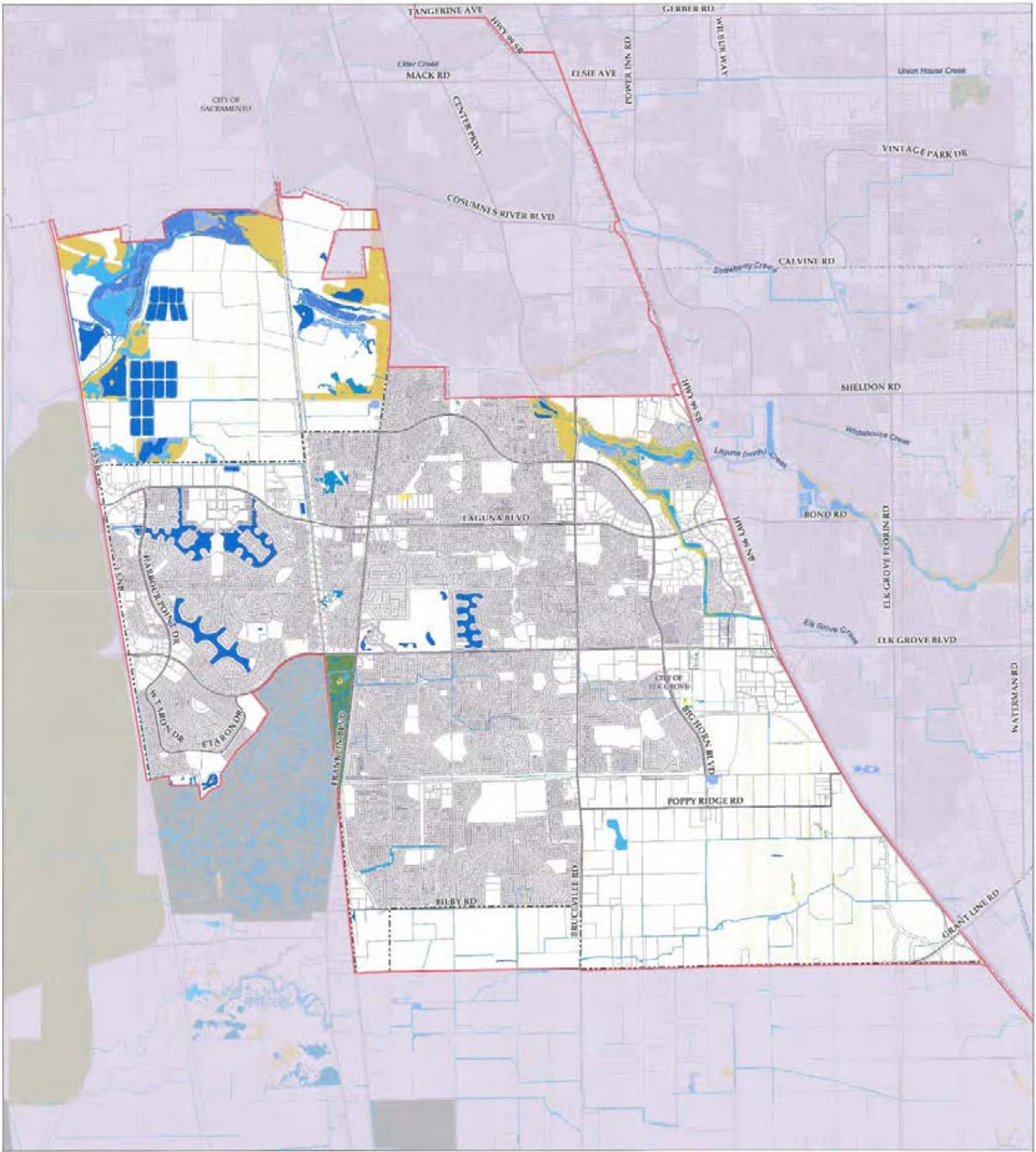
Protected Policy

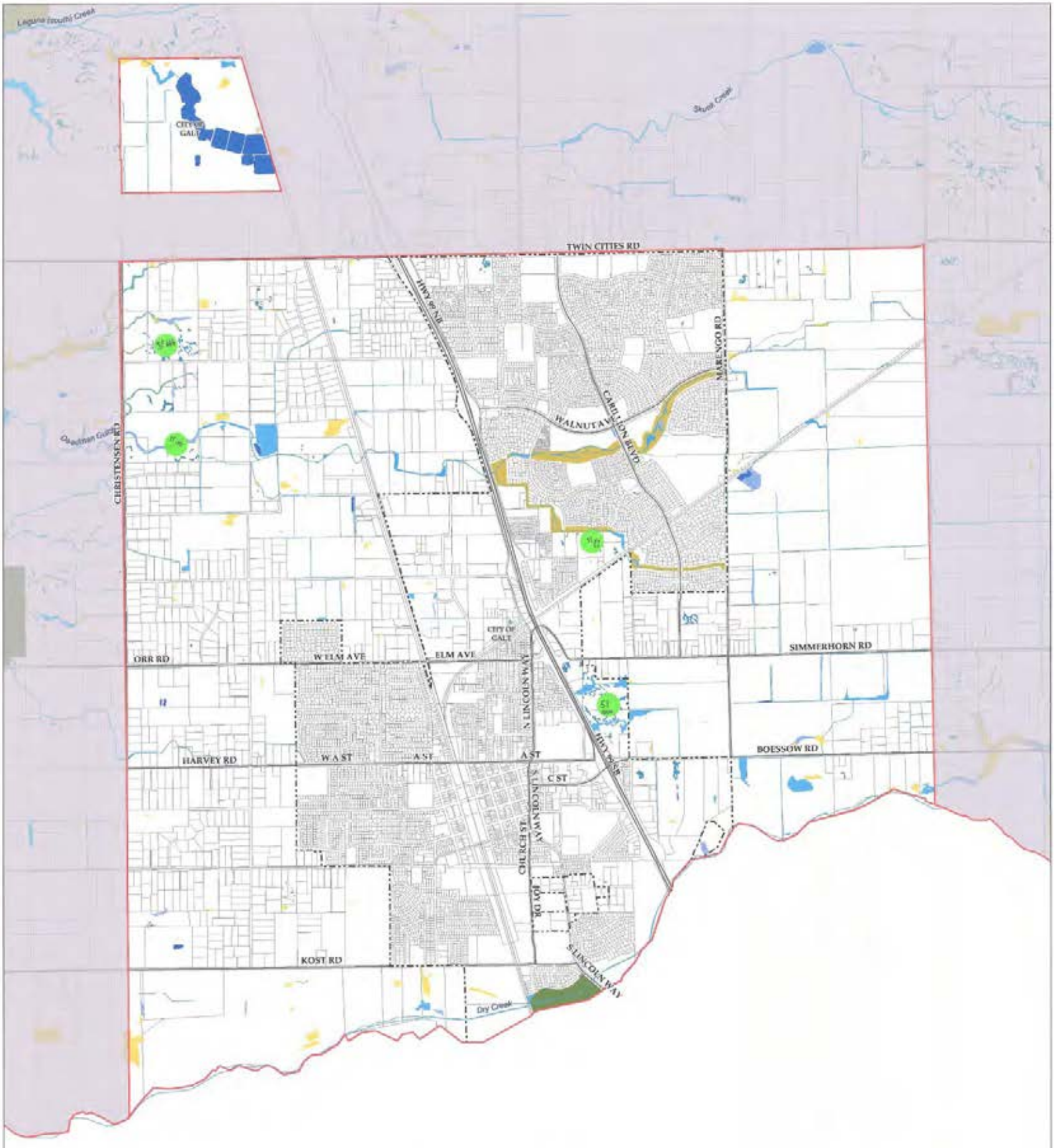
Mitigation Bank

Wetland Cover Type

- Freshwater Marsh
- Open Water
- Seasonal Impoundment
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Vernal Pool
- Wetland Restoration
- Incorporated Areas

N


TANGERINE AVE
HWY 99 SB
GERBER RD
WEBER WAY
Elder Creek
MACK RD
ELSIE AVE
POWER INN RD
Union House Creek
CITY OF SACRAMENTO
CENTER POINT
VINTAGE PARK DR
COSUMNES RIVER BLVD
CALVINE RD
Strawberry Creek
SHELDON RD
Whitehouse Creek
Laguna (north) Creek
HWY 99 NB
BOND RD
ELK GROVE FLORIN RD
LAGUNA BLVD
HARBOUR POINT DR
W TARON DR
E TARON DR
Elk Grove Creek
ELK GROVE BLVD
CITY OF ELK GROVE
WATERMAN RD
FRANKLIN BLVD
BIG HORN BLVD
POPPY RIDGE RD
BILBY RD
BRUCEVILLE RD
GRANT LINE RD
Zone 5
Urban Development Area Conservation Zone
Protected Easement
Protected Fee Title
Protected Policy
Mitigation Bank
Wetland Cover Type
Freshwater Marsh
Open Water
Seasonal Impoundment
Seasonal Wetlands
Streams/Creeks
Swale
Vernal Pool
Wetland Restoration
Incorporated Areas
N



Zone 12

Urban Development Area Conservation Zone

Protected Easement
(Lands protected by a perpetual conservation or agricultural easement or deed restriction)

Protected Fee Title
(Land owned by a conservancy or government entity for purposes of habitat or agriculture protection)

Protected Policy
(Lands protected via set aside required by governmental jurisdictions for purposes of mitigation)

Mitigation Bank
(Lands within a mitigation bank that have credits remaining to be sold)

Wetland Cover Type

- Incorporated Areas
- Freshwater Marsh
- Open Water
- Seasonal Impoundment
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Vernal Pool
- Wetland Restoration

N

0 0.25 0.5 1
Scale in Miles

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 1

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

1-a Preserve a creek buffer the length of Laguna creek that averages 600 feet eg 300' each side of the creek or 100' one side & 500' the other side. the width would vary based on the resource & constraints. Creek corridor can connect vernal pools as well as uplands preserves.

1-b Preserve vernal pools - important & unique pools here -

1-c another important vernal pool area that needs to have large preserves - both Cordova Hills & to N

1-d important to preserve Morrison Creek with buffer

1-e Heritage Falls - Preserve VP's

1-f Early Triangle - Vernal pools should be preserved.

1-g Preserve vernal pools in a long connected preserve.

1-h Important for riparian. Established & regenerating oaks. Ave

1-i Preserve runway pools

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process - EIS/EIR

Comment Card

Participant Number:

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

1-J - Laguna Creek buffer - 600 feet wide
1-K - If there is an opportunity to preserve creek buffer
1-L Vernal pools
1-M Vernal pools

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process - EIS/EIR

Comment Card

Participant Number: 3

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

3-a: This section of the map seems to contain the vernal pools or other "water parts" that start the Laguna Creek water system

3-b: This section seems to contain critical habitat for vernal pools. If development continues into this habitat how does stormwater run-off affect the vernal pools and creeks?

3-c: From Folsom-South Canal to ~~Bo~~ Vinyard there shows the Upper Laguna Creek Watershed that ~~contains~~ demonstrates potential to be protected for riparian habitat, pedestrian walkways and possibly a wildlife corridor

3-D: If this section is existing farm land then it should be set aside as such with the possibility of also using it as a buffer zone for nearby vernal pools and crecks.

Antonio Gonzalez

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 8

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

8A - This Area is part of City of Elk Grove SOI Amendment process & should be included in UDA under the HCP.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process - EIS/EIR

Comment Card

Participant Number: 15

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

15A - Laguna Creek North potential restoration of natual stream

15-B - Vernal pool

15-C - Vernal pool potential preservation

15-D - Mather vernal pools

15-E - Habitat - wildlife corridor

15-F - Morrison Creek - riparian restoration

15-G Laguna Creek Corridor restoration

15-H - Laguna Creek corridor restoration

15-I - Elder Creek corridor restoration

15-J - Gerber Creek Corridor restoration

15-K - Deer Creek Tributary Corridor restoration

15-L - Restore waterway to provide connection to Deer Creek

15-M - Rotore Creek corridor

15-N Laguna Creek Corridor restoration

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 15

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

15-O Elder Creek Corridor restoration

15-P Laguna Creek Corridor restoration

15-QQ - Deer Creek Floodplain protection

15-R - Restore Creek between Grant and Poppy Ridge

15-S - Buffer land protected

15-T Dry Creek protect-restore riparian corridor

15-U Protect enhance wetlands

15-V Restorian Creek Corridor.

15-W Restore Creek/Swale corridor

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 17

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

17a – Lot P Keep Lot P as a preserve - is contiguous with Laguna Creek Corridor. Should have a management plan for the vernal pool area,

17b - please this property in preserve - keep contiguous with Laguna Creek corridor -

17a – Drainage Plans for the area

17c Keep the creek natural channel – 300ft

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 19

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

19 a - Find a name for the creek. Widen Creeks, add native plants + trees, to the area to prevent wash out.

19 B. Preserve as many Vernal pools in the largest area as possible. The houses can be concentrated in one areas

19 a red Developments need to be slowed
19 b " or even stopped until the problems are fixed in those housing areas. (such as traffic lights.) etc.

19 c Extend preserve to include this area.

19 d - e Marsh areas should be preserved also.

19 c red Again problems should b fixed concerning Strip malls + housing + traffic. Continued housing ruins habitat for wild life. Increased traffic also de stroys wild life

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 19

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

19f preserve creek

19g extend preserve

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 20

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

20 a – Watershed – preserve Streams & Any related vernal pools that are within close proximity to the streams – streams should be left as natural as possible (not channeled), leave at least 100 yards on each side as part of the preserve

20 b. – Same as 20a

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: John R Newman

Title and Org/Business (if applicable): Florin Historical Society (V.P.)

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 21

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

21-a RED - AREA Along GRANT Line Rd is Adjacent to city of ELK Grove and has been Farmed Continuously for >100 years, so Little PRESERVATION Value

21-b RED - Area is NOT Suitable for preservation because it Could be used for PASSIVE RECREATION since it is close to city of ELK Grove & INCONSISTENT with Farming.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 21

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information. ALSO ON ~~Finance~~ Economic Committee

Name: Doug Williams

Title and Org/Business (if applicable):

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 22

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

RED. ZONE 1

22A – DON'T DESIGNATE AS CONSERVATION & PRESERVE. PROPERTY IS ENTITLED & OUTCOME OF LITIGATION MAY ALLOW DEVELOPMENT TO PROCEED — REASONABLE MITIGATION ANTICIPATED

JAKEEM ROAD 530, LLC. "THE DONUT WHOLE" HAS INTENTIONS TO DEVELOP

COMMENT IS SUBJECT TO PARTNERSHIP APPROVAL — WILL CONFIRM WITH DAVE DEFANTI & RICH RADMACHER

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 22

Environmental Review Process – EIS/EIR **Comment Card**

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: FRANCES KNIGHT

Title and Org/Business (if applicable): K. HOVNANIAN HOMES

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 23

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

23a & 23b:

Land south of Eschinger Rd. (outside UDA) adjacent to future Elk Grove SOI Amendment area should be considered as a critical buffer between future development in the SOI area and permanent preserve land. As such, this area provides / supports some of the key elements of the HCP including:

1. Interconnecting future and existing preserves
2. Minimization of Edge effects
3. Support of greater biodiversity in the form of corridors allowing for animal movement and hawk foraging

This land area south of Eschinger should be given additional credit for preserving land as a permanent preserve line against future development.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 24

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

a. RESERVE 25 ADJACENT TO MATHER LAKE AND PACIL, SO THIS IS A NATURAL EXTENSION

b. CONSERVE ALL AREA WITHIN STREAM/CREEK BANKS.

c. " " " " " "

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 27

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

- For vernal pool reserves, please include uplands with resources for salamanders (burrows from ground squirrels, etc.)

27-a Connect to the nearby existing reserves. Use large culverts to hydrologically connect the reserves across roads.

27-b Connect this area to 27-a

27-c connect this area to 27-a also

27-d restore Morrison Creek – use it for a riparian reserve/ flood control system – make the floodplain wide enough to incorporate riparian trees and shrubs (willow-cottonwood)

27-e Restore this portion of Morrison Creek and connect it to the City of Sacramento

27-f protect the vernal pools and Elder Creek

27-g connect to 27-f area

27-h connect this area to the existing reserves nearby

27-i connect this area to the existing reserves nearby

27-j connect these pools to the nearby reserve (across Florin Rd)

27-K connect these pools to the nearby reserve and restore the creek (Laguna) – connect the vernal pool area to the creek.

27-l connect all parts of Laguna Creek and restore it – protect a wide portion of the floodplain. How wide? wide enough to have large trees growing along the creek

27-m this should be connected to the rest of the creek restoration area and vernal pools nearby

27-n connect this part of the creek to the existing reserve → same comments in 27-l apply here

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process - EIS/EIR

Comment Card

Participant Number: 27

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

27-o connect the creek to the two existing reserves on both ends - restore the creek - same comments apply from comment 27-l

27-p connect the creek to the existing reserves and to 27-q - the idea is to have a creek system protected

27-r connect this area of vernal pools to the Galt water treatment plant area

27-s Connect this area to the existing reserve nearby

27-t connect this area to the nearby reserves -expand the floodplain of the creek also

27-u Connect this area to the nearby reserves to west & South

27-v same system → keep it hydrologically connected

27-w high density of vernal pools should be preserved

27-x this whole system (From North to South) needs protection, especially because of the density of pools

27-y connect this area to the reserves to the north

27-z connect this area to 27-y and the existing reserve to the South

27-aa connect this area of Laguna Creek to the reserves downstream - these are valuable headwater areas of Laguna Creek and will preserve water quality and wildlife/plants.

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Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 28

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

28a – Green High concentration of high quality vernal pools running from Anatolia north east toward Kiefer Landfill. Still potential for large-scale preserver in this area.

28b – green vernal pools critical habitat area. Opportunity for connectivity between Matter to North + preserve (S) of Jackson Hwy.

28a Red – Preserve not feasible near "node" on Jackson Hwy / Excelsior. This is area being considered for next stage of logical growth for County. New growth area. Also – preserve/open space inconsistent w/ Blueprint policies.

28b – red Elder Creek is very disturbed in this area. Could be improved through restoration but doesn't make sense to preserve in current state.

28c – green High concentration of vernal pools in close proximity to Laguna Creek. Also – Laguna Creek is habitat for variety of protected species

28d – High concentration vernal pools w/ potential to connect to Anatolia preserve

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Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 30

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

2 Inconsistent with farming. This land should be governed by the City of Elk Grove.

I will follow up with a letter or use the #30 I.D.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 31

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

31 A/B Preserves should be established where there is a high concentration of natural resources and where development is not anticipated. Opportunities ~~are~~ for preserving corridor are available here.

31 C Preserves are inappropriate in this area. ~~Reuse~~ These areas, closest to services and infrastructure are more suitable for development.

31 D/H Preserves should be contiguous ~~&~~ and to existing preserves south of Jackson.

31 E F G Sacramento Rendering Company is at this location. This site is adjacent to the city of Rancho Cordova and proximate to infrastructure. It is not a suitable preserve.

31 I Preserves should be contiguous to existing preserves.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 32

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

32A - ? Mather Preserve.
32B + C I sent my comments in
32D restoration area ? creek?

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 42

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

42-a Carli Triangle (green)
42-b Cordova Hills (green)
42-c Waegells (green)
42-d Orcutt ia (green)
42-e developed (red)
42-b developed (red)
42-e bomb pool (green)
42-f spadefoot (green)
42-g thru j SPVPP targets (green)
42-k habitat corridor (green)
42-l George Clark Preserve (green)
42-m School Pool (green)
42-n Tricolored Blackbirds (green
42-o corridor (green)
42-p corridor (green)
42-q rest of arroyo seco (green)
42-r lot P (green)
42-s Juncus & Gratiola (green)
42-t Critical Habitat

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 42

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: Carol Witham

Title and Org/Business (if applicable):

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 43

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

43A Carli Triangle (G)
43B Cordova Hills (G)
43C Waegells (G)
43D Orcutt/a family (G)
43A Developed (R)

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 47

George Waegell

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

47 a Preserve Blodgett Lake

47 B John Tracy 1000 acres has vernal pools

47 C Carli property has good vernal pools + creek

47 D SE half of Wakita propety good vernal pools

47 E Oaks on Mathes park tributary of Morrison Creek

47 F Wakita creek tributary of Morrison creek.

47 G TriangleRock Frye creek preserve has 41 shelters for oak trees 37 living?

47 H Preserve Werre property for vernal pools and its proximity to large wetland area

47 I Lot was dedicated by A K T when Vineyard Springs was built

47 J Shehadeh property has vernal pools and Laguna creek. Frye creek joins Laguna on Shehadeh property

47 K Preserve Laguna Creek oak riparian habitat on Waegell property

Red 47A Major flooding from Sunridge that shed jumps from Morrison creek headwaters down into Laguna creek

Red 47B Inadequate flumes across Folsom S canal move water south flooding into Folsom S canal and cutting a new creek across Shalako onto Laguna Creek

Red 47 C Kiefer Landfill sits in an outcrop of Mehrten sands that are the aquifer under Sacto County. This a decrest pipeline into aquifer.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 47

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

Green

47L Preserve 4' tall valley west of bridge on 99

47M Protect western pond turtles on Elk Grove Creek (Greg Suba) down stream of Emerald Vista Drive

47N Granite Construction is digging up Morrison Creek E of Hedge. They will backfill and restore creek to current location. See that creek gets restored. See that pit slopes are sloped and planted to scattered oaks - Valleys not bomb craters!

47O Remove chain link and oleanders so public can see a beautiful green valley.

General Workshop Comments:

47P ~~Level~~ strip along Laguna Creek so oaks can be planted. There are about 8 new oaks east of Vineyard on S side of Laguna Creek

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: _____

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 49

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

Red 49a – Adjacent to Grant Line Rd. is an ideal ~~location~~ sylable location for a major retail center for Cordova Hills.

Green 49a – The highest density of vernal pools exist in this area. A core preserve in this area should entail a preserve boundary associated with watersheds & clear hydrological barriers such as topo.

Red 49b – Only viable location within Cordova Hills for a regional shopping center/town center.

Red 49c – Minimal wetland resources exist in this area. Does not make sense to preserve Swainson Hawk ~~foraging~~ foraging habitat on non-prime ag land with minimal wetlands & no alfae. Preserving foraging habitat within the urban services boundary only pushes development further out, which worsens air quality, increases traffic, & ultimately leads to economic losses for the region. Need a balance between Swainson Hawk needs & human needs.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

GLEN HOLSTEIN

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 50

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

50a.- ALL AREAS EAST OF GRANTLINE, NORTH OF THE KIEFER LANDFILL, AND NORTH TO THE ALIGNMENT OF WHITEROCK ROAD SHOULD BE PRESERVED. THIS AREA INCLUDES ONE OF THE MOST OUTSTANDING LARGE VERNAL POOL LANDSCAPE IN THE WORLD INCLUDING SIGNIFICANT ENDANGED SPECIES POPULATIONS. FOR EXAMPLE THE MOST SIGNIFICANT POPULATION OF ORCUTTIA VISCIDA IS HERE. FARTHER EAST IS THE ANCIENT VALLEY OAK RIPARIAN FOREST NEAR THE EASTERN EDGE OF THE URBAN SERVICES BOUNDARY. ROLLING PRAIRIE HILLSIDES BETWEEN THEM IS AMONG THE MOST SIGNIFICANT PRAIRIE HABITAT NEAR SACRAMENTO. IT IS IMPORTANT FOR RAPTOR FORAGING AND HAS HIGH POTENTIAL FOR URBAN RECREATION BEAUSE OF ITS OUTSTANDING VIEW SHEDS. THIS LINKED COMPLEX HAS EXTREMELY HIGH PRESERVE POTENTIAL.

50b VERNAL COMPLEXES SOUTHWEST OF THE CORNER OF GRANTLINE AND DOUGLAS ARE EXTREMELY DENSE AND HAVE A DOCUMENTED FULL RANGE OF SPECIES INCLUDING NUMEROUS LISTED THREATENED AND ENDANGERED SPECIES ASSOCIATED WITH VERNAL POOLS. UPLAND AREAS ARE OUTSTANDINGLY INTACT AND CAN PROVIDE THE FULL RANGE OF UPLAND PRAIRIE ECOLOGICAL SERVICES. THESE RANGE FROM POLLINATOR NEST AREAS REQUIRED FOR VERNAL POOL PLANT SEED SET TO FORAGING BY MIGRATORY RAPTORS LIKE SWAINSON, ROUGH-LEGED, AND FERRUGINOUS HAWKS

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 50

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

50c DENSE VERNAL POOLS HERE NEED PROTECTION
50d DENSE VERNAL POOLS HERE NEED PROTECTION
50e DENSE VERNAL POOLS HERE NEED PROTECTION
50f RIO DEL ORO SUPPORTS NUMEROUS EXAMPLES OF GOOD VERNAL POOL HABITAT INCLUDING ORCUTTIA VISCIDA AND PROBABLE SPADEFOOTS
50g DENSE VERNAL POOLS NEED PROTECTION
50h WELL OVER ONE HUNDRED LARGE AND SMALL VERNAL POOLS OCCUR INCLUDING A RARE TRANSITION BETWEEN REDDING AND SAN JOAQUIN VERNAL POOL LANDSCAPES, RICH VERNAL POOL FLORA, BUT RECENT LOLIUM INVASION NEEDS CONTROL, EXCELLENT OPPORTUNITY FOR CORRIDOR CONNECTION WITH RIPARIAN PROTECTED ZONE ALONG LAGUNA CREEK
50i DENSE VERNAL POOLS NEED PROTECTION
50j DENSE VERNAL POOLS NEED PROTECTION
50K DENSE VERNAL POOLS NEED PROTECTION
50L DENSE VERNAL POOLS NEED PROTECTION
50M DENSE VERNAL POOLS NEED PROTECTION
50N DENSE VERNAL POOLS NEED PROTECTION
50O EXTREMELY IMPORTANT AND DENSE VERNAL POOL COMPLEX – THE MAIN MATHER POOLS – VERY HIGH PLANT DIVERSITY – SITE OF SAC SPLASH ENVIRONMENTAL ED PROGRAM – THIS OUTDOOR LABORATORY HAS TOUGH THOUSANDS OF KIDS ABOUT VERNAL POOL BIOLOGY
50p. THIS IS THE CRITICALLY IMPORTANT HIGH TERRACE SECTION OF THE MATHER POOL EDUCATION PROGRAM – SAC SPLASH – POOL DENSITY SOMEWHAT LOW BUT POOLS VERY LARGE

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

CRITICAL HABITAT FOR SEVERAL LISTED PLANTED AND ANIMAL RARE SPECIES – SHRIMP AND ORCUTTIA

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 50

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50 Q SAILFOOT'S ARE HERE – PRESERVE NEEDED

50 R AHART'S RUSH IS HERE – PRESERVE NEEDED

50 S TRICOLOR BLACKBIRDS ARE HERE – PRESERVE NEEDED

50 T DENSE VERNAL POOLS HERE NEED PROTECTION

50 U SWAINSON'S HAWKS USE AND PROBABLY NEST IN OLD GROWTH FREMONT COTTONWOOD GALLERY FOREST HERE

50 V OLD GROWTH VALLEY OAK RIPARIAN FOREST ALONG MORRISON CREEK + ADJACENT RELATIVELY UNALTERED PRAIRIE IS OUTSTANDING URBAN HABITAT

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Kelly. Cohen

Environmental Review Process – EIS/EIR **Comment Card**

Participant Number: 51

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

51a West Fork tributary into Deer Creek adjacent to Mitigation Bank. watershed should be studied for expansion of bank/preserves.

zone 2 51b-k Vernal pools, esp. Those w/ connectivity & other habitat/ecological value and connectivity should be conserved in preserves.

51j Frye Creek, west of Eagles nest, should be added to existing preserves due to wetland/ecological value & connectivity

51k East of Excelsior, 160 acres possible habitat value; vernal pools.

51l West of Eagles nest – wetland/vernal pool habitat, adjacent to protected area – value for connectivity.

51m&o Laguna Creek (north) – habitat value, wetlands. Habitat like this should be considered in preserves, as they support a wide range of species.

51p&t Laguna (north) Creek – whole section (sp) = Quarter N/W section and section northeast (51t) wetland-ecological values need preserving. Valuable to ecosystem

51qr-whole section – wetland, vernal pool values – irreplacable, unique habitat (entire habitat type marked green in Zone 1) applies to eco. value

51 y-yy entire watershed of Deer Creek into Mitigation bank and south, should be included in conservation/protection areas due to value to species and systems. Deer Creek is also habitat to bats in places – though bats aren't listed, they are in need of protection.

51s Fork (west) of Coyote Creek into Coyote Creek/Canyon Creek would have ecological habitat value to wildlife and ecolog. systems important to wildlife (tho they may not live in the habitat). This applies to all habitat of this character.

51v – along with areas marked by 51 Q&t, this watershed has ecological value that needs to be considered for preservation.

51 v&w Alder Creek and habitat south (oak grazing woodland?) has habitat value and needs to be conserved for connectivity value since areas north of 50 are developed. In fact the

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Why north of 50 in Folsom is newly developed and wildlife are →

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 51

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51 v & w cont.

being pushed out. It is critical that large swaths of contiguous habitat are preserved. Habitat that includes creeks & streams & wetlands are especially needed.

51 x wetland habitat & open space (for wildlife) value, though I see a seasonal impound there, so habitat may be degraded from grazing? If so, the vernal pools wetlands need to be protected from the cattle.

51 aa – west of Prairie City Road – Buffalo Creek watershed. Same reasons as above. Additional wetland value occurs outside UDA boundary to the southeast

51 bb – watershed & vernal pools

51 ee/ff: Same comments.

51 cc – west of South Canal & east of Grantline & watershed/vernal pools habitat has high value & needs to be included in conservation/protected area. 51 dd: Morrison Creek watershed – rapid development surrounding this watershed necessitates protection in this area.

NOTE: Zone 1 has concentrations of vernal pools, creeks with nearby vernal pools & wetland areas and these habitats are unique enough and important enough ecologically to be seriously planned for preservation, protection, limitations on use/development, etc. This habitat ecological value cannot be re-created, nor is it more common in the area. Rapid development in the County is reducing habitat and the ecological purposes that occur within. Conservation is now or never for this region.

51 Zone 2 51 gg, hh, ii, jj (plus 51 b–i from pg 1) – watershed of Morrison Creek & scattered wetlands/vernal pools need to be considered for protection, whether in preserves, easements, mitigation banks, or via limitations from within permitting requirements/restrictions. Development is encroaching and displacing wildlife & reducing habitat, and so protected areas and linkages need to be retained. This includes wildlife movement corridors.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 51

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zone 3

51 KK Elder Creek, west of Bradshaw – watershed, wetland, vernal pool habitat is of value & needs protecting.

51 LL area south of Jackson Rd / north of Elder Creek, west of protected easement is wetland habitat adjacent to existing easement & would be of benefit to include into this protected area in a contiguous way.

51 mm South of Jackson Rd – include into existing protected area to south.

51 oo any development in this watershed needs to be set back at least 200', with riparian habitat maintained or restored. This should apply to any & all development/"improvement" along creeks, streams or wetlands.

zone 4 51 pp area south of Vintage Park Drive (NW corner of SE ¼ section) suggest adding this Qtr section to mitigation area to North.

51 RR Add to mitigation protected parts of creek to west.

zone 5 51 rr/ss/tt/ww Include in mitigation area already protected. Any other habitat that is of ecological value or that would connect two or more protected areas should be acquired. This applies to entire HCP area.

51 a, b, c (red) infeasible to protect.

zone 12 51 yy include in mitigation area – would enable protected connectivity & protection of ecological value

51 zz Deadman's Gulch, east of Christensen Rd: wetland habitat / creek has ecological value that needs protecting. watershed protection enables movement corridors along creeks / riparian zones. Very important habitat. ~~area~~ Applies to all my comments where creeks/streams or "dots" of vernal pools occur.

51 aaa patchwork of wetlands may be important to gene exchange if movement is occurring or able to occur → conserve this value

bbb wildlife movement corridors are critical! They need to be studied and built in to HCP. This is a #1 priority.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 51

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments: Great!

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Kelly Cohen

Title and Org/Business (if applicable):

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 54

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59 – We are landowners of the area that comes down in a "V" in zone one. There is a lot of land for mitigation to the east of this property that is within the Urban Service Boundary line. ~~this~~ Thus, we feel the V ~~should~~ since it is within the USB should be developed. The fact that a Catholic University is close by is an additional reason to allow development in the "V" area.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 55

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

- My biggest concern is that the HCP or the participation in any type of preservation be [redacted] voluntary.

55

JUSTIN CARNEY

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 56

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

~~120,000 in~~

~~60,000 DEV~~

56 PRIVATE PROP. – NO EASEMENTS OR PRESERVES

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 58

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

58 A – included in JACKSON HW Study AREA – limited resources

58 B – same comments as above.

58 A – concentration of vernal pools.

58 C – included in NVSSP – limited resources

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 58

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Don Barnett

Title and Org/Business (if applicable): Lennar

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 61

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

a - Connect to existing preserve, keep whole corridor
b - Riparian corridor in place & good quality
Keep the whole stretch
c - Contiguous preserve

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 61

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: David Shabazian

Title and Org/Business (if applicable): SACOG

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 64

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

64-1 USES BEING RESTRICTED RE-USE OF EXISTING LAND, NO HABITAT VALUES VISUALLY PRESENT.

64-2,3

I OPTED TO NOT PUT RED DOTS IN MOST INSTANCES – DEVELOPMENT WHERE PLANNED

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant 64

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Stacey McKinley

Title and Org/Business (if applicable): The McKinley Group

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 1

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

1-a Preserve a creek buffer the length of Laguna creek that averages 600 feet eg 300' each side of the creek or 100' one side & 500' the other side. The width would vary based on the resource & constraints. Creek corridor can connect vernal pools as well as upland preserves.

1-b Preserve vernal pools - important & unique pools here -

1-c another important vernal pool area that needs to have large preserves - both Cordova Hills & to N

1-d important to preserve Morrison Creek with buffer

1-e Heritage Falls - Preserve VP's

1-f Early Triangle - Vernal pools should be preserved.

1-g Preserve vernal pools in a long connected preserve.

1-h Important for riparian. Established & regenerating oaks. Dne

1-i Preserve runway pools

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: _____

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

1-J - Laguna Creek Reserve - 600 feet wide

1-K - There is an opportunity to preserve creek riparian

1-L Vernal pools

1-M Vernal pools

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 3

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

3-a: This section of the map seems to contain the vernal pools or other "water parts" that start the Laguna Creek water system

3-b: This section seems to contain critical habitat for vernal pools. If development continues into this habitat how does stormwater run-off affect the vernal pools and creeks?

3-c: From Folsom-South Canal to ~~be~~ Vinyard there shows the Upper Laguna Creek Watershed that ~~remains~~ demonstrates potential to be protected for riparian habitat, pedestrian walkways and possibly a wildlife corridor

3-D: If this section is existing farm land then it should be set aside as such with the possibility of also using it as a buffer zone for nearby vernal pools and creeks.

Antonio Gonzalez

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 8

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

8A - This Area is part of City of Elk Grove SOI Amendment process & should be included in UDA under the HCP.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 15

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15A - Laguna Creek North potential restoration of natual stream

15-B - Vernal pool

15-C - Vernal pool potential preservation

15-D - Mather vernal pool

15-E - Habitat - wildlife corride

15-F - Morrison Creek - riparian restoration

15-G Laguna Creek Corridor restoration

15-H - Laguna Creek corridor restoration

15-I - Elder Creek corridor restoration

15-J - Gerber Creek Corridor restoration

15-K - Deer Creek Tributary Corridor restoration

15-L - Restore waterway to provide connection to Deer Creek

15-M - Rotore Creek corridor

15-N Laguna Creek Corridor restoration

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Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 15

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15-O Elder Creek Corridor restoration

15-P Laguna Creek Corridor restoration

15-QQ - Deer Creek Floodplain protection

15-R - Restore Creek between Grant and Poppy Ridge

15-S - Buffer land protected

15-T Dry Creek protect-restore riparian corridor

15-U Protect enhance wetlands

15-V Restoration Creek Corridor.

15-W Restore Creek/Swale Corridor

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 17

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17a – Lot P Keep Lot P as a preserve – is contiguous with Laguna Creek Corridor. Should have a managment plan for the vernal pool area,

17b – please this property in preserve – keep contiguous with Laguna Creek corridor –

17a – Drainage Plans for the area

17c Keep the creek natural channel – 300ft

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 19

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19 a - Find a name for the creek. Widen Creeks add native plants + trees to the area to prevent wash out.

19B Preserve as many Vernal pools in the largest area as possible. The houses can be concentrated in one areas

19 a red Developments need to be slowed
19b " or even stopped until the problems are fixed in those housing areas. (such as traffic lights.) etc.

19 c Extend preserve to include this area.

19d-e Marsh areas should be preserved also.

19 c red Again problems should b fixed concerning strip malls + housing + traffic. Continued housing ruins habitat for wild life. Increased traffic also destroys wild life

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to. County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 19

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

19f preserve creek

19g extend preserve

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Participant No. 20

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

20 a – Watershead – preserve Streams & Any related vernal pools that are within close proximity to the streams – streams should be left as natural as possible (not channeled). leave at least 100 yards on each side as part of the preserve

20 b. – Some as 20a

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☑ Yes ☐ No

If so, please provide your contact information.

Name: John R Newman

Title and Org/Business (if applicable): Florin Historical Society (V.P.)

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 21

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

21-a RED - AREA Along GRANT Line Rd is Adjacent to City of ELK Grove and has been Farmed Continuously for >100 years, so little Preservation Value

21-b RED - Area is NOT suitable for preservation because it Could be used for Passive Recreation since it is close to city of Elk Grove & inconsistent with Farming.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No 21

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information. ALSO ON ~~[illegible]~~ Economic Committee

Name: Doug Williams

Title and Org/Business (if applicable):

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 22

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RED. ZONE 1

22A – DON'T DESIGNATE AS CONSERVATION & PRESERVE. PROPERTY IS ENTITLED & OUTCOME OF LITIGATION MAY ALLOW DEVELOPMENT TO PROCEED — REASONABLE MITIGATION ANTICIPATED. JAEGER ROAD 530, LLC. "THE DONUT WHOLE" HAS INTENTIONS TO DEVELOP COMMENT IS SUBJECT TO PARTNERSHIP APPROVAL — WILL CONFIRM WITH DAVE DEFANTI & RICH RADMACHER

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 22

Environmental Review Process – EIS/EIR

Comment Card

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General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: FRANCES KNIGHT

Title and Org/Business (if applicable): K. HOVNANIAN HOMES

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 23

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

23a & 23b:

Land south of Eschinger Rd. (outside UDA) adjacent to future Elk Grove SOI Amendment area should be considered as a critical buffer between future development in the SOI area and permanent preserve land. As such, this area provides / supports some of the key elements of the HCP including:

1. Interconnecting future and existing preserves
2. Minimization of Edge effects
3. Support of greater biodiversity in the form of corridors allowing for animal movement and hawk foraging

This land area south of Eschinger should be given additional credit ~~in~~ for preserving land as a permanent preserve line against future development.

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Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 24

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a. RESERVES 25 ADJACENT TO MATHER LAKES AND PARK, SO THIS IS A NATURAL EXTENSION

b. CONSERVE ALL AREA WITHIN STREAM/CREEK BANKS.

c. " " " " " "

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 27

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

- For vernal pool reserves, please include uplands with resources for salamanders (burrows from ground squirrels, etc.)

27-a Connect to the nearby existing reserves. Use large culverts to hydrologically connect the reserves across roads.

27-b Connect this area to 27-a

27-c connect this area to 27-a also

27-d restore Morrison Creek – use it for a riparian reserve/flood control system – make the floodplain wide enough to incorporate riparian trees and shrubs (willow-cottonwood)

27-e Restore this portion of Morrison Creek and connect it to the City of Sacramento

27-f protect the vernal pools and Elder Creek

27-g connect to 27-f area

27-h connect this area to the existing reserves nearby

27-i connect this area to the existing reserves nearby

27-j connect these pools to the nearby reserve (across Florin Rd)

27-K connect these pools to the nearby reserve and restore the creek (Laguna) – connect the vernal pool area to the creek.

27-l connect all parts of Laguna Creek and restore it – protect a wide portion of the floodplain. How wide? wide enough to have large trees growing along the creek

27-m this should be connected to the rest of the creek restoration area and vernal pools nearby

27-n connect this part of the creek to the existing reserve → same comments in 27-l apply here

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 27

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27-o connect the creek to the two existing reserves on both ends – restore the creek – same comments apply from comment 27-l

27-p connect the creek to the existing reserves and to 27-q – the idea is to have a creek system protected

27-r connect this area of vernal pools to the Galt water treatment plant area

27-s Connect this area to the existing reserve nearby

27-t connect this area to the nearby reserves – expand the floodplain of the creek also

27-u Connect this area to the nearby reserves to west & South

27-v same system → keep it hydrologically connected

27-w high density of vernal pools should be preserved

27-x this whole system (From North to South) needs protection, especially because of the density of pools

27-y connect this area to the reserves to the north

27-z connect this area to 27-y and the existing reserve to the South

27-aa connect this area of Laguna Creek to the reserves downstream – these are valuable headwater areas of Laguna Creek and will preserve water quality and wildlife/plants.

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Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 28

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28a – Green – High concentration of high quality vernal pools running from Anatolia northeast toward Kiefer Landfill. Still potential for large-scale preserver in this area.

28b – Green vernal pool – critical habitat area. Opportunity for connectivity between Matter to North + preserve (S) of Jackson Hwy.

28a Red – Preserve not feasible near "node" on Jackson Hwy / Excelsior. This is area being considered for next stage of logical growth for County. New growth area. Also – preserve/open space inconsistent w/ Blueprint policies.

28b – Red – Elder Creek is very disturbed in this area. Could be improved through restoration but doesn't make sense to preserve in current state.

28c – Green – High concentration of vernal pools in close proximity to Laguna Creek. Also – Laguna Creek is habitat for variety of protected species

28d – High concentration vernal pools w/ potential to connect to Anatolia preserve

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Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 30

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2 Inconsistent with forming: No land should be governed by the City of Elk Grove.

I will follow up with a letter & use Re # 30 ID.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 31

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31 A/B Preserves should be established where there is a high concentration of natural resources and where development is not anticipated. Opportunities ~~are~~ for preserving corridor are available here.

31 C Preserves are inappropriate in this area. ~~Rural~~ These areas, closest to services and infrastructure are more suitable for development.

31 D/H Preserves should be contiguous ~~B~~ ~~and~~ to existing preserves south of Jackson.

31 E F G Sacramento Rendering Company is at this location. This site is adjacent to the city of Rancho Cordova and proximate to infrastructure. It is not a suitable preserve.

31 I Preserves should be contiguous to existing preserves.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 32

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32A - ? Mather Preserve.
32B + C I sent my comments in
32D restoration area ? creek?

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Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 42

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

42-a Carli Triangle (green)
42-b Cordova Hills (green)
42-c Waegells (green)
42-d Orcutt ia (green)
42-e developed (red)
42-b developed (red)
42-e bomb pool (green)
42-f spadefoot (green)
42-g thru j SPVPP targets (green)
42-k habitat corridor (green)
42-l George Clark Preserve (green)
42-m School Pool (green)
42-n Tricolored Blackbirds (green
42-o carridor (green)
42-p corridor (green)
42-q rest of arroyo seco (green)
42-r lot P (green)
42-s Juncos & Gratiola (green)
42-t Critical Habitat

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Participant No. 42

Environmental Review Process – EIS/EIR

Comment Card

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General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: Carol Witham

Title and Org/Business (if applicable):

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 43

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

43A Carli Triangle (G)
43B Cordova Hills (G)
43C Waegells. (G)
43D Orcutt's family (G)
43A Developed (R)

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 47

George Waegell

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

47 a Preserve Blodgett Lake

47 B John Tracy 1000 acres has vernal pools

47 C Carli property has good vernal pools + creek

47 D SE half of Wakita proputy good vernal pools

47 E oaks on Mathes park tributary of Morrison Creek

47 F Wakita creek tributary of Morrison creek.

47 G TriangleRock Frye creek preserve has 41 shelters for oak trees 37 living?

47 H Preserve Werre property for vernal pools and its proximity to large wetland area

47 I Lot was dedicated by AKT when Vinyard Springs was built

47 J Shehadeh property has vernal pools and Laguna creek.. Frye creek joins Laguna on Shehadeh property

47 K Preserve Laguna Creek oak riparian habitat on Waegell property

Red 47A Major flooding from Sunridge that shed jumps from Morrison creek headwaters down into Laguna creek

Red 47 B Inadequate flumes across Folsom S canal move water south flooding into Folsom S canal and cutting a new creek across Shalako onto Laguna Creek

Red 47 C Kiefer Landfill sits in an outcrop of Mehrten sands that are the aquifer under Sacto County. This a direct pipeline into aquifer.

over

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 47

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

Green

47L Preserve 4' tall valley west of bridge on 99

47M Protect western pond turtles on Elk Grove Creek (Greg Suba) down stream of Emerald Vista Drive

47N Granite Construction is digging up Morrison Creek E of Hedge. They will backfill and restore creek to current location. See that creek gets restored. See that pit slopes are sloped and planted to scattered oaks - Valleys not bomb craters!

47O Remove chain link and oleanders so public can see a beautiful green valley.

General Workshop Comments:

47P Level strip along Laguna Creek so oaks can be planted. There are about 8 new oaks east of Vineyard on S side of Laguna Creek

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: _____

Title and Org/Business (if applicable): _____

Email address: _____

Mailing address: _____

Phone: _____

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 49

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

Red 49a – Adjacent to Grant Line Rd. is an ideal viable location for a major retail center for Cordova Hills.

Green 49a – The highest density of vernal pools exist in this area. A core preserve in this area should entail a preserve boundary associated with water sheds & clear hydrological barriers such as topo.

Red 49b – Only viable location within Cordova Hills for a regional shopping center/town center.

Red 49c – Minimal wetland resources exist in this area. Does not make sense to preserve Swainson Hawk ~~Hab~~ foraging habitat on non-prime ag land with minimal wetlands & no alfae. Preserving foraging habitat within the urban services boundary only pushes development further out, which worsens air quality, increases traffic, & ultimately leads to economic losses for the region. Need a balance between Swainson Hawk needs & human needs.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

EILEEN HOLSTEIN

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 50

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

502 – ALL AREAS EAST OF CHANTLINE, NORTH OF THE KIEFER LANDFILL, AND NORTH TO THE ALIGNMENT OF WHITERACK ROAD SHOULD BE PRESERVED. THIS AREA INCLUDES ONE OF THE MOST OUTSTANDING LARGE VERNAL POOL LANDSCAPES IN THE WORLD INCLUDING SIGNIFICANT ENDANGERED SPECIES POPULATIONS. FOR EXAMPLE THE MOST SIGNIFICANT POPULATION OF ORCUTTIA VIRIDIS IS HERE. FURTHER EAST IS THE ARCHENT VALLEY OAK RIPARIAN FOREST NEAR THE EASTERN EDGE OF THE URBAN SERVICES BOUNDARY. ROLLING PRAIRIE HILLSIDES BETWEEN THESE TWO AREAS ARE THE MOST SIGNIFICANT PRAIRIE HABITAT NEAR SACRAMENTO. IT IS IMPORTANT FOR RAPTOR FORAGING AND HAS HIGH POTENTIAL FOR URBAN RECREATION BECAUSE OF ITS OUTSTANDING VIEW SHEDS. THIS LINKED COMPLEX HAS EXTREMELY HIGH PRESERVE POTENTIAL.

506 VERNAL COMPLEXES SOUTHWEST OF THE CORNER OF CHANTLINE AND DUNCAN ARE EXTREMELY DENSE AND HAVE A DOCUMENTED FULL RANGE OF SPECIES INCLUDING NUMEROUS LISTED THREATENED AND ENDANGERED SPECIES ASSOCIATED WITH VERNAL POOLS. VALLEY AREAS ARE OUTSTANDINGLY INTACT AND CAN PROVIDE THE FULL RANGE OF VALLEY PRAIRIE ECOLOGICAL SERVICES. THESE RANGE FROM POLLINATION NEST AREAS REQUIRED FOR VERNAL POOL PLANT SEED SET TO FORAGING BY MIGRATORY RAPTORS LIKE SWAINSON, ROUGH-LEGGED AND FERRUGINOUS HAWKS

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 50

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50c DENSE VERNAL POOLS HERE NEED PROTECTION
50d DENSE VERNAL POOLS HERE NEED PROTECTION
50e DENSE VERNAL POOLS HERE NEED PROTECTION
50f RIO DEL ORO SUMMIT I NUMEROUS EXAMPLES OF GOOD VERNAL POOL HABITAT INCLUDING ORCUTTIA VIRIDA AND PALEDALE SPADEFOOT
50g DENSE VERNAL POOLS NEED PROTECTION
50h WELL OVER ONE HUNDRED LARGE AND SMALL VERNAL POOLS OCCUR INCLUDING A RARE TRANSITION BETWEEN REDDING AND SAN JOAQUIN VERNAL POOL LANDSCAPES, RICH VERNAL POOL FLORA, BUT RECENT LOTUS INVASION NEEDS CONTROL. EXCELLENT OPPORTUNITY FOR CORRIDOR CONNECTION WITH RIPARIAN PROTECTED ZONE ALONG LAGUNA CREEK
50i DENSE VERNAL POOLS NEED PROTECTION
50j DENSE VERNAL POOLS NEED PROTECTION
50K DENSE VERNAL POOLS NEED PROTECTION
50L DENSE VERNAL POOLS NEED PROTECTION
50M DENSE VERNAL POOLS NEED PROTECTION
50N DENSE VERNAL POOLS NEED PROTECTION
50o EXTREMELY IMPORTANT AND DENSE VERNAL POOL COMPLEX – THE MAIN MATHER POOLS – VERY HIGH PLANT DIVERSITY – SITE OF SAC SPLASH ENVIRONMENTAL ED PROGRAM – THIS OUTDOOR LABORATORY HAS TAUGHT THOUSANDS OF KIDS ABOUT VERNAL POOL BIOLOGY
50p. THIS IS THE CRITICALLY IMPORTANT HIGH TERRACE SECTION OF THE MATHER POOL EDUCATION PROGRAM – SAC SPLASH – POOL DENSITY SOMEWHAT LOW BUT POOLS VERY LARGE

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

CRITICAL HABITAT FOR SEVERAL LISTED PLANTS AND ANIMAL NAME SPECIES – FAUNA AND ORCUTTIA

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 50

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

50 Q SWAINSON'S HAWK HERE - PRESERVE NEEDED

50 R AMARGOSA RUSH IS HERE - PRESERVE NEEDED

50 S TWO COLOR BLACK BIRDS ARE HERE - PRESERVE NEEDED

50 T DENSE VERNAL POOLS HERE NEED PROTECTION

50 U SWAINSON'S HAWKS USE AND PROBABLY NEST IN OLD GROWTH FREMONT COTTONWOOD GALLERY FOREST HERE

50 V OLD GROWTH VALLEY OAK RIPARIAN FOREST ALONG MORRISON CREEK + ADJACENT RELATIVELY UNALTERED PRAIRIE IS OUTSTANDING WILD RAPTOR HABITAT

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Kelly Cohen

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 51

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

51 a West Fork ~~Tributary~~ into Deer Creek adjacent to Mitigation Bank. watershed should be studied for expansion of bank/preserves.

zone 2 51 b-~~k~~ Vernal pools, esp. those w/ connectivity & other habitat/ecological value and connectivity should be conserved in preserves.

51 j Frye Creek, west of Eagles nest, should be added to existing preserves due to wetland/ecological value & connectivity

51 K East of Excelsior 160 acres, possible habitat value; vernal pools.

51 L west of Eagles nest – wetland/vernal pool habitat, adjacent to protected area – value for connectivity.

51 m & o Laguna Creek (north) – habitat value, wetlands. Habitat like this should be considered in preserves, as they support a wide range of species m whole 1/2 section south

51 p & t Laguna (north) Creek – whole section (p) – o Quarter N/W section wetland-ecological values and section northeast (51 t) need preserving. Valuable to ecosystem

51 Q & r – whole section – wetland, vernal pool values – irreplacable, unique ecol. value habitat (entire applies to habitat type marked green in Zone 1)

51 Y-YY entire watershed of Deer Creek into Mitigation bank and south, beyond should be included in conservation/protection areas due to value to species and systems. Deer Creek is also habitat to bats in places – though bats aren't listed, they are in need of protection.

51 s Fork (west) of Coyote Creek into Coyote Creek/Carson Creek would have ecological habitat value to wildlife and ecolog. systems important to wildlife (tho they may not live in the habitat). This applies to all habitat of this character.

51 u – along with areas marked by 51 Q & t, this watershed has ecological value that needs to be considered for preservation.

51 v & w Alder Creek and habitat south (oak gray pine woodland?) has habitat value and needs to be conserved for connectivity value

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since areas north of 50 are developed. In fact, the whole north of I-50 in Folsom is newly developed and wildlife are →

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 51

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51 v, w Cont.

being pushed out. It is critical that large swaths of contiguous habitat are preserved. Habitat that includes creeks & streams & wetlands are especially needed.

51 x wetland habitat & open space (for wildlife) value, though I see a seasonal impound there, so habitat may be degraded from grazing? If so, the vernal pools wetlands need to be protected from the cattle.

51 aa – west of Prairie City Road – Buffalo Creek watershed. Same reasons as above. Additional wetland value occurs outside UDA boundary to the southeast

51 bb – watershed & vernal pools 51 ee/ff: Same comments.

51 cc – west of South Canal & east of Grantline & watershed/vernal pools – habitat has high value & needs to be included in conservation/protected area. 51 dd: Morrison Creek watershed – rapid surrounding development necessitates protection in this watershed

NOTE: Zone 1 has concentrations of vernal pools, creeks with nearby vernal pools & wetland areas and these habitats are unique enough and important enough ecologically to be seriously planned for preservation, protection, limitations on use/development etc. This habitat ecological value cannot be re-created, nor is it more common even in the area. Rapid development in the County is reducing habitat and the ecological processes that occur within. Conservation is now or never for this region.

51 Zone 2 51 gg, hh, ii, jj (plus 51 b–i from pg 1) – watershed of Morrison Creek & scattered wetlands/vernal pools need to be considered for protection, whether in preserves, easements, mitigation banks, or via limitations from within permitting requirements/restrictions. Development is encroaching and displacing wildlife & reducing habitat, and so protected areas and linkages need to be retained. This includes wildlife movement corridors.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 51

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zone 3

51 KK Elder Creek, west of Bradshaw – watershed, wetland, vernal pool habitat is of value & needs protecting.

51 LL area south of Jackson Rd / north of Elder Creek, west of protected easement is wetland habitat adjacent to existing easement & would be of benefit to include into this protected area in a contiguous way.

51 mm South of Jackson Rd – include into existing protected area to south.

51 oo any development in this watershed needs to be set back at least 200', with riparian habitat maintained or restored. This should apply to any & all development/"improvement" along creeks, streams or wetlands.

zone 4

51 pp area south of Vintage Park Drive (NW corner of SE ¼ section) suggest adding this Qtr section to mitigation ~~area~~ area to North.

51 QQ Add to mitigation protected parts of creek to west.

zone 5

51 rr/ss/~~tt~~/uu Include in mitigation area already protected. Any other habitat that is of ecological value or that would connect two or more protected areas should be acquired. This applies to entire HCP area.

51 a, b, c (red) infeasible to protect

zone 12

51 yy include in mitigation area – would enable protected connectivity & protection of ecological value

51 zz Deadman's Gulch, east of Christensen Rd: wetland habitat / creek has ecological value that needs protecting. watershed protection enables movement corridors along creeks / riparian zones. Very important habitat. ~~of~~ Applies to all my comments where creeks / streams or "dots" of vernal pools occur.

51 aaa bbb patchwork of wetlands may be important to gene exchange if movement is occurring or able to occur → conserve this value

Wildlife movement corridors are critical! They need to be studied and built in to HCP. This is a #1 priority.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 51

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments: great!

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Kelly Cohen

Title and Org/Business (if applicable):

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 54

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

59 – We are landowners of the area that comes down in a "V" in zone one. There is a lot of land for mitigation to the east of this property that is within the Urban Service Boundary line ~~that~~ this, we feel the V ~~should~~ since it is within the USB should be developed. The fact that a Catholic University is close by is an additional reason to allow development in the "V" area.

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 55

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

- My biggest concern is that the HCP or the participation in any type of preservation be [redacted] voluntary.

55

JUSTIN CARNEY

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 56

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

~~120,000 TO~~

~~60,000 DEV~~

56 PRIVATE PROP. – NO EASEMENTS OR PRESERVES

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN. Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 58

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

58 A – included in JACKSON HW study AREA – limited resources.
58 B – same comments as above.
58 A – concentration of vernal pools.
58 C – included in NVSSP – limited resources

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 58

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Don Barnett

Title and Org/Business (if applicable): Lennar

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 61

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

a - Connect to existing preserve, keep whole corridor

b - Riparian corridor in place & good quality
Keep the whole stretch

c - Contiguous preserve

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant No. 61

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☐ Yes ☐ No

If so, please provide your contact information.

Name: David Shabazian

Title and Org/Business (if applicable): SACOG

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

Environmental Review Process – EIS/EIR

Comment Card

Participant Number: 64

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

64-1 USES BEING REQUESTED RE: USE OF EXISTING LAND, NO HABITAT VALUES VISUALLY PRESENT.

64-23

I OPTED TO NOT PUT RED DOTS IN MOST INSTANCES – DEVELOPMENT WHERE PLANNED

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Peter Morse, 827 7th Street, Room 220, Sacramento, CA 95814

Participant 64

Environmental Review Process – EIS/EIR

Comment Card

Thank you for your interest in the Environmental Impact Statement/Environmental Impact Report for the proposed South Sacramento Habitat Conservation Plan. Please record a clearly legible **comment** correlating with **every** red and green **dot** placed on the Zone maps.

General Workshop Comments:

Would you like to be added to the SSHCP mailing list? ☒ Yes ☐ No

If so, please provide your contact information.

Name: Stacey McKinley

Title and Org/Business (if applicable): The McKinley Group

Email address:

Mailing address:

Phone:

Please submit your comments to a project representative or fold this form in half, seal with tape, and mail to: County of Sacramento, Department of Environmental Review and Assessment, ATTN: Tim Hawkins, 827 7th Street, Room 220, Sacramento, CA 95814

EIS/EIR APPENDIX C

Draft Multi-Layered CWA 404 Permit Strategy for future SSHCP Covered Activities

Appendix C-1. Draft CWA 404 Permit Strategy

Appendix C-2. Draft Programmatic General Permit

Appendix C-3. Draft Letter of Permission Procedure

Appendix C-4. Abbreviated Standard Permit Process

EIS/EIR APPENDIX C-1

Draft CWA 404 Permit Strategy

CWA 404 Permit Strategy Aligned with the South Sacramento Habitat Conservation Plan

February 2018

Background

The South Sacramento Habitat Conservation Plan (SSHCP) covers twenty-eight species of plants and wildlife, including ten that are state and/or federally-listed as threatened or endangered. The SSHCP is a regional approach to address issues related to planned development and species habitat conservation, following a comprehensive conservation strategy, over a 50-year period. The boundaries of the 317,655-acre SSHCP Plan Area are generally U.S. Highway 50 to the north, the Sacramento River levee and County Road J11 to the west, the county line with El Dorado and Amador Counties to the east, and the county line with San Joaquin County to the south. The six SSHCP Plan Partners are the County of Sacramento, City of Galt, City of Rancho Cordova, Sacramento County Water Agency, Sacramento Regional County Sanitation District, and the Southeast Connector Joint Powers Authority. The Plan Partners have formed a SSHCP Implementing Entity to carry out the HCP's commitments and requirements. The U.S. Fish and Wildlife Service's Sacramento Field Office (USFWS) will approve the SSHCP through a species incidental take permit issued to five of the Plan Partners and the SSHCP Implementing Entity under Section 10 of the Endangered Species Act (ESA 10), collectively termed "SSHCP Permittees" upon approval of ESA 10. Before it can issue its incidental take permit, the USFWS must internally consult under Section 7 of the ESA (ESA 7) and is required to comply with the National Environmental Policy Act (NEPA) and other related laws.

The U.S. Army Corps of Engineers (Corps) regulates discharges of dredged or fill material into waters of the U.S., including wetlands, under Section 404 of the Clean Water Act (CWA 404) through its Regulatory Program. Permits are issued to applicants only after a determination has been made that the proposed activity is the least environmentally damaging practicable alternative under the U.S. Environmental Protection Agency's (USEPA) 404(b)(1) Guidelines, which involves evaluating avoidance, minimization and compensation for impacts to waters of the U.S. Further, the Corps must comply with ESA 7, NEPA, Section 401 of the Clean Water Act (CWA 401), and Section 106 of the National Historic Preservation Act (NHPA 106) before authorizing an activity under CWA 404. Types of permits the Corps issues include general permits issued on a regional, nationwide, or programmatic basis for activities with minimal impacts on the aquatic environment, individually and cumulatively, and individual permits (standard and letters of permission) for those activities which do not fall under a general permit or have greater than minimal impacts. The Corps' Sacramento District (Sacramento District) administers the Regulatory Program in the Central Valley and Sierra Nevada California, the States of Nevada and Utah, and the Western Slope of Colorado.

Currently, the Corps reviews permit applications on an individual or case-by-case basis, which sometimes makes it challenging to evaluate avoiding, minimizing and compensating impacts to aquatic resources on a broader scale. As a result, the Corps' review is generally on the merits of the individual activity and the characteristics of the proposed project site, with limited ability to comprehensively assess where the risks, trade-offs and interactions among several projects and aquatic resources can be considered. Over time, environmental issues and development demands, especially in urbanizing areas, have resulted in adverse effects to the aquatic ecosystem that are not necessarily surprising, but fall short of more

ecologically meaningful and sustainable outcomes that a landscape-scale permitting solution may afford. For instance, permits issued by the Corps have led to a patchwork of wetland mitigation sites in certain areas, which may have disjointed or inconsistent preserve boundaries and be functionally compromised by abutting development. Furthermore, the distance between the permitted impact location and its mitigation site may be considerable, especially in cases where the compensation was accomplished through the purchase of credits at a mitigation bank or through an in-lieu fee (ILF) program.

The Sacramento District views the SSHCP as a remarkable opportunity to improve both species and aquatic resource protection in a coordinated way on a regional scale, taking into account planned development and providing greater certainty for the regulated public. With this in mind, the Sacramento District has been coordinating with the USFWS and Plan Partners, and others, since 2004 to develop and implement a "streamlined" approach to permitting under CWA 404 that encompasses a number of different permit types and processes. The Corps' "CWA 404 permit strategy" is intended to provide for better assurances and quicker permit decisions for the regulated public, while protecting aquatic resources to an equal or greater level in a manner consistent with existing regulations, policies and processes. The expectation of putting in place an effective and efficient CWA 404 permit strategy is based on a number of tenets upon which the SSHCP is founded including, but not limited to:

The Sacramento District views the SSHCP as a remarkable opportunity to improve both species and aquatic resource protection in a coordinated way on a regional scale, taking into account planned development and providing greater certainty for the regulated public.

- Protection of a broad range of species and habitats;
- Implementation of Low Impact Development Strategies (LIDS);
- Consistency with general plans;
- Avoidance of high quality vernal pool landscapes; and
- Preservation of watershed functions and stream corridors, and development of large, contiguous preserves, with particular focus on the Mather Core Recovery Area.

The CWA 404 permit strategy is being vetted through a public review process, inclusive of NEPA (as described in further detail below) and public notices distributed by the Sacramento District.

Benefits of CWA 404 Alignment

In addition to providing a regional platform to inform better and faster CWA 404 permit decisions, a USFWS-approved SSHCP provides several other benefits to the Sacramento District and its customers. Because the SSHCP is an action that may potentially significantly affect the quality of the human environment, the USFWS is in the process of completing an Environmental Impact Statement (EIS) under NEPA that will include impact analyses over a 50 year period of all SSHCP covered activities within the Plan Area. As a cooperating agency, the Sacramento District intends to use the EIS in a programmatic manner to underpin its CWA 404 permit strategy. Because the EIS will examine a range of reasonable HCP alternatives affecting waters of the U.S., it can serve as the basis for the Sacramento District's evaluation of alternatives under NEPA, and along with supplemental information provided to the Corps, the primary basis for evaluation of less damaging alternatives and mitigation under USEPA's 404(b)(1) Guidelines. The Sacramento

As a cooperating agency, the Sacramento District intends to use the EIS in a programmatic manner to underpin its CWA 404 permit strategy.

District will adopt the EIS and make its own Record of Decision (ROD) regarding the CWA 404 permit strategy's compliance with the 404(b)(1) Guidelines at the regional scale. Any necessary subsequent NEPA documentation prepared by the Sacramento District will tier from the EIS.

The CWA 404 permit strategy will rely, at all levels of permitting, on the SSHCP to address avoidance, minimization and requirements for compensatory mitigation for impacts to aquatic resources. Key to satisfying compensatory mitigation requirements, payment of HCP-required fees will dually fulfill a Corps-approved SSHCP In-lieu Fee (ILF) Program established by the Plan Partners. Substantial processing efficiency and improving aquatic resource protection at the regional level will result from the CWA 404 permit strategy's reliance on the compensatory mitigation ratio requirements for aquatic resources contained in the SSHCP. Implementation of on-the-ground compensatory mitigation projects would be consistent with the SSHCP conservation strategy, located within SSHCP preserve areas.

The Sacramento District will further streamline the CWA 404 regulatory review process by requesting the USFWS to consult once programmatically for all SSHCP covered activities that require a CWA 404 permit, eliminating the need for individual project-by-project ESA 7 consultations. Furthermore, the Sacramento District will request programmatic water quality certification under CWA 401 from the Central Valley Regional Water Quality Control Board for all activities under the CWA 404 permit strategy. This will eliminate the need for permit applicants to apply individually for CWA 401 certification. Finally, to comply with NHPA 106, the Sacramento District will seek to develop a programmatic agreement with the California State Historic Preservation Officer, following coordination with tribes and others, for the CWA 404 permit strategy.

CWA 404 Permitting Strategy

The Sacramento District has developed a multi-tiered approach to CWA 404 permitting that will address activities which involve discharges of dredged or fill material into waters of the U.S. covered by the USFWS-approved SSHCP. This strategy consists of the use of:

- A programmatic general permit (PGP) founded on a local aquatic resources protection program to be implemented through local aquatic resource ordinances, and designed to reduce duplication with that program, for activities with minimal individual and cumulative effects on the aquatic environment;

- A procedure for issuing Letters of Permission (LOPs) for activities with more than minimal but less than significant effects on the human environment, including aquatic resources; and

- An abbreviated process for issuing standard permits (SPs) for other activities consistent with the SSHCP that may have a significant impact on the human environment, and require the preparation of an EIS under NEPA.

PGP

Based on the SSHCP and local aquatic resource ordinances (Sacramento County, City of Galt, City of Rancho Cordova and SSHCP Implementing Entity) that implement a locally-based Aquatic Resources Program (ARP), the Sacramento District will establish a PGP for covered activities that have minimal impacts on the aquatic environment. The PGP is premised on the ordinances resulting in the same or better level of protection to waters of the U.S. as currently in place under CWA 404. The PGP includes

limits and thresholds that exceed those found in many of the Nationwide Permits, such as an upper threshold for most projects of 2 acres instead of 0.5 acre. The PGP will not impose additional requirements or conditions on individual activities for avoiding, minimizing, or compensating for the loss of aquatic resources beyond those in the SSHCP, ARP and ordinances. The Corps will rely on the agencies responsible for administering the ARP/ordinances to regularly report to the Sacramento District on use of the ordinances and coverage under the PGP, not requiring a project-by-project notification or review process, thus eliminating to the maximum extent possible the Sacramento District's review of activities with minimal impacts on waters of the U.S. The PGP will result in CWA 404 authorization in under 30 days. The process for the Corps to establish the PGP follows the standard permit process, which requires a public notice. The PGP will be addressed in the Sacramento District's ROD prepared for the SSHCP EIS. The PGP will be effective once the local aquatic resources ordinances are approved.

The PGP will not impose additional requirements or conditions on individual activities for avoiding, minimizing, or compensating for the loss of aquatic resources.

LOP Procedure

For covered activities found to be consistent with the SSHCP requirements which would have more than minimal impacts to aquatic resources but less than significant impacts on the human environment under NEPA, the Sacramento District will institute an procedure for issuing LOPs under CWA 404. For purposes of the permit strategy, activities that are determined to not require an EIS will be eligible for authorization under the LOP procedure. As such, the procedure will not have a specific limitations or thresholds. The LOP procedure will streamline the standard permit process by eliminating the need for a public notice and only require the preparation of a simplified decision document that tiers from the SSHCP EIS. Most on-site avoidance and minimization requirements will be satisfied when proposed activities are designed to comply with all applicable avoidance and minimization measures contained in the SSHCP and ARP. As a type of individual permit, the LOP procedure will require evaluation of on-site avoidance and minimization in compliance with CWA 404, including USEPA's 404(b)(1) Guidelines. For example, the USACE may require evaluation of alternatives to avoid and minimize effects to waters of the U.S. within and adjacent to streams. This may result in minor adjustments to features such as stream setback width requirements imposed by the SSHCP, in an area of a project site containing a wetland adjacent to the stream setback. Like the other types of CWA 404 permits in the Sacramento District's permit strategy, compensatory mitigation requirements will be the same as those in the SSHCP. The goal is to issue LOPs in 60 days or less, assuming compliance (programmatic or otherwise) with other laws is in place.

The LOP procedure will rely on the SSHCP to address avoidance, minimization, and compensatory mitigation for impacts to aquatic resources.

The process for establishing the LOP procedure requires the development of a list of categories or activities proposed for authorization (which consists of the SSHCP covered activity categories) through coordination with federal, state and local agencies, a public notice, and a 401 WQC issued or waived on a generic or individual basis. The decision to implement the LOP procedures will be addressed in the Sacramento District's ROD.

SP Abbreviated Process

A small number of SSHCP covered activities requiring CWA 404 will not fall under the PGP or LOP procedure and will require a SP. These activities are those that may have a significant impact on the human environment and require the preparation of an EIS under NEPA. If the Sacramento District serves as the federal lead agency for an activity under NEPA, the EIS requirement would be determined on a case-by-case basis upon receipt of a CWA 404 permit application by the Corps, consistent with the CWA 404 implementing regulations for NEPA (33 CFR Part 325, Appendix B). If the Corps is a cooperating agency to a federal lead agency who has determined an EIS is required under NEPA, the SP abbreviated process would apply if the Corps determines potential significant individual and/or cumulative impacts to the human environment could occur as a result of the proposed activities.

The extent of analysis in the project EIS will be reduced by tiering from the SSHCP EIS, alternatives will be limited to the project site because avoidance has been addressed at the regional level, and compensatory mitigation requirements will align with those of the SSHCP.

Even for activities that require a SP, the process and amount of time it takes to reach a permit decision can be compressed significantly by relying on the SSHCP. For instance, the extent of analysis in the project EIS will be lessened by tiering from the SSHCP EIS. Similar to the LOP procedure, most on-site avoidance and minimization requirements will be satisfied when proposed activities are designed to comply with all applicable avoidance and minimization measures contained in the SSHCP and ARP. The primary additional evaluation necessary for the SP process is an alternatives analysis required for compliance with USEPA's 404(b)(1) Guidelines. This will be limited to just the project site ("on-site alternatives"), because avoidance and minimization assessment that would normally be done via evaluation of off-site alternatives as part of a typical SP process has already been addressed at the regional level. Please refer to the LOP procedure, above, for an example of how minor adjustments in project design may be sought to support compliance with avoidance and minimization requirements. Compensatory mitigation requirements will align with those of the SSHCP, as described above. Time may further be shortened through the preparation of a joint EIS/EIRs for projects (the Corps' preference). In addition, the Corps will pursue programmatic compliance with ESA, NHPA 106 and CWA 401 to provide for greater assurances and further streamline the process. With reliance on the SSHCP EIS and programmatic compliance with related laws, the Corps expects to complete SP decisions for activities under the SSHCP within six to nine months.

Activities not Covered by the SSHCP

Activities involving a discharge of fill material into waters of the U.S. that are not covered under the SSHCP would be subject to the normal Corps' regulatory permit processes.

Next Steps

The Sacramento District's proposed CWA 404 permit strategy was provided in the Draft EIS for the SSHCP published in June 2017. Following public input on the Draft EIS, coordination with the Plan Partners, resource agencies and others, and review of any new information that becomes available, the Sacramento District's CWA 404 permit strategy and final draft permit instruments were updated and included for public review in the Final EIS for the SSHCP. With adoption of the EIS, the Sacramento District will complete its ROD, issue final permit instruments, finalize establishment of the SSHCP ILF Program, and implement the CWA 404 permit strategy.

EIS/EIR APPENDIX C-2

Draft Programmatic General Permit

MINIMAL IMPACT COVERED ACTIVITIES UNDER THE SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

EFFECTIVE:
EXPIRES: (*5 years from effective date*)

The U.S. Army Corps of Engineers, Sacramento District (Corps), hereby issues a programmatic general permit (PGP) for certain covered activities under the South Sacramento Habitat Conservation Plan that result in the discharge of dredged and/or fill material into waters of the United States (U.S.) resulting in no more than minimal individual and cumulative impacts on aquatic resources, and have been authorized by a local Aquatic Resource Impact Permit pursuant to local Aquatic Resource Protection (ARP) ordinances, implemented by SSHCP "Land Use Authority Permittees" (SSHCP LUAPs) or the SSHCP Implementing Entity (SSHCP IE). The ARP ordinances are associated with, and refer directly to, the SSHCP and an associated locally-based Aquatic Resources Program.

An activity is verified under the PGP when a SSHCP LUAP or the SSHCP IE approves a local Aquatic Resource Impact Permit, in compliance with the [*INSERT FINAL DATE*] SSHCP Aquatic Resources Program, a local ARP ordinance and all applicable terms and conditions of the SSHCP.

ISSUING OFFICE: U.S. Army Corps of Engineers, Sacramento District

ACTION ID: SPK-1995-00386

AUTHORITY: Section 404 of the Clean Water Act (CWA 404)

LOCATION: The South Sacramento SSHCP Plan Area encompasses approximately 317,655 acres within Sacramento County (*Figure 1 [showing SSHCP Plan Area; figure to be developed*], attached). The Plan Area includes the City of Galt and the City of Galt's sphere of influence, and the portion of the City of Rancho Cordova that is located south of U.S. Highway 50. The geographical boundaries of the Plan Area are U.S. Highway 50 and White Rock Road to the north, the Sacramento River levee and County Road J11 (Walnut Grove-Thornton Road) to the west, the Sacramento County line with El Dorado and Amador Counties to the east, and with the San Joaquin County to the south.

PURPOSE: This PGP is intended to minimize duplication between the SSHCP LUAPs' and SSHCP IE's local ARP and the Corps' Regulatory Program, for authorization of SSHCP covered activities subject to CWA 404 that are substantially similar in nature, and would result in minimal individual and cumulative impacts on the aquatic environment. The PGP is premised on local ARP ordinances, resulting in the same or better level of protection of waters of the U.S. as currently exists under CWA 404. Subject to certain exclusions and conditions, the PGP eliminates the need for project applicants to seek separate review from the Corps for many activities that result in minimal impacts to waters of the U.S., when such activities are authorized by a SSHCP LUAP or SSHCP IE in compliance with the SSHCP Aquatic Resources Program, under a local ARP ordinance. In addition to reducing duplication with the SSHCP Aquatic Resources Program and local ARP ordinances, the PGP is designed to

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expedite review of certain covered activities through other programmatic elements, such as compliance with Section 7 of the federal Endangered Species Act (ESA) and Section 106 of the National Historic Preservation Act (NHPA). The PGP will increase certainty, reduce time, and improve efficiency for project applicants through synergies with processes implemented by local jurisdictions, such as those associated with land use entitlements, while protecting aquatic resources, including waters of the U.S.

BACKGROUND: The SSHCP is a regional approach to address issues related to planned development and species habitat conservation. The SSHCP provides coverage for twenty-eight species of plants and wildlife, including ten that are state and/or federally-listed as threatened or endangered. The Plan Permittees consist of Sacramento County, the City of Galt, the City of Rancho Cordova, the Sacramento County Water Agency, Sacramento Regional County Sanitation District, the Southeast Connector Joint Powers Authority, and the SSHCP IE. The U.S. Fish and Wildlife Service's Sacramento Field Office (USFWS) [*has approved*] the SSHCP through a species incidental take permit (ITP) issued to the SSHCP's Plan Permittees under Section 10 of the ESA.

ACTIVITIES COVERED: This PGP applies only to SSHCP covered activities that are substantially similar in nature, would result in minimal individual and cumulative impacts on the aquatic environment, and have been authorized under the local Aquatic Resources Program. SSHCP covered activities are described briefly below and in greater detail in Chapter 5 of the SSHCP.

1. **Urban Development in the UDA:** Activities associated with the construction and maintenance of urban development projects and associated facilities/activities, including but not limited to structures (residential, commercial, industrial), parks/recreation facilities, water supply facilities, flood control and stormwater management, utilities (e.g., electric), solid waste management, wastewater, transportation and stream channel modification.

2. **Mining in the UDA:** Activities associated with surface extraction of rock or mineral resources, construction of associated infrastructure (e.g., buildings and facilities including surface mining pits, processing sites, conveyors, access roads and detention basins), and reclamation of previously mined land in accordance with the applicable federal and state laws.

3. **Rural Transportation Projects:** Activities associated with transportation projects outside of the UDA that are approved by the Sacramento County's 2030 General Plan, inclusive of construction, improvement and operation-related maintenance. For example, road widening, realignment and interchange improvement. Chapter 5 of the SSHCP describes specific rural transportation projects that fit into this category (e.g., widening of nine segments of arterial roads).

4. **Recycled Water Projects:** Activities associated with construction and maintenance of facilities associated with two specific recycled water projects; one that would serve the existing Bartley-Cavanaugh Golf Course, and the other known as the South Sacramento County Agriculture and Habitat Lands Recycled Water Project (South County Agricultural Program).

5. **Covered Activities in Preserve Setbacks in the UDA:** Activities associated with construction and maintenance of permeable and semi-permeable trails, bio-retention swales, fencing, firebreaks, benches, shade structures, shade trees, trash receptacles, interpretive signs and kiosks, outdoor lighting and livestock access facilities (e.g., access points) for livestock utilized pursuant to preserve management plans.

6. **Covered Activities in Stream Setbacks in the UDA:** Activities associated with construction and maintenance of permeable and semi-permeable trails, bio-retention swales, crossings perpendicular to streams (e.g., new roads, bike or pedestrian trails and utility lines), stream bank stabilization projects, fencing, firebreaks, benches, shade structures, shade trees, interpretive signs and kiosks, riparian habitat re-establishment or establishment, outfalls, flood control structures and stormwater management.

7. **SSHCP Preserve System Covered Activities:** Activities associated with implementation of the SSHCP Conservation Strategy, including preserve management, monitoring, habitat (including aquatic) enhancement, re-establishment establishment, "low-impact" nature trails, removal or breeching of farm levees, research activities (e.g., species surveys), livestock water supply, groundwater monitoring and extraction wells (specific to Kiefer Landfill), detention basins, and maintenance of existing utility facilities within SSHCP preserves.

8. **Covered Activities in the Laguna Creek Wildlife Corridor of the SSHCP Preserve System:** Activities associated with construction and maintenance of permeable and semi-permeable trails, benches, trash receptacles, bio-retention swales, fencing, shade structures, shade trees, crossings perpendicular to streams (e.g., new roads, bike or pedestrian trails and utility lines), stream bank stabilization projects, interpretive signs and kiosks, riparian habitat re-establishment and establishment, outfalls, flood control structures and stormwater management.

EXCLUSIONS:

1. This PGP may not be used to authorize discharges of dredged and/or fill material into waters of the U.S. for activities that do not require authorization from a SSHCP LUAP or SSHCP IE pursuant to a local ARP ordinance.

2. After-the-fact authorizations: This PGP may not be used to authorize activities that resulted in the discharge of dredged or fill material into waters of the U.S. without Department of the Army (DA) authorization.

TERMS OF AUTHORIZATION:

1. Activity Completion: Activities authorized by the Corps under this PGP may be conducted until the expiration date of the PGP, or the expiration date of the local Aquatic Resource Impact Permit issued by a SSHCP LUAP or SSHCP IE, whichever occurs sooner.

2. Applying for PGP Authorization: Prior to commencing a proposed activity, project applicants seeking authorization under this PGP shall notify the applicable SSHCP LUAP or SSHCP IE as required by the Aquatic Resources Program and local ARP ordinances, and in accordance with PGP general condition number 13 (*Notification*).

3. Compliance with SSHCP Conditions: Activities to be authorized under this PGP must be covered activities as identified above and in Chapter 5 of the SSHCP, and must comply with any applicable terms and conditions contained in the SSHCP. Project applicants must receive written concurrence from a SSHCP LUAP of SSHCP IE that the proposed project is eligible for coverage under the SSHCP. Compliance with the SSHCP requires project applicants to implement the applicable and

appropriate avoidance and minimization measures contained in Chapter 5 of the SSHCP, and other applicable terms and conditions as contained in the SSHCP.

4. Discretionary Authority: The Corps has the discretion to suspend, modify, or revoke authorizations under this PGP. This discretionary authority may be used by the Corps to further condition or restrict the applicability of the PGP for cases in which it has concerns associated with the Clean Water Act Section 404(b)(1) Guidelines, or regarding any factor of the public interest. Should the Corps determine that a proposed activity may have more than minimal individual or cumulative adverse impacts to waters of the U.S. or otherwise be contrary to the public interest, the Corps will modify the authorization to reduce or eliminate those adverse effects, or notify the project applicant that the proposed activity is not authorized by the PGP and provide instructions on how to apply for authorization under another type of DA permit. Activities not meeting the terms and conditions of this permit may be authorized through another type of permit from the Corps, such as a Nationwide Permit, , Regional General Permit, Letter of Permission or Standard Permit. The Corps will determine on a case-by-case basis, as needed, whether an activity has a more than minimal impact, individually or cumulatively, on the aquatic environment or may be contrary to the public interest. The Corps may restore authorization under the PGP at any time it determines the reason for asserting discretionary authority has been resolved or satisfied by a condition, project modification, or new information. The Corps may also use its discretionary authority to modify, suspend, or revoke the PGP at any time.

5. Avoidance and Minimization: Impacts to waters of the U.S. shall be avoided and minimized to the maximum extent practicable. For purposes of the PGP, notwithstanding the Corps' discretionary authority described above, this term shall be considered satisfied when project applicants have designed and implemented activities to comply with all applicable avoidance and minimization measures contained in both Chapter 5 of the SSHCP and the applicable ARP ordinance.

6. Impact Thresholds for Losses of Waters of the U.S.: Loss of waters of the U.S. shall be determined using the definition in Section F of the January 6, 2017, Federal Register Notice for *Issuance and Reissuance of Nationwide Permits; Final Rule* (82 FR 1860), which can be found at: http://www.usace.army.mil/Portals/2/docs/civilworks/nwp/2017/nwp2017_final_rule_FR_06jan2017.pdf?ver=2017-01-06-092409-457

a. Except for as specified in b – c below, the loss of waters of the U.S. (including wetlands) resulting from authorization of a single and complete project under this PGP shall not exceed a total of 2.0 acres, and/or a total of 500 linear feet of perennial, intermittent, or third or higher order of ephemeral streams, and/or a total of 1,000 linear feet of irrigation or drainage ditch (provided the irrigation or drainage ditch is not a relocated or channelized stream, as verified by the Corps). The acreage of loss of streambed for streams and/or ditches shall be included in the acreage threshold for loss of waters of the U.S.

b. The loss of vernal pool waters of the U.S., as verified in writing by the Corps, in the Mather Core Recovery Area resulting from authorization of a single and complete project under this PGP shall not exceed 1.5 acres.

c. The cumulative loss of waters of the U.S. authorized under this PGP shall not exceed 120 acres of waters of the U.S., including wetlands, within the Plan Area. Additional restrictions are listed in the General Conditions, below.

7. Single and Complete: The activity must be a single and complete project as defined in the Section F of the January 6, 2017, Federal Register Notice for *Issuance and Reissuance of Nationwide Permits; Final Rule* (82 FR 1860), which can be found at: http://www.usace.army.mil/Portals/2/docs/civilworks/nwp/2017/nwp2017_final_rule_FR_06jan2017.pdf?ver=2017-01-06-092409-457.

8. Section 401 Water Quality Certification: In order for authorization to be valid under this PGP, an approved Section 401 Water Quality Certification (WQC) or waiver thereof is required to be obtained and evidence thereof in possession by the applicable SSHCP LUAP or SSHCP IE, prior to the commencement of activities authorized by this PGP (see General Condition 10 [*Water Quality Certification*]).

9. Reporting Requirements for Local Implementing Entities: Each of the four implementing entities of the local ARP ordinances (the SSHCP LUAPs and the SSHCP IE) shall submit reports to the Corps documenting usage of the PGP. Reporting will include the activity name, type of SSHCP covered activity, acreage and/or linear feet of permanent and temporary discharges of dredged and/or fill material into waters of the U.S. by aquatic resource type, acreage and/or linear feet of loss of waters of the U.S. by aquatic resource type, and evidence of the project applicant's fulfillment of CWA 404 compensatory mitigation requirements. Reporting shall be provided on a quarterly basis for Year 1, biannually for Year 2, and annually for Years 3-to-5 of this PGP. For this PGP to be applicable, a memorandum of understanding between the Corps and each LUAP or IE will need to be executed to record processing, tracking, and reporting of SSHCP covered activities.

GENERAL CONDITIONS:

1. Compensatory Mitigation: Compensatory mitigation for impacts to waters of the U.S. shall be accomplished at the ratios specified in the *Compensatory Mitigation Standards* specified in the local ARP ordinances (which mirror requirements contained the SSHCP), and shall be accomplished by payment into a Corps-approved SSHCP in-lieu fee (ILF) program.

2. Compliance Inspections: The project applicant must allow representatives from the Corps to inspect the authorized activity at any time deemed necessary to ensure that the activity is being, or has been, accomplished in accordance with the terms and conditions of the permit. The Corps will notify the project applicant at least 48 hours advance of an inspection.

3. Threatened and Endangered Species: No activity is authorized under this PGP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal ESA. Activities authorized under this PGP must comply with the mandatory terms and conditions of the USFWS's [programmatic Biological Opinion (BO) for this PGP] (USFWS #___, dated ___) (copy [to be] attached). The BO contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" authorization under this PGP. Authorization under this PGP is conditional upon your compliance with all of the mandatory terms and conditions of the Biological Opinion. Failure to comply with the terms and conditions of the Biological Opinion would constitute non-compliance with the PGP. The USFWS is the appropriate authority to determine compliance with the terms and conditions of the Biological Opinion, and with the ESA. The project applicant must comply with all applicable conditions of this Biological Opinion, including those ascribed to the Corps.

4. Historic Properties: No activity is authorized under the PGP if the activity may affect historic properties listed, or eligible for listing, in the National Register of Historic Places, until the requirements of Section 106 of the National Historic Preservation Act (NHPA), as amended, have been satisfied. If NHPA compliance is not addressed programmatically, e.g., by a Programmatic Agreement (PA), project applicants must notify the Corps if the activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, including previously unidentified historic properties. The notification shall consist of the application identified in General Condition 5, and two hard copies and one electronic copy of a cultural resources report meeting the Corps Guidelines for Compliance with Section 106 of the National Historic Preservation Act of 1966 (http://www.spk.usace.army.mil/Portals/12/documents/regulatory/sec-106-tribal/FINAL_2014-03-24_Section-106-Guidelines.pdf). The Corps will consult with the State Historic Preservation Officer (SHPO), as appropriate, following the policy and procedural standards of 33 CFR Part 325 Appendix C.

5. Notification: The prospective project applicant shall submit an application to the applicable SSHCP LUAP or SSHCP IE, in accordance with the procedures specified in the SSHCP Aquatic Resources Program and local ARP ordinances. No notification is required to be made to the Corps, except as provided by General Condition 4.

6. Permit Transfer: If the property associated with this permit is sold, the project applicant shall transfer the permit verification to the new owner by submitting a letter to the applicable SSHCP LUAP or SSHCP IE, with a copy provided to the Corps, to validate the transfer. A copy of the local Aquatic Resource Impact Permit authorization issued by the applicable SSHCP or SSHCP IE must be attached to the letter, and the letter must contain the name and address of the transferee, as well as the following statement and signature of the transferee

> When the structures or work authorized by this programmatic general permit (PGP) are still in existence at the time the property is transferred, the terms and conditions of this PGP, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this PGP and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.
>
> _____
> (Transferee)
>
> _____
> (Date)

7. Wetland and Stream Setbacks: Project applicants shall establish wetland and stream setback standards consistent with the minimum standards as described in the SSHCP Aquatic Resources Program and local ARP ordinances (mirroring requirements contained the SSHCP). Associated terms of the local ARP ordinances concerning setbacks, including (but not limited to) land use, allowable uses within setbacks, exemptions, and waivers shall apply as described in the SSHCP Aquatic Resources Program and applicable local ordinance. These terms shall meet or exceed all applicable standards and terms contained within Chapter 5 of the SSHCP.

8. Tribal Rights: No activity or its operation shall impair reserved Tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

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9. Unanticipated Discovery: If the project applicant discovers any previously unknown historic, cultural or archeological remains and/or artifacts while accomplishing the activity authorized by this PGP, the project applicant shall immediately notify the Corps of what has been found, and to the maximum extent practicable, shall avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. Notification to the Corps shall include a copy of the local Aquatic Resource Impact Permit issued by the applicable SSHCP LUAP or SSHCP IE. The Corps will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

10. Water Quality Certification: Water Quality Certification (WQC), or waiver thereof, under Section 401 of the Clean Water Act is required for activities to be authorized by this PGP. The project applicant shall comply with the terms and conditions of any individual or programmatic WQC provided by the State Water Resources Control Board and/or Central Valley Regional Water Quality Control Board.

FURTHER INFORMATION:

1. Congressional Authorities: Section 404 of the Clean Water Act (33 U.S.C. 1344)

2. Limits of this authorization:

a. The Corps has authority to determine if an activity complies with the terms and conditions of the PGP.

b. This permit does not obviate the need to obtain other federal, state, or local authorizations required by law.

c. This permit does not grant any property rights or exclusive privileges.

d. This permit does not authorize any injury to the property or rights of others.

e. This permit does not authorize interference with any existing or proposed federal projects.

3. Limits of Federal Liability: In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

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e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of the Corps that issuance of this PGP is not contrary to the public interest was made in reliance on the information provided by the SSHCP Plan Permittees.

5. Reevaluation of Permit Decision: The Corps may reevaluate its decision on this PGP at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. The project applicant fails to comply with the terms and conditions of this permit.

b. The information provided by the project applicant in support of a permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which the Corps did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5.

PERMIT DURATION: This PGP is valid for five (5) years from the date of issuance. It will expire on [Day, Month, 20XX]. At least sixty (60) calendar days prior to expiration, the Corps will issue a public notice, with an opportunity for public comment, describing the reasons for reissuing the PGP for another five years with or without modification, or not reissuing the PGP. If the Corps has not reissued the PGP by the expiration date, the PGP will no longer be valid. This PGP may also be modified, suspended, or revoked by the Corps at any time deemed necessary. In such instance, the Corps will issue a public notice concerning the proposed action.

CONTACTS AND ADDITIONAL INFORMATION: For additional information about this PGP, please contact the U.S. Army Corps of Engineers, Sacramento District.

This permit becomes effective when the federal official, designated to act for the Secretary of the Army has signed below.

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_____ _____

[Name] [Date]
Chief, Regulatory Division
Sacramento District

EIS/EIR APPENDIX C-3

Draft Letter of Permission Procedure

LETTER OF PERMISSION PROCEDURES FOR COVERED ACTIVITIES UNDER THE SOUTH SACRAMENTO HABITAT CONSERVATION PLAN WITH LESS THAN SIGNIFICANT IMPACTS ON THE HUMAN ENVIRONMENT

DATE: *[Insert Date of Issuance]*

ACTION ID: SPK-1995-00386

AUTHORITY: 33 CFR 325.2(e)(1)(ii)

LOCATION: The South Sacramento Habitat Conservation Plan (SSHCP) Plan Area encompasses approximately 317,655 acres in southern Sacramento County (*Figure 1 [showing SSHCP Plan Area; figure to be developed*], attached). The Plan Area includes the City of Galt, including its sphere of influence, and the area of the City of Rancho Cordova located south of U.S. Highway 50. The geographical boundaries of the Plan Area are U.S. Highway 50 and White Rock Road to the north, the Sacramento River levee and County Road J11 (Walnut Grove-Thornton Road) to the west, the Sacramento County line with El Dorado and Amador Counties to the east, and with the San Joaquin County to the south.

PURPOSE: The U.S. Army Corps of Engineers (Corps), Sacramento District has established this Letter of Permission (LOP) procedure to efficiently authorize SSCHP covered activities which involve discharges of dredged or fill material into waters of the United States (U.S.) under Section 404 of the Clean Water Act (CWA 404) with more than minimal on the aquatic environment but less than significant impacts on the human environment under the National Environmental Policy Act.

The SSHCP LOP Procedure is an optional abbreviated process for issuing an individual permit, available to all applicants for Department of the Army (DA) permits for SSHCP covered activities meeting the criteria and conditions described in this notice. If the proposed activity does not meet LOP criteria or the applicant chooses not to use this process, the activity may be evaluated under a different permit type or procedure.

BACKGROUND: In accordance with Title 33 of the Code of Federal Regulations (CFR) Part 325, district engineers are authorized to use alternative procedures to authorize activities under the Corps Regulatory Program. LOPs are a type of individual permit that is issued through an abbreviated process which includes coordination with federal and state fish and wildlife agencies and a public interest evaluation, but without publishing an individual public notice.

The SSHCP provides coverage for twenty-eight species of plants and wildlife, including ten that are state and/or federally-listed as threatened or endangered. The SSHCP is a regional approach to address issues related to planned development and species habitat conservation. The U.S. Fish and Wildlife Service's Sacramento Field Office (USFWS) [*has approved*] the SSHCP through a species

incidental take permit (ITP) issued to the SSHCP's Plan Permittees under Section 10 of the ESA. The Plan Permittees have additionally developed a SSHCP Aquatic Resources Program (ARP), complementary to the SSHCP, with a locally-based permit program for activities resulting in no more than minimal individual and cumulative impacts on aquatic resources.

PROPOSED CATEGORIES OF ACTIVITIES: This LOP procedure applies only to SSHCP covered activities that have been authorized by a SSHCP "Land Use Authority Permittees" (SSHCP LUAPs) or the SSHCP Implementing Entity (SSHCP IE), consistent with the SSHCP and locally-based ARP. SSHCP covered activities are described briefly below, and in greater detail in the SSHCP.

Activities to be authorized under an LOP following the procedure described herein must be SSHCP covered activities. Applicants must receive a consistency determination from a SSHCP LUAP of SSHCP IE that the proposed project is a covered activity under the SSHCP. Compliance with the SSHCP requires applicants to implement applicable and appropriate avoidance and minimization measures contained in Chapter 5 of the SSHCP, and other applicable terms and conditions as contained in the SSHCP.

An LOP will be issued only for those activities which meet all of the procedures and criteria identified in this notice, including the general conditions, and which do not result in a potentially significant impact(s) on the human environment. The Corps reserves the use of its discretionary authority to determine that an activity may be authorized under an LOP, to add special conditions to LOP authorizations, or to determine that an activity may not be authorized by a LOP and will instead require authorization under another permit type.

For a SSHCP covered activity to be authorized under an LOP following this procedure, impacts to waters of the U.S. shall be avoided and minimized to the maximum extent practicable. All applicable avoidance and minimization measures contained in Chapter 5 of the SSHCP and the ARP shall be required, resulting in fulfillment of most on-site avoidance and minimization requirements necessary to comply with CWA 404 requirements. Evaluation of project-level, on-site avoidance and minimization opportunities will be assessed on a case-specific basis. For example, the USACE may require evaluation of alternatives to avoid and minimize effects to waters of the U.S. within and adjacent to streams. This may result in minor adjustments to features such as stream setback width requirements imposed by the SSHCP in an area of a project site containing a wetland adjacent to the stream setback.

To qualify for a LOP under this procedure; activities must meet the following criteria:

1. The proposed activity does not result in a potentially significant impact(s) on the human environment that requires preparation of an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA).

2. Compensatory mitigation for impacts to waters of the U.S. shall be accomplished at the ratios specified in the SSHCP, and shall be accomplished by payment into a Corps-approved SSHCP in-lieu fee (ILF) program.

Covered Activities under the SSHCP: The following SSHCP covered activities, described in greater detail in Chapter 5 of the SSHCP, are applicable to this LOP procedure.

1. **Urban Development in the UDA:** Activities associated with the construction and maintenance of urban development projects and associated facilities/activities, including but not limited to structures (residential, commercial, industrial), parks/recreation facilities, water supply facilities, flood control and stormwater management, utilities (e.g., electric), solid waste management, wastewater, transportation and stream channel modification.

2. **Mining in the UDA:** Activities associated with surface extraction of rock or mineral resources, construction of associated infrastructure (e.g., buildings and facilities including surface mining pits, processing sites, conveyors, access roads and detention basins), and reclamation of previously mined land in accordance with the applicable federal and state laws.

3. **Rural Transportation Projects:** Activities associated with transportation projects outside of the UDA that are approved by the Sacramento County's 2030 General Plan, inclusive of construction, improvement and operation-related maintenance. For example, road widening, realignment and interchange improvement. Chapter 5 of the SSHCP describes specific rural transportation projects that fit into this category (e.g., widening of nine segments of arterial roads).

4. **Recycled Water Projects:** Activities associated with construction and maintenance of facilities associated with two specific recycled water projects; one that would serve the existing Bartley-Cavanaugh Golf Course, and the other known as the South Sacramento County Agriculture and Habitat Lands Recycled Water Project (South County Agricultural Program).

5. **Covered Activities in Preserve Setbacks in the UDA:** Activities associated with construction and maintenance of permeable and semi-permeable trails, bio-retention swales, fencing, firebreaks, benches, shade structures, shade trees, trash receptacles, interpretive signs and kiosks, outdoor lighting and livestock access facilities (e.g., access points) for livestock utilized pursuant to preserve management plans.

6. **Covered Activities in Stream Setbacks in the UDA:** Activities associated with construction and maintenance of permeable and semi-permeable trails, bio-retention swales, crossings perpendicular to streams (e.g., new roads, bike or pedestrian trails and utility lines), stream bank stabilization projects, fencing, firebreaks, benches, shade structures, shade trees, interpretive signs and kiosks, riparian habitat re-establishment or establishment, outfalls, flood control structures and stormwater management.

7. **SSHCP Preserve System Covered Activities:** Activities associated with implementation of the SSHCP Conservation Strategy, including preserve management, monitoring, habitat (including aquatic) enhancement, re-establishment establishment, "low-impact" nature trails, removal or breeching of farm levees, research activities (e.g., species surveys), livestock water supply, groundwater monitoring and extraction wells (specific to Kiefer Landfill), detention basins, and maintenance of existing utility facilities within SSHCP preserves.

8. **Covered Activities in the Laguna Creek Wildlife Corridor of the SSHCP Preserve System:** Activities associated with construction and maintenance of permeable and semi-permeable trails, benches, trash receptacles, bio-retention swales, fencing, shade structures, shade trees, crossings perpendicular to streams (e.g., new roads, bike or pedestrian trails and utility lines), stream bank stabilization projects, interpretive signs and kiosks, riparian habitat re-establishment and establishment, outfalls, flood control structures and stormwater management.

EXCLUSIONS:

1. The LOP procedure does not apply to any activities in waters of the U.S. that are not considered covered activities under the SSHCP.

2. The LOP procedure does not apply to any activities in waters of the U.S. that have a potential to significantly impact the human environment.

LOP PROCEDURE:

1. **Before submitting an application**:

The applicant must attend a pre-application meeting with the Sacramento District. Applicants are encouraged to invite the applicable SSHCP LUAP or SSHCP IE (i.e., the anticipated reviewer of the local Aquatic Resource Impact Permit) to the pre-application meeting.

2. **Application submittal**:

To be considered for authorization by LOP, the application must include all information required for a standard permit application, pursuant to 33 CFR 325.1. The application package must be submitted to the Sacramento District in both paper and electronic form (pdf), suitable for electronic transmittal and/or posting to an FTP site, and include the following:

a. A cover letter from the applicant requesting an LOP under the SSHCP LOP procedure for the proposed activity, referencing the Sacramento District's identification number and including contact information for the applicant and their designated agents or primary points-of-contact. This must include mailing and e-mail addresses and telephone and fax numbers.

b. A completed and signed Department of the Army Engineering Form 4345.

c. A copy (hardcopy, and electronic on CD) of the Aquatic Resource Impact Permit application submitted to the SSHCP LUAP and/or SSHCP IE.

d. An aquatic resources delineation for the activity area, conducted in accordance with the Sacramento District's minimum standards for aquatic resource delineations, or information that an aquatic resources delineation has been verified and is still valid.

e. Site location map(s), including the proposed activity, clearly outlined on USGS 7.5' quad sheet drawings, with latitudes and longitudes for the site(s), name of the quad sheet(s) and directions to the site, as well as all appropriate aerial and other imagery available.

f. A complete description of the proposed activity, including all of the information identified under 33 CFR 325.1(d) "Content of application."

g. Plan and profile views of the proposed work, relative to potential or approved waters of the U.S. (e.g., wetlands and open waters below the Ordinary High Water Mark), showing areas, types and acreages of waters of the U.S. proposed to be impacted by the proposed activity. All available

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drawings must be provided and must show proposed impacts on appropriately scaled figures, in accordance with the Corps' map and drawing standards. All maps and drawings shall follow the South Pacific Division February 2016, Updated Map and Drawing Standards for the South Pacific Division Regulatory Program, or most recent update (available on the South Pacific Division website at: http://www.spd.usace.army.mil/Missions/Regulatory/PublicNoticesandReferences.aspx/), unless specifically waived by the Corps.

h. The total area (acreage and/or linear feet) and types of waters of the U.S. to be directly and/or indirectly affected by the proposed activity, the volume (in cubic yards) and type of material to be discharged into each type of aquatic resource(s), acreage and/or linear feet of loss of waters of the U.S. by aquatic resources type, a description of habitat types, including plant communities, within and surrounding the activity site, and a description of how the proposed activity would affect all of the above resources.

i. A description and graphical representation of how impacts to waters of the U.S. and associated functions (e.g., water quality and habitat) have been avoided and minimized to the maximum extent practicable on the project site. A summary of all applicable avoidance and minimization conditions proposed to be implemented, as required by the SSHCP, shall also be provided. This may be fulfilled by submitting a copy of the applicant's documentation provided to the SSHCP LUAP and/or SSHCP IE, including but not limited to the submittal of documentation to support the local permitting entity's Determination of Environmentally Equivalent or Superior Alternative (DEESA), provided these documents clearly identify avoidance and minimization measures related to waters of the U.S.

j. A description of potential indirect (secondary) and cumulative impacts to waters of the U.S. and the human environment in the watershed and vicinity of the proposed activity.

k. Documentation and record of all pre-application coordination with the Sacramento District and other agencies (as applicable), including any activity-specific comments or concerns provided by agencies, as well as the applicant's response(s) to the comments or concerns.

l. Information, in report form, concerning on-site practicable alternatives and the relative environmental impacts of those alternatives as compared to the environmental impacts of the proposed activity, in accordance with 33 CFR 325.1 (e) and 323.6 (a). The information must address compliance with the Environmental Protection Agency's 404(b)(1) Guidelines at 40 CFR part 230.

m. A statement providing the proposed compensatory mitigation for offset of unavoidable losses of waters of the U.S., indicating proposed compliance with General Condition 3, *Compensatory Mitigation*.

n. Copies of state and local approvals, pending applications or approvals, and any other evidence that the proposed activity has been or is currently being reviewed by the appropriate state and local agencies and is consistent with their land use plans and policies, particularly wetland policies, programs, ordinances and/or laws.

3. Review and Decision:

a. The Sacramento District will review the applicant's submittal for completeness within approximately fifteen (15) calendar days of receipt. If the application is incomplete, the appropriate Sacramento District staff person will notify the applicant and request the additional information necessary to complete the application for further processing.

b. If the Sacramento District determines the application is complete but the activity cannot be authorized by a LOP, the Sacramento District will notify the applicant within 15 calendar days of that determination and proceed to an alternate permitting process (General Permit or Standard Permit).

c. If the application is determined to be complete and appears to meet LOP criteria, the Sacramento District will notify the applicant that the proposed activity is being evaluated for LOP authorization. The Sacramento District will notify the applicable SSHCP LUAP and SSHCP IE, and applicable state and federal coordination agencies via e-mail of the proposed LOP for the activity, and request any comments within fifteen (15) calendar days of such notice. The Sacramento District will also request any additional information necessary to complete processing of the permit application, and, if sufficient information has been submitted, initiate any required consultation(s) with other agencies, to the extent necessary (e.g., in lieu of programmatic consultations).

d. The Sacramento District will review the comments received and, if otherwise complete (e.g., Endangered Species Act [ESA], National Historic Preservation Act [NHPA] consultations and 401 Water Quality Certification done), make a determination within 30 calendar days after the close of the comment period as to whether LOP authorization is warranted, and whether special conditions are needed. If the Sacramento District determines the activity (1) meets the criteria for LOP authorization, (2) would have a less than significant impact on aquatic resources and the human environment, (3) meets the requirements of the U.S. Environmental Protection Agency's Section 404(b)(1) Guidelines for Specification of Disposal Sites, (4) would not be contrary to the public interest, (5) is in compliance with other applicable laws (e.g. ESA, NHPA, Section 401 WQC), and (6) has been provided evidence of a consistency determination from the applicable SSHCP LUAP or SSHCP IE that the project is covered under the SSHCP, an LOP will be issued.

e. If at any time during the process the Sacramento District determines the activity may not be authorized by a LOP, Sacramento District staff will immediately notify the applicant, terminate the LOP process, and proceed to an alternate permitting process, as described in C(3)(b) above.

f. Evidence of Section 401 Water Quality Certification must be provided to the Sacramento District before any final LOP decision is made. A LOP will not be issued until and unless all necessary certifications, consultations and/or authorizations (e.g., 401 Water Quality Certification, ESA and/or NHPA) have been completed and/or issued.

g. The Sacramento District will add special conditions to LOP authorizations as necessary.

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EIS/EIR APPENDIX C-4

Abbreviated Standard Permit Process

February 2018

ABBREVIATED STANDARD PERMIT PROCESS FOR COVERED ACTIVITIES UNDER THE SOUTH SACRAMENTO HABITAT CONSERVATION PLAN WITH MORE THAN SIGNIFICANT IMPACTS ON THE HUMAN ENVIRONMENT

Background

The South Sacramento Habitat Conservation Plan (SSHCP) covers twenty-eight species of plants and wildlife, including ten that are state and/or federally-listed as threatened or endangered. The SSHCP is a regional approach to address issues related to planned development and species habitat conservation, following a comprehensive conservation strategy. Additional background information on the SSHCP and the U.S. Army Corps of Engineers (Corps) Sacramento District's long-term coordination with the U.S. Fish and Wildlife Service (USFWS), other state and federal agencies, and the SSHCP Plan Partners is provided in the document titled "CWA 404 Permit Strategy Aligned with the South Sacramento Habitat Conservation Plan" (dated February 2018, hereafter "CWA 404 Permit Strategy"). The goal of the Sacramento District's coordination "from the ground up" with development of the SSHCP is to develop and implement a "streamlined" approach to permitting under Section 404 of the Clean Water Act (CWA 404) that encompasses a number of different permit types and processes. The following provides approaches and mechanisms to be utilized in the abbreviated SP process for issuing standard permits (SP) for SSHCP covered activities.

When Would the Abbreviated Standard Permit Process Apply?

The abbreviated standard permit process will be used for the small number of SSHCP covered activities requiring authorization under CWA 404 that may significantly affect the human environment under the National Environmental Policy Act (NEPA), requiring the preparation of an Environmental Impact Statement (EIS). As a result of coordination and alignment with the SSHCP and a locally-based Aquatic Resources Program (ARP) the Sacramento District's' evaluation process for SP applications can be streamlined or "abbreviated" to produce higher quality and faster decisions.

EIS Trigger for SSHCP Abbreviated SP Process

If an EIS is required for a SSHCP covered activity, the abbreviated SP process would apply when the Corps determines an EIS is required. The determination that a proposed activity may significantly affect the human environment is based on an analysis of the direct and indirect effects of the proposed action, within the Corps' scope of analysis as defined in 33 CFR Part 325, Appendix B.

The Sacramento District recognizes that identifying the appropriate type of CWA 404 permit appropriate for processing SSHCP covered activities needing CWA 404 authorization is of paramount interest to project applicants, particularly early in project planning and design. Although a final determination of the need for an EIS can only be made by the Corps in response to receiving a complete permit application, the Sacramento District encourages project applicants to engage during the early planning stages of projects to discuss CWA 404 regulatory strategies. Following this approach, project applicants would have limited unknowns in terms of which type of SSHCP aligned CWA 404 permit is anticipated to be required.

Abbreviated Standard Permit Process

While the procedural requirements for CWA 404 SPs would follow the same process as identified by regulations found at 33 CFR Part 325, *Applications for Permits*, the anticipated timeline for completing this process would be substantially reduced as a result of streamlining. Certain SP processing components are required by regulation; examples include contents of a complete application, and public notices. A top objective of the abbreviated SP process is to address, in the most efficient way possible and with reliance on the SSHCP, including its EIS and other related documents including the ARP, the most information-intensive and time-consuming aspects of SP evaluation and streamline these to the maximum extent possible. Key processing elements of the SSHCP abbreviated SP process are described below, and summarized (with some additional procedural examples) in comparison to a typical SP process in **Table 1**.

Pre-application Meeting

The abbreviated SP process will include a required pre-application meeting between the project applicant, Corps and SSHCP Implementing Entity. As an outcome of the pre-application meeting, the Corps will provide feedback on whether it appears and EIS may be necessary, as well as guidance on alternatives the applicant may consider to avoid and minimize effects to the human environment, and reduce the likelihood of an EIS being required.

Complete Permit Application and Supplemental Information

Reducing the review time for an SP under the SSHCP will be in part achieved through the applicant's submittal of a complete Department of the Army (DA) permit application and supplemental information. The information necessary to reduce processing times includes: (1) Providing information required for a complete application as defined at 33 CFR 325, *Applications for Permits*; (2) Information to show the project is in compliance with all applicable requirements of the SSHCP; (3) Information to show the project is in compliance with the U.S. Environmental Protection Agency's (EPA) *Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (404(b)(1) Guidelines) as relates to on-site alternatives to avoid and minimize adverse effects to waters of the U.S.; (4) Information to show the project is in compliance with Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, and Section 401 of the Clean Water Act, as appropriate; and (5) A proposed plan for compensating for the loss of waters of the U.S. on the project site, consistent with the SSHCP In-Lieu Fee (ILF) Program.

Information Requirements for Aquatic Resources in SP Application's EIS

The level of information and/or extent of analysis necessary in the project EIS to comply with NEPA at the project level will be reduced as a result of tiering from the SSHCP EIS. While timelines for review required by NEPA regulations will remain the same (e.g. Draft EIS comment period of 45 days, Final EIS review period of 30 days), submittal of information necessary for a complete application and tiering from

the SSHCP EIS will substantially reduce the required preparation time of the EIS, including using applicable information regarding the direct, indirect, and cumulative effects, incorporation of applicable avoidance and minimization measures, and elimination of the evaluation of off-site alternatives.

Compliance with CWA 404 Avoidance and Minimization Requirements, Including EPA's 404(b)(1) Guidelines

Because the SSHCP EIS examines a range of reasonable HCP alternatives affecting waters of the U.S., it can serve as the basis for the Sacramento District's landscape-level evaluation of alternatives under NEPA. Similarly, the SSHCP EIS and supplemental information submitted concurrently with EIS processing to the Corps, provide the fundamental basis for the Corps' evaluation of avoidance, minimization and less damaging practicable alternatives at the regional scale. Most project-level avoidance and minimization requirements will be satisfied when proposed activities are designed to comply with all applicable avoidance and minimization measures contained in the SSHCP and ARP.

An on-site alternatives analysis will still be required, but the off-site alternatives analysis normally required for SP evaluation under EPA's 404(b)(1) Guidelines would have been addressed at the regional level in the Corps' ROD for the SSHCP EIS. Most on-site avoidance and minimization will be achieved by incorporating applicable avoidance and minimization measures from the documents noted above. The Corps will exercise its discretionary judgment, consistent with CWA 404 regulations, in evaluating avoidance and minimization of on-site impacts to waters of the U.S. This will be accomplished within the context of recognizing regional, plan-wide trade-offs in aquatic resource impacts, avoidance, minimization and compensatory mitigation, resulting in an overall enhanced quality of regional aquatic resource protection offered by the SSHCP and associated local ARP. For example, a stream setback may have opportunity to be reasonably expanded to include the outer boundary of an adjacent wetland. Assessment of avoidance and minimization opportunities is necessarily site-specific, however the Sacramento District expresses the intent to apply case-specific analysis in consideration of the SSHCP regulatory context within which the proposed action would processed toward decision-making.

Compensatory Mitigation Requirements

Compensatory mitigation requirements for unavoidable impacts to waters of the U.S. would align to the mitigation requirements contained in the SSHCP, and would be satisfied by a "one-fee" system in which the SSHCP's fees required for impacts to aquatic resources would cover both the SSHCP's requirements and the Corps' compensatory mitigation requirements, vis-à-vis a SSHCP ILF Program that would be established consistent with requirements of the Federal Mitigation Rule (33 CFR Part 332).

Compliance with Other Laws

The Corps will pursue programmatic compliance with ESA, NHPA 106 and CWA 401 to provide for greater assurances and streamline these processes. In comparison to a typical SP process, programmatic approaches to complying with these laws is anticipated to save significant amounts of time and cost to project applicants.

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Table 1. SSHCP Abbreviated Standard Permit vs. Normal Standard Permit Requirements

Requirements	SSHCP Abbreviated SP	Normal SP
Pre-application Meeting	Required	Recommended
Complete Application	Required. See 33 CFR Part 325.1(d)	Required. See 33 CFR Part 325.1(d)
Public Notice	Required. See Under 33 CFR Part 325.3	Required. See under 33 CFR Part 325.3
EIS Level of Analysis	Reduced, Due to "Tiering" from SSHCP EIS/EIR	Required. Stand-Alone, Project-Specific
Alternatives for NEPA, 404(b)(1) and Public Interest Review	Reduced, Due to "Tiering" from SSHCP EIS/EIR, and Incorporating SSHCP Avoidance/Minimization Measures	Required. Stand-Alone, Project Specific
Evaluation of Off-site Alternatives Analysis	Not Required	Required
Evaluation of On-site Alternatives Analysis	Required. See 33 CFR Part 325, Appendix B.9(5). Primarily Satisfied through Incorporation of SSHCP Avoidance/Minimization Measures; Minor Adjustments Along Preserve Boundaries may be Necessary	Required. See Under 33 CFR Part 325, Appendix B.9(5). Project-Specific Avoidance and Minimization
Applicant Information About Avoidance and Minimization for Impacts to Waters of the US	Required. Most On-site Avoidance and Minimization Requirements Satisfied by Incorporating SSHCP Avoidance/Minimization Measures; Additional Supporting Information Will be Required	Required. No Standardized Design and Construction Avoidance/Minimization Measures to Rely Upon
Compensation for Impacts to Waters of the U.S.	Required. Compensatory Mitigation Achieved through SSHCP In-Lieu Fee Program	Required. Project-specific mitigation plan subject to Corps approval. Compensatory mitigation Achieved through Mitigation Bank, Corps-Approved (Non-SSHCP) In-Lieu Fee Program, and/or Permittee-Responsible Mitigation; See 33 CFR Part 332.
Compliance with Section 7 of the Endangered Species Act (ESA)	Required. Project Covered by Programmatic Biological Opinion (BO)	Required. Project-Specific Biological Assessment, Consultation, and BO
Compliance with Section 401 of the Clean Water Act (Section 401 Water Quality Certification [WQC])	Required. Project Covered by Programmatic Section 401 Water Quality Certification (WQC)	Required. Project-Specific Section 401 WQC Application
Compliance with Section 106 of the National Historic Preservation Act (NHPA)	Required. Project Covered by Programmatic Agreement (PA)	Required. Project-Specific Information and Consultation

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BENEFITS OF THE ABBREVIATED STANDARD PERMIT PROCESS

Alignment with the SSHCP is an opportunity to streamline the standard permit process under the Corps Regulatory Program for covered actions which require the preparation of an EIS. The abbreviated SP process will reduce Corps review time by more than half. With NEPA tiering and programmatic consultations, a permit decision can be made in 6 to 9 months (excluding any delays attributable to the permit applicant). Additional reduction in processing times would also occur if reviews are conducted concurrent with local agency review, including completing a joint EIS' and Environmental Impact Report (EIR) with the local agency. As shown in **Table 1**, reduction in length of processing of SPs under the abbreviated SP process will result from:

1. A reduction in time necessary to complete a Draft and Final EIS, as a result of tiering from the SSHCP EIS.

2. A reduction in the level of information required to show compliance with EPA's Section 404(b)(1) Guidelines, which would be limited to evaluation of on-site avoidance and minimization alternatives, most of which would be satisfied by incorporating SSHCP avoidance/minimization measures. This would result in a reduction in the review time by the Corps.

3. A reduction in Corps review time for proposed compensatory mitigation, as compensatory mitigation would occur through the purchase of ILF program credits consistent with the SSHCP.

4. A reduction in processing time for Section 7 ESA compliance due to issuance of a programmatic BO by USFWS.

5. A reduction in processing time for Section 401 WQC due to issuance of a programmatic 401 WQC by the Central Valley Regional Water Quality Control Board.

6. A reduction in processing time for Section 106 of the NHPA, due to development of a PA with the California State Historic Preservation Officer.

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EIS/EIR APPENDIX D

Impact Avoidance and Minimization Measures (AMMs)

As required by the ESA (Section 10(a)(2)(A)(ii)), Fish and Game Code Section 2081, and the 2008 Mitigation Rule (USACE and USEPA 2008), the action alternatives evaluated in this EIS/EIR include measures to avoid and minimize take of Covered Species and measures to avoid and minimize impacts to aquatic resources. This appendix describes the Avoidance and Minimization Measures (AMMs) that would be included in the projects and activities implemented under the Proposed Action/Proposed Project Alternative, and implemented under the Reduced Permit Term HCP (i.e. the HCP Covered Activities). The AMMs presented in this EIS/EIR Appendix are conditions on each HCP Covered Activity. Each condition contains several AMMs that are intended to eliminate or to reduce direct or indirect effects to species habitats and to aquatic resources.

GENERAL AVOIDANCE AND MINIMIZATION MEASURES

General AMMs are designed to avoid or minimize effects of Covered Activities on natural land covers and Covered Species.

Condition 1. Avoid and Minimize Urban Development Impacts to Watershed Hydrology and Water Quality

Urban development Covered Activities may adversely alter watershed hydrology and degrade water quality. Condition 1 is designed to conserve and/or rehabilitate on-site natural creeks and streams. This condition would require project designs to include low-impact development (LID) drainage control measures and would require the implementation of BMPs during construction and during other ground disturbance. These AMMs would assure that rainwater runoff from newly developed lands would not change the pre-development hydrographs of receiving waterways, and these aquatic resources would retain most pre-development functions and services.

LID-1 (Stormwater Quality): When the size of a Covered Activity project exceeds the thresholds established by the State Water Resources Control Board (SWRCB) (see the most recent Stormwater Quality Design Manual for the Sacramento and South Placer Regions, or future SWRCB-approved design manuals applicable to the Planning Area), incorporate stormwater management into site design to satisfy the requirements outlined in the most recent Stormwater Quality Design Manual for the Sacramento and South Placer Regions. Stormwater management may include groundwater recharge (LID-2) and natural site features (LID-3).

LID-2 (Groundwater Recharge): When siting new HCP Preserves containing Riparian, Open Water, or Freshwater Marsh land cover types, the HCP Implementing Entity will prioritize locations that are suitable for groundwater recharge.

LID-3 (Natural Site Features): Incorporate preservation of a site's natural aquatic features (such as creeks and streams) into the project's design to retain natural hydrologic patterns and to retain habitat that might be used by Covered Species.

Condition 2. Avoid and Minimize Urban Development Direct and Indirect Impacts to Existing Preserved Lands and HCP Preserves

New Urban Development adjacent to existing natural lands or HCP Preserves may indirectly impact species habitat and species that use those lands. Condition 2 seeks to avoid or minimize these environmental stressors, which could n direct and indirect impacts to species habitats and aquatic resources existing preserves or the HCP Preserve System:

- Alterations to landscape hydrology from new impervious surfaces may adversely affect natural communities in the lower watershed, the ecology of preserved lands, and/or downstream aquatic resources.
- Water runoff from development or from roadways directed into preserved lands may introduce harmful substances into existing preserves and HCP Preserves. Unseasonal and/or additional water entering Preserved Lands may eliminate vernal pools and other seasonal wetlands native to the region by converting them to low-functioning perennial wetlands.
- New development adjacent to existing or HCP Preserves may alter or remove the soil's "perched aquifer" (see Appendix G), reducing or eliminating the micro-watersheds that support the natural hydrology of vernal pools within the preserve boundary. These changes may adversely affect the existing hydrologic regime of vernal pools by changing the timing, depth, and/or duration of vernal pool saturation and/or ponding, causing long-term changes to a suite of vernal pool functions. For example, changes to water chemistry could adversely affect species habitat, and although the vernal pool may remain, the environmental conditions of the pools may no longer provide habitat for vernal pool Covered Species, or provide the benefit of other wetland functions (e.g., stormwater attenuation) compared to pre-project conditions.
- Introduction or proliferation of non-native or invasive plant and wildlife species may displace native species.
- Urban landscaping in the interface of a new development and a vernal pool ecosystem Preserve often includes native or non-native trees and other plant species that are not found in California grasslands, and therefore, cannot survive in the interface without intensive irrigation and cultivation. In addition to adverse effects from artificial irrigation and landscape maintenance, adult trees may become landscape barriers that inhibit species movement and may act to isolate individual Preserves from the larger HCP Preserve System.

- Recreational use of HCP Preserves near developed areas may compact soils, eliminate vegetation, impair hydrologic functions, introduce weeds or invasive plant species, and disturb plants and wildlife.
- Introduction of light, noise, or vibrations may disrupt normal nocturnal and diurnal cycles of native species.

AMMs associated with Condition 2 must be applied to all Covered Activities implemented within the UDA that border an existing Preserve or a planned HCP Preserve.

EDGE-1 (Compatible Land Uses): To the maximum extent practicable, unban development project Covered Activities will locate compatible land uses (e.g., designated open space such as parks and ball fields, detention basins, and other land uses with less-intensive human activity) in areas immediately adjacent to existing preserves or planned HCP Preserve boundaries. The compatible land use will provide additional buffering of existing preserves or HCP Preserves from potential indirect effects of adjacent urban development. However, the soil surfaces in a compatible land use area may be re-contoured slightly, provided that the soil restrictive layer remains undamaged and most of the soil profile above the restrictive layer remains intact. The Land Use Authority Permit Applicant will determine when it is not practicable for a new project to locate a compatible land use adjacent to existing preserve or a planned HCP Preserve boundary.

EDGE-2 (Single-Loaded Streets): To the maximum extent practicable, the design of new urban development Covered Activities will locate single-loaded streets adjacent to existing preserves or planned HCP Preserves. The Land Use Authority Permit Applicant will determine when it is not practicable for a new project to locate single-loaded streets adjacent to existing preserves or planned HCP Preserves.

EDGE-3 (Preserve Setbacks): New urban development Covered Activities constructed adjacent to existing preserves or planned HCP Preserves must establish a minimum 50-foot-wide setback, measured outward from the boundary of any existing Preserve or a planned HCP Preserve. This minimum 50-foot-wide setback will function as a transition between urban development and the preserved lands, and must be managed to maintain the natural community of vegetation present in the adjacent preserved lands. As much of the setback as possible should remain in the same natural habitat as the preserved lands.

However, some recreational Covered Activities would be allowed in the Preserve Setbacks. Also, where an existing preserve or planned HCP Preserve is adjacent to an existing roadway (e.g., collectors, arterials, thoroughfares), the 50-foot

Preserve Setback will not be required, and any bicycle or pedestrian trails will be located in the road right-of-way. In addition, where a roadway Covered Activity crosses an existing preserve or planned HCP Preserve, no Preserve Setback will be required at the crossing, and any bicycle or pedestrian trail will be located in the road right-of-way.

EDGE-3a (Setback Recreational Trails): Trails are best suited outside of the setback; however, certain types of recreational trails or facilities (e.g., benches, trash receptacles, shade structures, fencing) that can be constructed with minimum ground disturbance and in compliance with EDGE-7 may be allowed within a Preserve Setback, as specified in Section 5.2.5 of the SSHCP document. Preserve Setback design must locate trails on the side nearest development, away from the Preserve boundary. Trails may be permeable or semi-permeable hiking trails or paved community trials. The maximum trail width will be 16 feet total, including 2-foot-wide shoulders. Post and cable fencing, split rail, or other open fencing will be installed adjacent to recreation trails to keep pedestrians on the trail.

EDGE-3b (Setback Firebreaks): If approved by the local authorities, the Preserve Setback trail may also be used as a firebreak. In instances where a trail cannot act as a firebreak, the firebreak will be located between the trail and the Preserve boundary (see Section 5.2.7 of the SSHCP document). Firebreaks allowed inside the setbacks must be created by methods that will not disturb the soil's restrictive layer or perched aquifer, such as mowing, minor scraping of surface vegetation, or shallow tilling, to comply with EDGE-7. Firebreak width within Preserve Setbacks is the minimum width needed to comply with applicable local codes.

EDGE-3c (Setback Shade Trees and Landscaping): To prevent potential impacts from landscaping irrigation water or from accumulation of landscaping leaf litter onto the grasslands or vernal pools of a n existing or HCP Preserve, planting of shade trees or landscaping vegetation will be limited to the area of the Preserve Setback that is located between the recreation trail and the adjacent urban development (i.e., away from the Preserve).

- Only drought-tolerant plant species will be planted. The planting pallet used for Preserve Setback landscaping will not include invasive plant species listed in the California Invasive Plant Council's (Cal-IPC) California Invasive Plant Inventory Database or listed in the Cal-IPC California Invasive Plant Watch List (see http://www.cal-ipc.org/paf/). Any shade trees planted along Preserve Setback trails will be native species that are

found in California grasslands and that can survive in the Vernal Pool Ecosystem/ Valley Grassland border without long-term irrigation or fertilization (e.g., valley oak, black oak, blue oak, oracle oak). In general, no more than 30% of any 1,000-foot-long segment of a Preserve Setback trail will have canopy cover from tree plantings (to be consistent with maximum tree densities naturally found within native California grasslands and savanna).

- Drip irrigation will be allowed for a maximum of 5 years to establish native shade trees or other native landscape vegetation planted between the recreation trail and adjacent urban development. The HCP Implementing Entity has the discretion to allow irrigation to continue past 5 years if extenuating circumstances necessitate it (e.g., during a drought) and the continuance of irrigation will not affect the Preserve. Any irrigation systems located within Preserve Setbacks will be inspected quarterly to determine if such systems are affecting soils or vegetation not part of the intended plantings. Irrigation system repairs will be completed immediately if it is determined that the irrigation system is affecting vegetation or soil moisture not part of the intended tree planting.
- If, during annual monitoring of the adjacent preserve (see Chapter 8 of the SSHCP document), adverse indirect effects (e.g., leaf litter accumulation, irrigation runoff, plant encroachment) of the Preserve Setback's planted vegetation are detected, then the HCP Implementing Entity, the HCP Preserve Manager, and the entity responsible for the Preserve Setback will identify appropriate adaptive management of the Preserve Setback tree or landscape plantings in accordance with the Preserve Setback Easement (see Section 5.2.5 and Chapter 9 of the SSHCP document).

EDGE-4 (Locate Stormwater Control Outside Preserves): Roads, sidewalks, and other impermeable surfaces of urban development Covered Activities adjacent to existing preserves or new HCP Preserves will slope away from preserved lands and Preserve Setbacks, or will intercept drainage with swales or curbs and gutters outside the Preserve Setbacks to preclude drainage from entering preserves and Preserve Setbacks. Stormwater flows must be directed away from preserved lands and Preserve Setbacks and directed into stormwater control facilities inside the development (outside Preserves and Preserve Setbacks)[1] (see EDGE-6 for exception to EDGE-4 in certain Linkage Preserves).

[1] However, detention basins are allowed in certain Linkage Preserves, consistent with the requirements of EDGE-6. At the time of SSHCP preparation, seven Linkage Preserves with drainages are planned SSHCP

EDGE-5 (Stormwater Control in Preserve Setbacks): If recreation trails are established in any Preserve Setback in compliance with EDGE-3, the trail must be sloped away from the Preserve, and rainwater leaving the trail surface must flow into an adjacent low-velocity bio-retention swale or cell to keep rainwater runoff and trail contaminants from entering the Preserve. Low-velocity bio-retention swales or cells are typically small linear features placed on one or both sides of a trail. As required by EDGE-3, trails and their adjacent bio-retention swales or cells must be located on the side of the Preserve Setback nearest development.

EDGE-6 (Detention Basins in Linkage Preserves): Because planned Linkage Preserves L1, L2, L4, L7, L8, L9, and L10 (see Section 7.5) surround natural creeks or streams that must receive stormwater from the planned adjacent urban development Covered Activities, a limited number of stormwater detention basins will be allowed on those Linkage Preserves. Detention basins within Linkage Preserves (see Section 5.2.7) will be designed and constructed with fill material to build up the perimeter of the detention basin so as not to impact the soil restrictive layer (duripan or hardpan) and functions of the soil perched aquifer. Detention basins within Linkage Preserves will capture stormwater flows and runoff, and will discharge water to the stream/creek or percolate collected water to the soil perched aquifer. Detention basin structures that collect stormwater entering the basin or convey stormwater leaving the basin must be designed to avoid and minimize effects to Covered Species habitat in the Linkage Preserve.

EDGE-7 (Hardpan/Duripan Protection): To protect the soil perched aquifer in the watersheds supporting existing vernal pool hydrology, activities that have the potential to cut into, disrupt, or remove the soil's restrictive layer (hardpan or duripan) will not occur within preserved lands or Preserve Setbacks. However, in certain circumstances, the Covered Activities (defined in Section 5.2.6 of the SSHCP document), Covered Activities in Stream Setbacks within the UDA, and Covered Activities discussed in Section 5.2.8 (Covered Activities in the Laguna Creek Wildlife Corridor of the HCP Preserve System), may result in small punctures[2] or other minor disruptions of the soil hardpan or duripan, if approved by the HCP Implementing Entity and the HCP Technical Advisory Committee according to the process described in Chapter 9 of the SSHCP document. If a Covered Activity on a Preserve or Preserve Setback results in a puncture or other disruption to the soil hardpan or duripan, the puncture will be sealed using bentonite clay or other

Preserves: L1, L2, L4, L7, L8, L9, and L10 (see Section 5.2.7 and Section 7.5). Also see project-specific measures in Section 5.5.1.

[2] Punctures may include small holes that penetrate the soil hardpan or duripan such as might occur when digging or drilling holes for the installation of fence posts, sign posts, or trees.

material that maintains the functionality of the soil's restrictive layer and associated perched aquifer.

EDGE-8 (Outdoor Lighting): All outdoor lighting in urban development Covered Activity projects will be designed to minimize light pollution into existing and planned HCP Preserves, except where a Land Use Authority Permit Applicant determines lighting is necessary for public safety or security. Minimization measures may include light fixture placement (e.g., as low to the ground as possible), lamp designs (e.g., shielding, low glare, or no lighting), directing light away from HCP Preserves, or other means to avoid or minimize light pollution. The Third-Party Project Proponent will use the best information available at the time of project design to minimize effects of light pollution on target Covered Species (e.g., western spadefoot (*Spea hammondii*) and Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*)).

EDGE-9 (Livestock Access to Preserves): urban development Covered Activity projects that include on-site HCP Preserves will include in their design an adequate number of access points and facilities for delivery and pick up of grazing animals (livestock), such that these activities will not significantly alter the Preserve's habitat and are consistent with the protection of livestock and protection of adjacent public property, and include adequate public safety measures.

EDGE-10 (Prevent Invasive Species Spread): Completed Covered Activities (including roads) will be maintained in a manner that avoids the spread of invasive species into Preserve and Open Space areas. Such maintenance measures will include the following:

- To prevent the transport of non-native invasive species onto HCP Preserves, before bringing any equipment onto an Preserve or Preserve Setback, equipment must be cleaned of mud, dirt, and plant material. Cleaning will occur in the infested area or another appropriate location as approved by a Permit Applicant.
- Mowing rotation will start in un-infested areas and move to infested areas.
- Invasive plant prevention techniques will be incorporated into maintenance plans.
- The HCP Implementing Entity will survey road shoulders, ditches, and rights-of-way that border HCP Preserves for invasive weeds or other exotic plant species. Where roadside weed infestations have reached a critical control point, the HCP Implementing Entity or Land Use Authority Permit Applicant will apply the appropriate manual, mechanical, or chemical treatment.

Condition 3. Implement Construction Best Management Practices

AMMs associated with Condition 3 must be applied to all Covered Activities.

BMP-1 (Construction Fencing): Orange construction fencing will be installed to ensure that ground disturbance does not extend beyond the allowed construction footprint (i.e., the limit of project construction plus equipment staging areas and access roads). Permit Applicants and their "Third-Party Project Proponents" implementing ground-disturbing Covered Activities will mark the outer boundary of any Preserve Setback or Stream Setback adjacent to or within the project site with orange construction fencing prior to ground disturbance. This fencing will remain in place until project completion, as identified by the Permit Applicant.

BMP-2 (Erosion Control): Permit Applicants and their Third-Party Project Proponents implementing ground-disturbing Covered Activities will install temporary control measures for sediment, stormwater, and pollutant runoff as required by the Permit Applicant to protect water quality and species habitat. Silt fencing or other appropriate sediment control device(s) will be installed downslope of any Covered Activity that disturbs soils.

Fiber rolls and seed mixtures used for erosion control will be certified as free of viable noxious weed seed. As discussed in Section 5.4.2, Covered Species Take Avoidance and Minimization Measures, erosion controls installed in or adjacent to Planning Area modeled habitat for giant gartersnake (*Thamnophis gigas*), western pond turtle (*Actinemys marmorata*), California tiger salamander (*California tiger salamander*), or western spadefoot (see Chapter 3 of the SSHCP document) must be of appropriate design and materials that will not entrap the species (e.g., not contain mesh netting). Regular monitoring and maintenance of the project's erosion control measures will be conducted until project completion to ensure effective operation of erosion control measures.

BMP-3 (Equipment Storage and Fueling): Permit Applicants and their Third-Party Project Proponents implementing ground-disturbing Covered Activities will ensure that equipment storage and staging will occur in the development footprint only (not sited in any existing on-site Preserve, planned on-site Preserve, Preserve Setback, Stream Setback, or aquatic land cover type). Fuel storage and equipment fueling will occur away from waterways, stream channels, stream banks, and other environmentally sensitive areas within the development footprint.

However, certain equipment storage and fueling activities can be allowed on HCP Preserves within habitat re-establishment/establishment sites (refer to Section

5.2.7) if no location outside of the site is available. If a Covered Activity results in a spill of fuel, hydraulic fluid, lubricants, or other petroleum products, the spill will be absorbed and waste disposed of in a manner to prevent pollutants from entering a waterway, Preserve, Preserve Setback, or Stream Setback.

BMP-4 (Erodible Materials): Permit Applicants and their Third-Party Project Proponents implementing Covered Activities must not deposit erodible materials into waterways. Vegetation clippings, brush, loose soils, or other debris material will not be stockpiled within stream channels or on adjacent banks. Erodible material must be disposed of such that it cannot enter a waterway, Preserve, Preserve Setback, Stream Setback, or aquatic land cover type. If water and sludge must be pumped from a subdrain or other structure, the material will be conveyed to a temporary settling basin to prevent sediment from entering a waterway.

BMP-5 (Dust Control): Permit Applicants and their Third-Party Project Proponents implementing ground-disturbing Covered Activities will water active construction sites regularly, if warranted, to avoid or minimize impacts from construction dust on adjacent vegetation and wildlife habitats. No surface water will be used from aquatic land covers; water will be obtained from a municipal source or existing groundwater well.

BMP-6 (Construction Lighting): Permit Applicants and their Third-Party Project Proponents implementing ground-disturbing Covered Activities will direct all temporary construction lighting (e.g., lighting used for security or nighttime equipment maintenance) away from adjacent natural habitats, and particularly Riparian and Wetland habitats and wildlife movement areas.

BMP-7 (Biological Monitor): If a Covered Activity includes ground disturbance within Covered Species modeled habitat, an approved biologist will be on site during the period of ground disturbance, and may need to be on site during other construction activities depending on the Covered Species affected. After ground-disturbing project activities are complete, the approved biologist will train an individual to act as the on-site construction monitor for the remainder of construction, with the concurrence of the Permitting Agencies. The on-site monitor will attend the training described in BMP-8. The approved biologist and the on-site monitor will have oversight over implementation of Avoidance and Minimization Measures, and will have the authority to stop activities if any of the requirements associated with those measures are not met. If the monitor requests that work be stopped, the Wildlife Agencies will be notified within one working day by email. The approved biologist and/or on-site monitor will record all observations

of listed species on California Natural Diversity Database field sheets and submit them to the California Department of Fish and Wildlife. The approved biologist or on-site monitor will be the contact source for any employee or contractor who might inadvertently kill or injure a Covered Species or who finds a dead, injured or entrapped individual. The approved biologist and on-site monitor's names and telephone numbers will be provided to the Wildlife Agencies prior to the initiation of ground-disturbing activities. Refer to species-specific measures for details on requirements for biological monitors.

BMP-8 (Training of Construction Staff): A mandatory Worker Environmental Awareness Program will be conducted by an approved biologist for all construction workers, including contractors, prior to the commencement of construction activities. The training will include how to identify Covered Species that might enter the construction site, relevant life history information and habitats, HCP and statutory requirements and the consequences of non-compliance, the boundaries of the construction area and permitted disturbance zones, litter control training (SPECIES-2), and appropriate protocols if a Covered Species is encountered. Supporting materials containing training information will be prepared and distributed by the approved biologist. When necessary, training and supporting materials will also be provided in Spanish. Upon completion of training, construction personnel will sign a form stating that they attended the training and understand all of the Avoidance and Minimization Measures (AMMs). Written documentation of the training must be submitted to the HCP Implementing Entity within 30 days of completion of the training, and the HCP Implementing Entity will provide this information to the Wildlife Agencies.

BMP-9 (Soil Compaction): After construction is complete, all temporarily disturbed areas will be restored similar to pre-project conditions, including impacts relating to soil compaction, water infiltration capacity, and soil hydrologic characteristics.

BMP-10 (Revegetation): Permit Applicants and their Third-Party Project Proponents implementing ground-disturbing Covered Activities will revegetate any cut-and-fill slopes with native or existing non-invasive, non-native plants (e.g., non-native grasses) suitable for the altered soil conditions and in compliance with EDGE-2 and EDGE-8, if applicable.

BMP-11 (Speed Limit): Project-related vehicles will observe the posted speed limits on paved roads and a 10-mile-per-hour speed limit on unpaved roads and during travel in project areas. Construction crews will be given weekly tailgate instruction to travel only on designated and marked existing, cross-country, and project-only roads.

Condition 4. Avoid and Minimize Impacts that May Result from Implementation of Covered Transportation Projects

Urban development transportation projects and Rural Transportation Project Covered Activities, including bridge projects, can affect Covered Species. AMMs included for Condition 4 seek to avoid or minimize direct and indirect impacts that may result from construction of roadways or roadway improvements. Condition 4 applies to all transportation-related Covered Activities (see Sections 5.2.1 and 5.2.3).

Permit Applicants and their Third-Party Project Proponents implementing Urban Development transportation or Rural Transportation Project Covered Activities must comply with the roadway siting, design, and construction AMMs described below.

ROAD-1 (Road Project Location): Road projects will be located in the least environmentally sensitive area to avoid, to the maximum extent practicable, impacts on Covered Species, Covered Species habitat, and waters of the United States. Road project alignments will follow existing roads, road easements, and rights-of-way, or be sited in disturbed areas to minimize habitat loss and additional habitat fragmentation.

ROAD-2 (Wildlife Crossing Structures): Road projects that are identified as Urban Development Covered Activities (see Section 5.2.1) (including the Capital Southeast Connector, see Section 5.2.1.1) or are identified as Rural Transportation Covered Activities (see Section 5.2.3) will include an adequate number of wildlife crossing structures, as depicted in Figure 5-10 of the SSHCP document. An adequate number of wildlife crossing structures within the Urban Development Area (UDA) and outside the UDA will provide for continued dispersal and movement of native wildlife throughout the Planning Area, as required by the HCP Biological Goals and Objectives.

The HCP defines “wildlife crossing structure” as a physical structure specifically designed or retrofitted to facilitate undercrossing for target wildlife species. The Plan further classifies wildlife crossings as hydrologic crossings and dry crossings. Hydrologic crossings are built where there is an existing stream, creek, or intermittent drainage to maintain existing hydrologic connectivity within the Planning Area. As described below, hydrologic crossings require specialized features to be built into the crossing structure, such as elevated platforms to allow wildlife to pass under a crossing structure when it is inundated with water. Dry wildlife crossings are built where there is no hydrologic feature but where a crossing is needed to provide for overland connectivity. wildlife crossing structures may include structures such as bridges, arches, or box and pipe culverts.

Permit Applicants expect that future wildlife movement and dispersal within the UDA will occur almost entirely within the boundaries of the future interconnected HCP Preserve System (see Section 7.5). Therefore, wildlife crossings are needed wherever a roadway crosses (bisects) the conceptual HCP Preserve System. Wildlife crossing structures inside the UDA will be sized to accommodate movement of a highly mobile native indicator species (i.e., coyote (*Canis latrans*)). By designing UDA wildlife crossing structures to meet the movement and dispersal requirements of coyote, the Permit Applicants anticipate that the crossing structure will also accommodate most native wildlife species that currently occupy the UDA (see Chapter 8 in the EIS/EIR).

The Permit Applicants expect that most of the Planning Area outside of the UDA will remain as Open Space over the 50-year EIS/EIR Study Period (see Chapter 3 of the EIS/EIR). Therefore, the Permit Applicants expect that the Rural Transportation Project Covered Activities proposed outside the UDA will have a relatively small effect on the movement and dispersal of larger or more mobile native wildlife species, including coyote. Consequently, the Permit Applicants anticipate that the design of Rural Transportation Project Covered Activities outside the UDA will need to include wildlife crossing structures primarily where the Rural Transportation Project Covered Activities occur within California tiger salamander modeled habitat (see AMM CTS-3 and also EIS/EIR Chapter 9, and Figure 3-16 of the SSHCP document).

The design and location of wildlife crossing structures both inside the UDA and outside the UDA will be determined by collaboration between the Third-Party Project Proponent, the Land Use Authority Permit Applicant, and the HCP Implementing Entity. Crossing design will use the best available scientific and commercial information for the target species. The design of crossing structures will be based on demonstrated effectiveness of design for the target species when such information is available, or will be designed with a high level of certainty of success based on studies of similar taxa in similar environmental settings. The proposed wildlife crossing structures designs will be reviewed and approved by the HCP Implementing Entity prior to final design.

The HCP Implementing Entity will develop a Wildlife Crossing Maintenance Manual to be provided to the entity responsible for maintaining the wildlife crossing. The Wildlife Crossing Maintenance Manual will identify vegetation management, clearing of obstructions, and other techniques to maintain the desired movement and hydrologic connectivity, and to avoid effects to adjacent HCP Preserves.

All HCP wildlife crossing structures in the UDA will include the following design elements:

- Open-bottom bridges or arches where the roadway crosses a river or stream. Where an open-bottom bridge or arch is used, the span of the crossing will be at least 1.2 times the bankfull width of the stream and span the banks to allow for dry wildlife passage along each side of the stream and to avoid or minimize piers or footings within the stream. (Bankfull width refers to the width of a stream channel at the point where over-bank flow begins during a flood event.)
- Any wildlife crossing structure that also maintains hydrologic connectivity will be designed to maintain pre-construction water capacity, depth, and velocity. The crossing structure will not restrict or impede normal flows or flood flows, unless a primary purpose of the structure is to manage such flow(s). Wildlife crossing structures must be designed to provide a dry passage (e.g., a platform ledge) higher than flows for a 10-year storm event to allow wildlife to pass through an inundated crossing structure.
- Wildlife crossing structures in the UDA will be designed and sized to accommodate movement of at least medium-sized mammals (e.g., coyote). The opening must be at least 3 feet high and the crossing structure must have a minimum openness ratio of at least 0.4.
- Vegetation leading up to the entrance of a crossing structure and the substrate leading into and within the crossing structure will be natural and appropriate to provide for continuity of habitat, attract the target animal species for which the crossing is designed, and facilitate use of the crossing structure.
- A wildlife crossing under six-lane roads or larger will be designed to provide ambient light and temperature in the longer crossing structures (e.g., either by providing a larger opening or a grate at the top of the structure to improve the attractiveness of the crossing to certain Covered Species and wildlife that may hesitate to cross through dark, confined structures or one with a temperature gradient (Jackson and Griffin 2000)). If a road is less than six lanes in width, these designs will be optional.
- Lighting will not be placed at or near the entrance of a wildlife crossing structure to maintain natural ambient light conditions at night and to increase chances of wildlife use. However, a Land Use Authority Permit Applicants may allow lighting if necessary for human health or safety.

Outside the UDA, wildlife crossing structures may be required for California tiger salamander (refer to AMM CTS-1), and could also be required for other native species.

ROAD-3 (Roadside Pesticide Use[3]): If pesticide use is necessary along roadsides, the appropriate HCP Permit Applicant will ensure that the pesticide application strictly complies with the pesticide label and all other applicable federal, state, and local authorities pertaining to the use, safety, storage, disposal, and reporting of the pesticide. Where roadside weed infestations have reached a critical control point, the HCP Implementing Entity or a Land Use Authority Permit Applicant will apply the appropriate manual, mechanical, or chemical treatment. In addition, the HCP Implementing Entity or appropriate Land Use Authority Permit Applicant will post signs along road shoulders adjacent to sensitive areas (e.g., California tiger salamander breeding ponds, endemic plant populations). The signs will identify pesticide use restrictions or other roadside maintenance restrictions.

Condition 5. Avoid and Minimize Impacts that Result from Public Use of Low-Impact Nature Trails in HCP Preserves

HCP Preserves within the UDA are likely to be surrounded by urban development. As discussed in Section 5.2.7, allowing limited use of HCP Preserves will help to foster a sense of community ownership and will provide an opportunity to educate the community about the natural resources to be protected within the HCP Preserve System.

Low-impact nature trails will be designed following the AMMs outlined below.

NATURE TRAIL-1 (Nature Trail Plan): A nature trail plan must be prepared for each Preserve where a trail is allowed by the HCP Preserve Management Plan. Nature trails will be unpaved trails that vary in width depending on terrain and existing constraints, but will never exceed 4 feet in width. Where a trail crosses a swale, wooden walkways elevated to a height no greater than 2 feet will be installed. Trail improvements may include mowing vegetation to create or maintain a trail, minor grading to remove trip hazards, and signs providing directional and educational information. Public access to land acquired for preservation will be prohibited until a trail plan can be prepared by the HCP Implementing Entity and approved by the Permitting Agencies. A trail plan will include the following:

- Maps identifying areas that contain sensitive habitats or species occurrences.

[3] Use of pesticides (including rodenticides and herbicides) is not an SSHCP Covered Activity. However, pesticide use specified in Section 5.3 is an allowed land management tool, provided the pesticide application is otherwise legal and conforms to all conditions in Section 5.4.

- Maps that show the location and footprint of proposed trails.
- Methods used to control public access.
- Trail and use monitoring methods, schedules, and responsibilities.
- Trail operation and maintenance guidelines and responsibilities.
- Clear triggers for use restrictions or closure based on sensitive biological indicators (e.g., seasonal closures of some trails on the basis of activity periods of Covered Species or sensitive species).

NATURE TRAIL-2 (Nature Trail Protection of Duripan): Nature trails will be sited and constructed so as not to interfere with existing soil duripan and the perched aquifer that support the existing hydrologic regime of the Vernal Pool Ecosystem and Valley Grassland, and will not interfere with existing pool hydrology. Trails within HCP Preserves will not be paved.

NATURE TRAIL-3 (Nature Trail Location): Nature trails will be located away from sensitive natural resources (e.g., vernal pools, riparian habitat, woodland habitat, Covered Species occurrences, raptor nesting sites, tricolored blackbird (*Agelaius tricolor*) colony sites). The Wildlife Agencies will determine the distance necessary to avoid impacts to sensitive natural resources.

NATURE TRAIL-4 (Biological Studies Prior to Nature Trail Design): Biological studies will be conducted within the area being considered for nature trail construction prior to project design. The studies will include land cover type mapping and focused species surveys and/or wetland delineations. The biological studies will include assessments of potential effects of trail construction on HCP Preserve System resources, and recommendations for avoidance and minimization that may be incorporated into project siting, design, construction, and operation.

NATURE TRAIL-5 (Monitoring of Nature Trail Impacts): Impacts that could result from use of a nature trail within a Preserve will be monitored according to the HCP Preserve Management Plan to ensure that uses do not conflict with the individual Preserve Management Plan. If use of a trail is found to conflict with the individual Preserve Management Plan, use of that trail will be discontinued until adjustments in the use can be made to reduce or eliminate conflicts. The HCP Implementing Entity will make decisions about discontinuing or modifying use of a trail in consultation with the HCP Preserve Manager or other applicable Preserve management agency or organization.

Condition 6. Avoid and Minimize Impacts When Re-Establishing or Establishing Wetlands

As discussed in Chapter 7 of the SSHCP document, the Permit Applicants anticipate that approximately 389 acres of Vernal Pool habitat will be re-established or established[4] within the Planning Area as part of the HCP Conservation Strategy. Although re-establishment or establishment of vernal pools is a Measurable Objective under this Plan, if not done correctly, the action could have an adverse impact on existing vernal pools.

RE-ESTABLISHMENT/ESTABLISHMENT-1 (Vernal Pool): Re-establish or establish Vernal Pool Wetland according to the following guidelines:

- Re-establishment will always take priority over establishment of vernal pools. Establishment will be permitted only after it has been determined that sites with the potential to re-establish vernal pools no longer exist in the Planning Area or cannot be acquired through a willing seller/buyer agreement.
- When possible, re-established or established sites will be located adjacent to an existing Preserve(s) to maximize connectivity and Preserve area.
- Re-establishment or establishment will not result in direct or indirect adverse impacts to the hydrologic regime of existing vernal pools. Vernal pool re-establishment or establishment actions will not remove more than 10% of any existing vernal pool watershed, as defined by the HCP LIDAR analysis (see Section 3.6 of the EIS/EIR document and Conservation Action VPI1.2 in Table 2-7 of the EIS/EIR).
- Vernal pool re-establishment will attempt to restore the historical density and range of vernal pool sizes to the maximum extent feasible using historical aerial photography of the site, if available. Where aerial photography of the site's historical conditions is not available, vernal pool re-establishment will include a range of pool sizes (area and depth) to accommodate the different habitat needs and life history characteristics of the vernal pool invertebrate Covered Species.
- Established vernal pools must be located on sites with vernal pool soils, defined as any Planning Area soil type where vernal pools currently exist.
- Established vernal pool sites will include a range of pool sizes to accommodate the different habitat needs and life history characteristics of the three vernal pool invertebrate Covered Species.

[4] In the context of this Plan, "establish" is synonymous with "create."

- The total density of vernal pools will not exceed 10% of the suitable soil areas in any vernal pool re-establishment and/or establishment site, unless it can be shown that the suitable areas of that site historically supported greater densities.
- Re-establishment or establishment may include inoculation when it is likely that no seed or cyst bank of vernal pool species remains at a site. Vernal Pool inocula will come from nearby vernal pools that are on the same geologic formation and soil type.

RE-ESTABLISHMENT/ESTABLISHMENT-2 (Vernal Pool Inocula Bank): Vernal pool re-establishment or establishment may include "soil inoculation" when it is likely that no seed or cyst bank of vernal pool species remains at a re-establishment or establishment site.

- During conversion of Urban Development Area vernal pools to a developed land cover type, project proponents will excavate and retain soil from vernal pools following protocols developed by the HCP Technical Advisory Committee (see Chapter 9 of the SSHCP document).
- Inocula applied in re-established or established vernal pools must be harvested from a vernal pool that is on the same geologic formation and soil type shown on the County General Soil Map as the re-establishment/establishment site. Geologic formations and soil types will follow U.S. Department of Agriculture Soil Conservation Service's 1993 Soil Survey of Sacramento County, California. Proposed off-site inocula sources must be approved by the Wildlife Agencies.

RE-ESTABLISHMENT/ESTABLISHMENT-3 (Re-Establishment/Establishment of Freshwater Marsh or Open Water near Airports): During review of proposed re-establishment/ establishment projects for freshwater marsh or open water on HCP Preserves, the HCP Implementing Entity shall consider the potential for the location of the re-establishment/establishment projects to increase the risk of wildlife strikes or generation of ground fog at airports. If a re-establishment/ establishment project would result in (1) a net increase in open water or freshwater marsh acreage over baseline conditions[5] within 5 miles of Mather Field, Sacramento Executive Airport, or Franklin Field; or (2) replacement of open water/freshwater marsh habitat that is located 2 or more miles from Mather Field or Sacramento Executive Airport with open

[5] For purposes of establishing baseline conditions, Freshwater Marsh and Open Water acreages will be calculated using that version of the SSHCP Land Cover Type Map in existence as of the date that the SSHCP ITP permit is issued to the Permit Applicants by the USFWS.

water/freshwater marsh habitat that is located less than 2 miles from those airports, a qualified biologist shall prepare a concise letter report. The letter report shall summarize the biologist's findings regarding (1) the species likely to use the re-established/established habitat, (2) a rough order of magnitude estimate on the peak number of birds that might use the re-established/established habitat, and (3) potential movement patterns for birds using the re-established/established habitat and whether they might cross through the airport safety zones (e.g., to reach foraging habitat or another wildlife attractant). The letter report will also provide recommendations to the HCP Implementing Entity on how they could reduce any of the identified wildlife hazards if there are any feasible means to do so that would not conflict with the biological goals and measurable objectives of the Conservation Plan.

Condition 7. Avoid and Minimize Impacts to Streams and Creeks

AMMs associated with Condition 7 must be applied to all Covered Activities where a stream or creek is located within a project footprint.

STREAM-1 (Laguna Creek Wildlife Corridor): A 150-foot setback measured from the top of the bank on both sides of the stream will be applied to Laguna Creek within the Urban Development Area (minimum 300-foot corridor width). If trails are located within the Laguna Creek Wildlife Corridor, the nearest edge of the trail will be located at least 80 feet from the top of the bank.

STREAM-2 (UDA Stream Setbacks): A 100-foot setback measured from the top of the bank on both sides of the stream channel will be applied to all streams listed in Table 1 below (see also Figure 2-4 of the SSHCP document). If a stream reach supports woody riparian vegetation, the setback will be equal to the riparian edge plus 25 feet or will be the setback defined above, whichever is greater. If trails are located within the Stream Setback, the nearest edge of the trail will be located at least 50 feet from the top of the bank.

Table 1. Stream Setback Minimum Requirements in the Urban Development Area

Stream	Minimum Setback (from the Top of Bank Measured in Aerial Perspective) on Both Sides of the Stream
Elder Creek	100 feet
Frye Creek	100 feet or as depicted as part of the NewBridge development project hardline Preserve (see Appendix K of the SSHCP Document)
Gerber Creek	100 feet
Morrison Creek	100 feet
Central Paseo	100 feet or as depicted as part of the Cordova Hills development project hardline Preserve (Appendix K of the SSHCP Document)
Sun Creek	100 feet or as depicted as part of the Sun Creek development project hardline Preserve (see Appendix K of the SSHCP Document)

STREAM-3 (Minor Tributaries to UDA Streams): A 25-foot setback measured from the top of the bank on both sides of the stream channel will be applied to all avoided first and second order tributaries to the streams listed in Table 1 and Laguna Creek. Refer to Objective W6 in Table 2-7 of the EIS/EIR regarding avoided first and second order tributaries. Trails are not permitted within headwater ephemeral Stream Setbacks.

STREAM-4 (Minimize Effects from Temporary Channel Re-Routing): When an Urban Development Covered Activity temporarily re-routes a stream, creek, or drainage, the re-routing will be completed in a manner that minimizes impacts to beneficial uses and habitat. The following measures will be employed to minimize disturbances that will adversely impact water quality:

- No equipment will be operated in areas of flowing or standing water.
- Construction materials and heavy equipment must be stored outside of the active flow of any waters.
- When work within waters is necessary, the entire stream flow will be diverted around the work area.
- In the event of rain, the disturbed in-water work area will be temporarily stabilized before water body flow exceeds the capacity of the diversion structure. The disturbed water body will be stabilized so that the disturbed areas will not come in contact with the flow.
- Once construction is complete, all project-introduced material (e.g., pipes, gravel, cofferdam, sandbags) must be removed, leaving the water as it was before construction. Excess materials will be disposed of at an appropriate disposal site.
- All work areas will be effectively isolated from stream flows using suitable control measures before commencement of any in-water work. The diverted stream flow will not be contaminated by construction activities. Structures for isolating the in-water work area and/or diverting the stream flow (e.g., cofferdam, geo-textile silt curtain) will not be removed until all disturbed areas are cleaned and stabilized.
- Any flow diversion used during construction will be designed in a manner to prevent pollution and minimize siltation, and will provide flows to downstream reaches. Flows will be maintained to support existing aquatic life, riparian wetlands, and habitat that may be located upstream and downstream from any temporary diversion.

- All surface waters, including ponded waters, will be diverted away from areas undergoing grading, construction, excavation, vegetation removal, and/or any other activity that may result in a discharge to waters.
- All temporary dewatering methods will be designed to have the minimum necessary impacts to waters to isolate the immediate work area. All dewatering methods will be installed such that natural flow is maintained upstream and downstream of the diversion area. Any temporary dams and diversions will be installed such that the diversion does not cause sedimentation, siltation, or erosion upstream or downstream of the diversion area. All dewatering methods will be removed immediately upon completion of diversion activities.
- A method of containment must be used below any bridge, boardwalk, and/or temporary crossing to prevent debris from falling into the waters through the entire duration of a project.
- If temporary surface water diversions and/or dewatering are anticipated, the Permit Applicant or their Third-Party Project Proponent will develop and maintain on site a surface water diversion and/or dewatering plan. The plan(s) must be developed prior to initiation of any water diversions and will include the proposed method and duration of diversion activities. The plan(s) must be made available to Central Valley Water Board staff upon request.
- When work in a flowing stream is unavoidable and any dam or other artificial obstruction is being constructed, maintained, or placed in operation, sufficient water will be allowed at all times to pass downstream to maintain beneficial uses of waters below the dam. Construction, dewatering, and removal of temporary cofferdams will not violate the turbidity, settle-able matter, pH, temperature, or dissolved oxygen requirements of any project water quality control Plan.
- Any temporary dam or other artificial obstruction will only be built from clean materials such as sandbags, gravel bags, water dams, or clean/washed gravel that will cause little or no siltation. Stream flow will be temporarily diverted using gravity flow through temporary culverts or pipes, or pumped around the work site with the use of hoses.

STREAM-5 (Design for Stream Channel Re-Routing, Widening, or Deepening): When an urban development Covered Activity alters a stream, creek, or drainage by re-routing, widening, or deepening a channel, the project design will include the following:

- The main channel of a re-routed channel will be free to migrate laterally over its active and terrace floodplain.
- Channel geometry (plan, profile, and cross-section) of the site will be appropriate for the watershed location and physical/hydrologic condition.
- Local, native materials will be used as fill material to the extent practicable.
- Bioengineering techniques will be used for construction and maintenance of bank stabilization. Bioengineered bank stabilization structures will use vegetation in combination with bank reshaping; biodegradeable geotextile materials; and, in some cases, a minimal amount of rock or wood to the extent practicable to dissipate erosive energy. The Permit Applicant or their Third-Party Project Proponents will consult a professional engineer when considering using bioengineering techniques.
- All re-routed, widened, or deepened streams are required to establish Stream Setbacks with minimum widths required under AMMs STREAM-1, STREAM-2, or STREAM-3. All re-routed, widened, or deepened streams must re-establish/ establish and maintain native Woody Riparian land cover and/or native Grassland Riparian land cover in the entire Stream Setback.

Condition 8. Avoid and Minimize Impacts to Covered Species from Utility and Utility Maintenance Covered Activities

AMMs associated with Condition 8 must be applied to all Covered Activities associated with construction and maintenance of infrastructure projects.

UTILITY-1 (Avian Collision Avoidance): Installation of new, or relocation of existing, utility poles, lines, and cell towers located within the HCP Preserve System or within 1,000 feet of a Preserve boundary will be coordinated with the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife. The applicant or relevant utility/service provider will install utility poles, lines, and cell towers in conformance with Avian Powerline Interaction Committee (APLIC) standards for collision-reducing techniques, as outlined in Reducing Avian Collisions with Power Lines: State of the Art in 2012 (APLIC 2012), or any superseding document issued by the APLIC.

UTILITY-2 (Utility Maintenance on Preserves): Utility maintenance inside HCP Preserves and Preserve Setbacks containing vernal pools will occur only when vernal pools have been dry for 30 days, except in emergency situations related to human health and safety.

UTILITY-3 (Trenchless Construction Methods): Where a pipeline or conduit crosses an existing or HCP Preserve or will be located between adjacent Preserves (e.g., under a roadway that has a Preserve on both sides), trenchless construction methods will be used to minimize impacts to the existing soil profile (including impacts to a hardpan or duripan) to maintain the perched aquifer in Vernal Pool Ecosystem and Valley Grassland land cover type.

UTILITY-4 (Siting of Entry and Exit Location): The entry and exit locations for the trenchless construction method (see Utility-3) will be sited to avoid impacts to vernal pools and Riparian Woodland, and to avoid direct take of HCP Covered Species.

Condition 9. Avoid and Minimize Impacts That Might Result From Removing or Breaching Levees to Establish or Re-establish Riparian Habitat

LEVEE-1 (Preparation of Hydrologic Analysis): Prior to approving a draft Preserve Management Plan that includes (1) modifying or breaching an existing levee, or (2) would place a potential impedance to high-water event flood-flows on the water side of an existing levee (including new riparian vegetation plantings or other new Preserve facilities), a hydrologic analysis will be conducted. The Preserve activity will only be implemented if the hydrologic analysis concludes that the activity will not result in a substantial increase in flood stage elevations or flood risk on lands outside the Preserve.

Condition 10. Avoid and Minimize Impacts That Might Result From Potential Residual Contamination of Preserves and Related Exposure of People to Such Hazardous Materials

HAZARDOUS MATERIALS-1 (Preparation of Phase I Environmental Site Assessment): Prior to the acquisition of a HCP Preserve site or implementation of a stream or riparian restoration project, a Phase I Environmental Site Assessment shall be conducted in general accordance with the American Society for Testing and Materials Standard Practice E1527-05. The purpose of this Environmental Site Assessment is to identify, to the extent feasible pursuant to the American Society for Testing and Materials Standard, recognized environmental conditions in connection with the potential site. The term “recognized environmental condition” means the presence or likely presence of hazardous substances or petroleum products on the property under conditions that may indicate an existing release, a past release, or a material threat of release of these substances to the property. If the Phase 1 Environmental Site Assessment indicates the presence of a recognized

environmental condition, the HCP Implementing Entity shall consider the following options.

- Determine that the acquisition/project can proceed on the basis that the Habitat Plan goals and objectives can be met on the site even with the presence of a recognized environmental condition.
- Conduct a Phase II Environmental Site Assessment, including soil and groundwater testing, to further study the potential for contamination to limit the HCP Implementing Entity's management activities.
- If the results of the Phase I (or Phase II) Environmental Site Assessment indicate that the Habitat Plan goals and objectives cannot be met on the site, the HCP Implementing Entity should not acquire the site.

HAZARDOUS MATERIALS-2 (Contingency Plan): As part of each Preserve Management Plan or site restoration plan, a Contingency Plan shall be prepared to address the actions that would be taken during construction in the event that unexpected contaminated soil or groundwater is discovered. The Contingency Plan shall include health and safety considerations, handling and disposal of wastes, reporting requirements, and emergency procedures. The Contingency Plan shall include a requirement that if evidence of contaminated materials is encountered during construction, construction would cease immediately and applicable requirements of the Comprehensive Environmental Release Compensation and Liability Act and the California Code of Regulations Title 22 regarding the disposal of waste would be implemented.

COVERED SPECIES TAKE AVOIDANCE AND MINIMIZATION MEASURES

The following section describes measures to avoid or minimize effects of Covered Activities on specific HCP Covered Species. Species-specific AMMs include species surveys, pre-construction surveys, and construction monitoring. Most species-specific AMMs require that species surveys be conducted if Covered Species modeled habitat is within the proposed Covered Activity footprint or within a specified distance of the proposed Covered Activity. Section 3.4 of SSHCP document and Appendix G of the EIS/EIR provides maps and descriptions of modeled habitat for each Covered Species. The AMMs described below apply to Covered Activities when Covered Species modeled habitat or a Covered Species occurrence are at a project site. The HCP Implementing Entity and the Wildlife Agencies may update specific HCP AMMs over the HCP Permit Term to provide the best and most appropriate protective measures for a Covered Species.

General Covered Species Take Avoidance and Minimization Measures

The following AMMs will apply to all Covered Activities that are required to implement Covered Species take AMMs.

SPECIES-1 (Litter Removal Program): A litter control program will be instituted for the entire project site. All workers will ensure that their food scraps, paper wrappers, food containers, cans, bottles, and other trash are deposited in covered or closed trash containers. All garbage will be removed from the project site at the end of each work day, and construction personnel will not feed or otherwise attract wildlife to the area where construction activities are taking place.

SPECIES-2 (No Pets in Construction Areas): To avoid harm and harassment of native species, workers and visitors will not bring pets onto a project site.

SPECIES-3 (Take Report): If accidental injury or death of any Covered Species occurs, workers will immediately inform the approved biologist or on-site monitor and site supervisor. The approved biologist or on-site monitor will phone the appropriate contact person at the HCP Implementing Entity. The HCP Implementing Entity will immediately contact the Wildlife Agencies by telephone. A memorandum will be provided to the HCP Implementing Entity and Wildlife Agencies within 1 working day of the incident. The report will provide the date and location of the incident, number of individuals taken, the circumstances resulting in the take, and any corrective measures taken to prevent additional take.

SPECIES-4 (Post-Construction Compliance Report): A post-construction compliance report will be submitted to the HCP Implementing Entity within 30 calendar days of completion of construction activities or within 30 calendar days of any break in construction activity that lasts more than 30 days. The report will detail the construction start and completion dates, any information about meeting or failing to meet species take Avoidance and Minimization Measures (AMM), effectiveness of each AMM that was applied at the project site, and any known project effects to Covered Species.

Rare Plants

PLANT-1 (Rare Plant Surveys): If a Covered Activity project site contains modeled habitat for Ahart's dwarf rush (*Juncus leiospermus* var*. ahartii)*, Bogg's Lake hedge-hyssop (*Gratiola heterosepala)*, dwarf downingia (*Downingia pusilla),* Legenere (*Legenere limosa*), pincushion navarretia (*Navarretia myersii),* or Sanford's arrowhead (*Sagittaria sanfordii*), the Covered Activity project site will be surveyed for the rare plant by an approved biologist and following

the California Department of Fish and Wildlife (CDFW) rare plant survey protocols (CDFG 2009) or the most recent CDFW rare plant survey protocols. An approved biologist will conduct the field surveys and will identify and map plant species occurrences according to the protocols. See Chapter 10 of the SSHCP document for the process to submit survey information to the Permit Applicant and the Permitting Agencies.

PLANT-2 (Rare Plant Protection): If a rare plant listed in AMM PLANT-1 is detected within an area proposed to be disturbed by a Covered Activity or is detected within 250 feet of the area proposed to be disturbed by a Covered Activity, the HCP Implementing Entity will assure one unprotected occurrence of the species is protected within a HCP Preserve before any ground disturbance occurs a the project site.

Sacramento and Slender Orcutt Grass

Sacramento Orcutt grass (*Orcuttia viscida*) is a federally and state endangered species and is ranked by the California Native Plant Society as a California Rare Plant Rank 1B.1 species. Slender Orcutt grass (*Orcuttia tenuis*) is a federally threatened and state endangered species and is ranked by the California Native Plant Society as a California Rare Plant Rank 1B.1 species. Both Orcutt grasses are very rare, and the likelihood of finding new occurrences within the Planning Area is low. Due to their rarity, take of either of these species is not permitted under the HCP, with the exception of take related to Preserve management and monitoring (see Section 5.2.7, HCP Preserve System Covered Activities).

ORCUTT-1 (Orcutt Grass Surveys): If a Covered Activity project site is located within 1 mile of the Mather Core Recovery Area and contains the Vernal Pool land cover type, the project site will be surveyed for Sacramento and slender Orcutt grass by an approved biologist following California Department of Fish and Wildlife (CDFW) rare plant survey protocols (CDFG 2009) or most recent CDFW guidelines to determine if Sacramento and/or slender Orcutt grass is present. An approved biologist will conduct the field investigation to identify and map occurrences. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

ORCUTT-2 (Orcutt Grass Protection): Where known or new Sacramento or slender Orcutt grass occurrences are found, they will be protected within an HCP Preserve that is at least 50 acres. The occurrence will be located interior to the Preserve at a distance of no less than 300 feet from the edge of the Preserve boundary. If a Third-Party Project Proponent encounters a previously undiscovered occurrence of Sacramento or slender Orcutt grass on a Covered Activity project site, the Third-Party Project Proponent will contact the HCP Implementing Entity or Land

Use Authority Permit Applicant with authority over the project, who will coordinate with the Wildlife Agencies for written concurrence of avoidance to ensure that the project does not cause take of the species.

California Tiger Salamander

To avoid direct and indirect effects of Covered Activities on California tiger salamander (*Ambystoma californiense*), the following AMMs will be implemented.

CTS-1 (California Tiger Salamander Daily Construction Schedule): Ground-disturbing Covered Activities within California tiger salamander modeled habitat (Figure 3-16 of the SSHCP document) will occur outside the breeding and dispersal season (occur after July 31 and before October 15), to the maximum extent practicable. If Covered Activities must be implemented in modeled habitat (Figure 3-16 of the SSHCP document) during the breeding and dispersal season (after October 15 and before July 31), construction activities will not start until 30 minutes after sunrise and must be complete 30 minutes prior to sunset.

CTS-2 (California Tiger Salamander Exclusion Fencing): If a Covered Activity must be implemented in modeled habitat (Figure 3-16 of the SSHCP document) during the breeding and dispersal season (after October 15 and before July 31), exclusion fencing will be installed around the project footprint before October 15. Temporary high-visibility construction fencing will be installed along the edge of work areas, and exclusion fencing will be installed immediately outside of the temporary high-visibility construction fencing to exclude California tiger salamanders from entering the construction area or becoming entangled in the construction fencing. Exclusion fencing will be at least 1 foot tall and be buried at least 6 inches below the ground to prevent salamanders from going under the fencing. Fencing will remain in place until all construction activities within the construction area are complete. No project activities will occur outside the delineated project footprint. An approved biologist must inspect the exclusion fencing and project site every morning before 7:00 a.m. for integrity and for any entrapped California tiger salamanders. If a California tiger salamander is encountered, refer to CTS-5, below. (However, the HCP Implementing Entity may, with approval of the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW), determine that it is appropriate for a Covered Activity project to not implement CTS-2 for certain long and linear roadway Covered Activity projects if it appears that the exclusion fencing will likely trap individuals or cause more take of California tiger salamander than it would prevent.)

CTS-3 (California Tiger Salamander Monitoring): If Covered Activities must be implemented in modeled habitat (Figure 3-16 of the SSHCP document), an approved biologist experienced with California tiger salamander identification and behavior will monitor the project site, including the integrity of any exclusion fencing. The approved biologist will be on site daily while construction-related activities are taking place, and will inspect the project site for California tiger salamander every morning before 7:00 a.m., or prior to construction activities. As required by AMM BMP-8 (Training of Construction Staff), the approved biologist will also train construction personnel on the required California tiger salamander avoidance procedures, exclusion fencing, and correct protocols in the event that a California tiger salamander enters an active construction zone. If a California tiger salamander is encountered, refer to CTS-5, below.

CTS-4 (Avoid California Tiger Salamander Entrapment): If Covered Activities must be implemented in modeled habitat, all excavated steep-walled holes or trenches more than 6 inches deep will be covered with plywood (or similar material) or provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each work day or 30 minutes prior to sunset, whichever occurs first. All steep-walled holes or trenches will be inspected by the approved biologist each morning to ensure that no wildlife has become entrapped. All construction pipes, culverts, similar structures, construction equipment, and construction debris left overnight within California tiger salamander modeled habitat will be inspected for California tiger salamanders by the approved biologist prior to being moved. If a California tiger salamander is encountered, refer to CTS-5, below.

CTS-5 (California Tiger Salamander Encounter Protocol): If a California tiger salamander is encountered during construction activities, the approved biologist will notify the Wildlife Agencies immediately (California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS)). Construction activities will be suspended in a 100-foot radius of the animal until the animal is relocated by an approved biologist with appropriate handling permits from the Wildlife Agencies. Prior to relocation, the approved biologist will notify the Wildlife Agencies to determine the appropriate procedures related to relocation. If the animal is handled, a report will be submitted, including date(s), location(s), habitat description, and any corrective measures taken to protect the salamander, within 1 business day to the Wildlife Agencies. The biologist will report any take of listed species to USFWS and CDFW immediately. Any worker who inadvertently injures or kills a California tiger salamander or who finds dead,

injured, or entrapped California tiger salamander(s) must immediately report the incident to the approved biologist.

CTS-6 (Erosion Control Materials in California Tiger Salamander Habitat): If erosion control (BMP-2) is implemented within California tiger salamander modeled habitat (Figure 3-16 of the SSHCP document), non-entangling erosion control material will be used to reduce the potential for entrapment. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material will be used to ensure that salamanders are not trapped (no monofilament). Coconut coir matting and fiber rolls with burlap are examples of acceptable erosion control materials. This limitation will be communicated to the contractor through use of special provisions included in the bid solicitation package.

CTS-7 (Rodent Control): CTS-7 only applies to projects that are within California tiger salamander modeled habitat (Figure 3-16 of the SSHCP document) and on Covered Activities. Rodent control will be allowed only in developed portions of a Covered Activity project site. Where rodent control is allowed, the method of rodent control will comply with the methods of rodent control discussed in the 4(d) Rule published in the U.S. Fish and Wildlife Service's (2004) final listing rule for tiger salamander.

Western Spadefoot

To avoid direct and indirect effects of Covered Activities on western spadefoot (*Spea hammondii*), the following AMMs will be implemented.

WS-1 (Western Spadefoot Work Window): Ground-disturbing Covered Activities within western spadefoot modeled habitat (Figure 3-17 of the SSHCP document) will occur outside the breeding and dispersal season (after May 15 and before October 15), to the maximum extent practicable.

WS-2 (Western Spadefoot Exclusion Fencing): If Covered Activities must be implemented in modeled habitat (Figure 3-17 of the SSHCP document) after October 15 and before May 15, exclusion fencing will be installed around the project footprint before October 15, and the project site must be monitored by an approved biologist following rain events. Temporary high-visibility construction fencing will be installed along the edge of work areas, and silt fencing will be installed immediately behind the temporary high-visibility construction fencing to exclude western spadefoot from entering the construction area. Fencing will remain in place until all construction activities within the construction area are completed.

No project activities will occur outside the delineated project footprint. If a western spadefoot is encountered, refer to WS-6, below.

WS-3 (Western Spadefoot Monitoring): If Covered Activities must be implemented in modeled habitat (Figure 3-17 of the SSHCP document) in the breeding and dispersal season (after October 15 and before May 15), an approved biologist experienced with western spadefoot identification and behavior will monitor the project site, including the integrity of any exclusion fencing. The approved biologist will be on site daily while construction-related activities are taking place, and will inspect the project site daily for western spadefoot prior to construction activities. The approved biologist will also train construction personnel on the required avoidance procedures, exclusion fencing, and protocols in the event that a western spadefoot enters an active construction zone (i.e., outside the buffer zone). If a western spadefoot is encountered, refer to WS-6, below.

WS-4 (Avoid Western Spadefoot Entrapment): If a Covered Activity occurs in western spadefoot modeled habitat (Figure 3-17 of the SSHCP document), all excavated steep-walled holes and trenches more than 6 inches deep will be covered with plywood (or similar material) or provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each work day or 30 minutes prior to sunset, whichever occurs first. All steep-walled holes and trenches will be inspected by the approved biologist each morning to ensure that no wildlife has become entrapped. All construction pipes, culverts, similar structures, construction equipment, and construction debris left overnight within western spadefoot modeled habitat will be inspected for western spadefoot by the approved biologist prior to being moved. If a western spadefoot is encountered, refer to WS-6, below.

WS-5 (Erosion Control Materials in Western Spadefoot Habitat): If erosion control (BMP-2) is implemented within western spadefoot modeled habitat (Figure 3-17 of the SSHCP document), non-entangling erosion control material will be used to reduce the potential for entrapment. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material will be used to ensure that western spadefoots are not trapped (no monofilament). Coconut coir matting and fiber rolls containing burlap are examples of acceptable erosion control materials.

WS-6 (Western Spadefoot Encounter Protocol): If Covered Activities must be implemented in modeled habitat (Figure 3-17 of the SSHCP document) during the breeding and dispersal season (after October 15 and before May 15), and a western spadefoot is encountered during construction activities, the approved biologist will notify

the Wildlife Agencies immediately. Construction activities will be suspended in a 100-foot radius of the animal until the animal leaves the project site on its own volition. If necessary, the approved biologist will notify the Wildlife Agencies to determine the appropriate procedures related to relocation. If the animal is handled, a report will be submitted, including date(s), location(s), habitat description, and any corrective measures taken to protect the western spadefoot within 1 business day to the Wildlife Agencies. The biologist will report any take of listed species to the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife immediately. Any worker who inadvertently injures or kills a western spadefoot or who finds dead, injured, or entrapped western spadefoot(s) must immediately report the incident to the approved biologist.

Giant Gartersnake

To avoid direct and indirect effects of Covered Activities on giant gartersnake (*Thamnophis gigas*), the following AMMs will be implemented.

GGS-1 (Giant Gartersnake Surveys): If the HCP giant gartersnake modeled habitat maps (Figure 3-18 of the SSHCP document) show that modeled habitat for giant gartersnake is present within a Covered Activity's project footprint or within 300 feet of a project footprint, then an approved biologist will conduct a field investigation to delineate giant gartersnake aquatic habitat within the project footprint and adjacent areas within 300 feet of the project footprint. In addition to the HCP land cover types shown in Figure 3-18 of the SSHCP document, giant gartersnake aquatic habitat includes, but is not limited to, low-gradient streams and creeks, open water, freshwater marsh, agricultural ditches, and rice fields. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. The Third-Party Project Proponent will map all existing or potential sites and provide these maps to the Local Land Use Permit Applicants and the HCP Implementing Entity. Locations of delineated giant gartersnake habitat must also be noted on plans that are submitted to a Local Land Use Permit Applicant. The applicant will use this information to finalize project design. Covered Activities may occur throughout the year as long as giant gartersnake habitat is identified and fully avoided. Otherwise, Covered Activities must comply with GGS-2 through GGS-8, below. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

GGS-2 (Giant Gartersnake Work Window): Covered Activities that do not fully avoid giant gartersnake modeled habitat (Figure 3-18 of the SSHCP document) will be

conducted during the snake's active season. Construction and ground-disturbing activities will be initiated after May 1 and will end prior to September 15. If it appears that construction activities may go beyond September 15, the Local Land Use Permit Applicant or their Third-Party Project Proponent will contact the HCP Implementing Entity as soon as possible, but not later than September 1. The Local Land Use Permit Applicant and the HCP Implementing Entity will discuss with the Wildlife Agencies additional measures necessary to minimize take.

GGS-3 (Giant Gartersnake Monitoring): If a Covered Activity is occurring in giant gartersnake modeled habitat (Figure 3-18 of the SSHCP document), an approved biologist experienced with giant gartersnake identification and behavior will monitor the project site, including the integrity of any exclusion fencing. The approved biologist will be on site daily while construction-related activities are taking place in aquatic habitat or within 300 feet of aquatic habitat, and will inspect the project site daily for giant gartersnake prior to construction activities. If a giant gartersnake is encountered, refer to GGS-7. The approved biologist will also train construction personnel on the required avoidance procedures, exclusion fencing, and protocols in the event that a giant gartersnake enters an active construction zone (i.e., outside the buffer zone).

GGS-4 (Giant Gartersnake Habitat Dewatering and Exclusion): If construction activities will occur in giant gartersnake aquatic habitat, aquatic habitat will be dewatered and then remain dry and absent of aquatic prey (e.g., fish and tadpoles) for 15 days prior to initiation of construction activities. If complete dewatering is not possible, the HCP Implementing Entity will be contacted to determine what additional measures may be necessary to minimize effects to giant gartersnake. After aquatic habitat has been dewatered 15 days prior to construction activities, exclusion fencing will be installed extending a minimum of 300 feet into adjacent uplands to isolate both the aquatic and adjacent upland habitat. Exclusionary fencing will be erected 36 inches above ground and buried at least 6 inches below the ground to prevent snakes from attempting to move under the fence into the construction area. In addition, high-visibility fencing will be erected to identify the construction limits and to protect adjacent habitat from encroachment of personnel and equipment. Giant gartersnake habitat outside construction fencing will be avoided by all construction personnel. The fencing and the work area will be inspected by the approved biologist to ensure that the fencing is intact and that no snakes have entered the work area before the start of each work day. The fencing will be maintained by the contractor until completion of the project. If giant gartersnake is encountered, refer to GGS-7, below.

GGS-5 (Avoid Giant Gartersnake Entrapment): If a Covered Activity occurs in giant gartersnake modeled habitat (Figure 3-18 of the SSHCP document), all excavated steep-walled holes and trenches more than 6 inches deep will be covered with plywood (or similar material) or provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each work day or 30 minutes prior to sunset, whichever occurs first. All steep-walled holes and trenches will be inspected by the approved biologist each morning to ensure that no wildlife has become entrapped. All construction pipes, culverts, similar structures, construction equipment, and construction debris left overnight within giant gartersnake modeled habitat will be inspected for giant gartersnake by the approved biologist prior to being moved. If a giant gartersnake is encountered, refer to GGS-7.

GGS-6 (Erosion Control Materials in Giant Gartersnake Habitat): If erosion control (BMP-2) is implemented within giant gartersnake modeled habitat (Figure 3-18 of the SSHCP document), non-entangling erosion control material will be used to reduce the potential for entrapment. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material will be used to ensure snakes are not trapped (no monofilament). Coconut coir matting and fiber rolls containing burlap are examples of acceptable erosion control materials.

GGS-7 (Giant Gartersnake Encounter Protocol): If a giant gartersnake is encountered during construction activities, the approved biologist will notify the Wildlife Agencies immediately. Construction activities will be suspended in a 100-foot radius of the animal until the animal leaves the project site on its own volition. If necessary, the approved biologist will notify the Wildlife Agencies to determine the appropriate procedures related to relocation. If the animal is handled, a report will be submitted, including date(s), location(s), habitat description, and any corrective measures taken to protect the giant gartersnake within 1 business day to the Wildlife Agencies. The biologist will report any take of listed species to the U.S. Fish and Wildlife Service immediately. Any worker who inadvertently injures or kills a giant gartersnake or who finds one dead, injured, or entrapped must immediately report the incident to the approved biologist.

GGS-8 (Giant Gartersnake Post-Construction Restoration): After completion of ground-disturbing Covered Activities, the applicant will remove any temporary fill and construction debris and will restore temporarily disturbed areas to pre-project conditions. Restoration work includes such activities as re-vegetating the banks and active channels with a seed mix similar to pre-project conditions. Appropriate methods and plant species used to re-vegetate such areas will be determined on a

site-specific basis in consultation with the HCP Implementing Entity. Restoration work may include replanting emergent aquatic vegetation. Refer to the U.S. Fish and Wildlife Service's (USFWS) Guidelines for the Restoration and/or Replacement of Giant Gartersnake Habitat (USFWS 1997), or the most current USFWS guidelines at the time of the activity. A photo documentation report showing pre- and post-project conditions will be submitted to the HCP Implementing Entity 1 month after implementation of the restoration.

Western Pond Turtle

To avoid direct and indirect effects of Covered Activities on western pond turtle (*Actinemys marmorata*), the following AMMs will be implemented.

WPT-1 (Western Pond Turtle Surveys): If the HCP western pond turtle modeled habitat maps (Figure 3-19 of the SSHCP document) show that modeled habitat for western pond turtle is present within a Covered Activity's project footprint or within 300 feet of a project footprint, then an approved biologist will conduct a field investigation to delineate western pond turtle aquatic habitat within the project footprint and within 300 feet of the project footprint. In addition to the HCP land cover types shown in Figure 3-19 of the SSHCP document, western pond turtle aquatic habitat includes, but is not limited to, low-gradient streams and creeks, open water, freshwater marsh, and rice fields. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. The Third-Party Project Proponent will map all existing or potential sites and provide those maps to the Local Land Use Permit Applicants and the HCP Implementing Entity. Locations of delineated western pond turtle habitat must also be noted on plans that are submitted to a Local Land Use Permit Applicant. The applicant will use this information to finalize project design. Covered Activities may occur throughout the year as long as western pond turtle habitat is identified and fully avoided. Otherwise, Covered Activities must comply with WPT-2 through WPT-9. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

WPT-2 (Western Pond Turtle Work Window): Maintenance and improvements to existing structures may occur throughout the year as long as western pond turtle habitat is identified and avoided, and movement of equipment is confined to existing roads. Otherwise, construction and ground-disturbing Covered Activities must be conducted outside of western pond turtle's active season. Construction and ground-disturbing activities will be initiated after May 1 and will commence prior to September 15. If it appears that construction activities may go beyond

September 15, the appropriate Permit Applicant will contact the Local Land Use Permit Applicant and the HCP Implementing Entity as soon as possible, but not later than September 1, to determine if additional measures are necessary to minimize take.

WPT-3 (Western Pond Turtle Monitoring): If a Covered Activity is occurring in western pond turtle modeled habitat (Figure 3-19 of the SSHCP document), an approved biologist experienced with western pond turtle identification and behavior will monitor the project site, including the integrity of any exclusion fencing. The approved biologist will be on site daily while construction-related activities are taking place in aquatic habitat or within 300 feet of aquatic habitat, and will inspect the project site daily for western pond turtle prior to construction activities. The approved biologist will also training construction personnel on the required avoidance procedures, exclusion fencing, and protocols in the event that a western pond turtle enters an active construction zone (i.e., outside the buffer zone).

WPT-4 (Western Pond Turtle Habitat Dewatering and Exclusion): If construction activities will occur in western pond turtle aquatic habitat, aquatic habitat for the turtle will be dewatered and then remain dry and absent of aquatic prey (e.g., crustaceans and other aquatic invertebrates) for 15 days prior to the initiation of construction activities. If complete dewatering is not possible, the HCP Implementing Entity will be contacted to determine what additional measures may be necessary to minimize effects to western pond turtle. After aquatic habitat has been dewatered 15 days prior to construction activities, exclusion fencing will be installed extending a minimum of 300 feet into adjacent uplands to isolate both the aquatic and adjacent upland habitat. Exclusionary fencing will be erected 36 inches above ground and buried at least 6 inches below the ground to prevent turtles from attempting to burrow or move under the fence into the construction area. In addition, high-visibility fencing will be erected to identify construction limits and to protect adjacent habitat from encroachment of personnel and equipment. Western pond turtle habitat outside construction fencing will be avoided by all construction personnel. The fencing and work area will be inspected by the approved biologist to ensure that the fencing is intact and that no turtles have entered the work area before the start of each work day. Fencing will be maintained by the contractor until completion of the project. If, after exclusion fencing and dewatering, western pond turtles are found within the project footprint or within 300 feet of the project footprint, the

Third-Party Project Proponent will discuss the next best steps with the HCP Implementing Entity and Wildlife Agencies.

WPT-5 (Avoid Western Pond Turtle Entrapment): If a Covered Activity occurs within western pond turtle modeled habitat (Figure 3-19 of the SSHCP document), all excavated steep-walled holes and trenches more than 6 inches deep will be covered with plywood (or similar material) or provided with one or more escape ramps constructed of earth fill or wooden planks at the end of each work day or 30 minutes prior to sunset, whichever occurs first. All steep-walled holes and trenches will be inspected by the approved biologist each morning to ensure that no wildlife has become entrapped. All construction pipes, culverts, similar structures, construction equipment, and construction debris left overnight within western pond turtle modeled habitat will be inspected for western pond turtle by the approved biologist prior to being moved.

WPT-6 (Erosion Control Materials in Western Pond Turtle Habitat): If erosion control (BMP-2) is implemented within western pond turtle modeled habitat (Figure 3-19 of the SSHCP document), non-entangling erosion control material will be used to reduce the potential for entrapment. Tightly woven fiber netting (mesh size less than 0.25 inch) or similar material will be used to ensure that turtles are not trapped (no monofilament). Coconut coir matting and fiber rolls containing burlap are examples of acceptable erosion control materials.

WPT-7 (Western Pond Turtle Modeled Habitat Speed Limit): Covered Activity construction and maintenance vehicles will observe a 20-mile-per-hour speed limit within western pond turtle modeled upland habitat (Figure 3-19 of the SSHCP document).

WPT-8 (Western Pond Turtle Encounter Protocol): If a western pond turtle is encountered during construction activities, the approved biologist will notify the Wildlife Agencies immediately. Construction activities will be suspended in a 100-foot radius of the animal until the animal leaves the project site on its own volition. If necessary, the approved biologist will notify the Wildlife Agencies to determine the appropriate procedures related to relocation. If the animal is handled, a report will be submitted, including date(s), location(s), habitat description, and any corrective measures taken to protect the turtle, within 1 business day to the Wildlife Agencies. The biologist will report any take of listed species to the U.S. Fish and Wildlife Service immediately. Any worker who inadvertently injures or kills a western pond turtle or who finds one dead, injured, or entrapped must immediately report the incident to the approved biologist.

WPT-9 (Western Pond Turtle Post-Construction Restoration): After completion of ground-disturbing Covered Activities, the applicant will remove any temporary fill and construction debris and will restore temporarily disturbed areas to pre-project conditions. Restoration work includes such activities as re-vegetating the banks and active channels with a seed mix similar to pre-project conditions. Appropriate methods and plant species used to re-vegetate such areas will be determined on a site-specific basis in consultation with the HCP Implementing Entity. Restoration work may include replanting emergent aquatic vegetation and placing appropriate artificial or natural basking areas in waterways and wetlands. A photo documentation report showing pre- and post-project conditions will be submitted to the HCP Implementing Entity 1 month after implementation of the restoration.

Tricolored Blackbird

To avoid direct and indirect effects of Covered Activities on tricolored blackbird (*Agelaius tricolor*), the following AMMs will be implemented.

TCB-1 (Tricolored Blackbird Surveys): If modeled habitat for tricolored blackbird is present within a Covered Activity's project footprint or within 500 feet of a project footprint, then an approved biologist will conduct a field investigation to determine if existing or potential nesting or foraging sites are present within the project footprint and adjacent areas within 500 feet of the project footprint. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. Within the Planning Area, potential tricolor blackbird nest sites are often associated with freshwater marsh and seasonal wetlands, or in thickets of willow, blackberry, wild rose, thistle, and other thorny vegetation. Tricolored blackbirds are also known to nest in crops associated with dairy farms. Foraging habitat is associated with annual grasslands, wet and dry vernal pools and other seasonal wetlands, agricultural fields (such as large tracts of alfalfa and pastures with continuous haying schedules and recently tilled fields), cattle feedlots, and dairies. The Third-Party Project Proponent will map all existing or potential nesting or foraging sites and provide these maps to the Local Land Use Permit Applicants and HCP Implementing Entity. Nesting sites must also be noted on plans that are submitted to a Local Land Use Permit Applicant. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

TCB-2 (Tricolored Blackbird Pre-Construction Surveys): Pre-construction surveys will be required to determine if active nests are present within a project footprint or within 500

feet of a project footprint if existing or potential nest sites were found during design surveys and construction activities will occur during the breeding season (March 1 through September 15). An approved biologist will conduct pre-construction surveys within 30 days and within 3 days of ground-disturbing activities, and within the proposed project footprint and 500 feet of the proposed project footprint to determine the presence of nesting tricolored blackbird. Pre-construction surveys will be conducted during the breeding season (March 1 through August 31). Surveys conducted in February (to meet pre-construction survey requirements for work starting in March) must be conducted within 14 days and 3 days in advance of ground-disturbing activities. If a nest is present, then TCB-3 and TCB-4 will be implemented. The approved biologist will inform the Land Use Authority Permit Applicant and the HCP Implementing Entity of species locations, and they in turn will notify the Wildlife Agencies.

TCB-3 (Tricolored Blackbird Nest Buffer): If active nests are found within the project footprint or within 500 feet of any project-related Covered Activity, the Third-Party Project Proponent will establish a 500-foot temporary buffer around the active nest until the young have fledged.

TCB-4 (Tricolored Blackbird Nest Buffer Monitoring): If nesting tricolored blackbirds are present within the project footprint or within 500 feet of any project-related Covered Activity, then an approved biologist experienced with tricolored blackbird behavior will be retained by the Third-Party Project Proponent to monitor the nest throughout the nesting season and to determine when the young have fledged. The approved biologist will be on site daily while construction-related activities are taking place near the disturbance buffer. Work within the nest disturbance buffer will not be permitted. If the approved biologist determines that tricolored blackbirds are exhibiting agitated behavior, construction will cease until the buffer size is increased to a distance necessary to result in no harm or harassment to the nesting tricolored blackbirds. If the biologist determines that the colonies are at risk, a meeting with the Third-Party Project Proponent, HCP Implementing Entity, and Wildlife Agencies will be held to determine the best course of action to avoid nest abandonment or take of individuals. The approved biologist will also train construction personnel on the required avoidance procedures, buffer zones, and protocols in the event that a tricolored blackbird flies into an active construction zone (i.e., outside the buffer zone).

TCB-5 (Timing of Pesticide Use and Harvest Timing on Agricultural Preserves): On HCP Farmland/Agricultural Preserves, pesticides (including herbicides) will not be applied from January 1 through July 15.

Swainson's Hawk

To avoid direct and indirect effects of Covered Activities on Swainson's hawk (*Buteo swainsoni*), the following AMMs will be implemented.

SWHA-1 (Swainson's Hawk Surveys): If modeled habitat for Swainson's hawk (Figure 3-25 of the SSHCP document) is present within a Covered Activity's project footprint or within 0.25 mile of a project footprint, then an approved biologist will conduct a survey to determine if existing or potential nesting sites are present within the project footprint and adjacent areas within 0.25 mile of the project footprint. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. Nest sites are often associated with Riparian land cover, but also include lone trees in fields, trees along roadways, and trees around structures. Nest trees may include, but are not limited to, Fremont's cottonwood (*Populus fremontii*), oaks (*Quercus* spp.), willows (*Salix* spp.), walnuts (*Juglans* spp.), eucalyptus (*Eucalyptus* spp.), pines (*Pinus* spp.), and Deodar cedar (*Cedrus deodara*). The Third-Party Project Proponent will map all existing and potential nesting sites and provide these maps to the Local Land Use Permit Applicants and HCP Implementing Entity. Nesting sites must also be noted on plans that are submitted to a Local Land Use Permit Applicant. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

SWHA-2 (Swainson's Hawk Pre-Construction Surveys): Pre-construction surveys will be required to determine if active nests are present within a project footprint or within 0.25 mile of a project footprint if existing or potential nest sites were found during initial surveys and construction activities will occur during the breeding season (March 1 through September 15). An approved biologist will conduct pre-construction surveys within 30 days and 3 days of ground-disturbing activities to determine presence of nesting Swainson's hawk. Pre-construction surveys will be conducted during the breeding season (March 1 through September 15). If a nest is present, then SWHA-3 and SWHA-4 will be implemented. The approved biologist will inform the Land Use Authority Permit Applicant and HCP Implementing Entity of species locations, and they in turn will notify the Wildlife Agencies.

SWHA-3 (Swainson's Hawk Nest Buffer): If active nests are found within the project footprint or within 0.25 mile of any project-related Covered Activity, the Third-Party Project Proponent will establish a 0.25 mile disturbance buffer around the active nest until the young have fledged, with concurrence from the Wildlife Agencies.

SWHA-4 (Swainson's Hawk Nest Buffer Monitoring): If nesting Swainson's hawks are present within the project footprint or within 0.25 mile of any project-related Covered Activity, then an approved biologist experienced with Swainson's hawk behavior will be retained by the Third-Party Project Proponent to monitor the nest throughout the nesting season and to determine when the young have fledged. The approved biologist will be on site daily while construction-related activities are taking place within the buffer. Work within the temporary nest disturbance buffer can occur with the written permission of the HCP Implementing Entity and Wildlife Agencies. If nesting Swainson's hawks begin to exhibit agitated behavior, such as defensive flights at intruders, getting up from a brooding position, or flying off the nest, the approved biologist will have the authority to shut down construction activities. If agitated behavior is exhibited, the biologist, Third-Party Project Proponent, HCP Implementing Entity, and Wildlife Agencies will meet to determine the best course of action to avoid nest abandonment or take of individuals. The approved biologist will also train construction personnel on the required avoidance procedures, buffer zones, and protocols in the event that a Swainson's hawk flies into an active construction zone (i.e., outside the buffer zone).

Greater Sandhill Crane

To avoid direct and indirect effects of Covered Activities on greater sandhill crane (*Grus canadensis*), the following AMMs will be implemented.

GSC-1 (Greater Sandhill Crane Surveys): If modeled habitat for greater sandhill crane (Figure 3-22 of the SSHCP document) is present within a Covered Activity's project footprint or within 0.5 mile of a project footprint, then an approved biologist will conduct a field investigation to determine if existing or potential roosting sites are present within the project footprint and adjacent areas within 0.5 mile of the project footprint. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. Roosting sites within the Planning Area are often associated with flooded fields, seasonal wetlands, and freshwater marsh. The Third-Party Project Proponent will map all existing or potential roosting sites and provide these maps to the Local Land Use Permit Applicants and HCP Implementing Entity.

Roosting sites must also be noted on plans that are submitted to a Local Land Use Permit Applicant. See Chapter 10 for the process to conduct and submit survey information.

GSC-2 (Greater Sandhill Crane Pre-Construction Surveys): Pre-construction surveys will be required to determine if active roosting sites are present within a project footprint or within 0.5 mile of a project footprint if existing or potential roosting sites were found during initial surveys and construction activities will occur when wintering flocks are present within the Planning Area (September 1 through March 15). An approved biologist will conduct pre-construction surveys within 15 days of ground-disturbing activities, and within 0.5 mile of a project footprint, to determine presence of roosting greater sandhill cranes. Pre-construction surveys will be conducted September 1 through March 15, when wintering flocks are present within the Planning Area. If birds are present, then GSC-3, GSC-4, and GSC-5 will be implemented. The approved biologist will inform the Land Use Authority Permit Applicant and HCP Implementing Entity of species locations, and they in turn will notify the Wildlife Agencies.

GSC-3 (Greater Sandhill Crane Roosting Buffer): If active roosting sites are found within the project footprint or within 0.5 mile of any project-related Covered Activity, the Third-Party Project Proponent will establish a 0.5 mile temporary roosting disturbance buffer around the roosting site until the cranes have left.

GSC-4 (Greater Sandhill Crane Visual Barrier): Greater sandhill cranes have low tolerance for human disturbance, and such disturbance has caused cranes to abandon foraging and roosting sites. Repeat disturbance affects their ability to feed and store energy needed for survival. If project-related activities occur within 0.5 mile of a known roosting site as identified by surveys conducted during implementation of GSC-1 or GSC-2, a visual barrier will be constructed.

GSC-5 (Greater Sandhill Crane Roosting Buffer Monitoring): If roosting sites are found within the project footprint or within 0.50 mile of any project-related Covered Activity, an approved biologist experienced with greater sandhill crane behavior will be retained by the Third-Party Project Proponent to monitor the roosting site throughout the roosting season and to determine when the birds have left. The approved biologist will be on site daily while construction-related activities are taking place within the disturbance buffer. Work within the temporary disturbance buffer can only occur with the written permission of the HCP Implementing Entity and Wildlife Agencies. If greater sandhill cranes are abandoning their roosting and/or forage sites, the approved biologist will have the authority to shut down construction activities. If

roost abandonment occurs, the approved biologist, Third-Party Project Proponent, HCP Implementing Entity, and Wildlife Agencies will meet to determine the best course of action to avoid harm and harassment of individuals. The approved biologist will also train construction personnel on the avoidance procedures, buffer zones, and protocols in the event that greater sandhill cranes move into an active construction zone (i.e., outside the buffer zone).

Western Burrowing Owl

To avoid direct and indirect effects of Covered Activities on western burrowing owl (*Athene cunicularia*), the following AMMs will be implemented.

WBO-1 (Western Burrowing Owl Surveys): Surveys within modeled habitat are required for both the breeding and non-breeding season. If the project site falls within modeled habitat, an approved biologist will survey the project site and map all burrows, noting any burrows that may be occupied. Occupied burrows are often (but not always) indicated by tracks, feathers, egg shell fragments, pellets, prey remains, and/or excrement. Surveying and mapping will be conducted by the approved biologist while walking transects throughout the entire project site plus all accessible areas within a 250-foot radius from the project site. The centerline of these transects will be no more than 50 feet apart and will vary in width to account for changes in terrain and vegetation that can preclude complete visual coverage of the area. For example, in hilly terrain with patches of tall grass, transects will be closer together, and in open areas with little vegetation, they can be 50 feet apart. This methodology is consistent with current survey protocols for this species (California Burrowing Owl Consortium 1993). Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. If suitable habitat is identified during the initial survey, and if the project does not fully avoid the habitat, pre-construction surveys will be required. Burrowing owl habitat is fully avoided if project-related activities do not impinge on a 250-foot buffer established by the approved biologist around suitable burrows. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

WBO-2 (Western Burrowing Owl Pre-Construction Surveys): Prior to any Covered Activity ground disturbance, an approved biologist will conduct pre-construction surveys in all areas that were identified as suitable habitat during the initial surveys. The purpose of the pre-construction surveys is to document the presence or absence of burrowing owls on the project site, particularly in areas within 250 feet of construction activities. To maximize the likelihood of detecting owls, the pre-construction

survey will last a minimum of 3 hours. The survey will begin 1 hour before sunrise and continue until 2 hours after sunrise (3 hours total), or begin 2 hours before sunset and continue until 1 hour after sunset. Additional time may be required for large project sites. A minimum of two pre-construction surveys will be conducted (if owls are detected on the first survey, a second survey is not needed). All owls observed will be counted and their location will be mapped. Surveys will conclude no more than 2 calendar days prior to construction. Therefore, the Third-Party Project Proponent must begin surveys no more than 4 days prior to construction (2 days of surveying plus up to 2 days between surveys and construction). To avoid last-minute changes in schedule or contracting that may occur if burrowing owls are found, the Third-Party Project Proponent may also conduct a preliminary survey up to 15 days before construction. This preliminary survey may count as the first of the two required surveys as long as the second survey concludes no more than 2 calendar days in advance of construction.

WBO-3 (Burrowing Owl Avoidance): If western burrowing owl or evidence of western burrowing owl is observed on the project site or within 250 feet of the project site during pre-construction surveys, then the following will occur:

During Breeding Season: If the approved biologist finds evidence of western burrowing owls within a project site during the breeding season (February 1 through August 31), all project-related activities will avoid nest sites during the remainder of the breeding season or while the nest remains occupied by adults or young (nest occupation includes individuals or family groups foraging on or near the site following fledging). Avoidance is establishment of a minimum 250-foot buffer zone around nests. Construction and other project-related activities may occur outside of the 250-foot buffer zone. Construction and other project-related activities may be allowed inside of the 250-foot non-disturbance buffer during the breeding season if the nest is not disturbed, and the Third-Party Project Proponent develops an avoidance, minimization, and monitoring plan that is approved by the HCP Implementing Entity and Wildlife Agencies prior to project construction based on the following criteria:

- The HCP Implementing Entity and Wildlife Agencies approve of the avoidance and minimization plan provided by the project applicant.
- An approved biologist monitors the owls for at least 3 days prior to construction to determine baseline nesting and foraging behavior (i.e., behavior without construction).

- The same approved biologist monitors the owls during construction and finds no change in owl nesting and foraging behavior in response to construction activities.

If there is any change in owl nesting and foraging behavior as a result of construction activities, the approved biologist will have authority to shut down activities within the 250-foot buffer. Construction cannot resume within the 250-foot buffer until any owls present are no longer affected by nearby construction activities, and with written concurrence from the Wildlife Agencies.

If monitoring by the approved biologist indicates that the nest is abandoned prior to the end of nesting season and the burrow is no longer in use, the non-disturbance buffer zone may be removed if approved by the Wildlife Agencies. The approved biologist will excavate the burrow in accordance with the latest California Department of Fish and Wildlife guidelines for burrowing owl to prevent reoccupation after receiving approval from the Wildlife Agencies.

The HCP Implementing Entity and Wildlife Agencies will respond to a request from the Third-Party Project Proponent to review the proposed construction monitoring plan within 21 days.

During Non-Breeding Season: During the non-breeding season (September 1 through January 31), the approved biologist will establish a minimum 250-foot non-disturbance buffer around occupied burrows. Construction activities outside of this 250-foot buffer will be allowed. Construction activities within the non-disturbance buffer will be allowed if the following criteria are met to prevent owls from abandoning over-wintering sites:

- An approved biologist monitors the owls for at least 3 days prior to construction to determine baseline foraging behavior (i.e., behavior without construction).
- The same approved biologist monitors the owls during construction and finds no change in owl foraging behavior in response to construction activities.
- If there is any change in owl foraging behavior as a result of construction activities, the approved biologist will have authority to shut down activities within the 250-foot buffer.
- If the owls are gone for at least 1 week, the Third-Party Project Proponent may request approval from the HCP Implementing Entity and Wildlife Agencies that an approved biologist excavate usable burrows and

install one-way exclusionary devices to prevent owls from re-occupying the site. After all usable burrows are excavated, the buffer zone will be removed and construction may continue.

Monitoring must continue as described above for the non-breeding season as long as the burrow remains active.

WBO-4 (Burrowing Owl Construction Monitoring): During construction of Covered Activities, 250-foot construction buffer zones will be established and maintained around any occupied burrow. An approved biologist will monitor the site to ensure that buffers are enforced and owls are not disturbed. The approved biologist will also train construction personnel on avoidance procedures, buffer zones, and protocols in the event that a burrowing owl flies into an active construction zone.

WBO-5 (Burrowing Owl Passive Relocation): Passive relocation is not allowed without the express written approval of the Wildlife Agencies. Passive owl relocation may be allowed on a case-by-case basis on project sites during the non-breeding season (September 1 through January 31) with the written approval of the Wildlife Agencies if the other measures described in this condition preclude work from continuing. Passive relocation must be done in accordance with the latest California Department of Fish and Wildlife guidelines for burrowing owl. Passive relocation will only be proposed if the burrow needing to be removed or with the potential to collapse from construction activities is the result of a Covered Activity. If passive relocation is approved by the Wildlife Agencies, an approved biologist can passively exclude birds from their burrows during the non-breeding season by installing one-way doors in burrow entrances. These doors will be in place for 48 hours to ensure that owls have left the burrow, and then the biologist will excavate the burrow to prevent reoccupation. Burrows will be excavated using hand tools only. During excavation, an escape route will be maintained at all times. This may include inserting an artificial structure into the burrow to avoid having materials collapse into the burrow and trap owls inside. Other methods of passive relocation, based on best available science, may be approved by the Wildlife Agencies over the HCP Permit Term.

WBO-6 (Burrowing Owl Timing of Maintenance Activities): All activities adjacent to existing or planned HCP Preserves, Preserve Setbacks, or Stream Setback areas will be seasonally timed, when safety permits, to avoid or minimize adverse effects on occupied burrows.

WBO-7 (Rodent Control): Rodent control will be allowed only in developed portions of a Covered Activity project site within western burrowing owl modeled habitat. Where rodent control is allowed, the method of rodent control will comply with the methods of rodent control discussed in the 4(d) Rule published in the U.S. Fish and Wildlife Service's (2004) final listing rule for tiger salamander.

Covered Raptor Species

To avoid direct and indirect effects of Covered Activities on covered raptor species, the following AMMs will be implemented. This measure applies to Cooper's hawk (*Accipiter cooperii*), loggerhead shrike (*Lanius ludovicianus*), northern harrier (*Circus cyaneus*), and white-tailed kite (*Elanus leucurus*). The following AMMs do not apply to ferruginous hawk (*Buteo regalis*), as they do not nest in the Planning Area. The following AMMs also do not apply to Swainson's hawk or burrowing owl, as specific AMMs have been developed for these covered raptor species.

RAPTOR-1 (Raptor Surveys): If modeled habitat for a covered raptor species (Figures 3-20, 3-23, 3-24, or 3-28 of the SSHCP document) is present within a Covered Activity's project footprint or within 0.25 mile of a project footprint, then an approved biologist will conduct a field investigation to determine if existing or potential nesting sites are present within the project footprint and adjacent areas within 0.25 mile of the project footprint. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. The Third-Party Project Proponent will map all existing or potential nesting sites and provide these maps to the Local Land Use Permit Applicants and HCP Implementing Entity. Nesting sites must also be noted on plans that are submitted to a Local Land Use Permit Applicant. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

RAPTOR-2 (Raptor Pre-Construction Surveys): Pre-construction surveys will be required to determine if active nests are present with a project footprint or within 0.25 mile of a project footprint if existing or potential nest sites are found during initial surveys and construction activities will occur during the raptor breeding season. An approved biologist will conduct pre-construction surveys within 30 days and 3 days of ground-disturbing activities within the proposed project footprint and within 0.25 mile of the proposed project footprint to determine presence of nesting covered raptor species. Pre-construction surveys will be conducted during the raptor breeding season. If a nest is present, then RAPTOR-3 and RAPTOR-4 will be implemented. The approved biologist will inform the Land Use

Authority Permit Applicant and HCP Implementing Entity of species locations, and they in turn will notify the Wildlife Agencies.

RAPTOR-3 (Raptor Nest/Roost Buffer): If active nests are found within the project footprint or within 0.25 mile of any project-related Covered Activity, the Third-Party Project Proponent will establish a 0.25 mile temporary nest disturbance buffer around the active nest until the young have fledged.

RAPTOR-4 (Raptor Nest/Roost Buffer Monitoring): If project-related Covered Activities within the temporary nest disturbance buffer are determined to be necessary during the nesting season, then an approved biologist experienced with raptor behavior will be retained by the Third-Party Project Proponent to monitor the nest throughout the nesting season and to determine when the young have fledged. The approved biologist will be on site daily while construction-related activities are taking place within the disturbance buffer. Work within the temporary nest disturbance buffer can occur with the written permission of the HCP Implementing Entity and Wildlife Agencies. If nesting raptors begin to exhibit agitated behavior, such as defensive flights at intruders, getting up from a brooding position, or flying off the nest, the approved biologist/monitor will have the authority to shut down construction activities. If agitated behavior is exhibited, the biologist, the Third-Party Project Proponent, HCP Implementing Entity, and Wildlife Agencies will meet to determine the best course of action to avoid nest abandonment or take of individuals. The approved biologist will also train construction personnel on the required avoidance procedures, buffer zones, and protocols in the event that a covered raptor species flies into an active construction zone (i.e., outside the buffer zone).

Western Red Bat

To avoid direct and indirect effects of Covered Activities on western red bat (*Lasiurus blossevillii*), the following AMMs will be implemented.

BAT-1 (Winter Hibernaculum Surveys): If modeled habitat (Figure 3-30 of the SSHCP document) for western red bat is present within 300 feet of a Covered Activity's project footprint, then an approved biologist will conduct a field investigation of the project footprint and adjacent areas within 300 feet of a project footprint to determine if a potential winter hibernaculum is present, and to identify and map potential hibernaculum sites. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas. If potential hibernaculum sites are found, the Third-Party Project Proponent

will note their locations on project designs and will design the project to avoid all areas within a 300-foot buffer around the potential hibernaculum sites. Winter hibernaculum habitat is fully avoided if project-related activities do not impinge on a 300-foot buffer established by the approved biologist around an existing or potential winter hibernaculum site. See Chapter 10 of the SSHCP document for the process to conduct and submit survey information.

BAT-2 (Winter Hibernaculum Pre-Construction Surveys): If the Third-Party Project Proponent elects not to avoid potential winter hibernaculum sites within the project footprint plus a 300-foot buffer, additional surveys are required. Prior to any ground disturbance related to Covered Activities, an approved biologist will conduct a pre-construction survey within 3 days of ground-disturbing activities within the project footprint and 300 feet of the project footprint to determine the presence of winter hibernaculum sites. Pre-construction surveys will be conducted during the winter hibernaculum season (November 1 through March 31). If a winter hibernaculum is present, then BAT-3 and BAT-4 will be implemented. The approved biologist will inform the Land Use Authority Permit Applicant and HCP Implementing Entity of species locations, and they in turn will notify the Wildlife Agencies.

BAT-3 (Winter Hibernaculum Buffer): If active winter hibernaculum sites are found within the project footprint or within 300 feet of the project footprint, the Third-Party Project Proponent will establish a 300-foot temporary disturbance buffer around the active winter hibernaculum site until bats have vacated the hibernaculum and the HCP Implementing Entity and Wildlife Agencies concur.

BAT-4 (Bat Eviction Methods): An approved biologist will determine if non-maternity and non-hibernaculum day and night roosts are present on the project site. If necessary, an approved biologist will use safe eviction methods to remove bats if direct impacts to non-maternity and non-hibernaculum day and night roosts cannot be avoided. If a winter hibernaculum site is present, Covered Activities will not occur until the hibernaculum is vacated, or, if necessary, safely evicted using methods acceptable to the Wildlife Agencies.

Table 2. Summary of Actions Associated with Covered Activities

Action		Residential, Commercial, and Industrial Development	Water Delivery	Recycled Water and Wastewater Facilities	Flood Control and Storm Drainage	Energy and Other Utility Services	Park and Recreation Facilities	Transportation Facilities	Sanitation Facilities	Other Public Facilities	Mining	Roads Outside the UDA	Land Management and Monitoring	Habitat Enhancement, Restoration, and Creation
Initial Construction	*Vegetation clearing*	X	X	X	X	X	X	X	X		X	X	X	X
	Grading, earthmoving	X	X	X	X	X	X	X	X		X	X	X	X
	Excavating	X	X	X	X	X	X	X	X		X	X	X	X
	Trenching and tunneling	X	X	X	X	X	X	X	X			X		
	Compacting soils	X	X	X		X	X	X	X		X	X		
	Pouring concrete/asphalt	X	X	X	X	X	X	X	X			X		
	Landscaping	X		X	X	X	X	X	X		X	X		
	Culvert placement	X						X				X		
Operation	*Vehicular use*	X	X	X			X	X				X		
	Wastewater generation	X		X		X								
	Water consumption	X		X		X								
Main Initial Construction enhancement	*Vegetation removal*	X	X	X	X	X	X		X			X		X
	Beaver dam removal				X									X
	In-stream removal of detritus	X			X		X	X						X

Table 2. Summary of Actions Associated with Covered Activities

Action		Residential, Commercial, and Industrial Development	Water Delivery	Recycled Water and Wastewater Facilities	Flood Control and Storm Drainage	Energy and Other Utility Services	Park and Recreation Facilities	Transportation Facilities	Sanitation Facilities	Other Public Facilities	Mining	Roads Outside the UDA	Land Management and Monitoring	Habitat Enhancement, Restoration, and Creation
	Ditch maintenance	X			X									X
	Fence repair	X		X	X		X		X		X	X	X	X
	Culvert clean-out	X			X							X	X	X
	Repairing channel banks	X			X									
	Spill cleanup	X		X	X			X				X		
	Cleaning trash racks	X			X									
	Tree trimming	X		X	X	X	X	X				X		
	Culvert replacement	X						X				X	X	X
	Fire management	X											X	X
	Species monitoring												X	X

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EIS/EIR APPENDIX E

Alternative Formulation and Screening

Table E-1. First Tier Alternatives Screening

Remove Lands Outside USB From the Planning Area Boundary	Remove Lands West of Interstate-5 From the Planning Area Boundary	All Habitat Preservation and Project Mitigation Is Located Outside of the USB	Preserve 50% of all Vernal Pools in the Planning Area	Recovery Plan Alternative (Preserve 95% of Total Acreage of the MCRA)	Preserve 76% of the Total Acreage of the MCRA	Preserve 49% of the Vernal Pools within the MCRA	Preserve More of the Highest-Quality Swainson's Hawk Habitat	SSHCP	Reduced Permit Term
Would the potential alternative include an interconnected preserve system throughout the Planning Area that is large enough to maintain in perpetuity each type of natural community that is native to the Planning Area, maintain in perpetuity each type of native plant and animal species present within the Planning Area, and maintain in perpetuity or expand the existing distribution of each native animal and plant species within the Planning Area?									
Not likely because the USB is already highly developed and the opportunities for preserve establishment are limited.	Not likely because it would not allow for establishment of preserves in lands that provide valuable habitat for greater sandhill crane.	Not likely because it would not include any additional conservation in the MCRA, which would likely make conservation of vernal pool tadpole shrimp not possible.	Not likely because it would not include sufficient preservation of vernal pools to maintain the existing distribution of native animal and plant species in the Planning Area.	Not likely because it would not be possible to establish a preserve system that meets the mandate of 95% vernal pool preservation in the MCRA.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative locate preserves in areas that maximize protection of native plant and animal species and the ecosystems on which they depend?									
Not likely because it would not allow for establishment of preserves in the areas of the Planning Area that retain the most intact habitat.	Not likely because it would not allow for establishment of preserves in lands that provide valuable habitat for greater sandhill crane.	Not likely because it would not allow for protection of special-status plant species that only occur within the USB.	Not likely because it would not include sufficient preservation of vernal pools to maximize protection of native plant and animals species and their ecosystems.	Not likely, as the high burden for preservation in the MCRA would reduce the amount of development fees available for preservation of other habitat types outside the MCRA.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative locate preserves in areas that maximize the protection of intact watersheds and watershed functions?									
Not likely because the watersheds in the USB are the most disturbed in the Planning Area; the intact watersheds are generally located outside the USB.	Possibly.	Not likely because it would not allow for establishment of preserves in all watersheds of the Planning Area.	Not likely because it would not prioritize preservation of vernal pools in the MCRA, resulting in preservation of vernal pools scattered around the Planning Area.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative protect large, contiguous blocks of species habitat. Provide habitat linkages between preserves that are wide enough to allow dispersal of individual native animals and plants and allow genetic exchange between species populations?									
Not likely because large, contiguous blocks of species habitat are mostly gone from the USB.	Possibly.	Not likely because it would not allow for establishment of linkage preserves in the USB to connect existing preserves.	Possibly.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative protect sufficient cropland and irrigated pasture to provide important foraging habitat on which some native animal species now depend (e.g., Swainson's hawk, white-tailed kite)?									
Not likely, because most of the habitat for these species is outside the USB. Although no Covered Activities would occur outside the USB, it is likely that development would still proceed outside the USB. However, it would not occur under the mitigation framework of an HCP.	Not likely because it would not allow for establishment of preserves in lands that provide valuable habitat for greater sandhill crane.	Possibly.	Possibly.	Not likely, as the high burden for preservation in the MCRA would reduce the amount of development fees available for preservation of other habitat types outside the MCRA.	Not likely, because the high avoidance within the MCRA would limit the available mitigation fees that would allow for acquisition of cropland and irrigated pasture. Preventing development in the MCRA would also shift development pressure to other lands, including those that currently contain cropland and irrigated pasture.	Possibly.	Possibly.	Possibly.	Possibly.

Table E-1. First Tier Alternatives Screening

Remove Lands Outside USB From the Planning Area Boundary	Remove Lands West of Interstate-5 From the Planning Area Boundary	All Habitat Preservation and Project Mitigation Is Located Outside of the USB	Preserve 50% of all Vernal Pools in the Planning Area	Recovery Plan Alternative (Preserve 95% of Total Acreage of the MCRA)	Preserve 76% of the Total Acreage of the MCRA	Preserve 49% of the Vernal Pools within the MCRA	Preserve More of the Highest-Quality Swainson's Hawk Habitat	SSHCP	Reduced Permit Term
Would the potential alternative preserve adequate greater sandhill crane roosting habitat and foraging habitat between the existing Stone Lakes National Wildlife Refuge and the existing Cosumnes River Preserve, to maintain or increase the population of greater sandhill crane over-wintering within the Planning Area?									
Not likely because it would not allow for establishment of preserves in lands that provide connectivity between Stone Lakes and the Cosumnes River Preserve.	Not likely because it would not allow for establishment of preserves in lands that provide connectivity between Stone Lakes and the Cosumnes River Preserve.	Possibly.	Possibly.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative protect the long-term viability of ranching and farming operations in the Planning Area (consistent with other objectives)?									
Not likely, as some ranching and farming operations outside the USB would be threatened by development if it is not included in the Plan Area.	Possibly.	Possibly.	Possibly.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative protect all currently documented and any newly discovered occurrences of Sacramento Orcutt grass and slender Orcutt grass in the Planning Area?									
Not likely, because if Orcutt grasses are found outside the USB they could not be included in the Preserve System.	Possibly.	Not likely, because Orcutt grasses are located inside the USB and then could not be included in the preserve system.	Possibly.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative avoid or minimize impacts to state and federally listed species and their habitats, to the maximum extent practicable?									
Possibly.	Not likely because it would not allow for establishment of preserves in lands that provide valuable habitat for greater sandhill crane.	Not likely, because Orcutt grasses are located inside the USB and then could not be included in the preserve system.	Not likely because it would not include sufficient preservation of vernal pools to avoid or minimize impacts to state and federally listed species to the maximum extent practicable.	Not likely, as the high burden for preservation in the MCRA would reduce the amount of development fees available for preservation of other habitat types outside the MCRA.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative avoid or minimize impacts to the existing physical, chemical, and biological functions and services of wetlands and streams in the Planning Area, to the maximum extent practicable?									
Possibly.	Possibly.	Not likely, because wetlands and streams in the USB would not be protected in preserves.	Possibly.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative achieve no net loss of the existing functions and services of aquatic resources in the Planning Area? Methods used to achieve no net loss may include the re-establishment and establishment of vernal pools, riparian, and other aquatic land cover types?									
Possibly.	Possibly.	Possibly.	Not likely because it would result in insufficient preservation of vernal pools than to mitigate Covered Activities and achieve no net loss.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.

Table E-1. First Tier Alternatives Screening

Remove Lands Outside USB From the Planning Area Boundary	Remove Lands West of Interstate-5 From the Planning Area Boundary	All Habitat Preservation and Project Mitigation Is Located Outside of the USB	Preserve 50% of all Vernal Pools in the Planning Area	Recovery Plan Alternative (Preserve 95% of Total Acreage of the MCRA)	Preserve 76% of the Total Acreage of the MCRA	Preserve 49% of the Vernal Pools within the MCRA	Preserve More of the Highest-Quality Swainson's Hawk Habitat	SSHCP	Reduced Permit Term
Would the potential alternative include a long-term preserve monitoring and habitat management program sufficient to maintain or improve habitats of targeted native plant and animal species in perpetuity?									
Possibly.	Possibly.	Possibly.	Possibly.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative support the development and implementation of streamlined water-resource permitting programs under CWA Section 404, CWA 401, the Porter–Cologne Water Quality Control Act, and Section 1600 of the California Fish and Game Code (Streambed Alteration Agreements) by the federal and state agencies with responsibility for implementing those statues within the Planning Area?									
Possibly.	Possibly.	Possibly.	Possibly.	Possibly, although this alternative is not feasible for the reasons listed under Screening Criteria #1.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative facilitate the recovery of federally listed species, and provide sufficient preservation of federally designated recovery areas within the Planning Area?									
Not likely, as it would not result in preservation of habitat in the Cosumnes/Rancho Seco Core Recovery Area.	Possibly.	Not likely because it would not include any additional conservation in the MCRA, which would likely make conservation of vernal pool tadpole shrimp not possible.	Not likely because it would include sufficient preservation of vernal pools ESA core recovery areas that are now designated within the Planning Area.	Not likely, as the high burden for preservation in the MCRA would reduce the amount of development fees available for preservation of other habitat types outside the MCRA including the Cosumnes/Rancho Seco Core Area.	Possibly.	Possibly.	Possibly.	Possibly.	Possibly.
Score (# of "Possibly")									
5	9	5	9	9	13	14	14	14	14
Carried Forward to Second Tier Screening?									
No	No	No	No	No	Yes	Yes	Yes	Yes	Yes

Table E-2. Second Tier Alternatives Screening

Preserve 76% of the Total Acreage of the MCRA	Preserve 49% of the Vernal Pools within the MCRA	Preserve More of the Highest-Quality Swainson's Hawk Habitat	SSHCP	Reduced Permit Term
Would the potential alternative avoid or substantially lessen any of the significant environmental effects of the proposed project?				
Possibly.	Possibly	Not likely, because the proposed project would have minimal effects on Swainson's hawk. This is especially true since the withdrawal of the City of Elk Grove from the Plan Area, as that was the area with by far the greatest impacts to Swainson's hawk habitat from Covered Activities.	Does not apply, as this alternative is the proposed project.	Possibly.
Would the potential alternative address one or more significant issues related to the proposed action?				
Possibly.	Possibly	Not likely, because the proposed project would have minimal effects on Swainson's hawk. This is especially true since the withdrawal of the City of Elk Grove from the Plan Area, as that was the area with by far the greatest impacts to Swainson's hawk habitat from Covered Activities.	Does not apply, as this alternative is the proposed project.	Possibly.
Score (# of "Possibly")				
2	2	0	N/A	2
Carried Forward to Third Tier Screening?				
Yes	Yes	No	Yes	Yes

Table E-3. Third Tier Alternatives Screening

Preserve 76% of the Total Acreage of the MCRA	Preserve 49% of the Vernal Pools within the MCRA	SSHCP	Reduced Permit Term
Would the potential alternative accommodate the existing transportation, utility, and other infrastructure master plans that have been prepared by the SSHCP permit Applicants (County of Sacramento, City of Galt, City of Rancho Cordova, SCWA, SRCSD, and Connector JPA)?			
Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative allow an adequate amount of urban development within the currently adopted spheres of influence for the City of Rancho Cordova and the City of Galt, and the currently adopted USB for Sacramento County, to discourage expansion beyond these boundaries and maintain the sound land use planning principles these boundaries encourage (e.g., preventing sprawl outside the USB and leap-frog development; consolidating development to support the efficient provision of utilities and infrastructure; promoting compact mixed use development that supports viable transit and walkable areas; creating communities with a variety of housing types that support different income levels and socioeconomic conditions; and maintaining compliance with air quality laws and regulations that influence, or are influenced by land use decisions such as Assembly Bill 32, Senate Bill 375, and the Clean Air Act).			
Not likely, because "displaced" development outside the USB would require additional development of utilities and infrastructure, lead to more urban sprawl with more vehicle trips, and would not promote compact mixed-use development that supports viable transit and walkable areas. This development outside the USB may also conflict with requirements of AB32 and SB375 to reduce greenhouse gas emissions through land use planning that minimizes vehicle trips.	Not likely, because "displaced" development outside the USB would require additional development of utilities and infrastructure, lead to more urban sprawl with more vehicle trips, and would not promote compact mixed-use development that supports viable transit and walkable areas. This development outside the USB may also conflict with requirements of AB32 and SB375 to reduce greenhouse gas emissions through land use planning that minimizes vehicle trips.	Possibly.	Possibly.
Would the potential alternative include an adequate amount of urban development with associated fees to meet first tier screening criteria, above? In addition, the associated mitigation-fee structure must be practicable, with fees that are analogous to fees collected under other Northern California permitted HCPs that have similar species habitats and similar impacts.			
Not likely, because the resource agencies did not take into account the feasibility of obtaining these lands for permanent habitat preservation when the 2011 Agency Conceptual Design was prepared. In order to acquire these lands, the development fee would need to be increased to such an extent that it would not be consistent with fees charged by other HCPs.	Possibly.	Possibly.	Possibly.
Would the potential alternative include as covered activities the SSHCP Permit Applicant's transportation, utility, and other infrastructure activities and projects as described in the approved master plans of the SSHCP permit Applicants (County of Sacramento, City of Galt, City of Rancho Cordova, SCWA, and Connector JPA)?			
Possibly.	Possibly.	Possibly.	Possibly.
Would the potential alternative rely on willing sellers for the purchase of land or easements when establishing habitat preserves; do not include condemnation or imminent domain to meet the project needs, purposes, and objectives?			
Not likely, as this alternative would require establishing preserves in nearly all of the remaining undeveloped land within the MCRA. One or more landowners would most likely refuse to sell.	Not likely, as this alternative would require establishing preserves in nearly all of the remaining undeveloped land within the MCRA. One or more landowners would most likely refuse to sell.	Possibly.	Possibly.
Score (# of "Possibly")			
3	3	5	5
Carried Forward to Analysis in the EIS/EIR?			
No	No	Yes	Yes

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EIS/EIR APPENDIX F

CEQA Environmental Checklist Form

INITIAL STUDY CHECKLIST

Appendix G of the California Environmental Quality Act (CEQA) provides guidance for assessing the significance of potential environmental impacts. Based on this guidance, Sacramento County has developed the following Initial Study Checklist. The Checklist identifies a range of potential significant effects by topical area. The words "significant" and "significance" used throughout the following checklist are related to impacts as defined by the California Environmental Quality Act as follows:

1 Potentially Significant indicates there is substantial evidence that an effect MAY be significant. If there are one or more "Potentially Significant" entries an Environmental Impact Report (EIR) is required. Further research of a potentially significant impact may reveal that the impact is actually less than significant or less than significant with mitigation.

2 Less than Significant with Mitigation applies where an impact could be significant but specific mitigation has been identified that reduces the impact to a less than significant level.

3 Less than Significant or No Impact indicates that either a project will have an impact but the impact is considered minor or that a project does not impact the particular resource.

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
1. **LAND USE** - Would the project:				
a. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including but not limited to a general plan, specific plan or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	X			See Chapter 4.
b. Physically disrupt or divide an established community?	X			See Chapter 4.
2. **POPULATION/HOUSING -** Would the project:				
a. Induce substantial unplanned population growth in an area either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of infrastructure)?	X			See Chapter 4 and 16.
b. Displace substantial amounts of existing housing, necessitating the construction of replacement housing elsewhere?	X			See Chapter 4.
3. **AGRICULTURAL RESOURCES** - Would the project:				
a. Convert Prime Farmland, Unique Farmland, Farmland of Statewide Importance or areas containing prime soils to uses not conducive to agricultural production?	X			See Chapter 6.
b. Conflict with any existing Williamson Act contract?	X			See Chapter 6.
c. Introduce incompatible uses in the vicinity of existing agricultural uses?	X			See Chapter 4 and Chapter 6. .

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
4. **AESTHETICS -** Would the project:				
a. Substantially alter existing viewsheds such as scenic highways, corridors or vistas?			X	Given its nature, the project is not expected to substantially alter the viewshed associated with Highway 16, the River Road or other corridors or vistas when compared to the No Action/No Project Baseline.
b. Substantially degrade the existing visual character or quality of the site and its surroundings?			X	Construction will not substantially degrade the visual character or quality of the project site when compared to the No Action/No Project Baseline.
c. Create a new source of substantial light, glare, or shadow that would result in safety hazards or adversely affect day or nighttime views in the area?			X	The project will not result in a new source of substantial light, glare or shadow that would result in safety hazards or adversely affect day or nighttime views in the area when compared to the No Action/No Project Baseline.
5. **AIRPORTS -** Would the project:				
a. Result in a safety hazard for people residing or working in the vicinity of an airport/airstrip?	X			See Chapter 4.
b. Expose people residing or working in the project area to aircraft noise levels in excess of applicable standards?	X			See Chapter 4.
c. Result in a substantial adverse effect upon the safe and efficient use of navigable airspace by aircraft?	X			See Chapter 4.
d. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	X			See Chapter 4.
6. **PUBLIC SERVICES -** Would the project:				
a. Have an adequate water supply for full buildout of the project?	X			See Chapter 12.

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
b. Have adequate wastewater treatment and disposal facilities for full buildout of the project?	X			See Chapter 12.
c. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	X			See Chapter 12.
d. Result in substantial adverse physical impacts associated with the construction of new water supply or wastewater treatment and disposal facilities or expansion of existing facilities?	X			See Chapter 12.
e. Result in substantial adverse physical impacts associated with the provision of storm water drainage facilities?	X			See Chapter 7 and Chapter 12.
f. Result in substantial adverse physical impacts associated with the provision of electric or natural gas service?	X			See Chapter 12.
g. Result in substantial adverse physical impacts associated with the provision of emergency services?	X			See chapter 12.
h. Result in substantial adverse physical impacts associated with the provision of public school services?			X	The project would not require the construction/expansion of additional new unplanned school facilities compared to the No Action/No Project Alternative. Established case law, *Goleta Union School District v. The Regents of the University of California* (36 Cal-App. 4th 1121, 1995), indicates that school overcrowding, standing alone, is not a change in the physical conditions, and cannot be treated as an impact on the environment.
i. Result in substantial adverse physical impacts associated with the provision of park and recreation services?	X			See Chapter 12.

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
7. **TRANSPORTATION/TRAFFIC** - Would the project:				
a. Result in a substantial increase in vehicle trips that would exceed, either individually or cumulatively, a level of service standard established by the County?	X			See Chapter 13.
b. Result in a substantial adverse impact to access and/or circulation?	X			See Chapter 13.
c. Result in a substantial adverse impact to public safety on area roadways?	X			See Chapter 13.
d. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	X			See Chapter 13.
8. **AIR QUALITY** - Would the project:				
a. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard?	X			See Chapter 14.
b. Expose sensitive receptors to pollutant concentrations in excess of standards?	X			See Chapter 14
c. Create objectionable odors affecting a substantial number of people?	X			See Chapter 14
9. **NOISE -** Would the project:				
a. Result in exposure of persons to, or generation of, noise levels in excess of standards established by the local general plan, noise ordinance or applicable standards of other agencies?			X	Compared to the No Action/No Project alternative, the project is not expected to result in exposure of persons to, or generation of, noise levels in excess of applicable standards.

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
b. Result in a substantial temporary increase in ambient noise levels in the project vicinity?			X	Project construction will result in a temporary increase in ambient noise levels in the project vicinity. This impact is less than significant due to the temporary nature of the these activities, limits on the duration of noise, and evening and nighttime restrictions imposed by the County Noise Ordinance (Chapter 6.68 of the County Code).
10. **HYDROLOGY AND WATER QUALITY** - Would the project:				
a. Substantially deplete groundwater supplies or substantially interfere with groundwater recharge?	X			See Chapter 7.
b. Substantially alter the existing drainage pattern of the project area and/or increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	X			See Chapter 7.
c. Develop within a 100-year floodplain as mapped on a federal Flood Insurance Rate Map or within a local flood hazard area?	X			See Chapter 7
d. Place structures that would impede or redirect flood flows within a 100-year floodplain?	X			See Chapter 7.
e. Expose people or structures to a substantial risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	X			See Chapter 7
f. Create or contribute runoff that would exceed the capacity of existing or planned stormwater drainage systems?	X			See Chapter 7
g. Create substantial sources of polluted runoff or otherwise substantially degrade ground or surface water quality?	X			See Chapter 7.

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
11. **GEOLOGY AND SOILS** - Would the project:				
a. Expose people or structures to substantial risk of loss, injury or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	X			See Chapter 5.
b. Result in substantial soil erosion, siltation or loss of topsoil?	X			See Chapter 5.
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, soil expansion, liquefaction or collapse?	X			See Chapter 5.
d. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available?	X			See Chapter 5.
e. Result in a substantial loss of an important mineral resource?	X			See Chapter 5.
f. Directly or indirectly destroy a unique paleontological resource or site?	X			See Chapter 5.
12. **BIOLOGICAL RESOURCES** - Would the project:				
a. Have a substantial adverse effect on any special status species, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop	X			See Chapters 8 and 9.

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
below self-sustaining levels, or threaten to eliminate a plant or animal community?				
b. Have a substantial adverse effect on riparian habitat or other sensitive natural communities?	X			See Chapter 8.
c. Have a substantial adverse effect on streams, wetlands, or other surface waters that are protected by federal, state, or local regulations and policies?	X			See Chapters 8 and 9.
d. Have a substantial adverse effect on the movement of any native resident or migratory fish or wildlife species?	X			See Chapters 8 and 9.
e. Adversely affect or result in the removal of native or landmark trees?	X			See chapter 8.
f. Conflict with any local policies or ordinances protecting biological resources?	X			See Chapters 1, 8 and 9.
g. Conflict with the provisions of an adopted Habitat Conservation Plan or other approved local, regional, state or federal plan for the conservation of habitat?	X			See Chapter 4.
13. **CULTURAL RESOURCES -** Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource?	X			See Chapter 11.
b. Have a substantial adverse effect on an archaeological resource?	X			See Chapter 11.
c. Disturb any human remains, including those interred outside of formal cemeteries?	X			See Chapter 11.

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
d. Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074?	X			See Chapter 11,
14. **HAZARDS AND HAZARDOUS MATERIALS** - Would the project:				
a. Create a substantial hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			X	Chapter 5, condition 10 of the SSHCP identifies responsibilities of the implementing agency, which will reduce impacts associated with hazardous materials to less than significant levels. The responsibilities are described below: *Prior to the acquisition of a preserve site or implementation of a stream or riparian restoration project, a Phase I Environmental Site Assessment shall be conducted in general accordance with the American Society for Testing and Materials Standard Practice E1527-05. The purpose of this Environmental Site Assessment is to identify, to the extent feasible pursuant to the American Society for Testing and Materials Standard, recognized environmental conditions in connection with the potential site. The term "recognized environmental condition" means the presence or likely presence of hazardous substances or petroleum products on the property under conditions that may indicate an existing release, a past release, or a material threat of release of these substances to the property. If the Phase 1 Environmental Site Assessment indicates the presence of a recognized environmental condition, the Implementing Entity shall consider the following options.* • *Determine that the acquisition/project can proceed on the basis that the Habitat Plan goals and objectives can be met on the site even with the presence of a recognized environmental condition.* • *Conduct a Phase II Environmental Site Assessment, including soil and groundwater testing, to further study the potential for contamination to limit the Implementing Entity's management activities.*

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
				• *If the results of the Phase I (or Phase II) Environmental Site Assessment indicate that the Habitat Plan goals and objectives cannot be met on the site, the Implementing Entity should not acquire the site.* *As part of each Preserve Management Plan or site restoration plan, a Contingency Plan shall be prepared to address the actions that would be taken during construction in the event that unexpected contaminated soil or groundwater is discovered. The Contingency Plan shall include health and safety considerations, handling and disposal of wastes, reporting requirements, and emergency procedures. The Contingency Plan shall include a requirement that if evidence of contaminated materials is encountered during construction, construction would cease immediately and applicable requirements of the Comprehensive Environmental Release Compensation and Liability Act and the California Code of Regulations Title 22 regarding the disposal of waste would be implemented.*
b. Expose the public or the environment to a substantial hazard through reasonably foreseeable upset conditions involving the release of hazardous materials?			X	See 14.a (above).
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school?			X	See 14.a (above)
d. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5, resulting in a substantial hazard to the public or the environment?			X	See 14.a (above). The project would not interfere with any ongoing clean-up efforts of known hazardous materials sites. *The Implementing Entity will take the following steps when reviewing and considering any fee title or conservation easement acquisition, in addition to any steps required to comply with applicable federal and state laws governing real estate transactions:* *Determine landowner interest in selling an easement or selling in*

	Potentially Significant	Less Than Significant with Mitigation	Less Than Significant or No Impact	Comments
				fee title. Approach property owner with proposal to acquire land through conservation easement or fee title. *The Implementing Entity will obtain a title report to determine if there are encumbrances that might exclude property from acquisition. Properties with encumbered water rights or surface mineral rights that cannot be subordinated to a conservation easement or habitat protection interest will be excluded from acquisition unless these encumbrances do not influence the integrity of the proposed Preserve. A Phase I survey with an environmental determination document for the presence of hazardous materials will be included with the title report.*
e. Impair implementation of or physically interfere with an adopted emergency response or emergency evacuation plan?			X	The project would not interfere with any known emergency response or evacuation plan.
15. GREENHOUSE GAS EMISSIONS – Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	X			See Chapter 15 of the EIS/EIR.

EIS/EIR APPENDIX G

Supporting Information for the Biological Resources Analyzed in Chapters 8 and 9

Appendix G-1. Environmental Stressors from Urban Development Projects and Activities

Appendix G-2. Selection of Special-Status Species to be Analyzed in this EIS/EIR

Appendix G-3. Species Accounts for Proposed Covered Species

Appendix G-4. Covered Species Habitat Models

EIS/EIR APPENDIX G-1

Environmental Stressors from Urban Development Projects and Activities

This section describes environmental stressors resulting from actions considered under the alternativesthat may affect land covers, species habitat, and individuals of species. Twenty-four environmental stressors are described below, organized by: (1) environmental stressors that would occur on an ongoing and permanent basis for activities over the 50-year study period considered in the EIS/EIR, and (2) those that would be temporary and occur only during and immediately after construction of an activity. These environmental stressors are listed below, then a narrative discussion is provided for each stressor. Table G-1.1 (tables are provided at the end of Appendix G-1) presents a matrix identifying which environmental stressors could result from different categories of projects or activities. Table G-1.2 provides a matrix indicating which environmental stressors have potential to affect each of the 28 proposed covered species included in the Propsoed Action/Proposed Project and the Reduced Permit Term Alternative.

ENVIRONMENTAL STRESSORS OF URBAN DEVELOPMENT

- Loss of land covers and species habitat
- Permanent alterations to watershed hydrographs and downstream water quality effects
- Habitat fragmentation
- Increased wildfire
- Vernal pool hydrologic alterations
- Chronic ground vibration and noise
- Lighting
- Increased human activity
- Wildlife community alterations
- Invasive plants
- Invasive animals
- Mesopredators
- Wildlife disease
- Pesticides and fertilizers
- Vehicle and aircraft collisions with wildlife
- Aboveground electrical utilities collision and electrocution

TEMPORARY ENVIRONMENTAL STRESSORS DURING CONSTRUCTION

- Temporary alterations to hydrographs and construction water quality effects
- Laydown or trampling of vegetation
- Construction noise
- Construction ground vibration

- Construction lighting
- Construction dust
- Increased human presence during construction
- Construction trash and debris.

PERMANENT ENVIRONMENTAL STRESSORS

Loss of Land Covers and Species Habitat

The major effect of new urban development, transportation, and utility projects is conversion from undeveloped to developed land cover types. In addition to the net loss of undeveloped land cover in the Planning Area, such conversion may further isolate remaining natural habitat rendering it less suitable or unsuitable for wildlife and plant species.

Natural land covers would be permanently converted to developed uses from construction of residential, commercial, and industrial structures, park and recreation facilities, some public and private utilities, solid waste management facilities, urban and rural transportation, and wastewater facilities.

Habitat Fragmentation

Fragmentation and isolation of plant and wildlife populations can affect wildlife movement and dispersal as well as seed dispersal and movement and dispersal of plant pollinators. These may cause extinction of local populations as a result of two processes: (1) reduction in total habitat area, which reduces effective population sizes; and (2) isolation of local populations, which affects dispersal and immigration rates (Wilcox and Murphy 1985). Because of complex community-level interactions (e.g., mutualistic species, habitat guilds, and keystone species), the loss of one or a few species from a habitat patch as a direct result of habitat fragmentation ("primary" extinctions) also may result in multiple "secondary" extinctions within the habitat patch (Wilcox and Murphy 1985). At the larger landscape scale, change in regional abundance and distribution of habitat may change the migration and habitat use patterns of some wildlife species, which in turn affects the metapopulation dynamics of numerous organisms and alters multiple landscape-scale ecological functions. For example, many species will either not cross roads, drainages, disturbed lands, and urbanized areas or do so infrequently or unsuccessfully. The necessity of crossing roads also increases the risk of vehicle collisions, especially for small rodents, reptiles, amphibians, and low- or slow-flying birds. Roadway mortality or limitations on species movement leads to a variety of problems, including reduction and isolation of populations. As populations become isolated and smaller, they become particularly vulnerable to negative demographic trends, including genetic bottlenecks, genetic drift, and inbreeding depression. These changes in turn can affect ecological functions and the long-term viability of

species, including those for which roads are not a major barrier, but which have important ecological relationships with high-risk species (e.g., predator/prey relationships, mutualisms such as burrow construction and use, pollination). This disruption may also affect vegetation communities if the spatial behavior of plant dispersers and pollinators is altered.

Fragmentation also decreases the functional size of conserved habitat patches. As remaining habitat areas diminish in size, the ratio of vulnerable edge to preserved interior area increases, especially with narrow or irregularly shaped habitat patches. Ecological consequences arise because, as this ratio increases, any given interior point (habitat or organism) is closer to potential threats existing outside the preserve boundary. Increased edge effects heighten species' vulnerability to stochastic disturbances, pollution, and invasion by non-native plant and animal species.

Fencing may inhibit the movement of some species that have large home ranges, such as badgers (*Taxidea taxus*), coyotes (*Canis latrans*), and mule deer (*Odocoileus hemionus*). Disrupting the ability of these species to move freely throughout their ranges may alter their foraging and social behavior, and may expose them to greater risks in other areas they may normally avoid or use less frequently due to lower habitat suitability, greater risks of predation, or greater risks of vehicle collisions.

Wildlife Community Alterations

Wildlife community alterations will occur in developed areas, and may occur along the open space–urban interface due to development-induced habitat degradation. Rottenborn (1999), for example, characterized wildlife species as being "tolerant" or "sensitive" to urbanization. The "tolerant" species include several birds that are commonly thought of as urban-related, such as pigeons (*Columbia livia*), mourning doves (Zenaida macroura), western scrub-jays (*Aphelocoma californica*), American crows (*Corvus brachyrhynchos*), northern mockingbirds (Mimus polyglottos), European starlings (*Sturnus vulgaris*), and bushtits (Psaltriparus minimus). Urban "sensitive" species included both year-long resident species, such as California quail (Callipepla californica), acorn woodpecker (Melanerpes formicivorus), and Bewick's wren (Thryomanes bewickii), as well as migrants, such as willow flycatcher (Empidonax traillii) and yellow warbler (Setophaga petechia). Permeability to invasive or urban-tolerant species may be increased through reductions in plant structure and cover related to increased human activity in the area, and especially related to fuel-modification activities along habitat edges. These species may out-compete resident native species for resources (e.g., habitat, food, nesting locations) or directly prey on or parasitize the native residents. European starlings, for example, may directly compete with native cavity nesters for nest sites in urban settings.

Permanent Alterations to Watershed Hydrographs and Downstream Water Quality Effects

By permanently increasing the extent of impermeable surfaces, urban development results in increased runoff, especially during storm events. Such increases can change the hydrograph of local creeks and streams, result in greater levels of scour and/or incision of local creeks, increased sediment loads downstream, alterations of downstream hydrology, and decreased groundwater recharge. Also, addition of new development may permanently increase the amount of pollutants such as grease, oil, and lawn pesticides in local creeks and streams transported from residences during wet weather. An increase in the quantity of pollutants reaching local creeks through higher runoff may affect the biological and physical characteristics of aquatic habitats. Pollutants can also enter groundwater when development occurs over percolation zones in streams, which can affect drinking water quality. High runoff temperature may also result in an increase of in-stream water temperatures when runoff enters local streams. Permanent increases in impermeable surfaces or compaction of soils may also inhibit natural percolation of stormwater into groundwater basins, which may lead to a drawdown in groundwater levels.

Activities increase the potential for permanent ongoing discharge of point and non-point source pollutants to the natural landscape through surface and subterranean water flows, windblown trash accumulation, windblown dispersion of chemicals, and illegal dumping of industrial and household trash and garden waste in natural ecosystems. Pesticides, herbicides, and fertilizers may enter adjacent landscapes through runoff from irrigated landscapes or from storm events on a frequent basis. Contaminants from automobiles that collect on roadways, parking lots, and driveways and enter natural landscapes during storm events include oil, gas, brake dust, and other fluids. Road materials, leaks, and spills also permanently adversely affect riparian, wetland, aquatic, and semiaquatic species by contaminating their habitats. Illegal dumping of unwanted items such as trash, tires, and appliances in vacant habitat areas also crush vegetation and restrict photosynthesis by blocking the sun. Discarded electronics (i.e., e-waste) can introduce various toxic chemicals into the environment, including heavy metals that may leach into soil and water. These waste materials may chronically disrupt natural hydrology by forming obstructions and blocking flows and may create permanent habitat for pest species, such as non-native rats.

Effects from Vernal Pool Hydrologic Alterations

Vernal pool ecosystems are especially vulnerable to hydrologic alteration, because the timing and period of inundation dictates whether vernal pool plants and vernal pool crustaceans are able to reproduce. Vernal pool ecology is directly linked to vernal pool hydrology. The vernal pool hydrologic cycle consists of multiple steps, several of which are susceptible to disruption

or disturbance. The vernal pool hydrologic cycle for vernal pools within this Plan Area consists of rainfall, soil saturation, formation of a perched aquifer, filling of the pools, surface swale flows, discharge to a stream or creek, and drying, as discussed below.

Water enters the vernal pool ecosystem through rainfall. In the Mediterranean climate of the Planning Area, rainfall in the Planning Area primarily occurs during the winter months, followed by a hot, dry season during the summer months. The winter rainy season, when there is sufficient precipitation to initiate and maintain filling of vernal pools, typically begins in November and ends in March or April.

Before vernal pools begin to fill, the soil under and around the vernal pools first becomes saturated. The rainfall percolates through the soil until it is stopped by an impervious layer in the soil profile. Soil series that contain vernal pools include an impermeable layer, which can be a claypan, a cemented hardpan (duripan), or rock (Solomeshch et al. 2007).

As water accumulates in the soil above the impermeable layer, a perched water table (a perched aquifer) forms. A perched aquifer is an area of saturated soil that is separated from underlying deeper groundwater by an impermeable layer of rock, clay, or other material. Seasonal perched groundwater is an important category of groundwater in the Planning Area with respect to the hydrologic functioning of vernal pools. Up to 60% of the water entering a vernal pool does so from the perched water table (Rains et al. 2006). The perched water table allows rainfall that falls some distance from the vernal pool to be retained in the soil and flow into the vernal pool. Subsurface flows from perched water tables stabilize vernal pool water levels, causing them to be inundated for longer periods of time than would be the case if the vernal pools were recharged only by rainfall (Rains et al. 2006).

Once the soils in the vernal pool ecosystem is saturated and the perched aquifer fills, water accumulates in the pool itself, resulting in the filling of the pool and inundation of the ground surface. Although vernal pools may temporarily hold water at the surface during and immediately after rainfall events, pools that are dependant on a perched aquifer will not remain inundated until the soil is saturated and the perched aquifer fills.

Most of the vernal pools in the Planning Area are types that occur on soils or soil layers impermeable to water, such as a hardpan, claypan, or volcanic basalt (Smith and Verrill 1998) that can result in a perched aquifer. However, another vernal pool type in the Planning Area, drainageway vernal pools, occur on recent alluvial deposits adjacent to the incised channels of active watercourses. Consequently, drainageway vernal pools are interspersed throughout the other vernal pool types present in the Planning Area. Drainageway vernal pools fill and drain rapidly, and may depend more on overland runoff and direct precipitation to maintain their hydrology relative to the other vernal pool types (Jones and Stokes 1990). In some cases, soils

above the restricting claypan or hardpan layers in these pool types may be too deep for perched water tables to become exposed in shallow vernal pools. Additionally, the basins of these types of pools are often shallow, increasing susceptibility to evaporation, or slightly sloped, which encourages drainage.

Once a vernal pool fills completely, water exits the pool via surface flows. The movement of surface water between vernal pools can occur in a network of narrow and intermittent surface "swales" (Solomeshch et al. 2007). In the Planning Area swales are defined as shallow seasonal drainages typically found in flat to gently rolling valley grassland in association with vernal pool complexes on soils with an impermeable claypan or hardpan layer. Swales convey rainwater runoff as broad gently sloping ephemeral drainages during, and for short periods after, winter rainstorms. All swales mapped in the Planning Area are associated with vernal pools. The swales provide intermittent conduits between vernal pools for movement of surface water and vernal pool plant and animal propogules (seeds, cysts, eggs, and spores), and adult amphibians that use vedrnal pools, such as California tiger salamanders and western spadefoot toads. The swale land cover type also provide habitat for these amphibian species (USFWS 2006). Many of the native plants that grow in vernal pools also grow in swales. Swales also often include smaller shallow depressional features that may pond during the rainy season to provide suitable reproductive habitat for some vernal pool associated species, and may be considered vernal pools. Generally, the swale land cover provides suitable habitat for portions or all of the life cycle of many of the species that occur in the vernal pool land cover type.

Water moving within a vernal pool complex via surface swale flows ultimately discharges from the complex if there is sufficient rainfall. Typically, at the topographic lowpoint of a vernal pool complex the surface discharge will be to a stream or creek.

Surface swale flows and discharges to streams and creeks are associated with rainfall events when additional water enters a vernal pool complex. Depending on the timing and volume of rainfall through the winter and spring, the depth of vernal pools may fluctuate somewhat as water enters and leaves the system, but the vernal pools will remain inundated. However, vernal pools begin to dry in spring as temperatures rise and rainfall diminishes. Without further rainfall adding water to the vernal pool ecosystem, water in the pools is lost through evaporation and transpiration. Many pools will no longer have surface water by March or April. The soil in the pool may remain moist through April and May, and then desiccates and stays dry until the next rainy season.

Vernal pools support endemic plants and animals that are adapted to living under the hydrologica cycle and inundation regime of vernal pools. The inundation regime is too short and unpredictable to support aquatic species but long enough to eliminate upland species, which characterizes vernal pools as ephemeral wetlands and differentiates them from other

aquatic ecosystems such as alkali meadows and seasonally flooded emergent bulrush or tule marshes (Solomeshch et al. 2007). Almost all plants that occur in vernal pools live their entire lifecycle within one year, but have seeds that could remain dormant for many years, allowing them to survive annual periods of drought. Similarly, species of crustaceans, amphibians, and insects that occur in vernal pools have adaptations to respond to periods of drying, such as a single year life cycle and eggs or cysts resitant to drought, or finding underground refugia during the dry season.

Urban development can affect vernal pool hydrology in three major ways: (1) by permanently interrupting connection to surface water flows from up-gradient swales; (2) by damaging or permanently interrupting hydrologic connections to the perched water table; and (3) by puncturing the duripan within the vernal pool's micro-watershed, permanently increasing rate of water loss from the vernal pool and its associated perched aquifer, and allowing that water to drain into deeper groundwater tables.

Reduced groundwater infiltration through development of increased impervious surfaces also may reduce the amount of seasonal perched groundwater available to support vernal pools. Increased impervious surfaces may also result in increased stormwater runoff rates and volumes from development sites. If increases in flows are sufficient, they could cause soil erosion and offsite sedimentation, including sedimentation of vernal pools.

Invasive Plants

Development, including roads and utility corridors, can promote invasive, non-native plant species that negatively affect habitat in a variety of ways, ultimately changing ecological functions and adversely affecting native species. As new urban development and infrastructure encroach into natural landscapes, newly disturbed areas and/or the new interface between developed areas and native habitats provide an opportunity for invasive plant species to establish and eventually invade natural habitat settings, degrading habitat and potentially displacing native species. Ornamental plants and native cultivars may spread to adjacent protected habitats and outcompete and displace native plant species; they can also hybridize (interbreed) with local native plants and thereby disrupt the genetics of the native population. Such hybridization can cause a number of problems for the native plant population, including poor growth and reproduction.

According to the *Invasive Plants of California's Wildlands* (Bossard et al. 2000), non-native invasive plant species can alter ecosystem processes, such as nutrient cycling, hydrologic cycles, frequencies of wildfires, and erosion and sediment deposition. Invasive plants interfere in ecosystem functions by outcompeting and displacing native plants and wildlife by providing refuge for non-native animals and by hybridizing with native species (Bossard et al. 2000).

Several organizations, such as the California Native Plant Society (CNPS) and the California Invasive Plant Council (Cal-IPC) (formerly known as the California Exotic Pest Plant Council), have provided detailed documentation regarding invasive plant species that threaten California's native plants and animals.

Invasive plant species, and especially upland species, are often identified as an indirect "edge effect" of new urban development because invasive plants generally colonize modified or otherwise disturbed zones between development and remaining natural areas. However, invasive species can colonize virtually any upland area that is subject to some kind of disturbance, such as road shoulders, cleared zones along railroad lines, clearings along utility easements, areas affected by fire, fire breaks, and grazed areas.

Future development in the Planning Area will likely increase local sources of nitrogenous air pollutants, primarily due to increased transportation and demand for electricity generation. Increased nitrogen deposition (N-deposition) facilitates the growth of non-native plant species, especially invasive annual grasses in low-biomass ecosystems. Increased abundance of non-native plants, and invasive annual grasses in particular, represents a potentially significant effect to native vegetation communities and wildlife habitat. Nitrogen deposition can be locally elevated near roadways, with nitrogen flux along busy roads up to four times above background levels (Redling et al. 2013). However, nitrogen deposition can also result from emissions within the greater air basin.

Broadleaved pepperweed (*Lepidium latifolium*), yellow star-thistle (*Centaurea solstitialis*), and medusahead (*Elymus caput-medusae*) are common invasive species in grasslands and/or along Planning Area roadsides (Kleinschmidt Associates 2008).

Riparian and wetland ecosystems are also extremely vulnerable to invasive plants because of the highly effective transport of invasive species along rivers and streams. Invasive species can dominate the biomass of riparian and wetland communities where they become established, virtually choking out the native vegetation. Invasive plants commonly found in wetlands, riparian systems, and/or waterways in the Planning Area include broadleaved pepperweed, common water hyacinth (*Eichhornia crassipes*), Brazilian waterweed (*Egeria densa*), and Himalayan blackberry (*Rubus armeniacus*) (Kleinschmidt Associates 2008). Several other invasive species potentially affecting vernal pools and associated watersheds have also been identified, including waxy mannagrass (*Glyceria declinata*), barbed goatgrass (*Aegilops triuncialis*), Italian thistle (*Carduus pycnocephalus*), stinkwort (*Dittrichia graveolens*), Klamath weed (common St. Johnswort) (*Hypericum perforatum*), yellow glandweed (*Parentucellia viscosa*), and milk thistle (*Silybum marianum*) (Sacramento County Department of Economic Development 2013).

Invasive Animals

Human activities associated with urban development can exacerbate the introduction or spread of non-native animal species. Non-native aquatic wildlife is known to have serious effects on native amphibian populations, including California tiger salamander (*Ambystoma californiense*). For example, aquarium species released in the wild may introduce new diseases to wild amphibian or fish populations. Feral cats (*Felis catus*) are a serious threat to native birds, especially birds that nest on or near the ground, as well as native reptiles and amphibians. They can also cause a shift in small mammal populations from native to non-native species. An increase in year-round water availability due to irrigation and water features can result in increased abundance of bullfrogs.

Invasive wildlife can negatively affect extant native wildlife and plants in many ways. Common native wildlife (e.g., ravens (*Corvus corax*), crows, pigeons, raccoons (*Procyon lotor*), skunks (*Mephitis mephitis)*, and gopher snakes (*Pituophis catenifer*)) and non-native species (e.g., Argentine ants (*Linepithema humile*), European starlings, wild turkeys (*Meleagris gallopavo*), bullfrogs (*Rana catesbeiana*), opossums (*Didelphimorphia*), house mice (*Mus musculus*), rats (*Rattus* spp.), and feral cats and dogs (*Canis lupus familiaris*)) may thrive in disturbed or otherwise marginal habitats and can harm native species through predation, competition, and displacement. Some of these non-native species may also have the potential to spread diseases and parasites to other native wildlife, as discussed below.

Urban development activities in the Urban Development Area (UDA) will increase the number of pet cats and dogs, and increase the potential for stray and feral animals. Unconstrained pets at the interface between habitat preserves and residential development can have significant predation effects on native wildlife, including birds, rodents, reptiles, and amphibians (e.g., Churcher and Lawton 1987; Kelly and Rotenberry 1993). Lost or abandoned pets may penetrate even farther into open space areas in search of food or refugia, including native prey.

Also, as noted below in the discussion of disease, domestic cats and dogs may be vectors for diseases that affect native wildlife, such as feline immunodeficiency virus, feline leukemia virus, feline infectious peritonitis, feline and canine distemper, panleukopenia, and rabies (Foley et al. 1999).

Mesopredators

A related indirect consequence of habitat fragmentation and isolation is an increase in urban-adapted or urban-tolerant mesopredators, such as raccoons, skunks, opossums, and foxes (*Vulpes* spp.), in small habitat fragments where top predators, such as coyotes and bobcats (*Lynx rufus*), have been removed (i.e., the “mesopredator release” effect) (Crooks and Soulé

1999). Non-native mesopredators also may include free-roaming stray and feral cats and dogs, which can have the same effects as wild mesopredators. These species can out-compete smaller native species for available resources and increase predation rates, thus reducing the distribution and populations of vulnerable native species (Crooks and Soulé 1999). The increase in mesopredators in fragmented habitats is often considered an indirect edge effect, but because some of these species can penetrate long distances in natural habitats in the absence of top predators (e.g., coyotes, bobcats), they also have landscape-level ecosystem effects.

Pesticides and Fertilizers

Pesticide (including fungicide, herbicide, and rodenticide) and fertilizer use associated with urban development may affect vegetation communities and habitat quality, be directly toxic to species, or indirectly toxic through prey vectors, or reduce prey abundance. These substances may penetrate the open space–urban interface through urban runoff from residential and commercial landscape areas and golf courses, overspray, wind, direct application in interface areas, soil penetration, and wildlife vectors.

Pesticides, for example, can act in several ways. The original pesticide can be toxic, its decomposed elements can be even more toxic, and it can "bioaccumulate," whereby the contaminant concentrates further in each successive link of the food chain, and thus reaches higher concentrations at higher levels of the food chain. Dichlorodiphenyltrichloroethane (DDT) and other chlorinated hydrocarbon pesticides have been used worldwide to control crop pests and disease-carrying insects since the 1940s. DDT was banned in the United States by the U.S. Environmental Protection Agency (EPA) in 1972 because of unacceptable risks to the environment and potential harm to human health (EPA 1972). Long-term ecological exposure and accumulation resulted in eggshell thinning and loss of young in many raptorial bird species, resulting in serious declines in reproductive success (Terres 1980; Henny and Wight 1972).

In a similar manner, fertilizers can enter wetland and riparian systems and cause eutrophication (excessive nutrients in water bodies) and result in large algae blooms. They also can enhance growth of non-native species in edge areas.

Rodenticides may also affect wildlife in various ways. Rodenticides are directly toxic to rodents, but may also indirectly affect rodent predators, such as hawks and owls, coyotes, snakes, etc., either through loss or contamination of prey. Eradication of rodents can also affect habitat quality for other species, such as burrowing owls (*Athene cunicularia*) that use ground squirrel (*Otospermophilus beecheyi*) burrows and many species of reptiles, amphibians, and insects that use rodent burrows as refugia and aestivation and hibernation habitat.

Chronic Ground Vibration and Noise

Chronic increases in noise related to urban development primarily result from increased traffic volumes at all hours. Other sources of development-related increases in noise that may affect native wildlife include operation of landscape maintenance equipment and tools (e.g., mowers, blowers, trimmers, wood chippers), active recreation at parks (particularly at night), loud music from vehicles and residences, noise from aircraft operations at Mather Airport, and on-site heavy equipment and machinery use by commercial and industrial businesses.

Some of these noise sources, such as traffic noise, are relatively constant (although with daily cycles related to peak traffic periods), and some wildlife species may habituate and adapt to the chronic ambient noise levels, while others may avoid noisy areas. Other noise sources are more occasional or discrete and are more likely to startle wildlife and at least temporarily disrupt their behavior at the time. Noise may affect wildlife in several ways that disrupt both their behavior and physiology in complex and interactive ways, including startling or annoying, raising stress levels, interrupting sleep and rest, interfering with acoustic communications, interfering with prey detection, and in the case of loud abrupt noises, causing permanent injury to the auditory system (Dooling 2006; Barrass and Cohn 1984; Brattstrom and Bondello 1983).

Lighting

Ecological light pollution associated with development, particularly in the UDA, would increase ambient light and direct glare from sky glare, lighted buildings, streetlights, and security lights, and would generally be chronic. Lighting from vehicles would be both chronic and unexpected.

Longcore and Rich (2004) address the ecological effects of light pollution at three levels: (1) behavioral and population ecology, (2) community ecology, and (3) large-scale ecosystem functions. Effects at the behavioral and population ecology level include orientation/ disorientation and attraction/repulsion, reproduction, and communication, and are the main effects of lighting related to construction activities. Orientation and disorientation are responses to ambient light levels, while attraction and repulsion are responses to the source of light (e.g., moths attracted to a light bulb). Orientation includes artificially expanding behavioral repertoires of normally diurnal (active during the day) or crepuscular (active during dawn or twilight hours) species, such as foraging or territorial advertisement or mate attraction (e.g., singing birds), into nighttime periods. Disorientation may occur in nocturnal species that normally orient during dark periods and whose visual systems are adapted to low light levels. Attraction to lights affects birds, which may suffer injury or mortality due to collisions with permanent lighted structures. Many insects are attracted to light sources, resulting in high numbers of prey being taken by nocturnal insectivores such as bats. Repulsion of nocturnal wildlife by lights is probably quite common and may cause them to avoid lighted areas in their normal home ranges.

Wildlife reproduction may be affected by lighting in various ways. Movement to breeding areas, chorus behavior, and mate selection by some amphibians may be affected (Longcore and Rich 2004). Lighting may disturb the nighttime rest and sleep periods of diurnal species, including most passerine (perching) birds, having effects similar to noise, including annoying individuals and causing them to abandon nests that are otherwise perfectly suitable. Nest site selection by some birds may be affected by light, with nests being established farther from light sources (Longcore and Rich 2004). Artificial light may simulate increased day length, affecting reproductive cycles by triggering premature reproductive activity at a time when environmental conditions are not conducive to successful reproduction (e.g., cold temperatures and/or poor food resources). Because light may interfere with sleep, it can be stressful and may disrupt normal biological rhythms and raise the level of stress hormones, which may in turn affect reproductive capacity.

At the level of community ecology, light pollution may affect competition and predation (Longcore and Rich 2004). Behavioral interactions by groups of species may be affected by lighting as species move into the "light niche" (Longcore and Rich 2004). Species groups that normally partition foraging periods in relation to ambient light levels may be in direct competition under artificial light conditions (e.g., some bats). Likewise, species that are adapted to higher light levels (e.g., crepuscular species) may out-compete strictly nocturnal species, which normally forage in the darkest part of the night.

Lighting may increase the risk of predation of both nocturnal and diurnal species because they may be more detectable to nocturnal predators. Some species, such as amphibians, may be attracted to light because insect prey may congregate around light sources, which may in turn increase the risk of the amphibians being preyed upon. Longcore and Rich (2004) characterize this as a tradeoff in the benefit of foraging longer (or at richer sources) with the cost of higher predation risk. Many small species, such as rodents, rabbits, snakes, and bats, actually forage at lower rates at high illumination levels (Longcore and Rich 2004), which may be a biological adaptation to high levels of moonlight. Chronic ecological light pollution may favor light-tolerant species over those that are dark-adapted (Longcore and Rich 2004).

Lighting can also indirectly affect vegetation communities, potentially by altering the behavior of seed dispersers (e.g., small rodents and ants); other potential plant dispersers, such as larger mammals and birds that transport seeds and plant parts over longer distances; and pollinators.

Increased Human Activity

Urban development results in permanent increases in human presence from adjacent development. Increased human presence near preserves will affect essential and normal behavioral patterns and physiology of wildlife. Similar to noise and lighting effects, permanent

increases in human activity from adjacent urban development will disturb nocturnal animals during their rest or sleep periods, annoying them and causing harm to them if they abandon nests or den sites, as well as harming them by disrupting their normal biological rhythms and raising the level of stress hormones. Abandonment (even temporary) of active nests or dens increases the risk to eggs, nestlings, fledglings, and other dependent young. Flushing animals from nests, dens, and other refuges also increases their risk of injury or mortality from collisions with vehicles, as well as predation. Human presence may also alter the spatial behavior of animals, causing them to avoid certain parts of their home range, which may prevent them from using critical resources such as water.

Increases in human activity along the open space–urban interface may also result in trampling of vegetation and compaction of soils, affecting the viability of vegetation communities, wildlife habitat quality, and species that are sensitive to habitat structure, such as shrub and herbaceous vegetation integrity, soil friability, and burrowing substrate quality (e.g., rodents, reptiles, amphibians, and invertebrates). Increased human activity near preserves will also increase the amount of trash and debris that enters preserves and natural communities. Trash and debris can degrade vegetation communities and wildlife habitat, and can attract nuisance and pest species. Trash and debris include discarded packaging materials, plastic bags, and plastic and other lighter materials may be dispersed into natural areas by wind or along creeks and streams.

Increased Wildfire

Increased human activity related to urban development activities can result in increased wildfires. These fires are a result of human activities at the habitat preserve–urban interface, including accidental ignitions from sparks from equipment (e.g., mowers striking rocks), cigarettes, children playing with matches, etc., as well as intentional ignitions (i.e., arson). However, fires also may be ignited by downed or arcing power lines or cars catching on fire along roadways.

In most cases, wildfires in the UDA would be quickly suppressed for public safety and to protect property, but in some cases wildfires become uncontrollable and catastrophic. Wildfire suppression activities (e.g., grading, fire line construction) can also affect plant and animals through ground disturbance.

Outside the UDA, activities would not result in increased frequency, duration, or intensity of wildfire in that portion of the Planning Area.

Wildlife Disease

The increased human and associated pet population can increase the risk of disease transmission to native wildlife in the Planning Area. For example, free-ranging domestic cats and dogs can transmit new diseases to wild animals. Native wildlife in the Planning Area,

including American badger, gray fox (*Urocyon cinereoargenteus*), and coyote, may be at risk of canine distemper (Deem et al. 2000). Diseases transmitted from humans and pets also may affect raptors, such as Cooper's hawk (*Accipiter cooperii*). Boal and Mannan (1999) found that mortality of nestling Cooper's hawks in urban settings primarily was from trichomoniasis, which is caused by the parasitic protozoan *Trichomonas gallinae* that occurs in the digestive and urogenital tracts of many animals and humans. This parasite causes lesions in the mouth, throat, and crop of birds and prevents infected individuals from eating. An important vector of trichomoniasis in urban areas may be domestic pigeons and potentially wild doves, which are preyed on by hawks and falcons. Stabler (1941), for example, found that of 242 pigeons originating from Pennsylvania, Maryland, and New Jersey, 64.5% were infected with *Trichomonas gallinae*. West Nile virus has been identified as a potential factor in loggerhead shrike (*Lanius ludovicianus*) declines in the Central Valley based on a correlation between higher infection rates of the virus and greater declines in shrike abundance in Central Valley counties compared to other counties (Pandolfino 2008). Chytrid fungus is implicated in the decline of several amphibian species, and can infect California tiger salamander. However, chytrid fungus has not been found to be responsible for California tiger salamander mortality in the lab or the field (CDFG 2010).

Vehicle and Aircraft Collisions with Wildlife

The increased capacity of roads in urban areas and increased capacity of roads from rural transportation projects likely will increase the risk of vehicle collisions where wildlife use or attempt to cross roadways, particularly in areas that were frequently used by wildlife before roads were constructed or improved and other development was built. Wildlife may be able to cross two-lane, low-density, and lower-speed roads in relative safety, but if roads are expanded to four and six lanes, and traffic densities and speeds increase, vehicle strikes can increase dramatically. Factors related to the number and types of species affected therefore include vehicle speeds, traffic volume, traffic pulses, accessibility of cover, structure of the road (e.g., whether the road is raised or at grade level with the surrounding environment), barrier walls to prevent access to a roadway, and availability of alternative crossings, such as bridges and culverts (Dodd et al. 2004).

Increased use of Mather Airport following proposed expansions will also result in increased chance of bird strikes; however, such strikes are relatively uncommon and are not included in take estimates for bird species.

Aboveground Utilities

Power lines, transmission towers, and utility poles can cause collisions, entanglements, and electrocution of birds, especially raptors (Franson et al. 1995; Lehman et al. 2007). Bird

species known to be at particular risk of collisions with aboveground utilities include ferruginous hawk (*Buteo regalis*) and greater sandhill crane (*Grus canadensis*), as discussed in more detail in Section 6.6.

TEMPORARY ENVIRONMENTAL STRESSORS DURING CONSTRUCTION

Construction Noise

Temporary direct effects related to noise will be generated during construction, including vegetation clearing, grading and earthmoving, excavation, trenching and tunneling, pouring of concrete and asphalt, and vehicle use. Construction may affect normal or essential behavioral patterns of wildlife in several ways. Excessive noise may affect bird species, for example, in at least four ways: (1) noise may annoy and cause birds to abandon nests that are otherwise suitable; (2) noise can raise the level of stress hormones, interfering with sleep and other activities; (3) intense noise can cause permanent injury to the auditory system; and (4) noise can interfere with acoustic communication by masking important sounds or sound components (Dooling 2006). Similar effects may occur in other taxa. For example, noise may interfere with communication in toads and frogs that use calls to advertise their location and attract mates (e.g., Barrass and Cohn 1984). Loud noise, such as off-road vehicles, may damage the hearing of some terrestrial species (Berry 1980; Brattstrom and Bondello 1983).

Construction Ground Vibration

Ground vibration will be generated during construction, including grading and earthmoving, excavation, trenching, and tunneling. Vibration caused by construction equipment may affect normal and essential behavioral patterns and the habitat of wildlife in several ways. Vibration from equipment operating in or near vernal pools, creeks, and other aquatic habitats may affect semi-aquatic species, such as giant gartersnake (*Thamnophis gigas*), western pond turtle (*Actinemys marmorata*), western spadefoot (*Spea hammondii*), and California tiger salamander, possibly causing them to alter their behavior and potentially abandon areas. For example, vibration can cause western spadefoot to emerge from burrow sites at inappropriate times because vibration created by machinery and construction equipment can mimic the effect of rainfall, which triggers western spadefoot emergence (Dimmitt and Ruibal 1980). Vibration may also directly disturb fossorial species that occupy burrows, dens, and depressions, including western burrowing owl and American badger, as well as rodents, coyotes, and lagomorphs (rabbits and hares), causing them to abandon these areas and increase predation and vehicle collision risks. Excessive vibration might also cause the collapse of burrow systems and dens of fossorial species in areas with highly friable soils.

Construction Lighting

Ecological light pollution directly associated with construction ultimately would be temporary, but it may be considered chronic to some extent in terms of effects on wildlife. For example, lighting for security and public safety in some construction areas may extend for several months or more, thus potentially disrupting critical phases of species' life cycles, such as reproduction, or causing animals to abandon lighted areas. Other lighting effects may be short term or unexpected. Lighting during urban development construction primarily would occur during concrete and asphalt pouring and from vehicular use, but also may be used for security and public safety and off-hours equipment maintenance (e.g., at staging areas). Lighting for nighttime construction or maintenance of construction equipment typically involves high-intensity lighting systems that may have very wide lightsheds and high glare values. Vehicle ingress and egress at construction sites may occur during twilight or nighttime hours (especially during winter months), resulting in unexpected light changes.

Construction Dust

Fugitive dust generated by construction, especially vegetation clearing and grading and earthmoving, can decrease photosynthesis and can kill individual plants by blocking or reducing light and penetration as well as photosynthesis, respiration, and transpiration; increased penetration of phytotoxic gaseous pollutants; and increased incidence of pests and diseases. The loss of plant vigor and productivity can directly affect plant species and wildlife that depend on plants for food or refuge. Construction vehicle traffic can also result in construction dust.

Increased Human Presence during Construction

Temporary construction effects include activity at the construction site and ingress and egress to and from the construction area. Increased human presence during construction will temporarily affect essential and normal behavioral patterns and physiology of wildlife. Similar to noise and lighting effects, temporary increased human activity during construction would disturb nocturnal animals during their rest or sleep periods, annoying them and causing harm to them if they abandon nests or den sites, as well as harming them by disrupting their normal biological rhythms and raising the level of stress hormones. Abandonment (even temporary) of active nests or dens increases the risk to eggs, nestlings, fledglings, and other dependent young. Flushing animals from nests, dens, and other refuges also increases their risk of injury or mortality from collisions with construction equipment and other vehicles, as well as predation. Human presence may also alter the spatial behavior of animals, causing them to avoid certain parts of their home range, which may prevent them from using critical resources such as water. In addition, construction traffic can result in crushing or disturbance of animal and plant species in and near construction sites.

Laydown or Trampling of Vegetation

Trampling of vegetation communities and wildlife habitat in designated construction zones may occur during construction activities such as vegetation clearing, equipment storage, and vehicle use. Accidental trampling of vegetation communities and wildlife habitat may also occur outside designated construction zones. These effects may occur for various reasons, including incorrect construction plans, human error in interpreting plans, human error or accidents in operating construction equipment, and misunderstandings or disregard by construction personnel in adhering to construction planning requirements, including avoidance of natural resources.

Construction Trash and Debris

Construction may cause trash and other non-toxic debris to enter species habitat. Trash and debris can degrade vegetation communities and wildlife habitat, and can attract nuisance and pest species. Trash and debris include discarded construction-related materials, such as packaging materials, plastic bags, and plastic sheeting that may be dispersed into natural areas by wind or along creeks and streams. Trash generated by construction personnel, such as food packaging and cigarette butts, also can be dispersed by wind and water into natural areas. Pest and predatory species, such as crows and ravens, gulls (*Laridae*), coyotes, skunks, and raccoons, may be attracted to discarded food. Certain kinds of construction debris, such as fiberglass insulation, can be directly dangerous to wildlife. Trash and debris may also blow into preserves from adjacent development and roadways.

Temporary Alterations to Hydrographs and Water Quality Effects

Construction may result in temporary release of contaminants in uplands during activities such as vegetation clearing, grading and earthmoving, excavation, trenching and tunneling, pouring concrete or asphalt, and landscaping, and equipment and vehicle refueling and maintenance. Chemical and toxic compound pollution (fuel, oil, lubricants, paints, release agents, and other construction materials) may affect the health of upland vegetation communities, wildlife habitats, and wildlife species. Wildlife may be affected by contaminants through direct exposure (e.g., to the skin, fur, or feathers), through consumption of contaminated food, or by reduced habitat quality.

Temporary hydrologic alterations potentially occurring from construction, including dewatering activities, include changes in flow rates and patterns in streams and small drainages that may temporarily affect adjacent and downstream aquatic, wetland, and riparian vegetation communities, and aquatic species (e.g., fish), semi-aquatic species (including reptiles such as giant gartersnake and western pond turtle), and riparian nesting birds. Construction of some activities may require temporary diversions or impoundments of

surface waters and thus remove or degrade wetland and aquatic habitats during the period of diversion or impoundment.

Temporary water temperature changes also may occur due to temporary changes in the active channel morphology, thus affecting species associated with aquatic habitats (such as giant gartersnake, western pond turtle, western spadefoot, and California tiger salamander) that may have specific thermal tolerances.

Table G-1.1. Environmental Stressors Associated with Development Projects and Activities

Activity	Temporary Environmental Stressors								Permanent Environmental Stressors															
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
Urban Development																								
Residential, Commercial and Industrial Structures	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Park and Recreation Facilities	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Water Supply Facilities	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Flood Control and Urban Stormwater Management in the UDA	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X								
Stream Bank Stabilization Projects	X	X		X	X	X	X	X	X	X	X	X		X	X	X								
Public and Private Utilities	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
Solid Waste Management Facilities	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Wastewater Facilities	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Urban Transportation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Stream Channel Modification	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X							
Capital Southeast Connector	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Mather Airport Development Projects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Third-Party Projects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mining in the UDA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Table G-1.1. Environmental Stressors Associated with Development Projects and Activities

Activity	Temporary Environmental Stressors								Permanent Environmental Stressors															
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
Rural Transportation Projects																								
Rural Collector Road Improvements	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Arterial Road Improvements	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Road Realignment Projects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Road Interchange Projects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Recycled Water Projects	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Activities in Preserve Setbacks in the UDA																								
Trails	X	X		X	X	X	X	X	X	X	X	X	X	X		X				X				
Bioswales	X	X		X	X	X	X	X	X	X	X	X	X	X	X									
Fencing	X	X			X	X	X		X	X	X		X											
Fire Breaks	X	X		X	X	X	X	X	X	X	X	X		X		X	X			X				
Benches, Shade Structures, and Shade Trees	X	X		X	X	X	X		X					X		X				X				
Interpretive Signs and Kiosks	X	X		X	X	X	X		X				X											
Activities in Stream Setbacks in the UDA																								
Trails	X	X		X	X	X	X	X	X	X	X	X	X	X		X				X				

Table G-1.1. Environmental Stressors Associated with Development Projects and Activities

Activity	Temporary Environmental Stressors								Permanent Environmental Stressors																
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
Bioswales	X	X		X	X	X	X	X	X	X	X	X	X	X	X										
Crossings	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X			X		
Stream-bank Stabilization	X	X		X	X	X	X	X	X	X	X	X		X	X	X									
Fencing	X	X			X	X	X		X	X	X		X												
Benches, Shade Structures, and Shade Trees	X	X		X	X	X	X		X					X		X				X					
Interpretive Signs and Kiosks	X	X		X	X	X	X		X				X												
Riparian Re-establishment and Establishment	X	X		X	X	X	X	X	X		X	X													
Outfalls	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X								
Flood Control Structures and Stormwater Management	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X									
Preserve System Activities																									
Preserve Management and Monitoring	X	X	X	X	X	X		X													X				
Low-Impact Nature Trails	X	X		X	X			X	X	X		X		X						X					
Habitat Re-establishment and Establishment	X	X		X	X	X	X	X	X		X	X													

Table G-1.1. Environmental Stressors Associated with Development Projects and Activities

Activity	Temporary Environmental Stressors								Permanent Environmental Stressors															
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
Species Surveys, Monitoring, Research and Adaptive Management Activities					X															X				
Water Supply for Livestock	X	X			X	X	X					X												
Groundwater Monitoring and Extraction Wells	X	X		X	X	X	X	X				X						X						
Allowed Detention Basins on certain Linkage Preserves	X	X		X	X	X	X	X	X		X	X	X	X	X									
Utility Maintenance and Repair	X	X	X		X	X	X										X			X	X		X	
Trails in Preserve and Stream Setbacks, including adjacent bioswales.	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X				X				
Crossings	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X		X	X	X			X	
Stream-bank Stabilization	X	X		X	X	X	X	X	X	X	X	X		X	X	X								
Fencing	X	X			X	X	X		X	X	X		X											
Benches, Shade Structures, and Shade Trees in Preserve Setbacks	X	X		X	X	X	X		X					X		X				X				
Interpretive Signs and Kiosks in Preserve Setbacks	X	X		X	X	X	X		X				X											

Table G-1.1. Environmental Stressors Associated with Development Projects and Activities

Activity	Temporary Environmental Stressors								Permanent Environmental Stressors																
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
Riparian Re-establishment and Establishment	X	X		X	X	X	X	X	X		X	X													
Outfalls in Preserve Setbacks	X	X		X	X	X	X	X	X	X	X	X		X	X	X	X								
Flood Control Structures and Stormwater Management in Preserve Setbacks	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X									

Table G-1.2. Proposed Covered Species Vulnerability to Environmental Stressors

Covered Species	Temporary Environmental Stressors								Permanent Environmental Stressors																
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Covered Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
Plants																									
Ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*)			X	X	X	X	X	X	X	X		X	X	X	X		X		X	X	X			
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)			X	X	X	X	X	X	X	X		X	X	X	X		X		X	X	X			
Dwarf downingia (Downingia pusilla)			X	X	X	X	X	X	X	X		X	X	X	X		X		X	X	X			
Legenere (Legenere limosa)			X	X	X	X	X	X	X	X		X	X	X	X		X		X	X	X			
Pincushion navarretia (*Navarretia myersii)*			X	X	X	X	X	X	X	X		X	X	X	X		X		X	X	X			
Sacramento Orcutt grass (*Orcuttia viscida*)			X	X	X	X	X	X	X	X		X	X	X	X		X		X	X	X			
Slender Orcutt grass (*Orcuttia tenuis*)			X	X	X	X	X	X	X	X		X	X	X	X		X		X	X	X			
Sanford's arrowhead (*Sagittaria sanfordii*)			X	X	X	X	X	X	X	X		X		X	X		X		X	X	X			
Invertebrates																									
Vernal pool fairy shrimp (*Branchinecta lynchi*)			X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X			
Midvalley fairy shrimp (Branchinecta mesovallensis)			X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X			

Table G-1.2. Proposed Covered Species Vulnerability to Environmental Stressors

Covered Species	Temporary Environmental Stressors								Permanent Environmental Stressors																
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Covered Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
Vernal pool tadpole shrimp			X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X			
Ricksecker's water scavenger beetle (*Hydrochara ricksecker*i)			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)			X	X	X	X	X	X	X	X	X	X		X	X		X		X	X	X			
Reptiles and Amphibians																									
California tiger salamander (*Ambystoma californiense*)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Western spadefoot (*Spea hammondii*)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
Giant gartersnake (*Thamnophis gigas*)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Western pond turtle (*Actinemys marmorata*)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Birds																									
Cooper's hawk (Accipiter cooperii)	X	X	X		X			X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
Ferruginous hawk (*Buteo regalis*)					X			X	X	X	X	X					X			X	X	X	X	X	X
Swainson's hawk (*Buteo swainsoni*)	X	X	X	X	X		X		X	X	X					X		X	X	X	X	X	X	X	X

Table G-1.2. Proposed Covered Species Vulnerability to Environmental Stressors

Covered Species	Temporary Environmental Stressors								Permanent Environmental Stressors																
	Construction Noise	*Construction Ground Vibration*	*Construction Lighting*	*Construction Dust*	*Increased Human Presence*	*Laydown or Trampling*	*Construction Trash and Debris*	*Temporary Alterations to Hydrographs and Water Quality Effects*	*Loss of Land Covers and Covered Species Habitat*	*Habitat Fragmentation*	*Wildlife Community Alterations*	*Permanent Alterations to Hydrographs and Water Quality Effects*	*Vernal Pool Hydrologic Alterations*	*Invasive Plants*	*Invasive Animals*	*Mesopredators*	*Pesticides and Fertilizers*	*Chronic Ground Vibration and Noise*	*Lighting*	*Increased Human Activity*	*Increased Wildfire*	*Wildlife Disease*	*Vehicle and Aircraft Collisions with Wildlife*	*Aboveground Utilities*
White-tailed kite (*Elanus leucurus*)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Northern harrier (*Circus cyaneus*)	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Western burrowing owl (*Athene cunicularia*)	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
Loggerhead shrike (*Lanius ludovicianus*)	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
Greater sandhill crane (*Grus canadensis*)	X	X	X	X	X	X	X	X	X	X		X					X	X	X	X	X	X	X	X	X
Tricolored blackbird (*Agelaius tricolor*)	X	X	X	X	X		X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X
Mammals																									
American badger (*Taxidea taxus*)	X	X	X		X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	
Western red bat (Lasiurus blossevillii)	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X			X

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EIS/EIR APPENDIX G-2

Selection of Special-Status Species to be Analyzed in this EIS/EIR

This appendix summarizes the review process and criteria used to identify individual plant and animal species evaluated in Chapter 9 of the EIS/EIR. The list of species evaluated in Chapter 9 includes the species proposed for coverage under the SSHCP incidental take permits (Table G-2.1), as well as additional special-status species that occur in the Planning Area and may be adversely affected by the implementation of the EIS/EIR Alternatives. The following section summarizes the process used by the EIS/EIR to determine special-status species, beyond the proposed covered species, to be addressed and analyzed in the EIS/EIR Alternatives. Tables G-2.2 and G-2.3 show the list of special-status plant and animal species, respectively, that are considered and the reasoning for inclusion or elimination in the EIS/EIR detailed analysis.

DEFINITION OF SPECIAL-STATUS SPECIES

As first defined in Section 9.1.2, Planning Area special-status species are plants and animals that are protected under state and/or federal law, or are species considered sufficiently rare or unique that they are given special consideration by a state and/or a federal resource agencies or they are given special consideration by a non-government conservation organization, as discussed below:

- Listed or proposed for listing under the federal Enangered Species Act (ESA) or the California Endangered Species Act (CESA) as endangered, threatened, or rare;
- a candidate for listing under the ESA or the CESA as endangered, threatened, or rare ;
- taxa (i.e., taxonomic category or group) that meet the criteria for ESA or CESA listing, even if not currently included on any list, as described in California Code of Regulations (CCR) Section 15380 of the CEQA Guidelines;
- Planning Area species that are included in a ESA species recovery plan prepared by the USFWS;
- Planning Area species identified by California Fish and Game Code as a Species of Special Concern. The term “California Species of Special Concern” is applied to animals not listed under the federal ESA or CESA, but that are nonetheless declining at a rate that could result in listing, or historically occurred in low numbers and known threats to their persistence currently exist;
- species identified by California Fish and Game Code as a Watch List Species;
- species afforded protection under the General Plans or codes or ordinances for Sacramento County or the Cities of Rancho Cordova and Galtn.
- species assigned a California Rare Plant Rank (CRPR) of 1A, 1B, and 2 by the California Native Plant Society.

The designations used by the CRPR are defined as follows:

- 1A = Presumed extirpated in California and either rare or extinct elsewhere
- 1B = Rare, threatened, or endangered in California and elsewhere
- 2A = Presumed extirpated in California, but more common elsewhere
- 2B = Rare, threatened, or endangered in California, but more common elsewhere
- 3 = Plants which need more information and on the Review list
- 4 = Plants of limited Distribution – Watch List

The CRPR designations correspond with and replace former CNPS listings. While these rankings do not afford the same type of legal protection as ESA or CESA, the uniqueness of these species affords special consideration.

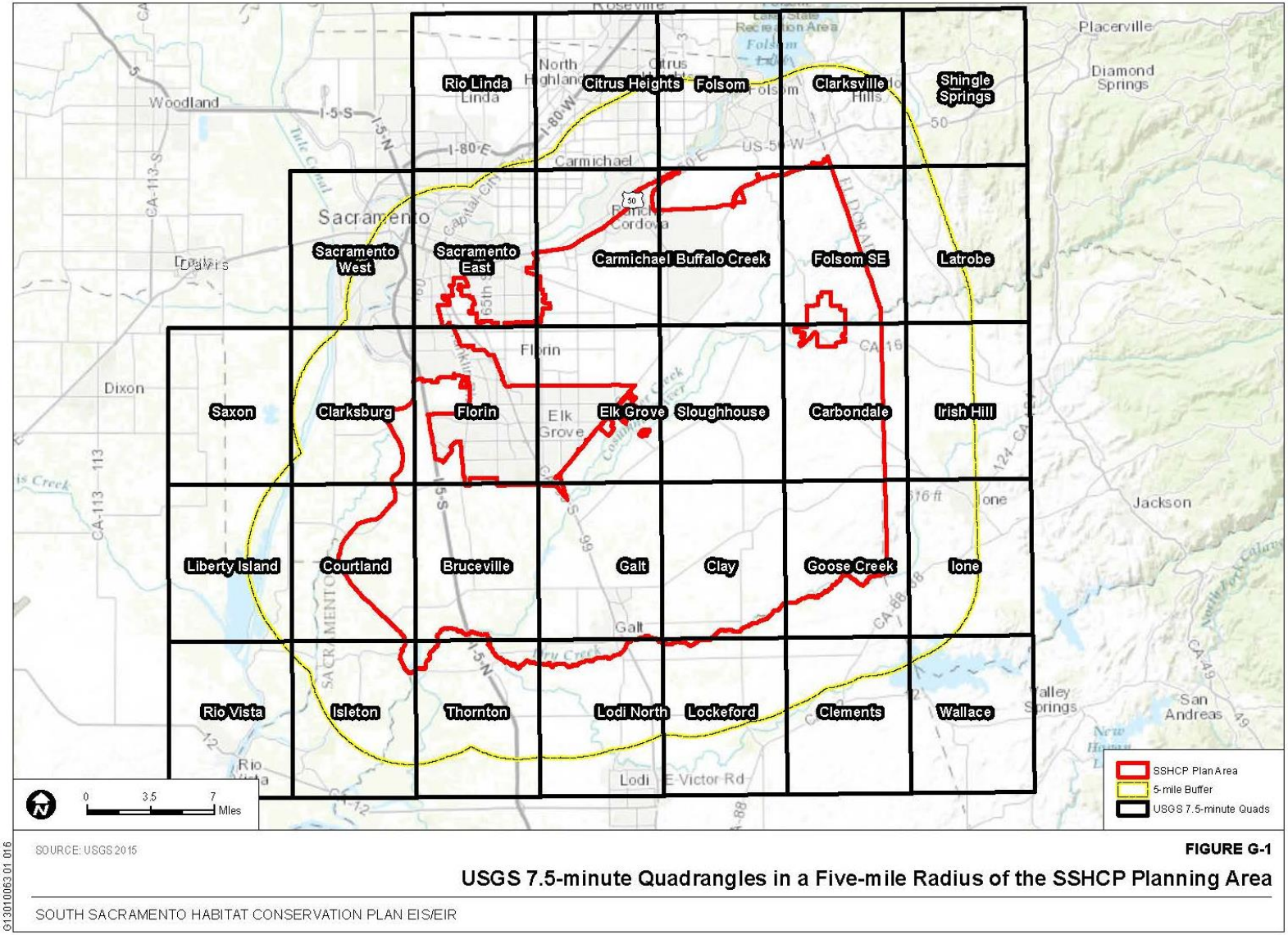
SPECIAL STATUS SPECIES EVALUATED IN THE EIS/EIR

All species proposed by the SSHCP permit applicants to be included as covered species in the SSHCP were selected for evaluation in the EIS/EIR, as these species were considered as part of the Proposed Action/Proposed Project Alternative. These species are identified first below. All other plant and wildlife species that meet the definition of "special-status" above, and were reported by various data sources reviewed for the analyis, were then considered for evaluation in the EIS/EIR. The data sources used to identify the list of species to be considered for inclusion in the EIS/EIR are described further below.

In addition to the species selected by the Permit Applicants to be Covered Species under the proposed SSHCP, a list of special-status plant and wildlife species known to occur in the EIS/EIR Chapter 9 Study Area, or with potential to occur in the Chapter 9 Study Area, was developed based on review of the following:

- a records search and GIS query of the California Natural Diversity Database (CNDDB) (CDFW 2015a) within 5 miles of the Planning Area. The use of a 5-mile search radius is based on typical best practices for environmental impact analyses to identify CNDDB recorded species with potential to occur in an action/project area;
- a review of the USFWS Environmenal Conservation Online System (ECOS) within the 29 US Geological Survey 7.5 minute quadrangles encompassing the Chapter 9 Study Area that are listed as endangered or threatened under the ESA, or are proposed for listing under the ESA (USFWS 2016) (Figure G-1);
- the CNPS online Inventory of Rare and Endangered Plants (CNPS 2014); The 29 U.S. Geological Survey 7.5 minute quadrangle topographic maps encompassing the Chapter 9 Study Area (Figure G-1) were used for the this data search;
- CalFlora database (CalFlora 2014), an electronic inventory operated by a non-profit organization

Figure G-1 USGS 7.5-minute Quadrangles in a Five-mile Radius of the SSHCP Planning Area



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HCP Covered Species

As first discussed in Section 2.3.3, "Covered Species" are the species proposed by the permit applicants to be included on the federal Endangered Species Act (ESA) Incidental Take Permits that have been requested by the Permit Applicants (See Section 9.1.1). The 28 proposed SSHCP Covered Species includes 20 wildlife species and 8 plant species, of which, 10 are currently listed as threatened or endangered under the ESA and/or CESA (Table G-2.1).

Table F-2.1 below presents the ESA, CESA, and CRPR status for each Covered Species under the Proposed SSHCP, as well as a brief description of the species' biology, a description of the species habitat model and information on occurrences within the Planning Area.

Other Special Status Species Evaluated in the EIS/EIR

Other Special Status Plant Species Evaluated in the EIS/EIR

The review of the data sources listed above identifed 37 special-status plant species known, or with potential to occur in the Chapter 9 Study Area. Of the total 37 plants liidentified in this review, eight were already selected by the Permit Applicants to be Covered Species under the proposed SSHCP.

For the other 29 special-status plants identified in the review, 18 species were selected for evaluation in the EIS/EIR. These species are listed in in Table G-2.2 with information on their legal status and rationale for evaluation in the EIS/EIR. These determinations were based primarily on the types, extent, and quality of habitats in the Chapter 9 Study Area; the proximity of the Study Area to known occurrences of the species; and the regional distribution and abundance of the species.

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
Invertebrates				
Lepidurus packardi Vernal pool tadpole shrimp	E*	—	—	Occurs in a variety of natural and artificial seasonally inundated habitats that are wet for at least 7 weeks and dry in summer (Gallagher 1996). This species is typically associated with low-alkalinity seasonal pools in unplowed grasslands throughout the northern and eastern portions of the Central Valley. The vernal pool tadpole shrimp needs cold winter waters to hatch and develop, typically appearing after the first frosts, and dry summers to dry the resting cysts and prevent them from being attacked by fungi. Habitats supporting the vernal pool tadpole shrimp are typically in Central Valley California floristic provinces below 984 feet in elevation. There are 851 documented occurrences of vernal pool tadpole shrimp within the Planning Area. There are 587 occurrences within the UDA and 264 occurrences outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Branchinecta lynchi Vernal pool fairy shrimp	T*	—	—	Inhabits vernal pools with clear to tea-colored water, most commonly in grass or mud-bottomed swales, or basalt flow depression pools in unplowed grasslands. Occupied pools typically have highly turbid waters, but also occurs in pools with clear water with aquatic vegetation that provides shelter from predators, and range in size from 54 square feet to 84 acres (USFWS 2007). This species is entirely dependent upon the aquatic environment provided by vernal pool wetland ecosystems. They depend upon the presence of water in the winter and early spring and the absence of water during the summer (USFWS 2007). These fairy shrimp need cold winter waters to hatch and grow, typically appearing after the first frosts, and dry summers to dry the resting cysts and prevent them from being attacked by fungi. The vernal pool fairy shrimp were first officially reported from the Planning Area in 1982 (CDFW 2014a). Numerous surveys related to development projects have been conducted within and adjacent to the Planning Area (CDFW 2014a), but the area has not been thoroughly surveyed for vernal pool fairy shrimp, and the total extent of potential habitat is unknown. There are 581 documented occurrences of vernal pool fairy shrimp within the Planning Area, There are 193 occurrences inside the UDA and 388 occurrences outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Branchinecta mesovallensis Mid-valley fairy shrimp	—	—	—	Endemic to the Central Valley, but its distribution is poorly understood. Habitat requirements for this species are similar to other local fairy shrimp species, although they tend to occupy shallower pools (USFWS 2005). As with other freshwater branchiopods, mid-valley fairy shrimp lay eggs in vernal pools during the wet season. These eggs are stored in the basin of the pool and stay dormant until the next rainy season. Since these shrimp are restricted to temporary pools, habitat loss increases the vulnerability of local populations to decline. The mid-valley fairy shrimp was first officially reported from the Planning Area in the species' original description (USFWS 2005). Numerous surveys related to development projects have been conducted within and adjacent to the Planning Area (CDFG 2014a), but the area has not been thoroughly surveyed for mid-valley fairy shrimp, and the total extent of potential habitat is unknown. There are 37 documented occurrences of mid-valley fairy shrimp within the Planning Area. There are 22 occurrences within the UDA and 15 occurrences outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	T	—	—	Dependent on elderberry shrubs (*Sambucus* spp.) for breeding and feeding habitat. Elderberry shrubs are a common component of riparian forests and adjacent upland habitats in California's Central Valley (USFWS 1999a). The VELB spends most of its life in the larval stage, living within the stems of the elderberry plant. USFWS considers all elderberry shrubs 2.5 centimeters (1 inch) or greater diameter at ground level within the species' range to be potential habitat (USFWS 1999a). Because comprehensive surveys for VELB in the Planning Area have not been conducted and because known occurrences throughout the species range are based mostly on incidental observations, the population size and locations of this species in the Planning Area are not known. There are 156 documented occurrences of valley elderberry longhorn beetle within the Planning Area. Within the UDA there is 1 occurrence and outside the UDA there are 155 occurrences. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
*Hydrochara ricksecker*i Ricksecker's water scavenger beetle	—	—	—	An aquatic beetle, it lives in weedy, shallow, open water associated fresh water seeps, springs, farm ponds, vernal pools, and slow moving stream habitats. This species is entirely dependent upon the aquatic environment provided by vernal pool wetland ecosystems. The Ricksecker's water scavenger beetle depends upon the presence of water in the winter and early spring and the absence of water during the summer. This species is able to fly and presumably can aerially disperse from one area to another, at least within the immediate vicinity (Sacramento County 2016). Ricksecker's water scavenger beetle is closely associated with temporary pools that contain a diversity of vernal pool plants and that support a complex vernal pool invertebrate community, including copepods, cladocerans, and ostracods, as well as flatworms and a number of other species of beetles (Rogers 1998). Ricksecker's water scavenger beetle co-occurs with the mid-valley shrimp, the vernal pool fairy shrimp, and the vernal pool tadpole shrimp. The Ricksecker's water scavenger beetle was first reported from the Planning Area from Mather Airport (Sacramento County 2016). No surveys focused on Ricksecker's beetle have been conducted within and adjacent to the Planning Area and the total extent of potential habitat is unknown. There are eight documented occurrences of Ricksecker's water scavenger beetle in the Planning Area. Four of these occurrences are located inside the UDA and four are outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Amphibians				
Ambystoma californiense California tiger salamander, (Central Valley population)	T*	T	—	This species may be found in riparian and wet meadow habitats, but is more common in grasslands. Adults are terrestrial outside of the breeding season, often inhabiting rodent burrows located up to 1.24 miles (2 kilometers) from breeding ponds (Orloff 2011). The CTS spends most of its life cycle underground in adjacent valley oak woodland or grassland habitat, primarily in rodent burrows. Research has shown that dispersing juveniles can roam up to 2 miles from their breeding ponds and that a minimum of several hundred acres of uplands habitat is needed surrounding a breeding pond in order for the species to survive over the long term (69 FR 47212–47248; Trenham 2001). Breeding takes place following the first heavy winter rains. Temporary or permanent freshwater pools or slowly flowing streams are required for egg-laying and larval development. They appear to be absent in waters containing predatory game fish (65 FR 3096–3109). There are 31 documented occurrences in the Planning Area. Two of these

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
				occurrences are within the UDA and 29 are located outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Spea hammondii Western spadefoot toad	—	CSC	—	Occurs in shallow temporary pools (i.e., vernal pools and seasonal wetlands) adjacent to annual grassland habitat. They prefer open areas with sandy or gravelly soils in a variety of habitats including mixed woodlands, grasslands, coastal sage scrub, chaparral, sandy washes, lowlands, river floodplains, alluvial fans, playas, alkali flats, foothills, and mountains. Western spadefoot eggs and larvae have been observed in a variety of permanent and temporary wetlands including rivers, creeks, pools in intermittent streams, vernal pools, and temporary rain pools (CDFW 2014a). They have also been found in altered wetlands including vernal pools that have been disturbed by activities such as earthmoving, disking, intensive livestock use, and off-road vehicle use, and man-made wetlands such as artificial ponds, livestock ponds, sedimentation and flood control ponds, irrigation and roadside ditches, roadside puddles, tire ruts, and borrow pits (Fisher and Shaffer 1996; CDFW 2014). Western spadefoot toads typically breed from January to May in temporary pools that do not contain bullfrogs, fish, or crayfish. According to Fisher and Shaffer (1996), the western spadefoot has suffered a severe decline with virtually complete extirpation from the Sacramento Valley, a reduced density of populations in the eastern San Joaquin Valley and modest declines in the Coast Ranges. There are 41 documented occurrences of western spadefoot in the southeastern portion of the Planning Area. Twenty occurrences are inside the UDA and twenty-one are outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Reptiles				
Actinemys marmorata Western pond turtle	—	CSC	—	The Planning Area falls within the introgression zone for the two subspecies of western pond turtle: the northwestern pond turtle (*A. m. marmorata*) and the southwestern pond turtle (*A. m. pallida*). Western pond turtles inhabit a variety of aquatic habitats from sea level to elevations of 1,980 meters (6,500 feet). They are found in fresh to brackish aquatic habitats including marshes, rivers, ponds, and streams. Western pond turtles may also occur in man-made habitats, such as irrigation ditches, reservoirs, and sewage and millponds, but seem to become more active in water that consistently reaches 15° Celsius (60° Fahrenheit) (Jennings and Hayes 1994). They require still or slow moving water with in-stream emergent woody debris, rocks, or other similar features for basking sites. Western pond turtles typically forage on land and in quiet pools of water and, as omnivores with a broad feeding niche, they eat almost anything they can capture (Bury 1986). Reproductive activity by western pond turtles has been observed from February through November (Buskirk 2002). Depending on latitude, peak nesting season is from late May through early July but extends from late April through August (Rosenberg et al. 2009). Nests are typically located on unshaded upland slopes in dry substrates with clay or silt soils. There are 16 documented occurrences of western pond turtle in a patchy distribution within the Planning Area. Fourteen occurrences are outside of the UDA and two are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
Thamnophis gigas Giant gartersnake	T	T	—	The giant garter snake inhabits marshes, sloughs, ponds, small lakes, low gradient streams, other waterways, agricultural wetlands, such as irrigation and drainage canals and rice fields, and the adjacent uplands (USFWS 1999b). Recent field studies have shown giant garter snakes to be associated with aquatic environments that contain: (1) sufficient water during the active summer season (May 1 through September 30) to supply food (fish and amphibians) and cover; (2) vegetated banks for basking located immediately adjacent to water; (3) emergent vegetation for cover during the active season; and (4) high ground or uplands, such as levees or railroad grades, that provide cover and refugia from floodwaters during the dormant winter season (USFWS 1999b). The giant garter snake inhabits dense emergent vegetation in and directly adjacent to water bodies during its active season, and upland habitat above ordinary high water mark throughout its winter dormancy period. The snake may utilize upland habitat during its active season, although upland habitat is utilized much less frequently during the active season. During the dormant season, giant garter snakes typically select small mammal burrows and other soil crevices in upland habitat within 200 feet of ordinary high water mark with sunny exposure along south- and west-facing slopes (USFWS 1999b). The dormant season typically extends from October 2 to April 31, although this is largely weather-dependent. The active season extends from May 1 to October 1. There are 11 documented occurrences of giant garter snake within the Planning Area, including two within the UDA and nine outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Birds				
Accipiter cooperii Cooper's hawk	—	WL	—	Throughout its range, the Cooper's hawk nests in a wide variety of woodland and forest habitats, including oak woodland, riparian woodland, coniferous, deciduous, and mixed forest, woodlots, and suburban and urban areas. In much of California's lowland valley and foothill landscapes, including those within the Planning Area, this species appears strongly associated with live oak woodland (Curtis et al. 2006; Asay 1987).Cooper's hawks breed from approximately March to August (Curtis et al. 2006; Asay 1987). Nesting usually occurs in a deciduous tree near open water or riparian vegetation. They prefer to nest in open interrupted or marginal type woodland habitats. Nest sites are mainly found in live oaks and in riparian habitats with deciduous trees, as in canyon bottoms of river floodplains. Foraging occurs while flying quickly through dense vegetation, and Cooper's hawks prey almost exclusively on small to mid-sized birds (Curtis et al. 2006). There are 20 documented occurrences of Cooper's hawk within the Planning Area. Thirteen occurrences are outside of the UDA and 7 are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Agelaius tricolor Tricolored blackbird	BCC	CE	—	This species typically nests in a freshwater marsh or other areas with dense, emergent vegetation such as dense cattails or tules and also in thickets of blackberry and willow. While the vast majority of tricolored blackbirds are permanent residents of California, they make extensive migrations and movements within California (Beedy 2008). Major wintering areas include the Sacramento–San Joaquin River Delta and coastal area, with smaller flocks occurring from Sonoma County south to San Diego County (Beedy 2008). Breeding begins in late March and early April and extends into late July. Clutch size is

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
				typically three or four eggs, with clutches of two and five eggs occasionally observed (Emlen 1941). The tricolored blackbird primarily feeds on seeds and invertebrates, and requires an abundant, concentrated supply of insects for successful breeding colonies. It may also forage in wet and dry vernal pools, seasonal wetlands, riparian scrub, and open marsh borders. Most foraging occurs within 3.1 miles of colony sites (Beedy 2008). There are 36 documented occurrences of tricolored blackbird within the Planning Area. Fourteen occurrences are outside of the UDA and 22 are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Athene cunicularia hypugea Western burrowing owl	BCC	CSC	—	Suitable habitat within the Planning Area is found in annual and perennial grasslands, fallow agricultural fields, and open oak savannah. While Burrowing owls prefer grasslands, they may also be found in habitats with trees and shrubs if the canopy covers less than 30% of the ground surface (DeSante et al. 1997). Burrows are the essential component of burrowing owl habitat. Both natural and artificial burrows provide protection, shelter, and nests for burrowing owls. Burrowing owls typically use burrows made by fossorial mammals, such as ground squirrels or badgers, but also may use man-made structures, such as cement culverts; cement, asphalt, or wood debris piles; or openings beneath cement or asphalt pavement. Suitable habitat is present within the annual grasslands or ruderal habitat and cropland edges within the Planning Area. Western burrowing owls exhibit high site fidelity and reuse burrows year after year (Gervais et al. 2008). Western burrowing owls are opportunistic feeders, primarily feeding on arthropods, small mammals and birds found in grasslands, mowed areas, overgrazed grasslands, and agricultural areas near nest sites (Gervais et al. 2008). Western burrowing owls breed from March through August, with a peak in April and May. The Planning Area occurs within the Middle Central Valley portion of the burrowing owl's range. DeSante et al. (1997) estimated that the Central Valley supports 14% of the total California burrowing owl population. Although burrowing owl populations have declined or disappeared from much of their historical habitat, outlying areas of the County still provide suitable habitat for the species (Sacramento County 2016). There are 97 documented occurrences of western burrowing owl within the Planning Area. Sixty-one occurrences are outside of the UDA and 36 are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Buteo regalis Ferruginous hawk	BCC	—	—	This bird is also protected under the MBTA. Ferruginous hawks do not regularly breed in California (Bechard and Schmutz 1995). Ferruginous hawks are birds of open country. They are found in habitats, such as grasslands, sagebrush, deserts, shrublands, and the outer edges of pinyon–pine and other forests. Since the species does not regularly nest in California, only the habitat requirements and ecology of wintering ferruginous hawks are included in this section. During the winter, ferruginous hawks use grasslands and arid areas, particularly where pocket gophers, ground squirrels, rabbits, or prairie dogs are abundant. Ferruginous hawks also winter near cultivated fields that support populations of pocket gophers (Bechard and Schmutz 1995). The spatial requirements of ferruginous hawks during winter have not been widely reported (Bechard and Schmutz 1995) and what constitutes the minimum size of suitable winter foraging habitat is unknown for most areas. Ferruginous hawk is only expected within the Planning Area as a migrant or overwintering visitor. Most observations

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
				of ferruginous hawks have been reported from open grassland habitats in the eastern portion of the Planning Area from U.S. Highway 50 south to Howard Ranch. Winter observations have also been recorded from non-vineyard agricultural habitats in the south and southwestern portions of the Planning Area. There are 26 documented occurrences of Ferruginous hawk within the Planning Area. Eighteen occurrences are outside of the UDA and 8 are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Buteo swainsoni Swainson's hawk	BCC	T	—	Swainson's hawks typically nest in riparian habitats or isolated trees bordered by suitable foraging habitat. This species migrates into California from South America in the spring to establish breeding territories for the summer and typically migrates out of California by the end of September. Throughout the North American breeding range, adults arrive on nesting territories in March to May, lay eggs between April and June, and the young fledge between June and August (Bechard et al. 2010). The Central Valley provides optimal nesting habitat for this species due to the abundance of agricultural fields and riparian woodlands, which this species uses for foraging and nesting, respectively. The Swainson's hawk is considered to be largely insectivorous, but breeding pairs are thought to switch to vertebrate prey due to the energetic demands of reproduction. In the Central Valley a wide variety of prey items are taken including small mammals, birds, reptiles, and insects; however, the California vole (*Microtus californicus*) is the preferred prey item (Bechard et al. 2010). Key components in this success involve prey densities, prey availability, and distance to the nest site. There are 410 documented occurrences of Swainson's hawk within the Planning Area. Three hundred forty-eight occurrences are outside of the UDA and 62 are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Circus cyaneus Northern harrier	—	CSC	—	This species is found in meadows, grasslands, open rangelands, desert sinks, and freshwater and saltwater emergent wetlands. The northern harrier nests on the ground, usually at marsh edge in emergent wetland or along rivers or lakes, but may also nest in grasslands or grain fields several miles from water (Smith et al. 2011). This species breeds approximately from March through May. Northern harriers almost always forage on the wing and take small and medium sized prey, including mammals and birds (Smith et al. 2011). Northern harrier breeding populations in the northern portions of the species' range are more migratory than those at more southern latitudes (Smith et al. 2011). In the United States, migrating northern harriers depart their breeding grounds in August to December, and leave their wintering grounds in February to March. Migratory birds may winter in California, and some migrate south through Central and South America (Smith et al. 2011). Northern harriers occur in suitable habitat within the Planning Area and are probably regular breeders (County of Sacramento 2015). There are 70 documented occurrences of northern harrier within the Planning Area. Fifty-eight occurrences are outside of the UDA and 12 are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
Elanus leucurus White-tailed kite	—	CFP	—	White-tailed kites roost individually or communally during winter and often reuse roost sites annually (Dunk 1995). This year-round resident breeds from February to October, with a peak from May to August. The species hunts almost exclusively by hovering at heights between 5 to 25 meters, often facing into the wind. White-tailed kites are known to forage for small rodents and insects in agricultural areas, especially alfalfa fields (Dunk 1995). White-tailed kites generally inhabit low-elevation grasslands, wetlands dominated by grasses, oak woodlands, and agricultural and riparian areas (Dunk 1995). Nests are built in trees that occur in isolation or in riparian areas. Nest sites are closely associated with suitable foraging habitat with high rodent populations in the immediate vicinity of the nest. White-tailed kites occur in suitable habitat throughout the Planning Area; their overall distribution, abundance, and population structure are not well known. There are 62 documented occurrences of white-tailed kite within the Planning Area. Forty-two occurrences are outside of the UDA and 20 are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Grus canadensis tabida Greater sandhill crane	—	T; CFP	—	Greater sandhill cranes winter within and around the Planning Area. They use open agricultural habitats, natural vegetation communities, and seasonally managed wetlands. They feed mostly in marshes and grain fields, consuming seeds, grains (including waste grain) and some invertebrates. They need shallow flooded fields for roosting where they can be protected for terrestrial predators. They rarely roost in areas with heavy emergent vegetation. Greater sandhill crane use in the Planning Area principally in the Cosumnes River floodplain. Greater sandhill cranes that are foraging and roosting at the Cosumnes River Preserve tend to be concentrated in the roadless area south of Desmond Road, 1 to 2 miles east of Franklin Boulevard, and north of the Cosumnes River. Greater sandhill cranes also use the area immediately west of the Planning Area south of Lambert Road (County of Sacramento 2015). There are 210 documented occurrences of greater sandhill crane within the Planning Area. Of these, 202 occurrences are outside of the UDA and eight are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Lanius ludovicianus Loggerhead shrike	BCC	CSC	—	Loggerhead shrikes occur most frequently in riparian areas along the woodland edge, grasslands with sufficient perch and butcher sites, scrublands, and open canopied woodlands, although they can be quite common in agricultural and grazing areas, and can sometimes be found in mowed roadsides, cemeteries, and golf courses. Preferred habitats for the loggerhead shrike are open areas that include scattered shrubs, trees, posts, fences, utility lines, or other structures that provide hunting perches with views of open ground, as well as nearby spiny vegetation or man-made structures (such as chain link fences or barbed wire) that provide a location to impale prey items for storage or manipulation (Humple 2008). They inhabit open areas with clear visibility for hunting, perches for scanning, and fairly dense trees and shrubs for nesting. In many areas, loggerhead shrike abundance is correlated with the amount of pastureland and available perches and hunting perches are especially important for loggerhead shrike foraging (Yosef 1996). Loggerhead shrikes prey mainly on arthropods, but also take reptiles, amphibians, fish, small birds, and rodents (Humple 2008). Loggerhead shrikes occur year-round in suitable habitat throughout the Planning Area. They are probably regular breeders in the Planning Area in low

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
				densities; however, their overall distribution, abundance, and population structure are not well known. There are 34 documented occurrences of loggerhead shrike within the Planning Area. Twenty-seven occurrences are outside of the UDA and seven are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Mammals				
Lasiurus blossevillii Western red bat	—	CSC	—	These bats are found along the West Coast and in the southwestern United States and into Mexico, where they are thought to hibernate in the winter and use torpor to conserve energy during the day when it is inactive (Shump and Shump 1982). They are solitary creatures that roost in broad-leaved trees, especially cottonwoods and willows in the foothills and lower mountains of the Southwest, and in the fruit and nut orchards of the west, where they resemble dried leaves when roosting. They are often found near streams. Red bats take a variety of prey, including moths, crickets, flies, true bugs, beetles, and cicadas (Shump and Shump 1982). They generally forage in grasslands, shrublands, open woodlands, and croplands, but they also take advantage of congregations of insects attracted to streetlights and building floodlights. There are seven documented occurrences of western red bat within the Planning Area. Two occurrences are outside of the UDA and five are within the UDA. Additionally, western red bat records were obtained from the numerous bat specimens annually submitted for rabies testing to the Sacramento County Public Health Laboratory; localities reported were the City of Sacramento, Folsom, Rancho Cordova, Wilton, Elk Grove, or Galt. These specimens included females and immature bats, which indicate the presence of reproductive populations (Sacramento County 2016). The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Taxidea taxus American badger	—	CSC	—	The Species' Habitat Model considers the land covers with potentially suitable habitat for badgers to be, blue oak savanna, vernal pool seasonal wetland, swale and valley grassland. Badgers occupy dry, open, treeless regions; prairies; parklands; and cold desert areas with friable soils. American badgers are large members of the weasel family that inhabit a wide range of natural communities and throughout the state (Ahlborn 1990). Badgers are ground-dwelling animals, and require friable soils that support burrows for den sites and permit digging for prey (e.g., ground squirrels and other small animals). Within the Planning Area, valley grasslands likely provide the most suitable badger habitat, although badgers also could occur in other habitat types with appropriate soil conditions. They require sufficient food (burrowing rodents), friable soils for burrowing, and open, uncultivated ground. Badgers have large home ranges and spend inactive periods in underground burrows. Badgers typically mate in mid-to-late summer and give birth between March and April (Ahlborn 1990). American badgers have been documented in the northeastern portion of the Planning Area. There are 9 documented occurrences of American badger within the Planning Area. One occurrence is outside of the UDA and 8 occurrences are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
Plants				
Downingia pusilla Dwarf downingia	—	—	2B.2	Dwarf downingia is an annual herb that grows along the margins of several types of vernal pools as well as mesic sites within valley and foothill grasslands at elevations between 3 and 1,591 feet (CNPS 2014). Occurrences are associated mainly with northern claypan vernal pools in central Sacramento County, with northern hardpan vernal pools in the foothills of the Sierra Nevada, and with vernal pools of the Interior Valleys of the Coast Range in Napa and Sonoma Counties (CDFW 2014a). In Sacramento County, dwarf downingia occurs primarily on the Laguna and Riverbank geologic formations. Flowers from March to May (CNPS 2014). There are 10 documented occurrences of dwarf downingia distributed in concentrated patches within the Planning Area. None of the occurrences are located within the UDA. Two occurrences are located outside of the UDA within the Planning Area. One of these is encompassed within the 16,420-acre Nature Conservancy Cosumnes River Preserve and the other is located within the Howard Ranch preserve (Sacramento County 2016). The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Gratiola heterosepala Boggs Lake hedge-hyssop	—	E	1B.2	Bogg's Lake hedge-hyssop is a semi-aquatic annual herb that is strictly associated with the vernal pool-type hydrologic cycle. In Sacramento County, Bogg's Lake hedge-hyssop is associated with vernal pools located on ancient weathered alluvial terraces of the Laguna Geologic formation, with soils of the Redding, Red Bluff and related Series. Bogg's Lake hedge-hyssop shares the annual growth habit with the vast majority of other endemic vernal pool plants. Flowers from April to August. There are 31 documented occurrences of Boggs Lake hedge-hyssop within the Planning Area. Twenty occurrences are located within the UDA, and 11 occurrences are located outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Juncus leiospemus var. ahartii Ahart's dwarf rush	—	—	1B.2	This annual rush species is found in mesic valley and foothill grassland between 98 and 751 feet mean sea level (msl) (CNPS 2014). This species is restricted to wetlands possessing vernal pool-type hydrology. The blooming period is between March and May. Currently, there are two documented occurrences of Ahart's dwarf rush in the Planning Area, both in the UDA. One of the recorded occurrences is possibly extirpated and is located southeast of Rancho Cordova on private land southeast of the intersection of Kiefer Boulevard and Sunrise Boulevard. The other recorded occurrence is extant and located approximately 1.75 miles to the northwest of the Kiefer Blvd. occurrence on Mather Airport (Sacramento County 2016). The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Legenere limosa Legenere	—	—	1B.1	Legenere is an annual herb that flowers and sets seeds during the dry-down phase of the vernal pool hydrologic cycle, sometimes while shallow water or inundated soil remains in the deepest parts of the pool basin. Flowers from April to June or can be without flowers and self-pollinates. Legenere occurs at elevations between 3 and 2,887 feet (CNPS 2014). Many historical occurrences are extirpated (CDFW 2014a). There are 62 documented occurrences of legenere patchily distributed

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
				in the Planning Area. Thirty-six are located within the UDA and 26 are outside the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Navarretia myserii Pincushion navarretia	—	—	1B.1	This annual herb is found in vernal features that are often acidic between 65 and 1,082 feet in elevation, and is considered a strict vernal pool endemic. This species blooms in May. There are 49 documented occurrences of pincushion navarretia within 5 miles of the Planning Area. The vast majority (48) of the documented occurrences are located outside the UDA in the southeast corner of the Planning Area. Most of these occurrences are on the 13,000-acre Howard Ranch property. The remaining Sacramento County occurrence is located outside of the Planning Area, just north of the American River at the Phoenix Field Ecological Reserve (Sacramento County 2016). The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Orcuttia tenuis Slender Orcutt grass	T*	E	1B.1	Like all grasses in the genus *Orcuttia*, slender Orcutt grass is strictly adapted to the vernal pool hydrological cycle. Slender Orcutt grass can tolerate a wider range of vernal pool sizes and vernal wetland types than other *Orcuttia* species. It also occurs over a greater geographical area and landform types, and a larger number of occurrences as well. This annual grass is found in vernal pools between 114 and 5,774 feet in elevation. This species blooms between May and September, sometimes until October (CNPS 2014). There are four documented occurrences of slender Orcutt grass distributed in the Planning Area. All four occurrences are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.
Orcuttia viscida Sacramento Orcutt grass	E*	E	1B.1	This annual grass is found in vernal features between 98 and 328 feet in elevation (CNPS 2014) and is generally restricted to the largest pools. This species blooms between April and July. There are 40 documented occurrences of Sacramento Orcutt grass within the Planning Area, 10 are located within the UDA and 30 are outside the UDA. The central population center is located on the terrace landscape east of Mather Air Force Base in the vicinity of the Laguna Creek watershed. As measured by the number of CNDDB occurrences, number of occupied pools, and past estimates of the number of individuals, this population center comprises the core of the species' currently known distribution. All four occurrences are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.

Table G-2.1. The Proposed Covered Species; their Listing Status, Biology, and Habitat Requirements

Scientific Name Common Name	Regulatory Status			Description
	ESA	*CESA*	*CRPR*	
Sagittaria sanfordii Sanford's arrowhead	—	—	1B.2	Sanford's arrowhead is a perennial rhizomatous, emergent herb whose blooming period is between May and October (CNPS 2014). This plant species grows in water bodies located between sea level and 2,132 feet in elevation (CNPS 2014). Sanford's Arrowhead is strictly associated with freshwater marsh hydrology. Sanford's Arrowhead shares the perennial clonal growth habit with the vast majority of other endemic emergent marsh plants. Thin elongate rhizomes produce ovoid tubers (corms) at their tips that allow the plant to persist within the submersed substrate through the dormant winter season. The ability of colonies to withstand at least 1 year of unfavorable hydrologic conditions and then reappear with vigor is likely attributable to the dormant rhizome and associated tubers/corms. This species is extirpated from Southern California and mostly extirpated from the Central Valley (CNPS 2014). There are 64 documented occurrences of Sanford's arrowhead in the Planning Area. Fifteen occurrences are located within the UDA, and 49 occurrences are located outside the UDA. All four occurrences are within the UDA. The habitat model for this species along with the acres of existing modeled habitat within the Planning Area is shown in Section 3 below.

Status Definitions

Federal ESA:

E = listed as endangered under the ESA
T = listed as threatened under the ESA
* = species has designated Critical Habitat located within the Planning Area.
— = no ESA listing
BCC = Bird of Conservation Concern, USFWS 2008.

State CESA:

E = listed as endangered under CESA
T = listed as threatened under CESA
CFP = fully protected under the California Fish and Game Code
CSC = species of special concern in California
WL = Watch List
CE = Candidate for listing as endangered by CDFW
— = no state status

California Native Plant Society

California Rare Plant Rank (CRPR)
1B = Rare, threatened, or endangered in California and elsewhere
2 = Rare, threatened, or endangered in California but more common elsewhere
CRPR Threat Ranks
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

Table G-2.2. Other Special-Status Plant Species Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
Brasenia schreberi Watershield	—	S2	2B.3	Y	Y	Found in freshwater marshes and swamps. Grows in aquatic waterbodies both natural and artificial. Elev. 98-7,218 ft. Blooms: June-September.	One record within 0.5 miles of Planning Area is located near the Stone Lake Duck club east of Highway 5 (CDFW 2015a, CalFlora 2014). This record is historic but considered extant. Suitable habitat and elevation occurs in the Planning Area. Potentially affected by wetland or riparian removal or damage from activities such as road development or preserve maintenance.
Carex comosa Bristly Sedge	—	S2	2B.1	Y	Y	Found in and on the edges of marshes and swamps; on edge of riparian areas. Valley and foothill grasslands and coastal prairies. Prefers wet places like lake margins. Elev.: 0-2,051 ft. Blooms: May- September.	Found in 10 recent locations (within the last 5 years) within and six locations outside the Planning Area near or following Snodgrass Slough and tributaries. Recorded in Delta Meadows River Park in the Sacramento River Delta. Suitable habitat and elevation occurs in the Planning Area. No records within the UDA. Could be affected by alternatives that result in wetland or riparian removal or damage in the Planning Area.
Castilleja campestris var. *succulent* Succulent owl's clover	T	E/S2	1B.2	N	Y	Found in vernal pools. Pools can be acidic. Elev. 164-2,460 ft. Blooms: April-May.	One record found outside of the Planning Area at UC Cooperative Extension Angraves Nature Study Area, just south of Dry Creek and Galt. Critical habitat is located just inside the southern boundary of the Planning Area along Dry Creek, just east of the

Table G-2.2. Other Special-Status Plant Species Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
							City of Galt. Suitable habitat and elevation occurs in the Planning Area. Could be affected by disturbance or removal of vernal pools.
Clarkia biloba ssp. *Brandegeeae* Brandegee's clarkia	—	S4	4.2	N	Y	Found in the foothills within chaparral, cismontane woodland, and lower montane coniferous forest. Elev. 0-1,640 ft. Blooms: April-June	One historic occurrence located within the UDA. Two occurrences outside of the Planning Area. One near American River bluffs in Folsom, and the other outside the County in El Dorado Hills near Marble Valley. Suitable habitat located in blue oak woodland and savannah in the western section of the Planning Area. Could be affected by disturbance or removal of blue oak woodland or savannah in the Planning Area.
Cicuta maculata var. *bolanderi* Bolander's Water-hemlock	—	S2	2B.1	Y	Y	Found in coastal, fresh, or brackish water marshes. Elev. 0-656 ft. Blooms: July-September.	One 1993 record for the Planning Area near Snodgrass Slough and Delta Meadows River Park. No records in the UDA. Suitable habitat exists within Planning Area. Could be affected by wetland or riparian removal or damage in the Planning Area.
Cuscuta obtusiflora var. *glandulosa* Peruvian Dodder	—	—	2B.2	Y	Y	Generally found in freshwater marshes and swamps. Parasitic to host plant. A native species that is classified as a noxious weed by CA Department of Food and Agriculture. Elev. 49-919 ft. Blooms: July-October.	One record near Franklin/Big Horn Blvd and Laguna Lake just outside the Planning Area in Elk Grove (CDFW 2015a, CalFlora 2014). No records within the UDA. Suitable habitat and elevation occurs in the Planning Area. Could be affected by wetland or riparian removal or damage.

Table G-2.2. Other Special-Status Plant Species Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
Eryngium pinnatisectum Tuolumne Button-celery	—	S2	1B.2	Y	Y	Found in freshwater wetlands, vernal pools, wetland riparian and foothill woodland communities. Elev. 100 -5,610 ft. Blooms: May-August.	One historic record within the Planning Area from 1941 by Michigan Bar and Rancho Murieta. Five more records occur on the eastern outskirts of the Planning Area just south of Rancho Murieta. No records within the UDA. Suitable habitat and elevation occurs in the Planning Area. Potential effects from wetland or riparian removal.
Fritillaria agrestis Stinkbells	—	S3	4.2	Y	Y	Found in chaparral, cismontane woodlands, and valley and foothill grasslands. Elev. 0-1,640 ft. Blooms March-June.	One recent record within the Planning Area along Sloughhouse Road (CalFlora 2014). One record from dirt parking lot in Citrus Heights outside the Planning Area. Suitable habitat and elevation exists on the eastern edge of the Planning Area. Potential effects in the Planning Area from disturbance or removal of blue oak woodland and savannah and valley grasslands.
Hibiscus lasiocarpos var. *occidentalis* Woolly Rose-Mallow	—	S2	1B.2	Y	Y	Found in freshwater marshes and swamps, along freshwater soaked river banks and low peat island sloughs. Can also occur on riprap and levees. Known in the Delta watershed. Elev. 0-394 ft. Blooms: June-September.	27 records within the Study Areas; ten are found within the Planning Area near and along Snodgrass slough. Remainder are along the Sacramento River or Mokelumne River and tributaries running into the Delta. No records within the UDA. Suitable habitat and elevation occurs in the Planning Area. Potential effects from wetland or riparian removal or damage.

Table G-2.2. Other Special-Status Plant Species Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
Juglans hindsii Northern California Black Walnut	—	S1	1B.1	Y	Y	Found in riparian forest and woodland. Elev. 0-1,444 ft. Blooms: April-May.	Seven recent records are located within the Planning Area. Records within the Study Areas are located along the Sacramento River, the American River, within the Prairie City State Vehicle Recreation Area, and along Crevis Creek (by Rancho Murietta) within the Planning Area (CalFlora 2014). Only one record is located within the UDA by Hazel Ave and Highway 50. CNDDB (CDFW 2015a) records indicate one historic and extirpated occurrence. Suitable habitat and elevation occurs in the Planning Area. Potential effects from removal of trees along riparian corridors.
Lathyrus jepsonii var. *jepsonii* Delta tule pea	—	S2	1B.2	Y	Y	Found in freshwater and brackish marshes and swamps. Elev. 0-13 ft. Blooms: May-September.	Nine records in the Study Areas with the majority (five) near Snodgrass Slough in the Planning Area and tributaries of the Delta outside the Planning Area. No records within the UDA. Suitable habitat and elevation occurs in the Planning Area. Potential effects from wetland removal or damage in the Planning Area.
Lepidium latipes var. *heckardii* Heckard's Pepper-grass	—	S2	1B.2	Y	Y	Found in alkaline flats in valley and foothill grasslands. Elev. 7-656 ft. Blooms: March-May.	Two recent locations within the Planning Area south of Stone Lake; associated with pools. Suitable habitat and elevation occurs within Planning Area. Potential effects on suitable

Table G-2.2. Other Special-Status Plant Species Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
							habitat from implementation of alternatives.
Lilaeopsis masonii Mason's lilaeopsis	—	S2	1B.1	Y	Y	Found in riparian scrub and brackish or freshwater marshes and swamps. Elev. 3-33 ft. Blooms: April-November.	Known from areas south of the Planning Area. Concentrated in region of southern Sacramento County. Recent records occur all along the Sacramento Deep Water Ship Channel outside the Planning Area and along the Mokelumne river and tributaries of the Delta. Older records found in Snodgrass Slough within the Planning Area. No records within the UDA. Suitable habitat and elevation range occurs in Planning Area. Potential effects from wetland or riparian removal or damage.
Limosella australis Delta Mudwort	—	S2	2B.1	Y	Y	Found in mud banks in riparian scrub and freshwater or brackish marshes and swamps. Elev. 0-10 ft. Blooms: May-August.	Suitable habitat and elevation range occurs in Planning Area. Six records in the Study Area with most outside the Planning Area on the Mokelumne River and tributaries. Two records in the Planning Area along Snodgrass Slough at the edge of the Planning Area. Potential effects from wetland or riparian removal or damage.
Scutellaria galericulata Marsh Skullcap	—	S1	2B.2	Y	Y	Found in Lower montane coniferous forest, meadows, seeps, marshes and swamps. Elev. 0-6,980 ft. Blooms: June-	Two recent records are located within the Planning Area along Snodgrass Slough. Preferred higher elevation range does not occur within Planning

Table G-2.2. Other Special-Status Plant Species Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
						September.	Area. Likely restricted to the western section of the Planning near recent occurrences. Potential effects from wetland or riparian removal or damage.
Scutellaria lateriflora Side-flowering Skullcap	—	S1	2B.2	Y	Y	Found in marshes, swamps, mesic meadows and seeps. Elev. 0-1,640 ft. Blooms: July-September.	Ten occurrences within the Study Area. The majority of them (eight) occurring in the Planning Area along Snodgrass Slough and the Mokelumne River. Suitable habitat and elevation range occurs within Planning Area. Potential effects from wetland or riparian removal or damage.
Symphyotrichum lentum Suisun Marsh aster	—	S2	1B.2	Y	Y	Found in brackish and freshwater marshes and swamps. Elev. 0-10ft. Blooms: May-November.	Suitable habitat and elevation range occurs in Planning Area. Eight occurrences within the Study Area. The majority of them occur outside the Planning Area (six) in the Sacramento Deep Water Ship Channel. Within the Planning Area, occurrence found on tributaries of Snodgrass Slough. No records within the UDA. Potential effects from wetland or riparian removal or damage.
Trifolium hydrophilum Saline Clover	—	S2	1B.2	Y	Y	Found in marshes and swamps, valley and foothill grasslands, and vernal pools. Elev. 0-984 ft. Blooms: April-June	There are five recent occurrences within the Planning Area around Stone Lake. Colonies located within seasonally wet grasslands and vernal pools.Suitable habitat and elevation range occurs in Planning Area.

Table G-2.2. Other Special-Status Plant Species Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
							Potential effects from wetland or riparian removal or damage.

Sources: CDFW 2015a, CalFlora 2014, CNPS 2015, USFWS 2016.
Records noted are from the CNDDB database (CDFW 2015a). If more data was needed, the CalFlora database was searched and was cited. Records noted as recent are within the last 10 years (CalFlora 2014). Elevation in the Planning Area is from -5 to 670 feet. Records noted as Historic are within > 20 years old.

Y = Yes; N = No

Status Definitions
— = no status in the category

Federal:
E = listed as endangered under the ESA
T = listed as threatened under the ESA

State:
E = listed as endangered under CESA
T=listed as threatened under CESA
S1- Critically Imperiled by the State
S2- Imperiled by the State

California Rare Plant Rank (CRPR):
1A= Presumed extirpated in California and either rare or extinct elsewhere
1B = Rare, threatened, or endangered in California and elsewhere
2A = Presumed extirpated in California, but more common elsewhere
2B = Rare, threatened, or endangered in California, but more common elsewhere
3 = Plants which need more information and on the Review list
4= Plants of limited Distribution – Watch List

CRPR Threat Ranks:
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

Other Special Status Wildlife Species Evaluated in the EIS/EIR

The review of the data sources listed in the introduction to this section identifed 53 special-status wildlife species known, or with potential to occur in the Chapter 9 Study Area. Of the total 53 wildlife species identified in this review, 20 were already selected by the Permit Applicants to be Covered Species under the proposed SSHCP.

For the other 33 special-status wildlife species identified in the review, four species were selected for evaluation in the EIS/EIR. These species are listed in Table G-2.3 with information on their legal status and rationale for evaluation in the EIS/EIR. These determinations were based primarily on the types, extent, and quality of habitats in the Chapter 9 Study Area; the proximity of the Study Area to known occurrences of the species; and the regional distribution and abundance of the species.

Table G-2.3. Other Special Status Wildlife Species Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
Birds						
Ammodramus savannarum Grasshopper sparrow (nesting)	—	CSC	Y	Y	Nests and forages in dense grasslands; favors a mix of native grasses, forbs, and scattered shrubs.	Suitable habitat occurs in Planning Area. Could nest in annual grassland habitat in the Planning Area. Known to occur in southern half of Sacramento County. Two records within the Planning Area. Potential affected by disturbance or removal of grasslands.
Grus canadensis canadensis Lesser sandhill crane (wintering)	—	CSC	N	Y	Wintering habitats include crop fields, grazed and mowed grasslands, pastures, alfalfa fields, and shallow wetlands.	Winters in Planning Area. A regular winter visitor to the Bufferlands, Cosumnes River Preserve and other waterfowl preserves in the Sacramento area. Primary range is in Central Valley, with fall and winter occurrences within the Sacramento–San Joaquin River Delta and Sacramento Valley within the Study Area. Suitable wintering habitat occurs in Planning Area. Potential effects from disturbance and removal of roosting areas in crop fields, grasslands, and wetlands.
Melospiza melodia Song sparrow (Modesto population)	—	CSC	Y	Y	Breeding and wintering habitat is in emergent freshwater marshes, riparian forests, vegetated irrigation canals, levees, and newly planted valley oak restoration sites.	Suitable habitat occurs within Planning Area. 17 occurrences within the Planning Area. Two occurrences within the UDA. Generally known to occur within Sacramento County in southwestern corner of the County. Potential effects from disturbance and removal of emergent freshwater marshes, riparian forests, vegetated irrigation canals and levees or oak restoration sites.

Table G-2.3. Other Special Status Wildlife Species Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
Riparia riparia Bank Swallow (nesting)	—	T	Y	Y	Breeds in riparian, lacustrian and coastal areas with vertical banks, bluffs, and cliffs with sandy soils.	Limited suitable habitat within Planning Area. Known to occur in Sacramento County. Two occurrences found along the Cosumnes River near Rancho Murietta. No occurrences within the UDA. Potential effects from disturbance and removal of vertical banks, bluffs, or cliffs along rivers.

Source: Black and Vaughn 2005,CDFW 2015a, USFWS 2016.
Note: CNDDB = California Natural Diversity Database; USFWS = U.S. Fish and Wildlife Service
The federal and state status of species primarily is based on the Special Animals List (October 2015) (CDFW 2015b).

Legal Status Definitions

Federal:
— = no ESA listing

State:
T= listed as threatened under CESA
CSC= Species of special concern (no formal protection other than CEQA consideration)

Other Special Status Species not Evaluated in the EIS/EIR

Other Special Status Plant Species not Evaluated in the EIS/EIR

As described previously, the review of the data sources listed in the introduction to this section identified 37 special-status plant species known, or with potential to occur in the Chapter 9 Study Area. Of the total 37 plant species identified, 11 were not included in the EIS/EIR analysis. These species are listed in Table G-2.4 with information on their legal status and rationale for not being included in the EIS/EIR evaluation. These determinations were based primarily on the types, extent, and quality of habitats in the Chapter 9 Study Area; the proximity of the Study Area to known occurrences of the species; and the regional distribution and abundance of the species.

The review of the data sources listed in the introduction to this section identifed 53 special-status wildlife species known, or with potential to occur in the Chapter 9 Study Area. Of the total 53 wildlife species identified, 29 were not included in the EIS/EIR analysis.

For the other 33 special-status wildlife species identified in the review, four species were selected for evaluation in the EIS/EIR. These species are listed in Table G-2.3 with information on their legal status and rationale for evaluation in the EIS/EIR. These determinations were based primarily on the types, extent, and quality of habitats in the Chapter 9 Study Area; the proximity of the Study Area to known occurrences of the species; and the regional distribution and abundance of the species.

Table G-2.4. Other Special-Status Plant Species not Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
Amsinckia grandiflora Large-flowered Fiddleneck	E	E	1.B.1	N	N	Cismontane woodland and valley grassland in Alameda, Contra Cost and western San Joaquin Counties. Elevation: 886 – 1,804 ft. Blooms: March-May	No records in the County or Planning Area. Suitable habitat exists in the Planning Area; however , the Planning Area is outside the known range of the species. Not likely to be affected by alternatives.
Arctostaphylos myrtifolia Ione Manzanita	T	—	1B.2	N	N	Chaparral habitat. Restricted to the Ione Formation in Amador and Calaveras Counties, along an approximate 19.5 mile stretch, with the central distribution being the large exposure of the Ione Formation in western Amador County around the City of Ione. Elev.: 229-2,526 ft. Blooms: November-March.	Eight occurrences within 0.5 miles of the Planning Area. No records in the County or Planning Area. No suitable habitat exists in the Planning Area. Not likely to be affected by alternatives.
Calystegia stebbinsii Stebbins' morning-glory	E	E/S1	1B.1	N	N	Found in gabbroic or serpentine soils in chaparral or cismontane woodland openings. Elev. 606-3,576 ft. Blooms: April-July.	Not found within the Study Areas. No suitable habitat within Planning Area. Not likely to be affected by alternatives.
Ceanothus roderickii Pine Hill ceanothus	E	S1	1B.1	N	N	Found in gabbroic or serpentine soils in chaparral or cismontane woodland openings. Elev. 803-2,066 ft. Blooms: April-July	Not found within the Study Areas. Suitable habitat and elevation does not occur in the Planning Area. Not likely to be affected by alternatives.
Crocanthemum suffrutescens Bisbee Peak rush-rose	—	S2	3.2	N	N	Found in chaparral openings on Serpentine, Gabbroic, or Ione Formation Soils. Elev. 328-2,296 ft. Blooms: March-June.	Seven records outside the eastern edge of the Planning Area on Ione Formation soils. No records within the UDA. No suitable habitat exists in the Planning Area. Would not be affected by alternatives.

Table G-2.4. Other Special-Status Plant Species not Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
Eriogonum apricum var. *apricum* Ione Buckwheat	E	E	1B.1	N	N	Found in chaparral habitat with gravelly opening on Ione Formation soil. Elev. 262 -656 ft. Blooms: July-October.	*Eriogonum apricum* var. *apricum* and *E. apricum* var. *prostratum* are known only from an approximate 10-mile stretch along the Ione Formation in western Amador County at the edge of the Planning Area. No records from within the Planning Area. No suitable habitat exists within the Planning Area. Not likely to be affected by the alternatives.
Eriogonum apricum var. *prostratum* Irish Hill Buckwheat	E	E	1B.1	N	N	Found in chaparral habitat with gravelly opening on Ione. Elev. 262 -656 ft. Blooms: June-July.	*Eriogonum apricum* var. *apricum* and *E. apricum* var. *prostratum* are known only from an approximate 10-mile stretch along the Ione Formation in western Amador County at the edge of the Planning Area. No records from within the Planning Area. No suitable habitat exists within the Planning Area. Not likely to be affected by the alternatives.
Fremontodendron californicum ssp. *Decumbens* Pine Hill flannelbush	E	S1	1B.1	N	N	Found in rocky, gabbroic or serpentine soils in chaparral or cismontane woodland openings. Elev. 1,394 -2,493 ft. Blooms: April-July.	Not found within the Study Area. Suitable habitat and elevation does not occur in the Planning Area. Would not be affected by alternatives.
Galium californicum ssp. *Sierra* El Dorado bedstraw	E	S1	1B.2	N	N	Found in gabbroic soils in chaparral, cismontane woodlands, or lower montane coniferous forests in the foothills. Elev. 328 -1,919 ft. Blooms: May-June.	Not found within the Study Areas. No suitable habitat exists within the Planning Area. Would not be affected by alternatives.

Table G-2.4. Other Special-Status Plant Species not Analyzed in the EIS/EIR

Species Scientific Name Common Name	ESA (Federal) Status	State Status	CRPR Plant Rank	CNDDB or CalFlora records within Planning Area	Analyzed in the EIS/EIR	Rationale for EIS/EIR Analysis Decision	
						Species Habitat Requirements	*Conditions in the Planning Area*
Horkelia parryi Parry's Horkelia	—	S2	1B.2	N	N	Found in chaparral and cismontane woodlands on Ione formation and other soils. Elev. 262-3,510 ft. Blooms: April-September.	Four records are located outside of the Planning Area in the Study Area on Ione soils in the foothills of Amador County.No suitable habitat located within the Planning Area. Not affected by alternatives.
Senecio layneae Layne's butterweed	T	S2	1B.2	N	N	Found in rocky, gabbroic or serpentine soils in chaparral or cismontane woodlands. Elev. 658 -3,559 ft. Blooms: April-August.	Not found within the Study Area. No suitable habitat found within the Planning Area. Not affected by alternatives.

Sources: CDFW 2015a, CalFlora 2014, CNPS 2015, USFWS 2016.

Records noted are from the CNDDB database (CDFW 2015a). If more data was needed, the CalFlora database was searched and was cited. Records noted as recent are within the last 10 years (CalFlora 2014). Elevation in the Planning Area is from -5 to 670 feet. Records noted as Historic are within > 20 years old.

Y = Yes; N = No

Status Definitions
— = no status in the category

Federal:
E = listed as endangered under the ESA
T = listed as threatened under the ESA

State:
E = listed as endangered under CESA
T=listed as threatened under CESA
S1- Critically Imperiled by the State
S2- Imperiled by the State

California Rare Plant Rank (CRPR):
1A= Presumed extirpated in California and either rare or extinct elsewhere
1B = Rare, threatened, or endangered in California and elsewhere
2A = Presumed extirpated in California, but more common elsewhere
2B = Rare, threatened, or endangered in California, but more common elsewhere
3 = Plants which need more information and on the Review list
4= Plants of limited Distribution – Watch List

CRPR Threat Ranks:
0.1 = Seriously threatened in California (high degree/immediacy of threat)
0.2 = Fairly threatened in California (moderate degree/immediacy of threat)
0.3 = Not very threatened in California (low degree/immediacy of threats or no current threats known)

Other Special Status Wildlife Species not Evaluated in the EIS/EIR

As described previously, the review of the data sources listed in the introduction to this section identified 53 special-status wildlife species known, or with potential to occur in the Chapter 9 Study Area. Of the total 53 wildlife species identified, 29 were not included in the EIS/EIR analysis. These species are listed in Table G-2.5 with information on their legal status and rationale for not being included in the EIS/EIR evaluation. These determinations were based primarily on the types, extent, and quality of habitats in the Chapter 9 Study Area; the proximity of the Study Area to known occurrences of the species; and the regional distribution and abundance of the species.

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
Fish						
Acipenser medirostris North American Green Sturgeon (Southern DPS)	T*	CSC	N	N	Spawn in deep pools in large, turbulent, freshwater rivers. Adults live in oceanic waters, bays, and estuaries. In the Sacramento River, spawning occurs near Red Bluff and in the Feather River. Can be found at other life stages in the Sacramento River and the Sacramento-San Joaquin Delta. Critical habitat in Snodgrass Slough area along the Sacramento River.	No CNDDB records in the Planning Area. The Planning Area boundary is the Sacramento River levee and does not extend into habitat or critical habitat for North American green sturgeon (Southern DPS) in the River. The species would not be affected by activities considered in the alternatives along other rivers/waterways in the Planning Area that could provide habitat for the species. Not included for analysis because the activities and projects included in the EIS/EIR alternatives would not directly or indirectly impact North American green sturgeon (Southern DPS).
Archoplites interruptus Sacramento perch (within native range only)	_	CSC	N	N	Historically existed in vegetated sloughs, and pooling areas of rivers and lakes. More recently found in ponds and impoundments where it has been translocated. Prefers warm water. Historically, native to the Central Valley, it is mostly likely extirpated from its native range (Crain and Moyle 2011).	Only one record in the Study Area by Lake Greenhaven between I-5 and the Sacramento River. No CNDDB records in the Planning Area. Known only from translocations. No currently recorded or persistent populations in the Sacramento River (Crain and Moyle 2011) or other areas with the Planning Area. While suitable habitat exists in the Planning Area, it is not likely that this species persists in the natural waterways within the County. Not included for analysis because the activities and projects included in the EIS/EIR alternatives would not directly or indirectly impact Sacramento perch.

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
Hypomesus transpacificus Delta smelt	T*	E	N	N	Found in estuaries. Able to occur in brackish and freshwater. Pelagic and anadromous. Occurs in Sacramento-San Joaquin Delta most of the year. Spawns in tidally influenced freshwater wetlands and seasonally submerged uplands along the Sacramento River, downstream from its confluence with the American River (City of Sacramento, 2009).	Critical habitat within the Planning Area from the Sacramento River to just east of I-5; includes Snodgrass Slough. No CNDDB records in the Planning Area. The Planning Area boundary is the Sacramento River levee and does not extend into habitat or critical habitat for Delta smelt in the River. The species would not be affected by activities considered in the alternatives along other rivers/waterways in the Planning Area that could provide habitat for the species. Not included for analysis because the activities and projects included in the EIS/EIR alternatives would not directly or indirectly impact Delta smelt.
Lampetra ayresii River lamprey	_	CSC	N	N	Found in estuaries and the ocean, migrating to clear gravel riffles of streams to spawn. Known to occur in the lower Sacramento River and other tributaries within the County, but it is uncommon.	No CNDDB records in the Planning Area. The Planning Area boundary is the inside toe of the Sacramento River levee and does not extend into habitat for river lamprey within the River. The species would not be affected by activities considered in the alternatives along other rivers/waterways in the Planning Area that could provide habitat for the species. Not included for analysis because the activities and projects included in the EIS/EIR alternatives would not directly or indirectly impact river lamprey.
Oncorhynchus mykiss irideus Central Valley steelhead	T*	—	Y	N	All river reaches and estuarine areas accessible to listed steelhead in the Sacramento and San Joaquin Rivers and their tributaries in California. Widely distributed in the Sacramento River and its	Three recent CNDDB occurrences within the Planning Area: the Sacramento-San Joaquin Delta area, the Mokelumne River and the Cosumnes River. Critical habitat on the Sacramento, American and Mokelumne Rivers (including Dry Creek) along the edge of the Planning Area. The Planning Area boundary is the

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
					tributaries.	inside toe of theSacramento River levee and does not extend into habitat or critical habitat for Central Valley steelhead in the River. The species would not be affected by activities considered in the alternatives along other rivers/waterways in the Planning Area that could provide habitat for the species. Not included for analysis because the activities and projects included in the EIS/EIR alternatives would not directly or indirectly impact Central Valley steelhead.
Oncorhynchus tshawytscha Chinook salmon - Central Valley spring-run Evolutionary Significant Unit (ESU)	T*	T	N	N	Chinook salmon tend to spawn in the mainstems of rivers (or larger tributaries) in areas of gravel and cobble substrate. Migrate to and from oceanic environments to natal streams. Requires cool winter and spring flows for migration, spawning and cool summer water temperatures for fry and juvenile rearing, Also found in lakes up to 375 meters in depth. Occurs in the Pacific Ocean for most of its life. Travels to clean gravel beds in the upper Sacramento and portions of the American River for spawning.	No CNDDB records within the Planning Area. Spring-run Chinook enter the Sacramento River from late March through September. Adults hold in cool water habitats through the summer, then spawn in the fall from mid-August through early October. Spring-run juveniles migrate soon after emergence as young-of-the-year, or remain in freshwater and migrate as yearlings (CDFW 2014b). Rearing habitat may be found in the Cosumnes River and tributaries. Critical habitat occurs along the Sacramento and American Rivers It also occurs in the Delta Cross Channel leading into Snodgrass Slough. The Planning Area boundary is the inside toe of the Sacramento River levee and does not extend into Chinook salmon habitat or critical habitat for the Central Valley spring-run ESU. The species would not be affected by activities considered in the alternatives along the Cosumnes or its tributaries or Snoddgrass Slough. Not included for analysis because the activities and projects included in the

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
						EIS/EIR alternatives would not directly or indirectly impact Chinook salmon – Central Valley spring-run ESU.
Oncorhynchus tshawytscha Chinook salmon - Sacramento River winter-run ESU	E	E	N	N	Chinook salmon tend to spawn in the mainstems of rivers (or larger tributaries) in areas of gravel and cobble substrate. Migrate to and from oceanic environments to natal streams. Occurs in the Pacific Ocean for most of its life. Travels to clean gravel beds in the upper Sacramento and portions of the American River for spawning.	No CNDDB records within the Planning Area. The Sacramento River winter-run Chinook salmon occur as far upstream as the Keswick Dam and depend on cold water releases from the Shasta dam (located 9 miles upstream of Keswick Dam) to allow them to hold for several months until they spawn in early summer in the 70 miles below the Dam (Moyle 2002). Adult winter-run pass under the Golden Gate Bridge from November through May, and pass into the Sacramento River from December through early August. (CDFW 2014b). Planning Area boundary is the Sacramento River levee and does not extend into Chinook salmon habitat. Not included for analysis because there is no habitat within the Planning Area.
Oncorhynchus tshawytscha Chinook salmon – Central Valley fall / late-fall-run ESU	C	CSC	N	N	Chinook salmon tend to spawn in the mainstems of rivers (or larger tributaries) in areas of gravel and cobble substrate. Migrate to and from oceanic environments to natal streams. Requires cool summer flows for fry and juvenile rearing.	No CNDDB records within the Planning Area. Present in Sacramento-San Joaquin Delta and associated marshes. Presently fall and late-fall run chinook spawn in the Sacramento and San Joaquin rivers and their tributaries (including the American River) between Keswick Dam (near Redding) and the Merced River (NMFS 2014, CDFW 2014b). Rearing may occur in the Cosumnes River and tributaries. The Planning Area boundary is the Sacramento River levee and does not extend into Chinook salmon habitat. The species would not be affected by activities considered in the alternatives along the

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
						Cosumnes or its tributaries. Not included for analysis because the activities and projects included in the EIS/EIR alternatives would not directly or indirectly impact Chinook salmon – Central Valley fall / late-fall-run ESU.
Pogonichthys macrolepidotus Sacramento splittail	—	CSC	N	N	Found in pooling areas of rivers and lakes as well as backwaters. Able to survive in brackish waters as well. Requires flooded vegetation for spawning and juvenile foraging habitat. Spawning occurs over flooded stream bank vegetation in sloughs and in slow moving large rivers Requires flooded vegetation for spawning and juvenile foraging habitat. Spawning occurs over flooded stream bank vegetation in sloughs and in slow moving large rivers.	Small amount of appropriate habitat along the Sacramento River. One CNDDB record from 1995 within the Sacramento River along the border of the Planning Area was found in CNDDB records. However, the Planning Area boundary is the Sacramento River levee and does not extend into Sacramento splittail habitat in the river. Young of the year found in the Cosumnes River Preserve (Whitener and Kennedy 1999). Present in Sacramento-San Joaquin Delta and associated marshes. The species would not be affected by activities considered in the alternatives along the Cosumnes or its tributaries. Not included for analysis because the activities and projects included in the EIS/EIR alternatives would not directly or indirectly impact Sacramento splittail.
Spirinchus thaleichthys Longfin smelt	C	T	N	N	Found in the California's bay, estuary, and nearshore coastal environments from San Francisco Bay north to Lake Earl, near the Oregon border. The San Francisco Estuary and the Sacramento-San Joaquin Delta supports the largest longfin smelt population in California.	While there are two recent CNDDB occurrences along the Sacramento River, the Planning Area boundary is the inside toe of theSacramento River levee and does not extend to longfin smelt habitat. The majority of the population's habitat is in the Delta region south and east of the Planning Area. Would not be affected by the alternatives because is found outside Sacramento County or on its borders, it has no known distribution within the

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
						Planning Area, and is not located near UDA activities.
Birds						
Aquila chrysaetos Golden eagle (nesting and wintering)	—	CFP (Breeding and Wintering)	Y	N	Occurs in mountainous canyon land, rimrock terrain of open desert, and grassland areas. Potential foraging habitat is in shrublands, grasslands, farmland, and riparian areas. Occurs in foothills and mountain areas of California with known occurrences in central Sacramento County.	Two historic records from the Planning Area. Only one record in the UDA of a wintering golden eagle by Mather Airport is located within the Planning Area. Golden eagles likely to do not nest in the Planning Area due to the lack of rocky ledges and cliffs. Limited suitable nesting habitat within the Planning Area. Low likelihood of nesting in the Planning Area and being affected by the alternatives.
Asio flammeus Short-eared owl (nesting)	—	CSC	N	N	Open areas with few trees including grasslands, prairies, dunes, meadows, and irrigated lands. Potential habitat within the Planning Area includes valley grasslands, wetlands, and agriculture lands. A winter migrant that is found primarily in the Central Valley, the western Sierra Nevada foothills and along the coastline.	No observations were found within the CNDDB within the Study Area. Highest concentrations are in Solano County. There is a low likelihood of nesting in the Planning Area and being affected by the alternatives.
Asio otus Long-eared owl (nesting)	—	CSC	N	N	Requires riparian habitat breeding and wintering; also uses live oak thickets and other dense stands of trees.	Some suitable habitat in Planning Area. No known occurrences within Sacramento County or surrounding region. A year-round resident in California, although it has been nearly extirpated from the central valley. Low likelihood of nesting in the Planning Area and being affected by the alternatives.

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
Coccyzus americanus occidentalis Western yellow-billed cuckoo (nesting)	T	E	Y	N	Open woodland; deciduous riparian woodland; nests in tall cottonwood and willow riparian woodland.	Found along the Sacramento River north of the Study Area. Does not nest within the Planning Area or Sacramento County. CNDDB record in Planning Area is from 1896. Low likelihood of nesting in the Planning Area and being affected by the alternatives.
Falco peregrinus anatum American peregrine falcon (nesting)	Delisted, Taxon Recovered;	Delisted, CFP	N	N	Occurs in a wide range of habitats. Breeds mostly in woodland, forest, and coastal habitats with high cliff faces. Year-around habitats include riparian areas, inland and coastal wetlands. Wintering may occur within the Planning Area.	Limited suitable habitat in Planning Area, and no known occurrences within Sacramento County. Low likelihood of nesting in the Planning Area and being affected by the alternatives.
Haliaeetus leucocephalus Bald eagle (nesting and wintering)	Delisted, Taxon Recovered;	E, CFP	N	N	Breeds in forested areas adjacent to large bodies of water. Usually nests in trees. Wintering birds may occur within Planning Area.	No known occurrences within Sacramento County. Limited suitable habitat within the Planning Area. Low likelihood of nesting in the Planning Area and being affected by the alternatives.
Icteria virens Yellow-breasted chat (nesting)	—	CSC	N	N	Breeds in early-successional, riparian habitats with well-developed shrub layer and open canopy.	Species is a rare spring and summer visitor to the region. Nesting has not been documented within the Planning Area. Limited habitat within Planning Area. Not known to occur in Sacramento County. Low likelihood of nesting and being affected by the alternatives.
Progne subis Purple Martin (nesting)	—	CSC	N	N	Within species range breeds in wooded, low elevation habitats including riparian, coniferous, and valley foothill and montane woodlands, and structures. Within the Planning Area, uses	Suitable habitat occurs within Planning Area and known from Sacramento County, but no known occurrences from the Planning Area. Only documented occurrences are within the City of Sacramento along freeway overpasses. Not likely to be affected by the alternatives.

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
					weep holes in freeway overpasses.	
Rallus longirostris obsoletus California clapper rail	E	E	N	N	Tidal marshes, shallow freshwater margins, wet meadows and flooded grassy vegetation. May breeding and winter in the Planning Area.	Some potential habitat occurs in Planning Area, but no known occurrences in Sacramento County. Low likelihood of being affected by the alternatives.
Setophaga petechia Yellow warbler (nesting)	—	CSC	N	N	Breeds in riparian woodlands, montane chaparral, open ponderosa pine, and mixed conifer habitats.	Yellow warblers currently occupy much of their former breeding range, except in the Central Valley, where they are close to extirpation (Shuford and Gardali, 2008). Limited suitable habitat and elevation within Planning Area. Not known to occur within Sacramento County. There is a low likelihood of being affected by the alternatives.
Vireo bellii pusillus Least Bell's vireo (nesting)	E	E	N	N	Breeds in dense, riparian scrub. Prefers early successional stages in riparian areas, brushy fields, young second-growth forest or woodland, scrub oak, coastal chaparral, and mesquite brushlands, often near water in arid regions.	While suitable riparian scrub may be found within the Planning Area, these birds are considered extirpated from Sacramento County. Therefore, there is a low likelihood of being affected by the alternatives.
Xanthocephalus xanthocephalus Yellow-headed blackbird (nesting)	—	CSC	Y	N	Marshes with tall emergent vegetation are used for breeding and wintering.	Some suitable habitat within the Planning Area. Not known to currently occur within Sacramento County. The one CNDDB record within the Planning Area is from 1899. Therefore, there is a low likelihood of being affected by the alternatives.

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
Mammals						
Bassariscus astutus Ringtail	—	CFP	N	N	Mixed forests and shrublands near rocky area or riparian habitats. Forages near water and is seldom found more than 0.62 mile from a water source.	There are no records of the species in CNDDB, and due to the limited occurrence of rocky habitats along rivers and within riparian areas of the Planning Area and the level of human disturbance within these habitats in the Planning Area this species is not likely to occur. There is a low likelihood of being affected by the alternatives.
Corynorhinus townsendii Townsend's Big-eared bat	—	CSC/ CT	N	N	Prefers mesic habitats characterized by coniferous and deciduous forests and riparian habitat, but also xeric areas. Roosts in limestone caves and lava tubes, also man-made structures and tunnels.	Limited suitable habitat within Planning Area. Not known to occur in Sacramento County. There is a low likelihood of being affected by the alternatives.
Sylvilagus bachmani riparius Riparian brush rabbit	E	E	N	N	Large patches of riparian vegetation composed of wild roses, grapes, willow or blackberries, edges of brushy species to grasses and herbaceous forbs. High ground refugia from flooding needed.	Limited habitat within the Planning Area. The range of this species is located within San Joaquin County and the Delta near Paradise Cut. There is a low likelihood of being affected by the alternatives.
Amphibians						
Rana boylii Foothill yellow-legged frog	—	CSC	N	N	Rocky streams and rivers with open banks in forest, chaparral, and woodland habitat. Generally found in the foothills.	No known occurrences within Sacramento County. Limited suitable habitat within Planning Area. Only CNDDB record in Study Area is from 1958. There is a low likelihood of being affected by the alternatives.

Table G-2.5. Other Special Status Wildlife Species not Analyzed in the EIS/EIR

Scientific Name Common Name	Status				Rationale	
	ESA (Federal) Status	*State Status*	*CNDDB Records within Planning Area*	*Analyzed in the EIS/EIR*	*Species Habitat Requirements*	*Conditions in the Planning Area*
Invertebrates						
Branchinecta conservatio Conservancy fairy shrimp	E	—	N	N	Larger more turbid vernal pools, playa pools.	Not known to occur in Sacramento County. Limited suitable habitat in Planning Area. Not likely to be affected by the alternatives.
Callophrys mossii bayensis San Bruno Elfin Butterfly	E	—	N	N	Coastal chaparral with populations of the larval food plant broadleaf stonecrop (*Sedum spathulifolium*). Known from these habitats in Northern San Mateo, Marin and Contra Costa Counties (Black and Vaughn 2005).	Not known to occur in Sacramento County. Found only in San Mateo, Marin and Contra Costa Counties. There is a low likelihood of being affected by the alternatives.
Elaphrus viridis delta green ground beetle	T	—	N	N	Vernal pool habitat.	Not known to occur in Sacramento County. Found only in Solano County at Jepson Prairie Preserve. There is a low likelihood of being affected by the alternatives.

Source: Black and Vaughn 2005,CDFW 2015a, USFWS 2016.
Note: CNDDB = California Natural Diversity Database; USFWS = U.S. Fish and Wildlife Service
The federal and state status of species primarily is based on the Special Animals List (October 2015) (CDFW 2015b).

Legal Status Definitions
Federal:
E = listed as endangered under the ESA
T = listed as threatened under the ESA
C = candidate for listing under the ESA
— = no ESA listing
*= species has designated Critical Habitat located within the Planning Area.

State:
E = listed as endangered under CESA
T= listed as threatened under CESA
C = Candidate for listing under CESA
CT = Candidate Threatened
CSC= Species of special concern (no formal protection other than CEQA consideration)
CFP = Fully protected (legally protected)
— = no state status
** Analysis of impacts to rookeries are a requirement under CEQA

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EIS/EIR APPENDIX G-3

Species Accounts for

Proposed Covered Species

The following species accounts describe each of the species proposed by the Project Aplicant for coverage under the South Sacramento Habitat Conervation Plan (SSHCP). Each account gives the listing status, life history, genetics, habitat and ecology of the species, including its distribute on within the Planning Area. These species accounts provide additional detailed information on these potential covered species and potential conservation strategy actions in support of the analysis found in Chapter 9 of the EIS/EIR. The information used to create these species accounts is found in the literature cited section at the end of each account. To reduce the amount of text in each profile, a three or four letter abbreviation is identified for each species. The abreviations either reflect abreviations already in common use for a species, such as VELB for valley-elderberry longhorn beetle, or were developed in support of SSHCP preparation based on the common name of the species.

DWARF DOWNINGIA (DWDO)

Dwarf Downingia (DWDO)

(Downingia pusilla)

Status USFWS: None

Status CDFW: None

Status CNPS:2.2

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DWDO Listing Status

Dwarf downingia (*Downingia pusilla*) is considered to be rare, threatened or endangered in California, but more common elsewhere, thus qualifying its designation as a list 2.2 species by the California Native Plant Society (CNPS), meaning it is fairly threatened in California with a moderate degree/immediacy of threat, but it is more common outside of California (CNPS 2010). It has been assigned an R-E-D Code of 1-2-1, meaning it is rare, but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time, it is endangered in a portion of its range, and it is more or less widespread outside of California.

Being a CNPS List 2 plant species, dwarf downingia meets the California Department of Fish and Wildlife (CDFW) definition of a special plant though it has no formal protection status by the CDFW or United States Fish and Wildlife Service (USFWS).

DWDO Life History and Ecology

DWDO Species Description and Life History

DWDO Morphology

Dwarf downingia, a strict endemic of the vernal pool hydrologic regime, is an annual member of the Bellflower family (Campanulaceae). This inconspicuous species is variable with regard to stem length (Mason 1957). Single small-stature plants can be erect and less than three centimeters in height at maturity, or longer branched stems (up to 15 cm) can sprawl horizontally, forming relatively dense colonies, or mix with the other sprawling vernal pool species (Dittes pers. obs.). Small (five to ten millimeter-long) narrowly linear leaves are alternately arranged on the stems. Single flowers are borne in the leaf axils towards the tips of the stems.

Dwarf downingia possesses atypical flowers within the genus with regard to size and symmetry. Typical *Downingia* flowers, ranging from five to 19 millimeters in length, are bilaterally symmetrical, with two narrow "upper petals" and a broad, three-lobed "lower petal." These five corolla lobes, mostly blue or blue-purple with varying combinations of white and yellow, are united into a tube below their bases. The flower is borne at the apex of a long narrow stalk-like ovary (inferior ovary).

In comparison to characteristically showy *Downingia* flowers, the flowers of dwarf downingia are very small, ranging from only 2.5 to 5.4 millimeters in length. In addition, they lack the strong bilateral symmetry characteristic of other *Downingia* species; dwarf downingia flowers appear almost radial or star-like, with five narrow, triangular lobes that barely exceed the green calyx lobes. Dwarf downingia flowers can be white or blue, with two small yellow spots near the throat (Hickman 1993). This is a very inconspicuous plant and must be surveyed for while in flower, as there is no other way to identify this species.

DWDO Ecological Life Cycle

Other than field observations recorded in the California Natural Diversity Data Base (CNDDB) (CDFG 2010), basic taxonomy and biogeographic treatments, dwarf downingia remains mostly unstudied. Since all vernal pool plant species share similar environmental selective pressures, they likely also share similar adaptive traits. For this reason, studies addressing the life history and ecology of other more common vernal pool plant species may provide some insight into the life history and ecology of dwarf downingia.

Dwarf downingia shares the annual growth habit with the vast majority of other endemic vernal pool plants. This adaptive trait allows populations to persist through the regular and extreme

summer drought that characterizes vernal pools and the Mediterranean Climate (Griggs and Jain 1983; Holland 1987; Stone et al. 1988; Zedler 1990).

DWDO Seed Germination

The specific timing of the germination of dwarf downingia seeds relative to the timing of the vernal pool inundation cycle has not been studied or described in detail. In general, *Downingia* seeds germinate during the early stages of vernal pool inundation (Zedler 1987). Studies involving germination of *Downingia cuspidata* have demonstrated a required pretreatment for germination at high percentages, although complete submersion was not required (Myers 1975). Studies involving *D. concolor* have had erratic to poor germination results (Hoover 1937; Linhart 1972 as reported in Zedler 1987). Seeds of other more common *Downingia* spp. occurring in the Sacramento Valley (*D. bicornuta, D. ornatissima, D. cuspidata, D. bella*) germinate under water in pool basins or in inundated soil at shallow edges of filled pools (Dittes pers. obs.). Germination requirements and optima for dwarf downingia have not been investigated. Seed dormancy and required environmental cues for in-situ germination may exist, but are presently unknown.

DWDO Vegetative Growth

One of the challenges posed to many vernal pool plant species is optimization of photosynthesis and other metabolic processes in both the early season aquatic and later season terrestrial phases of the vernal pool cycle. *Downingia* and many other vernal pool species, being amphibious, possess differing aquatic and terrestrial growth forms. After germination, seedlings and young plants growing under water produce thickened, elongate, spongy stems with large air chambers, and narrowly linear leaves that lack waxy cuticle (Weiler 1962). Stems produced in the terrestrial phase are thinner with denser tissue, and leaves are somewhat wider, thicker and posses waxy cuticle. The air-filled aquatic stems hold the plant vertical in the water column and with the thinner leaves, facilitate light exposure and gas exchange. This in effect lengthens the growing season by maximizing growth while vernal pools are still inundated.

DWDO Reproduction

Dwarf downingia and other species in the genus flower and set seeds during the dry-down and terrestrial phase of the vernal pool hydrologic cycle, typically during March through May (CNPS 2010). The very small, reduced flowers and included anthers and stigma reflect a self-fertilizing breeding system for dwarf downingia, in contrast to the outcrossing strategy for almost all other Downingias (Weiler 1962; Zedler 1987; Thorp 1990). Once fertilized, the inferior ovary elongates into a narrow stalk like capsule that can reach two to three centimeters in length. The mature capsules produce numerous minute dust-like seeds that are released as the capsule

disintegrates through the late spring, summer and fall months. Fecundity and variation in seed production have not been investigated in dwarf downingia.

DWDO Dispersal

In many other vernal pool species, seed dispersal is naturally limited, although this has not been stated specifically for *Downingia*. Limited seed dispersal in vernal pool species is thought to represent an adaptation to spatially unpredictable and limited vernal pool habitat (Griggs 1974, 1980). Natural dispersal of dwarf downingia seeds likely occurs via flowing water, transport on feet and feathers of waterfowl, and in mud on hooves and legs of livestock.

Evidence of dwarf downingia dispersal and colonization exists in occupancy of man-made topo-hydrologic features within occupied vernal pool landscapes (stock pond margins, roadside ditches, rutted tire tracks, gravel pits and scraped depressions (Witham 1991; CDFG 2010). As with all other vernal pool species, natural dispersal of seeds was likely a more frequent event when there were many more vernal pools, more pool interconnectivity, exceedingly larger waterfowl migrations and unfenced roaming ungulates (Griggs 1980). Dwarf downingia, and about 10-15 other vernal pool species occur both in Californian and South American vernal pool habitats (amphitropical); a distribution most likely resulting in historic long-distance dispersal by migratory waterfowl (Zedler 1987).

DWDO Seed Dormancy

The existence of a dormant soil seed bank is unknown for dwarf downingia. The presence of a persistent soil seed bank provides insurance against localized extirpation resulting from the unpredictable occurrence and duration of appropriate growing conditions. If total seed crop failure occurs in a given year or set of years (failure to germinate, loss to late season flooding or fire, excessive grazing by livestock or grasshopper herbivory), additional stored seeds are available for another year's effort.

DWDO Population Genetics

The population biology and genetics of dwarf downingia have not been investigated, so intra- and inter-population patterns of genetic variability are unknown. Elam (1998) provides a good overview of the different issues that should be considered in assessing the population genetics of vernal pool plants in the absence of empirical data for a given taxon. Given the limited number of occurrences and the scattered geographical distribution, each dwarf downingia population should be considered unique, and for species conservation, are unique genetic entities.

DWDO Habitat Requirements and Ecology

DWDO Biogeography and Landform Relations

It is generally held that many of the endemic vernal pool plant species, including downingias, are relatively recent evolutionary derivations of more common and widespread upland progenitors (Stebbins 1976; Stone 1990; Raven and Axlerod 1978; Thorne 1984). These neoendemic vernal pool species are thought to have evolved from terrestrial habitat into seasonally aquatic vernal pool habitat made available as the Mediterranean Climate developed and the inland Tertiary-age Sea dried.

Dwarf downingia occurrences are associated mainly with northern claypan vernal pools in central Sacramento County, with northern hardpan vernal pools in the foothills of the Sierra Nevada, and with vernal pools of the Interior Valleys of the Coast Range in Napa and Sonoma Counties (CDFG 2010). Throughout this area, the species occurs on a variety of landforms and soil associations. In Sacramento County, dwarf downingia occurs primarily on the Laguna and Riverbank.

DWDO Hydrology Relations

Dwarf downingia is a strict endemic of the vernal pool hydrologic cycle. It is of importance to conservation however, that in contrast to the “deeply-adapted” vernal pool grasses of the Orcuttiae Tribe, and legenere (*Legenere limosa*), dwarf downingia occupies more commonly occurring, smaller and/or shallower vernal pools with comparatively more “flashy” hydrology (CDFG 2010; Dittes pers. obs.). In a survey of eight dwarf downingia-occupied vernal pools at Beale Air Force Base, the mean vernal pool area was found to be 299 square meters (357.6 square yards) and the mean vernal pool depth was 20.8 centimeters (8.2 inches). These are reported as being of average area and depth among the pools measured in that study (Platenkamp 1998). Vernal pool dimensions or reference to size are not given for any of the other CDFW occurrences. Dwarf downingia is also known to occupy the margins of larger or deeper vernal pools, and the seasonally fluctuating vernal pool-like edges of more severely inundated systems, including seasonal marsh, slough and stock pond habitats.

DWDO Biological Community Relations

Floristic associations provide further indication of preference for less extreme (more typical) vernal pool hydrological cycles. Dwarf downingia grows in the same hydro-topographical position as more commonly occurring vernal pool associates, including Fremont’s goldfields (*Lasthenia fremontii*), smooth goldfields (*L. glaberrima*), dwarf wooly marbles (*Psilocarphus brevissimus*), Oregon wooly marbles (*P. oregonus*), annual hairgrass (*Deschampsia danthonoides*), popcorn-flowers (*Plagiobothrys stipitatus* var. *micranthus, P. bracteatus),* double-horned downingia (*Downingia bicornuta*), mousetail (*Myosurus minimus*), American

pillwort (*Pilularia americana*), quillwort (*Isoetes howellii*), coyote thistle (*Eryngium* spp.), and others. All species reported as associates of dwarf downingia in Sacramento County (CDFG 2010). Most of these are commonly occurring vernal pool species that inhabit small to medium size vernal pools and swales, and the slopes and margins of larger and/or deeper pools. It is interesting to note that at least one population has been reported as growing among deeper pool associations [e.g., smooth goldfields*,* common spikerush (*Eleocharis macrostachya*)*,* and water starwort (*Callitriche marginata)].*

DWDO Non-Native Weed Relations

Hydrological stresses associated with vernal pools exclude the majority of non-native weedy species that characterize the present-day valley annual grassland, agricultural fields, and ruderal habitats. Italian wild rye (*Lolium multiflorum*) and Mediterranean barley (*Hordeum marinum* ssp, *gussoneanum*), two non-native facultative wetland species typically dominate disturbed wetlands and can be invasive in smaller, more ephemeral vernal pool types. Some suggest that built-up thatch from Italian wild rye, Mediterranean barley, Medusa-head grass (*Taeniatherum caput-medusae*), and other non-native upland species may indirectly affect vernal pool species as well by lessening the amount of water entering the system through surface and subsurface flow (Robins and Vollmar 2002).

Since dwarf downingia occupies the smaller to medium size, “more typical” vernal pool types and the margins of larger or deeper pools, it may be more susceptible to the effects of excessive growth of Italian wild rye and Mediterranean barley and thatch buildup than the Orcuttiae grasses, or the more deeply adapted legenere.

Other weedy hydrophytic species reported as growing with dwarf downingia include lippia (*Phyla nodiflora*), and swamp pricklegrass (*Crypsis schoenoides*). Although none of the following are specifically reported to co-inhabit vernal pools with dwarf downingia, other non-native weedy hydrophytes may present future problems, including European mannagrass (*Glyceria declinata*), field bindweed (*Convolvulus arvensis*), Common unicorn plant (*Probiscidea louisianica*), Bermuda-grass (*Cynodon dactylon*) and paradox canary-grass (*Phalaris paradoxa*). Cocklebur (*Xanthium strumarium*), another native species, can also dominate vernal pools (Schlising, Unger pers. comms.).

DWDO Livestock Grazing Relations

Specific interactions between livestock grazing and dwarf downingia are largely unknown. In general, appropriately timed dry-pasture livestock grazing regimes are thought to be compatible with the development and persistence of vernal pool vegetation. Robins and Vollmer (2002) provide a review of information pertaining to livestock grazing in vernal pool ecosystems.

Many extant populations of dwarf downingia inhabit long-operating cattle ranches, so persistence indicates tolerance for at least some level of grazing. Timing of livestock grazing is likely more important than stocking rates in affecting persistence of dwarf downingia. During the period when pools are inundated and upland forage is still green and attractive, cattle tend to not congregate in pools and trampling and grazing pressures to vernal pool plant species in their seedling or juvenile aquatic phase are minimized. Once the upland forage cures and the vernal pools are in their flowering and seed-producing terrestrial phase, moist pools become more attractive to livestock and grazing and trampling pressures are increased. It should be noted however, as with many other vernal pool annuals, small stature and high plant densities ensure that in all but extreme cases, a portion of every year's cohort escapes destruction, matures and sets seed. Grazing in the summer and fall months, after seeds have set and plants have died likely has little negative effect on dwarf downingia.

DWDO Disturbance Response

Observations of field workers provide some evidence of the potential response of dwarf downingia populations to particular disturbance regimes. Several dwarf downingia populations persist despite periodic disking of the vernal pool substrates over decades (Kelsey pers. comm.; Dittes pers. obs.; CDFG 2010). It is very important to note that in these cases, disking is not so deep as to significantly affect the subtending impermeable layer or the vernal pool hydrological cycle. In addition, the disking is performed in the late summer or fall months in preparation for dryland winter grain crops, so vernal pool plants have set seed and dried. Persistence of populations in fall-disked and planted dryland winter wheat fields has also been noted for several of the Orcuttiae grasses (Hoover 1941; Crampton 1959; Stone et al. 1988). This has been observed for other more common vernal pool species as well (Ahart pers. comm. 2003).

If this disking occurs earlier in the growing season, before seeds are mature, over consecutive years, population extirpation is probable through exhaustion of soil seed bank. These are outstanding examples of the overriding selective force of the vernal pool hydrologic cycle in affecting floristic composition, and the importance of timing of management-related disturbances relative to specific life-history stages.

DWDO Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for dwarf downingia in this Planning Area are identified in Table G-3.1-1 with from input from agency and local species experts.

Table G-3.1-1. Habitat Elements for Dwarf Downingia

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

DWDO Species Distribution and Population Trends

DWDO Species Range

Presently, dwarf downingia is recorded from 117 CNDDB occurrences, all in California (CDFG 2010). These are distributed primarily in the Great Central Valley from Fresno County in the south, to Tehama County in the north. Dwarf downingia also occurs at scattered sites in the interior valleys of the southern North Coast Ranges, in Napa and Sonoma Counties. These occurrences are all situated at sites ranging from 10 to 1,600 feet elevation above mean sea level (CNPS 2010), and lie within the California Floristic Province (Sacramento Valley and San Joaquin Valley Sub-regions of the Great Valley Region; Sierra Nevada Foothill Subregion of the Sierra Nevada Region; North Coast Range Subregion of the Northwest Region; Hickman 1993). At least two additional occurrences, not yet registered in the CNDDB, occur in Sacramento County (Gibson and Skordal 1994; TNC *date unknown*).

Throughout its range, dwarf downingia occupies a variety of landforms and numerous soil associations.

DWDO Central Valley Distribution

Dwarf downingia is known from three geographically defined population centers in the Central Valley. The northernmost is located in Tehama County, between the vicinity of Red Bluff in the north and Black Butte Lake in the south. The southernmost population center occupies a narrow band in the San Joaquin Valley along the eastern edge of Merced County and a single occurrence on the northern edge of Fresno County. The central population center, located in

the southern Sacramento Valley, is comprised of occurrences within Solano, Placer, Sacramento, and Yuba Counties.

DWDO Distribution within the Planning Area

Of the 10 occurrences of dwarf downingia recorded from Sacramento County (eight CNDDB occurrences and two occurrences not-yet registered), five are located outside of the Planning Area (CNDDB occurrence #32, #56, #57, #58, and #59). Of the remaining five occurrences, three are located within the UDA in the City of Elk Grove (Figure DWDO-1) (CNDDB occurrence #54, #55, and an occurrence not yet registered); and two occurrences are located outside of the UDA within the Planning Area. One of these is encompassed within the 16,420-acre The Nature Conservancy (TNC) Cosumnes River Preserve (CNDDB occurrence #53) and the other is located within the Howard Ranch preserve and is not yet registered with the CNDDB.

It is important to note that owing to its small stature, preference for small to medium-sized vernal pools and the area of remaining unsurveyed or partially surveyed habitat, moderate to high potential exists for discovery of additional populations within the Planning Area.

Table G-3.1-2 shows the soil series, geological formation and landform associations for each known occurrence in Sacramento County. Generally, dwarf downingia is associated with Lower Unit Riverbank and old terrace remnant alluvial deposits of the Laguna Formation.,The modeled habitat of dwarf downingia is described in Section G-4 of this Appendix.

Table G-3.1-2. CNDDB Occurrence Numbers, Distribution, Associated Soil Series and Landform Formations for Dwarf downingia In Sacramento County

Occurrence #	Quadrangle	Soil Series[a]	Geological Formation and Landform
32	Rio Linda	San Joaquin Fine Sandy Loam (0-3% slopes and 3-8% slopes)	Lower Unit Riverbank Formation
53	Galt	Adjacent to Clear Lake Clay, Partially Drained, 0-2% Slopes	Adjacent to Qfa
54	Elk Grove	Redding Gravelly Loam, 0-8% Slopes	Laguna
55	Elk Grove	Redding Gravelly Loam, 0-8% Slopes	Laguna
56	Florin	San Joaquin-Galt Complex, 0-3% Slopes	Lower Unit Riverbank Formation
57	Rio Linda	San Joaquin Fine Sandy Loam (0-3% Slopes and 3-8% Slopes)	Lower Unit Riverbank Formation
58	Rio Linda	San Joaquin Fine Sandy Loam (0-3% Slopes and 3-8% Slopes)	Lower Unit Riverbank Formation
59	Rio Linda	San Joaquin Fine Sandy Loam (0-3% Slopes and 3-8% Slopes)	Lower Unit Riverbank Formation

[a] Soil series information based on what USDA soil survey type occurs at the CNDDB species location (USDA 1993)

DWDO Distribution Status and Trends

Dwarf downingia is known from a total of 117 CNDDB occurrences in California. Of the 117 CNDDB occurrences, two are extirpated and one possibly extirpated from Sonoma County, one is extirpated from Napa County, one is extirpated and another possibly extirpated from Placer County, and one is extirpated from Sacramento County. Of the remaining 110 CNDDB occurrences presumed extant, 26 have not been revisited since before 1983 (CDFG 2010). Of the 84 CNDDB occurrences reported since 1983 and presumed extant, one is listed as experiencing a decreasing trend, and the rest are listed as trend "unknown" (CDFG 2010). It should be noted though, that the vast majority of these 84 occurrences are located on private lands and most are reported as being subject to one or more threats.

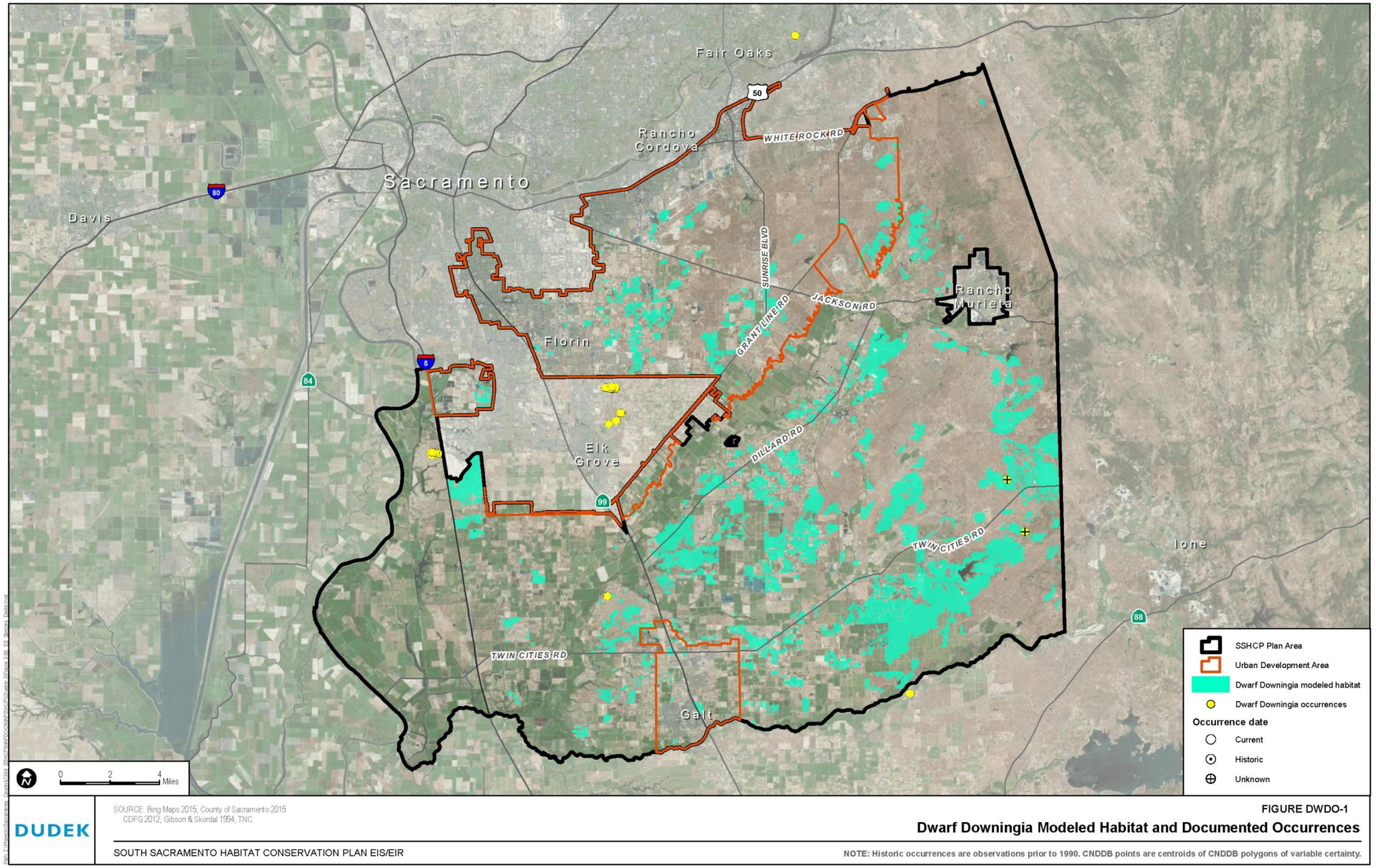
It is impossible to determine the number of historically occurring dwarf downingia populations or the acreage of suitable habitat lost to historic agricultural and urban land-use conversions, since so much had happened before these species first received attention. Investigators have made estimates as to the acreage of vernal pool habitat lost since historic times (Holland 1978). Since dwarf downingia is adapted to the smaller, more "flashy" types of vernal pools, as well as to the margins of larger or deeper pools, estimates of vernal pool habitat lost may reflect loss of potentially suitable dwarf downingia habitat as well. Effects of historic livestock grazing combined with drought cycles and habitat alterations relating to development of non-native annual grassland are not quantifiable (Table G-3.1-3).

Table G-3.1-3. Dwarf downingia Population Estimates Recorded for Sacramento County

CNDDB Occurrence #	# of Pools Observed	Range of Population Estimates
32	unknown	1994: 100 plants
53	Large vernal marsh	1991: 1000 plants
54	1	1991: 200 plants
55	6 vernal pools and 2 scraped areas	1991: 300
56	2 vernal pools	1990: varied from 100's to 1000's
57	Created depression	1991:50 plants
58	Vernal pool	1993: 50 plants
59	Vernal pool	1993: 150 plants

Between-year variation in population numbers has been documented for several of the dwarf downingia occurrences outside of Sacramento County, although none have been studied in detail. One occurrence is reported as supporting 300 plants in 1988, and 10,000 in 1989 (CNDDB occurrence #29). Another occurrence (CNDDB occurrence #60) was reported as supporting more than 1,000 plants in 1989 and 237 plants in 1990. CNDDB occurrence #62 was found to support 200-400 plants in 1989 and 36 plants in 1990 (CDFG 2010).

Figure DWDO-1 Dwarf Downingia Modeled Habitat and Documented Occurrences



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Studies involving other vernal pool plant rarities, including Orcuttiae grasses and Hoover's spurge (*Chamaesyce hooveri*) have demonstrated marked fluctuation in numbers of individuals within populations between years (Griggs 1983; Holland 1987; Alexander and Schlising 1997). This extreme population variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as principally determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). It is not known however, to what degree dwarf downingia exhibits a similar between-year pattern.

Observations made over a decade or so may provide a reasonable indication of the short-term vigor of a given dwarf downingia population. It is important to consider however, that in order to assess the trend of the species, long-term monitoring of both habitat and populations conducted over multiple cycles of wet and dry years is needed. Another critical aspect of population demography is the presence and nature of the soil seed bank, which is unknown for dwarf downingia.

DWDO Threats to the Species

Potential direct threats to dwarf downingia include: loss of vernal pool habitat to agricultural or urban/industrial land-use conversions; construction and maintenance of firebreaks, roads, and utility corridors; inappropriate livestock grazing regimes (later spring/summer rotations, sheep versus cattle); grassland fires; recreational vehicles; equestrian and pedestrian traffic, and refuse dumping.

Potential Indirect threats to dwarf downingia include hydrological alteration of sub-watersheds by surrounding developments and land uses, shifts in competitive interactions (hydrology-mediated or invasive weeds), windblown refuse accumulation, point and non-point source water pollution, air pollution, and global climate change.

DWDO Data Gaps and Conservation Implications

Despite its distinctive appearance and relative rarity, dwarf downingia has received little research attention from botanists or ecologists. Aside from general observations of field workers provided in the CNDDB, detailed studies have not been conducted regarding the biology, ecology, pollinators, breeding system, population genetics, habitat relationships, population levels, trends or threats associated with this species. Pertinent data gaps, implications for conservation, and operating assumptions include:

DWDO Unknown Number of Undiscovered Populations

Additional unsurveyed and partially surveyed potentially suitable habitat exists within the Planning Area and elsewhere within the range of the species. In the Planning Area, discovery of

new populations may occur on the large dry-land ranchlands, public quasi-public lands and vernal pool-grassland preserves already established in the eastern portion of the County.

DWDO Unknown Relationship between Landform/Soil Chemistry and Bio-Geographic Distribution

Throughout its range, dwarf downingia is associated with a variety of geological formations and associated soil types. In Sacramento County, this species is occurs on the Lower Unit Riverbank Formation (five occurrences) and on the Laguna Formation (two occurrences) (CDFG 2010). The exact nature of relationship to landform is however, unknown. It is unknown if soil pH or other edaphic factors influence dwarf downingia distribution and population vigor. It is possible that the presence of functioning vernal pools, regardless of landform, soil series and soil pH indicates suitable habitat.

DWDO Unknown Pollination Ecology

Dwarf downingia possesses the smallest flowers of any of the species in the genus, and is thought to be a self-pollinator; however, without knowing specific breeding abilities and pollinator relationships, it is difficult to ascertain habitat needs for potentially co-evolved insect pollinators.

DWDO What Constitutes Population Vigor, and How to Measure?

Population dynamics, including year-to-year variability in abundance, have not been studied for dwarf downingia. The existence of a dormant soil seed bank, a critical contributor to population stability in some other vernal pool species, is unknown for dwarf downingia as well. Other rare vernal pool species have been shown to be highly variable in abundance from year-to-year (Holland 1987; Griggs pers. comm. 2003), and causative factors contributing to year-to-year population fluctuations may be difficult to identify (Alexander and Schlising 1997).

Trends may occur that are not discernable and trends that are discerned may be unexplainable. These factors will complicate attempts to change management for benefit of the species if measured vigor shows decline.

DWDO Specific Hydrological Requirements

Numerical data do not exist regarding specific parameters of the annual hydrological cycle of vernal pools supporting dwarf downingia populations (e.g., timing of rainfall, depth of ponding, duration of ponding and soil dry down rate).

The general lack of numerical hydrological data limits the ability to precisely monitor and/or assess hydrological suitability of dwarf downingia-vernal pool habitat within established

preserves. Similarly, assessment of potentially suitable dwarf downingia habitat for preserve establishment or for detection of the species at this time must rely on generalities. Once preserves for existing dwarf downingia populations are established, assessed and monitored over time, a more quantifiable definition of suitable dwarf downingia -vernal pool hydrology may be developed.

DWDO Hydrological Trends of Vernal Pools

Extant dwarf downingia populations in the Planning Area may have already experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds (CDFG 2010). Without complete protection of entire vernal pool watersheds, or precise hydrological monitoring and accurate modeling on a pool complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown.

Existing dwarf downingia conditions within the planning area may not be pristine, so if trends in vigor or habitat quality become apparent over time, it may be difficult to attribute trend to any specific management activity.

DWDO Buffer Sizes to Protect Habitat

There is no standard for appropriate scale of effective buffers between new urban development and vernal pools that provide dwarf downingia habitat, to assure no indirect impact to the vernal pool's existing hydrologic regime, because the nature of vernal pool complexes and their geo-hydrological relations may vary substantially by landform, geologic formation, and soil type (Holland and Dains 1990).

Proposed preserve designs may not afford complete protection to the hydrological systems that support dwarf downingia and other species assemblages dependent on them.

Definition of Appropriate Scale Dwarf Downingia-Vernal Pool-Annual Grassland Preserve

There is no standard for appropriate scale of effective dwarf downingia-vernal pool preserves. It is a paradigm of conservation biology that "bigger is better" for a variety of well-documented reasons. Conservation challenges associated with the relatively small-scale vernal pool preserve that includes dwarf downingia at Phoenix Field and Phoenix Park are well documented and reflect consequences of increase edge effect associated with smaller preserves (Clark et al. 1998).

DWDO Determination of Appropriate Livestock Grazing Regime

Livestock grazing will occur in at least some of the dwarf downingia-vernal pool preserves, because livestock grazing is used for upland annual grassland vegetation management. Specific grazing regimes have not been formulated for annual grassland pasture systems with dwarf downingia-occupied pools, although grazing and monitoring in similar systems have been addressed (Barry 1998; TNC 2000; Griggs 2000; Robins and Vollmar 2002). It is important to note that dwarf downingia does persist though, in historically and contemporary operating livestock ranches. At a minimum, compatibility with some level of grazing is evidenced by persistence of the species in these systems.

Specific livestock grazing regimes cannot be formulated until preserve size, configuration, and soil and vegetation conditions and vegetation management goals are determined.

DWDO Interactions with Non-Native Weeds and Weed Management Activities

Non-native weeds, or weedy native species reported as occurring in vernal pools include European mannagrass, swamp pricklegrass, Bermuda grass, common spikerush, field bindweed, lippia, paradox canary grass, hairy hawkbit, cocklebur and cattails. None of these are reported to co-inhabit dwarf downingia-occupied vernal pools in Sacramento County. Any of these and others now unknown may appear or change in abundance in dwarf downingia-occupied pools over time. Italian wild rye and Mediterranean barley, two common non-native inhabitants of shallow vernal pools and vernal pool margins, might be of management concern to dwarf downingia, owing to the latter's preference for small to medium size vernal pools.

Potential competitive interactions with these species may affect the vigor of dwarf downingia populations. In addition, any eradication or control methods implemented for these species may in turn potentially affect dwarf downingia populations.

DWDO Potential Association and Compatibility with Other Rare Vernal Pool Species

It is desirable to design preserves for multi-species conservation. Suitability of dwarf downingia habitat for supporting other rare plant species has not been specifically addressed, although in Sacramento County natural populations of legenere and Sanford's arrowhead (*Sagittaria sanfordii*) are documented as sharing habitat with it. Many of these pool complexes also may provide habitat for rare invertebrates, amphibians, mammals, and bird species as well.

Management for multiple species maximizes the effectiveness of habitat conservation and requires coordinated monitoring and actions. Management for the benefit of one species may conflict with management needs of other rare species. For instance, livestock grazing anytime

between November 1st and April 15th may be compatible with or even benefit some dwarf downingia-associated pool complexes, but may be detrimental to ground-dwelling amphibians depending on those complexes (e.g., California tiger salamander).

DWDO Genetic Considerations (Spatial and Temporal Variation, Seed Bank, Drift, Bottlenecks)

Population genetics for dwarf downingia are completely unknown. For an overview of genetic considerations of vernal pool plant species see Elam (1998).

Current limitations in our understanding of dwarf downingia population genetics have little immediate conservation implication, given the extreme rarity of dwarf downingia.

DWDO Seed Longevity and Dynamics of Stored Soil Seed Bank

As previously mentioned, the existence and potential role of a dormant soil seed bank in population dynamics is completely unknown for dwarf downingia. There have been no studies addressing the presence of a soil seed bank, seed dormancy or longevity.

From the perspective of conservation, knowledge of site-specific soil seed bank characteristics would allow more accurate assessment of population size and stability (vigor). This is particularly true of populations that typically support the fewest standing individuals through time.

DWDO Inoculation

Since there are so few natural populations of dwarf downingia in Sacramento County, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable pools and increasing the number of naturally self-sustaining populations. These additional populations would increase the likelihood of natural dispersal events into preserved but unoccupied dwarf downingia habitat, create meta-population structure at extant occurrences where single pools may support the species, and ensure existence should any natural populations become compromised.

DWDO Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide)

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter, ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to vernal pool vegetation. Assuming that extant dwarf downingia occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of dwarf downingia, if existing air quality

can be maintained. If however, California's human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively affect dwarf downingia and other native plant species.

DWDO Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology.

It is likely that given the expected global climate trends, a vigor response of some kind could be expected for dwarf downingia populations within the study period of this EIS/EIR, or at some time beyond.

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BOGG'S LAKE HEDGE-HYSSOP (BLHH)

Bogg's Lake hedge-hyssop (BLHH)

(Gratiola heteropepala)

Status USFWS: None

Status CDFW: Endangered

Status CNPS: List 1B.2

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BLHH Listing Status

Bogg's Lake hedge-hyssop (*Gratiola heterosepala*) was listed by the California Department of Fish and Wildlife (CDFW), as State Endangered under the California Endangered Species Act (CESA) in 1978. The California Native Plant Society (CNPS) includes Bogg's Lake hedge-hyssop as

a CNPS List 1B.2 species which means it is a plant species that is fairly threatened in California with moderate degree or immediacy of threat (CNPS 2010). CNPS has also assigned an R-E-D Code of 1-2-2, meaning it is rare but found in sufficient numbers and distributed widely enough that the potential for extinction is low at this time, it is endangered in a portion of its range, and it is rare outside of California (CNPS 2010).

BLHH Life History and Ecology

BLHH Species Description and Life History

Bogg's Lake hedge-hyssop is a small-stature annual in the figwort family (Scrophulariaceae). This diminutive species has an erect, un-branched stem that can reach from two to 10 cm in height. Small one to two centimeter-long leaves are arranged oppositely on the stem; the lower ones are linear-lanceolate and the upper ones are shorter, proportionally wider and more blunt (obtuse) at the tip. The inflorescence is comprised of one to several six to eight millimeter-long flowers arranged in a terminal raceme. Individual pale-yellow and white, tubular flowers are born on 10 to 20 millimeter-long stalks (pedicels). The pedicels and upper stem are glandular puberulent. The calyx is comprised of five round-tipped sepals, three of which are united about 1/3 the distance from their base, and two that are more–or-less separate. Of the three united sepals, the central one is wider and longer. Numerous small seeds are produced in pear-shaped (pyriform) capsules that usually equal the mature calyx in length (four to six millimeter).

The more common and potentially co-occurring bractless hedge-hyssop (*Gratiola ebracteata*) is distinguished from its rare relative on the basis of having more elongate and sharply pointed sepals that are mostly separate to their bases, and white, versus mostly yellow flowers (Mason and Bacigalupi 1954; Hickman 1993). A third species, clammy hedge-hyssop (*Gratiola neglecta*), is distinguished from *G. bracteata,* and *G. heterosepala* on the basis of having two small bracts subtending the flowers, and flowers that are at least two to three times as long as the calyx.

Bogg's Lake hedge-hyssop, and the genus *Gratiola* in general, has received little attention from biologists or ecologists. Other than basic taxonomic and biogeographic treatments, and a single study of pollinator ecology (Kaye et al. 1990), Bogg's Lake hedge-hyssop remains mostly unstudied. Ecological information, mostly from observations of field workers, exists mostly as a result of land management and agency-mandated resource management activities (Corbin 2000; Corbin et al. 1994; Schoolcraft 2000; Plantenkamp 1998; Jones and Stokes 1994).

BLLH Ecological Life Cycle

Bogg's Lake hedge-hyssop shares the annual growth habit with the vast majority of other endemic vernal pool plants. This adaptive trait confers to the populations avoidance of the

regular and extreme seasonal drought that characterizes vernal pool habitat and the Mediterranean Climate (Griggs and Jain 1983; Holland 1987; Stone et al. 1988; Zedler 1990).

BLLH Seed Germination

The specific timing of germination of Bogg's Lake hedge-hyssop seeds relative to the timing of the vernal pool inundation cycle has not been described in detail. Observations indicate that Bogg's Lake hedge-hyssop seeds germinate and begin juvenile growth under water (Kaye et al. 1990; Corbin et al. 1994). Seed longevity, germination requirements and germination optima for Bogg's Lake hedge-hyssop have not been investigated.

BLLH Vegetative Growth

One of the challenges to many vernal pool plant species is optimization of physiological processes in both the early season aquatic and later season terrestrial phases of the vernal pool cycle. For Bogg's Lake hedge-hyssop, the hollow (fistulous) stem is the principal structural adaptation to growth in the aquatic habitat. The air-filled stems hold the plant vertical in the water column, thus facilitating light exposure and gas exchange. This in effect lengthens the growing season by maximizing growth while vernal pools are still inundated. It is interesting to note that, although the species inhabits the basins and slopes of deeper/larger vernal pools, it lacks distinctly different juvenile aquatic morphology, an adaptation that is shared by many other deep pool annual species with which it occurs (e.g., *Orcuttia* spp., *Downingia* spp., *Navarretia* spp., *Eryngium* spp., *Callitriche* spp.).

BLLH Reproduction

Bogg's Lake hedge-hyssop flowers and sets seeds during the dry-down phase of the vernal pool hydrologic cycle, typically while shallow water up to two inches (five centimeters) deep remains in the pool basin (Corbin et al. 1994). Flowering occurs in the Central Valley from April to June (CNPS 2010), and at higher elevations as late as August (Corbin et al. 1994; CNPS 2010; CDFG 2010). Bogg's Lake hedge-hyssop is completely self-compatible as indicated by pollinator exclusion experiments (Kaye et al. 1990). Fruits mature quickly, usually within one to two weeks after the flowers appear (Corbin et al. 1994). The mature capsules produce numerous minute seeds that are released as the 4-valved capsule opens, and as the parent plant disintegrates. Fecundity and variation in seed production have not been investigated in Bogg's Lake hedge-hyssop.

BLLH Dispersal

In many other vernal pool species, seed dispersal is naturally limited, although this has not been stated specifically for *Gratiola*. Limited seed dispersal in vernal pool species is thought to represent an adaptation to spatially unpredictable and limited vernal pool habitat (Griggs 1974,

1980, 1990). Bogg's Lake hedge-hyssop does not appear to have dispersal-limiting traits (e.g., fruit adherent to parent plant, fruit not opening).

Evidence of natural Bogg's Lake hedge-hyssop dispersal and colonization exists in occupancy of man-made topo-hydrologic features located within or near occupied vernal pool landscapes (created vernal pools, stock pond and reservoir margins, ditches, and other excavated or scraped depressions (CDFG 2010). Further evidence of long-range dispersal exists in the relatively widespread range of this species in northern California. Natural dispersal of Bogg's Lake hedge-hyssop seeds likely occurs via flowing water, transport on feet and feathers of waterfowl, and in mud on hooves and legs of livestock. As with all other vernal pool species, natural dispersal of seeds was likely a more frequent event when there were many more vernal pools, more pool interconnectivity, exceedingly larger waterfowl migrations and unfenced roaming native ungulates (Griggs 1980).

BLLH Seed Dormancy

Seed dormancy is indicated by observation of a three-year period where Bogg's Lake hedge-hyssop plants were absent, followed by reappearance during the favorable growing season of the fourth year (Corbin et al. 1994). Seed longevity and seed abundance in the soil has not been investigated. The presence of a persistent soil seed bank provides insurance against localized extirpation resulting from the unpredictable occurrence and duration of appropriate growing conditions. If total seed crop failure occurs in a given year or set of years (failure to germinate, loss to late season flooding or fire, excessive grazing by livestock or grasshopper herbivory), additional stored seeds are available for another year's effort.

BLLH Population Genetics

Population genetics of Bogg's Lake hedge-hyssop have not been investigated, so intra- and inter-population patterns of genetic variability are unknown. Elam (1996) provides a good overview of the myriad considerations in assessing the population genetics of vernal pool plants in the absence of empirical data for a given taxon. Given the limited number of occurrences in the Planning Area and the scattered geographical distribution, all Bogg's Lake hedge-hyssop populations should be considered unique, and important genetic entities.

BLHH Habitat Requirements and Ecology

BLLH Biogeography and Landform Relations

Bogg's Lake hedge-hyssop is strictly associated with the vernal pool-type hydrologic cycle. Over its geographic range, this species is found in a number of distinct physiographic/edaphic settings. In Sacramento County, Bogg's Lake hedge-hyssop is associated with vernal pools

located on ancient weathered alluvial terraces of the Laguna Geologic formation, with soils of the Redding, Red Bluff and related Series. Soils of the Redding Series tend to be strongly acidic (indication of age and weathering) and are generally gravelly with cobble. These soils also typically possess a shallow, water-impermeable iron-silica hardpan that favors the development of vernal pools (SCS 1993). In Tehama County, Bogg's Lake hedge-hyssop occurs in vernal pools associated with cemented hardpan of the Tuscan, Toomes and related series, as well as in more shallow volcanic soils (CDFG 2010). The montane occurrences of Lassen, Shasta and Modoc Counties are also associated with volcanic soils, but in addition to volcanic mudflow and basalt substrates, wetlands formed on large hydric clay flats also support the species. Similarly, in Lake County, and Solano County, Bogg's Lake hedge-hyssop is associated with large seasonal Playa Lake-type pools formed on clay substrates.

BLLH Hydrology Relations

Bogg's Lake hedge-hyssop is a strict endemic of the vernal pool hydrologic cycle. This species is reported to grow in well-developed vernal pools, and playa lakes, as well as along the seasonally fluctuating margins of more permanent water bodies (small lakes, reservoirs, stock ponds, seasonally saturated clay flats in meadows). It is significant to note that most of the other rare species with which Bogg's Lake hedge-hyssop grows are also associated with well-developed large or deep vernal pools that exhibit more extreme, longer duration inundation such as slender Orcutt grass (*Orcuttia tenuis*), San Joaquin Valley Orcutt grass (*O. ineaequalis*), Sacramento Orcutt grass (*O. viscida*), Greene's tuctoria (*Tuctoria greenei*), hairy Orcutt grass (*Orcuttia pilosa*), legenere (*Legenere limosa*), and Hoover's spurge (*Chamaesyce hooveri)* (CDFG 2010). Specific pool area, pool depth, or other measures of pool hydrology are not reported for any of the Bogg's Lake hedge-hyssop occurrences. It has been observed that the species germinates and grows underwater, and quickly flowers and sets seed as the pool dries, while two to five inches of water remain in the pool basin.

BLLH Biological Community Relations

Floristic associations provide further indication of preference for more extreme vernal pool hydrological cycles. Like the Orcuttiae grasses, Bogg's Lake hedge-hyssop often grows in comparatively barren areas within deeper portions of vernal pools, sometimes in barren openings with common spikerush (*Eleocharis macrostachya*). In addition to the fore-mentioned rarities, other associated species indicative of well-developed vernal pool hydrology, including hairy pepperwort (*Marsilea vestida*), coyote thistle (*Eryngium castrense, E. vaseyi*), Alisma-leaved coyote thistle (*E. alismifolium),* bee-thistle (*E. arictulatum*), Mathia's thistle (*E. mathiasae),* bractless hedge-hyssop, downingias (*Downingia bicornuta, D. bacigalupi, D. cuspidata, D. ornatissima*), quillwort (*Isoetes howellii, I. orcuttii and I. nuttallii*), flowering

quillwort (*Lilaea scilloides*), smooth goldfields (*Lasthenia glaberrima*), California elatine (*Elatine californica*), and winged water starwort (*Callitriche marginata*),

Other vernal pool endemics reported as occurring with Bogg's Lake hedge-hyssop include common inhabitants of shallower or smaller to medium-size vernal pools with shorter duration ponding, or the slopes and edges of larger or deeper pools. These species include Fremont's goldfields (*Lasthenia fremontii*), white-headed navarretia (*Navarretia leucocephala*), stalked popcorn-flower (*Plagiobothrys stipitatus*), bracted popcorn-flower (*P. bracteatus*), dwarf wooly marbles (*Psilocarphus brevissimus*), dwarf downingia (*Downingia pusilla*), annual hairgrass (*Deschampsia danthonioides*), Douglas' meadowfoam (*Limnanthes douglasii*), tricolored monkey-flower (*Mimulus tricolor*).

BLLH Non-Native Weed Relations

Hydrological stresses associated with vernal pools exclude the majority of non-native weedy species that characterize the present-day valley annual grassland, agricultural fields, and ruderal habitats. Italian Rye and Mediterranean Barley, two non-native facultative wetland species typically dominate disturbed wetlands and can be invasive in smaller, more ephemeral vernal pool types. Some suggest that built-up thatch from Italian wild rye (*Lolium multiflorum*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), Medusa-head grass (*Taeniatherum caput-medusae*), and other non-native upland species may indirectly affect vernal pool species as well by lessening the amount of water entering the system through surface and subsurface flow (Robins and Vollmar 2001).

Since Bogg's Lake hedge-hyssop occupies medium to larger or deeper vernal pools, it may not be particularly susceptible to the effects of excessive growth of Italian wild rye and Mediterranean barley and thatch buildup, as with the more deeply-adapted legenere and Orcuttiae grasses.

No weedy hydrophytic species are presently reported as growing with Bogg's Lake hedge-hyssop. Although none of the following are specifically reported to co-inhabit vernal pools with Bogg's Lake hedge-hyssop, other non-native weedy hydrophytes may present future problems, including mannagrass (*Glyceria declinata*), lippia (*Phyla nodiflora*), swamp pricklegrass (*Crypsis schoenoides*), field bindweed (*Convolvulus arvensis*), common unicorn plant (*Probiscidea louisianica*), Bermuda grass (*Cynodon dactylon*) and paradox canary grass (*Phalaris paradoxa*). Cocklebur (*Xanthium strumarium*), a native species, can also dominate vernal pools (Schlising pers. comm.; Unger pers. comm.).

BLLH Livestock Grazing Relations

In general, appropriately timed dry-pasture livestock grazing regimes are thought to be compatible with the persistence of vernal pool vegetation. Robins and Vollmer (2002) provide a review of information pertaining to livestock grazing in vernal pool ecosystems. Observations made on (U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS) grazing allotments indicate that Bogg's Lake hedge-hyssop populations are somewhat resistant to grazing and trampling pressures, with abundant and vigorous flowering and fruiting plants present despite hoof-pocked surfaces. Others have indicated livestock grazing as a threat (CDFG 2010).

Many extant populations of Bogg's Lake hedge-hyssop inhabit long-operating cattle ranches and USFS and BLM grazing allotments. Persistence in un-irrigated pasture systems indicates tolerance for at least some level of grazing. In most cases, timing of livestock grazing is likely more important than stocking rates in affecting persistence of Bogg's Lake hedge-hyssop, as it is for the Orcuttiae grasses (Stone et al. 1988). During the period when pools are inundated and upland forage is still green and attractive, cattle tend to not congregate in pools and trampling and grazing pressures to vernal pool plant species in their seedling or juvenile aquatic phase are minimized. As the upland forage cures and the vernal pools are in their flowering and seed-producing terrestrial phase, moist pools become more attractive to livestock and grazing and trampling pressures are increased. Excessive trampling and grazing during this period may negatively affect Bogg's Lake hedge-hyssop, and other vernal pool species. Grazing in the summer and fall months, after seeds have set and plants have died likely has little negative effect on Bogg's Lake hedge-hyssop (Mason and Bacigalupi 1954; CDFG 1987) especially since the plant usually disintegrates rapidly once pools have dried (Corbin et al. 1994).

It should be noted however, as with many other vernal pool annuals, small stature and high plant densities ensure that in all but extreme cases, a portion of every year's cohort escapes destruction, matures and sets seed.

BLLH Disturbance Response

Observations of field workers provide some evidence of the potential response of Bogg's Lake hedge-hyssop populations to particular disturbance regimes. One occurrence has been extirpated as a result of disking and harrowing. It is interesting to note that several rare and common vernal pool species, including Bogg's Lake hedge-hyssop and Orcuttiae grasses are recorded to persist despite periodic disking of the vernal pool substrates over decades (Hoover 1941; Crampton 1959; Stone et al. 1988; CDFG 2010; Ahart pers. comm.; Kelsey pers. comm.; Dittes pers. obs.). It is very important to note that in these cases, disking is not so deep as to significantly affect the subtending impermeable layer or the vernal pool hydrological cycle. In addition, the disking is performed in the late summer or fall months in preparation for dry land

winter grain crops, so vernal pool plants have set seed and dried. If this disking occurs earlier in the growing season, before seeds are mature, over consecutive years, population extirpation is probable through exhaustion of soil seed bank.

BLLH Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Bogg's Lake hedge-hyssop are identified in Table G-3.2-1 and have been derived from input from local species experts.

Table G-3.2-1. Habitat Elements for Bogg's Lake Hedge Hyssop

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, and vernal pool.	Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

BLHH Species Distribution and Population Trends

BLHH Species Distribution

Bogg's Lake hedge-hyssop was first collected from Bogg's Lake in Lake County, California in 1954. Since that time, 90 total occurrences have been recorded (CDFG 2010), ranging from Fresno County in the south to northern Modoc County in northeast California. Bogg's Lake hedge-hyssop occurrences are distributed among five of the Geographic Sub-regions of the California Floristic Province, as described by Hickman (1993); the San Joaquin Valley, Sacramento Valley, Inner Coast Range, Cascade Range Foothill, High Cascade Range, and the non-Warner Mountain and Warner Mountain Sub-regions of the Modoc Plateau Region. Bogg's Lake hedge-hyssop is among the most widespread of the rare vernal pool species in the Chapter 8 and Chapter 9 Study Areas and exhibits the widest range in elevations (25 to 7,900 feet elevation) (CNPS 2010).

Tehama and Modoc Counties together support 40 percent of the 90 presently known Bogg's Lake hedge-hyssop occurrences, with 17 and 19 occurrences for each county, respectively. Shasta County supports 14 occurrences (16 percent of total), while Sacramento County supports 11 occurrences (12 percent of total) and Solano County supports six occurrences (seven percent of total). San Joaquin, Fresno, Lake, Placer, Lassen, Madera, Siskiyou, Merced, and Fresno Counties each support five or fewer occurrences (CDFG 2010).

This comparatively wide geographic and elevation distribution of Bogg's Lake hedge-hyssop may partially reflect comparatively broad habitat requirements relative to some of the other vernal pool rarities (e.g., Sacramento Orcutt Grass). It may also reflect a different propensity for seed dispersal by waterfowl, or perhaps even a different "biogeographic legacy" (e.g., timeline of evolution and geographic distribution of ancestral taxon).

BLHH Central Valley Distribution

In the Central Valley, Bogg's Lake hedge-hyssop occurs among five roughly defined population centers. The southernmost of these, comprising four CNNDB occurrences, is located along the eastern edge of the Great Central Valley near the Fresno and Madera County lines. The next population center to the northwest, comprised of a single occurrence, is located approximately 45 miles away in eastern Merced County. A third population center is located 75 miles to the north and is comprised of 18 occurrences. These occurrences extend approximately 45 miles north-to-south along the eastern edge of the Great Central Valley from northern San Joaquin County north through Sacramento County, to western Placer County. A fourth population center, comprised of six occurrences, is located approximately 30 miles to the west near the Sacramento-San Joaquin River Delta in Solano County. The northernmost Great Central Valley population center, comprised of four occurrences, is located in southern Tehama County, approximately 75 miles north of the northernmost Placer County occurrence. Another Tehama County population center, comprised of 13 additional occurrences, is located approximately 20 miles further northeast at higher elevations on the volcanic mudflow formations of the Cascade Range Foothills, east of the Great Central Valley.

BLHH Distribution within the Planning Area

Currently, there are ten CNDDB occurrences of Bogg's Lake hedge-hyssop within the Planning Area (Figure BLHH-1), all of which are located within the Urban Development Area (UDA). Within the UDA, the northeastern-most occurrence (CNDDB occurrence #48) is located northwest of the intersection of White Rock and Prairie City Roads. This occurrence is located on private land and is comprised of an unrecorded number of occupied pools. The next occurrence to the southwest is located approximately seven mi away (CNDDB occurrence #57)

at the proposed Sunrise-Douglas Subdivision development. With 12 occupied pools, this is the largest Bogg's Lake hedge-hyssop occurrence in Sacramento County (CDFG 2010).

The next occurrence to the west (CNDDB occurrence #84) is located approximately two miles from the Sunrise Douglas site, just north of Morrison Creek and west of Eagles Nest Road near the southern edge of Mather Field. This occurrence is comprised of an unrecorded number of occupied vernal pools.

Another occurrence (CNDDB occurrence #30), associated with the 138-acre Sheldon Mitigation Site, is located approximately 2.5 miles south of the Sunrise-Douglas occurrence, just north of the Cosumnes River Floodplain. The number of occupied pools at this site is not recorded. CNDDB occurrence #81, comprised of a single occupied pool, is located on private land near Laguna Creek east of Excelsior Road, approximately 4.5 miles west by southwest of CNDDB occurrence #30.

The three westernmost occurrences (CNDDB occurrence #33, #34, and #35) are distributed along a north-south oriented axis with Elk Grove-Florin Road on the west, and Gerber Road and Elk Grove Boulevard on the north and south, respectively. The southernmost of these three occurrences (CNDDB occurrence #33) is located on private land, and is comprised of one occupied vernal pool. CNDDB occurrence #34, located on private land approximately 1.8 miles to the north, is comprised of an unrecorded number pools. The northernmost of these three occurrences (CNDDB occurrence #35) is located approximately one mile north of the central occurrence, and is also comprised of an unrecorded number of occupied pools.

Two additional occurrences are associated with the Kiefer Landfill development (CNDDB occurrence #18 and #82). Occurrence #18 is composed of seven occupied vernal pools, and occurrence #82 is reported to support one occupied vernal pool (Jones and Stokes 1998; CDFG 2010).

In Sacramento County, eight of the nine (89 percent) extant Bogg's Lake hedge-hyssop occurrences are associated with the Laguna Formation. Associated soils include those of the Redding and Red Bluff/Redding Series. This geological landform is comprised of remnant old-terrace alluvial deposits of ancestral river channels and pediment gravels, which were deposited during the early Pleistocene, between 600,000 and 1,500,000 years ago. Laguna Formation and associated soils are strongly associated with the distribution of vernal pools. Table G-3.2-2 shows the soil series, geological formation and landform associations for each known occurrence in Sacramento County. It is significant to note that owing to the diminutive size of the species, its ability to inter-mingle with the more common species bractless hedge-hyssop, and the area of unsurveyed or partially surveyed area of Laguna Formation, other occurrences are likely to be present in Sacramento County. In addition, well-developed vernal pools on landforms other than Laguna could provide suitable habitat. The modeled habitat of Bogg's Lake hedge-hyssop is described in Section G-4 of this Appendix.

Figure BLHH-1 Boggs Lake Hedge-Hyssop Modeled Habitat and Documented Occurrences

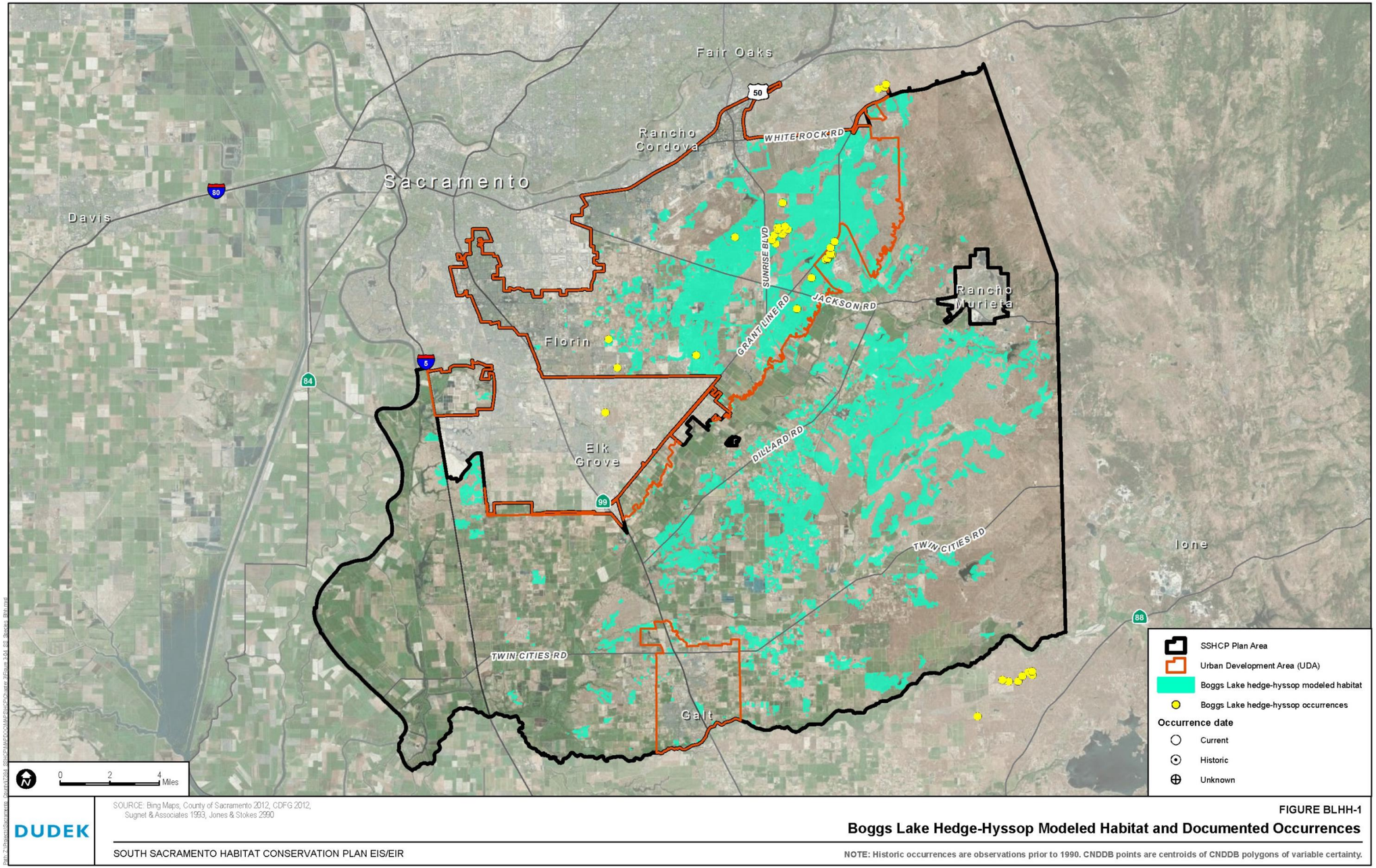

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Table G-3.2-2. CNDDB Occurrence Numbers, Distribution, Associated Soil Series and Landform Formations for Bogg's Lake hedge-hyssop in Sacramento County

CNDDB Occurrence #	Quadrangle	Soil Series[a]	Geological Formation and Landform
3 (possibly extirpated)	Rio Linda	San Joaquin Fine Sandy Loam, 3-8% Slopes	Lower Unit, Riverbank Formation
18	Buffalo Creek	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
30	Sloughhouse	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
33	Elk Grove	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
34	Elk Grove	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	North Merced Gravel (Arroyo Seco gravel)
35	Elk Grove	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
48	Buffalo Creek	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
57	Buffalo Creek	Red Bluff-Redding Complex, 0-5% Slopes	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
81 (extirpated)	Elk Grove	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
82	Buffalo Creek	Redding gravelly loam, 0-8% slopes, Claypan and hardpan +/- 20 inches	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.
84	Carmichael	Red Bluff-Redding Complex, 0-5% Slopes	Laguna Formation, remnant, high-terrace deposits of Pleistocene river channels.

[a] Soil series information based on what USDA soil survey type occurs at the CNDDB species location (USDA 1993)

BLHH Population Levels and Trends

Of the 90 documented CNDDB occurrences, all but two are presumed extant. One occurrence in Sacramento County is listed as "possibly extirpated" after the vernal pools were plowed, harrowed, and leveled for a housing development in 1977 (CNNDB occurrence #3) (CDFG 2010). The extirpated occurrence is located in the City of Elk Grove where the site had been disked and partially leveled and is slated for development (CDFG 2010).

Downward population trends have been reported for five populations (two in Sacramento County and one each in Placer, Lake, and Tehama Counties); while three occurrences from Shasta County are classified as "fluctuating" and one Shasta County occurrence is classified as "increasing." The population trends for the remaining occurrences are listed as "unknown."

It should be noted that Bogg's Lake hedge-hyssop is a diminutive and a relatively ephemeral species that easily escapes the notice of botanists, particularly since the taxonomic features used to circumscribe it are subtle, and it often grows intermingled with the more common and

superficially similar species. Given these considerations and the amount of unsurveyed or partially surveyed potentially suitable habitat, additional occurrences will likely be discovered.

It is impossible to determine the number of historically occurring Bogg's Lake hedge-hyssop populations lost or the acreage of suitable habitat lost to historic agricultural land-use conversions, since so much had happened before these species first received attention (Stone et al. 1988). Investigators have made estimates as to the acreage of vernal pool habitat lost since historic times (Holland 1978; Jones and Stokes 1990), however owing to habitat specificity (restriction to), only a subset of the vernal pool habitat lost within the natural range of the species likely provided suitable habitat for Bogg's Lake hedge-hyssop.

There has been no comprehensive effort to monitor all populations of Bogg's Lake hedge-hyssop although various monitoring projects have been conducted by the BLM and USFS. However, the population estimates for some of the occurrences in Sacramento County occurrences have been made (Table G-3.2-3).

Observations of Bogg's Lake hedge-hyssop indicate that abundance of individuals in a population can vary greatly from year-to year, depending at least in part on precipitation of the season. Abundance estimates made at several occurrences range from a complete lack of plants to thousands in subsequent years (CDFG 2010). Population variability in some vernal pools species is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as principally determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). Fluctuations of similar magnitude are also recorded for Hoover's spurge, hairy Orcutt grass, and Greene's tuctoria at the Vina Plains Preserve in Tehama County (Alexander and Schlising 1997).

Observations made over a decade or so may provide a reasonable indication of the short-term vigor of a given Bogg's Lake hedge-hyssop population. It is important to consider however, that in order to assess the trend of the species, long-term monitoring of both habitat and populations conducted over multiple cycles of wet and dry years is needed. Another aspect of population demography is the quantity and age of stored seed in the soil profile. Undoubtedly, the number of stored seeds in the soil profile has bearing on how many plants can be produced in a given favorable year.

Table G-3.2-3. Bogg's Lake Hedge-hyssop Population Estimates for Sacramento County (CNDDB)

CNDDB Occurrence #	Occurrence # of pools observed	Range of population estimates
3	Reported from "several vernal pools:	Possibly extirpated
18	7	10,000 + plants
30	1	1990: 0 plants 1993: 1,000 + plants
33	1	1991: 20 plants
34	1	1991: 200 plants
35	3	?
48	Ponds	?
57	12	Several thousand to several hundred thousand
81	1	1998: 1 plant
82	1	?
84	1	2000: 1,000's of plants

BLHH Threats to the Species

Potential direct threats to Bogg's Lake hedge-hyssop include loss of vernal pool habitat to agricultural or urban/industrial land-use conversions; construction and maintenance of firebreaks, roads, and utility corridors; timber harvest activities (in montane Occurrences); inappropriate livestock grazing regimes (later spring/summer rotations); grassland fires; recreational vehicles; equestrian and pedestrian traffic; and refuse dumping (CDFG 1992, 1998; CDFG 2010; Corbin et al. 1994; Kaye et al. 1990).

Potential Indirect threats to Bogg's Lake hedge-hyssop include hydrological alteration of sub-watersheds by surrounding developments and land uses; shifts in competitive interactions (hydrology-mediated or invasive weeds); windblown refuse accumulation; point and non-point source water pollution; air pollution, and global climate change.

BLHH Data Gaps and Conservation Implications

With exception to an investigation into the breeding system (Kaye et al. 1990), various monitoring projects, and the visual observations of field workers (Corbin et al. 1994; Schoolcraft 2000; CDFG 2010; Witham pers. comm.), Bogg's Lake hedge-hyssop has received limited research attention. Detailed studies have not been conducted regarding the biology, ecology, potential for cross pollination, population genetics, habitat relationships, population dynamics, trends or threats. Pertinent data gaps, implications for conservation, and operating assumptions include the following.

BLHH Unknown Number of Undiscovered Populations

Additional unsurveyed and partially surveyed potentially suitable habitat exists within the Planning Area and elsewhere within the range of the species. In the Planning Area, discovery of new populations of Bogg's Lake hedge-hyssop may occur on the large dry-land ranchlands, public/quasi-public lands and vernal pool-grassland preserves already established in Sacramento County.

BLHH Unknown Relationship between Landform/Soil Chemistry and Bio-Geographic Distribution

In Sacramento County, Bogg's Lake hedge-hyssop has a geographic association with old alluvial terraces possessing acidic soils, primarily of the Redding and Red Bluff Families (Laguna Geological Formation). The exact nature of this relationship is, however, unknown. It is unknown if soil pH or other edaphic factors influence the species distribution and population vigor. It is possible that functioning vernal pools with well-developed hydrology, regardless of landform, soil series and soil pH may provide suitable habitat for this species. This is supported by the occurrence of this species in vernal pools and wetlands with vernal pool-type hydrology on other landforms, with different soil types, at varying locations. In the Planning Area, vernal pools are most frequent and best developed on the Laguna Formation.

BLHH Unknown Pollination Ecology

In a study conducted in Oregon, Bogg's Lake hedge-hyssop has been shown to be completely self-compatible, and insects were never observed visiting its flowers (Kaye et al. 1990). It is not known though whether or not out-crossing ability exists, and if so, whether or not insect pollinators are associated with the species anywhere in its range.

BLHH What Constitutes Population Vigor, and How to Measure?

Population vigor and population dynamics, including year-to-year variability in abundance, have not been described in detail for any of the occurrences in Sacramento County. In other areas, Bogg's Lake hedge-hyssop population estimates have been made over varying periods of time. Population estimates range from 1,000,000 plants at CNDDB occurrence #36, to a single individual at CNDDB occurrence #64. Observations made over time also indicate that Bogg's Lake hedge-hyssop populations can vary by several orders of magnitude between years, with low numbers present during years with sub-optimal hydrology (CDFG 2010; Corbin et al. 1994). Other rare vernal pool species have been shown to be variable in population abundance from year-to-year (Holland 1987; Griggs pers. comm.), and causative factors contributing to year-to-year population fluctuations in rare species may be difficult to identify (Alexander and Schlising 1997).

Population vigor will be difficult to assess based on number of individuals present over short intervals of time. Trends occurring over longer periods may occur that are not discernable, and trends that are discerned may be unexplainable. These factors will complicate attempts to change management for benefit of the species if measured vigor shows decline.

BLHH Specific Hydrological Requirements of Bogg's Lake hedge-hyssop

Numerical data do not exist regarding specific parameters of the annual hydrological cycle of vernal pools supporting Bogg's Lake hedge-hyssop populations in the Planning Area (e.g., timing of rainfall, depth of ponding, duration of ponding and soil dry down rate).

The general lack of numerical hydrological data limits the ability to precisely monitor or assess hydrological suitability of Bogg's Lake hedge-hyssop -vernal pool habitat within established preserves. Similarly, assessment of potentially suitable Bogg's Lake hedge-hyssop habitat for preserve establishment or for detection of the species at this time must rely on generalities. Once preserves for existing Bogg's Lake hedge-hyssop populations are established, assessed and monitored over time, a more quantifiable definition of suitable Bogg's Lake hedge-hyssop - vernal pool hydrology will emerge based on learned information.

BLHH Existing Hydrological Trend of Pools and Existing Indirect Effects

Extant Bogg's Lake hedge-hyssop populations in the Planning Area may have already experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds (CDFG 2010). Without complete protection of entire vernal pool watersheds, or precise hydrological monitoring and accurate modeling on a pool complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown.

Existing Bogg's Lake hedge-hyssop habitat existing conditions may not be pristine, so if trends in vigor or habitat quality become apparent over time, it may be difficult to attribute trend to any specific management activity.

BLHH Definition of Appropriate Hydrology Buffer

There is no standard for appropriate scale of effective hydrologic buffers for vernal pool-annual grassland ecosystems, since the nature of vernal pool complexes and their geo-hydrological relations may vary substantially by geography (Holland and Dains 1990).

Proposed preserve designs may not afford complete protection to the hydrological systems that support Bogg's Lake hedge-hyssop and other species assemblages dependent on them.

BLHH Definition of Appropriate Scale Bogg's Lake hedge-hyssop -Vernal Pool-Annual Grassland Preserve

There is no standard for appropriate scale of effective Bogg's Lake hedge-hyssop -vernal pool preserves. It is a paradigm of conservation biology that "bigger is better" for a variety of well-documented reasons. Conservation challenges associated with the relatively small-scale vernal pool preserve that includes rare plant populations at Phoenix Field and Phoenix Park are well documented and reflect consequences of increase edge effect associated with smaller preserves (Clark et al. 1998).

BLHH Determination of an Appropriate Livestock Grazing Regime

Livestock grazing will occur in at least some of the Bogg's Lake hedge-hyssop -vernal pool preserves, primarily for upland annual grassland vegetation management. Specific grazing regimes have not been formulated for annual grassland pasture systems with Bogg's Lake hedge-hyssop -occupied pools, although grazing and monitoring in similar systems have been addressed (Barry 1998; TNC 2000; Griggs 2000; Robins and Vollmar 2002). It is important to note that Bogg's Lake hedge-hyssop does persist though, in historically and contemporary operating livestock ranches and USFS and BLM grazing allotments. At a minimum, compatibility with some level of grazing is evidenced by persistence of the species in these systems. Since Bogg's Lake hedge-hyssop occupies medium to large-size vernal pools, management of Italian wild rye and Mediterranean barley around the margins of vernal pools, and Medusa-head grass in uplands should be monitored and managed but not primarily for the needs of Bogg's Lake hedge-hyssop specifically.

Specific livestock grazing regimes cannot be formulated until preserve size, configuration, and soil and vegetation conditions and vegetation management goals are determined.

BLHH Interactions with Non-Native Weeds and Weed Management Activities

Non-native weeds, or weedy native species reported as occurring in vernal pools include western mannagrass, swamp pricklegrass, Bermuda grass, common spikerush, filed bindweed, lippia, paradox canary-grass, hairy hawkbit, Cocklebur and cattails. None of these are reported to co-inhabit Bogg's Lake hedge-hyssop -occupied vernal pools in Sacramento County. Any of these and others now unknown may appear and/or change in abundance in Bogg's Lake hedge-hyssop -occupied pools over time. Italian wild rye and Mediterranean barley, two common non-native inhabitants of shallow vernal pools and vernal pool margins, might be of management concern to Bogg's Lake hedge-hyssop if they are allowed to completely dominate the vernal pool margins and adjacent uplands. Potential competitive interactions with these species may affect the vigor of Bogg's Lake hedge-hyssop populations. In addition, any eradication or control

methods implemented for these species may in turn potentially affect Bogg's Lake hedge-hyssop populations.

BLHH Potential Association and Compatibility with Other Rare Vernal Pool Species

It is desirable to combine to design preserves for multi-species conservation. Bogg's Lake hedge-hyssop has been reported as sharing vernal pools with other rare plant species, including Sacramento Orcutt grass, hairy Orcutt grass, slender Orcutt grass, Greene's tuctoria, San Joaquin Valley Orcutt grass, Bogg's Lake hedge-hyssop, Hoover's spurge, legenere, succulent owl's-clover. Many of these pool complexes supporting rare species also provide habitat for rare invertebrates, amphibians, mammals, and bird species as well.

Management for multiple species maximizes the effectiveness of habitat conservation and requires coordinated monitoring and actions. Management for the benefit of one species may conflict with management needs of other rare species. For instance, livestock grazing anytime between July 1 and April 1 may be compatible with or even benefit some Bogg's Lake hedge-hyssop -associated pool complexes, but may be detrimental to ground-dwelling amphibians depending on those complexes (e.g., California tiger salamander).

BLHH Genetic Variation (Spatial and Temporal [Seed Bank], Genetic Drift, Genetic Bottlenecks)

Population genetics for Bogg's Lake hedge-hyssop are completely unknown. For an overview of genetic considerations of vernal pool plant species, see Elam 1998). Current limitations in our understanding of Bogg's Lake hedge-hyssop population genetics have little immediate conservation implication, given the relatively few number of Bogg's Lake hedge-hyssop occurrences in the Planning Area.

BLHH Seed Longevity and Dynamics of Stored Soil Seed Bank

As previously mentioned, the existence and potential role of a dormant soil seed bank in population dynamics is indicated by the observation of a three-year period during which plants were absent, followed by abundant plants the following favorable hydrologic season. Beyond this observation though, there have been no empirical studies addressing the presence of a soil seed bank, seed dormancy or longevity for Bogg's Lake hedge-hyssop.

From the perspective of conservation, knowledge of site specific soil seed bank characteristics would allow more accurate assessment of population size and stability (vigor). This is particularly true of populations that typically support the fewest standing individuals through time.

BLHH Inoculation

Since there are so few natural populations of Bogg's Lake hedge-hyssop in Sacramento County, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable pools and increasing the number of naturally self-sustaining populations. These additional populations would increase the likelihood of natural dispersal events into preserved but unoccupied Bogg's Lake hedge-hyssop habitat, create meta-population structure at extant occurrences where single pools may support the species, and help ensure existence should any natural populations become compromised. Dispersal into, and colonization of created or enhanced vernal pools, stock-ponds, reservoirs and even rutted tire tracks in already occupied vernal pool landscapes has been documented (CDFG 2010; Sanger pers. comm. 2003). Bogg's Lake hedge-hyssop is a fully self-compatible species, which is a pre-adaptation for colonization.

BLHH Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide)

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter, ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to vernal pool vegetation. Assuming that extant Bogg's Lake hedge-hyssop occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of Bogg's Lake hedge-hyssop, if existing air quality can be maintained. If however, California's human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively affect Bogg's Lake hedge-hyssop and other native plant species in the future.

BLHH Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology.

It is likely that given the expected global climate trends, a vigor response of some kind could be expected for Bogg's Lake hedge-hyssop populations within the study period of this EIS/EIR, or at some time beyond.

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AHART'S DWARF RUSH (ADR)

Ahart's dwarf rush (ADR)

(Juncus leiospermus ahartii)

Status USFWS: None

Status CDFW: None

Status CNPS: 1B.2

photo courtesy BCAG

ADR Listing Status

Ahart's dwarf rush is considered to be rare, threatened or endangered throughout its range, thus qualifying its designation as a list 1B.2 species by the California Native Plant Society (CNPS 2010). It has been assigned an R-E-D Code of 3-2-3, meaning it is distributed in one to several highly restricted occurrences, endangered in a portion of its range, and entirely restricted to California.

Being a CNPS List 1B plant species, Ahart's dwarf rush meets the California Department of Fish and Wildlife's (CDFW's) definition of a special plant though it has no formal protection status by the CDFW or United States Fish and Wildlife Service (USFWS).

ADR Life History and Ecology

ADR Species Description and Life History

Dwarf rush (*Juncus leiospermus* F.J. Herm.), is represented by two varieties, var. *leiospermus* (Red Bluff dwarf rush), and var. *ahartii* (Ahart's dwarf rush), both of which are rare and endemic to California. The species is an annual in the rush family (Juncaceae) that is restricted to wetlands possessing vernal pool-type hydrology.

This inconspicuous species exhibits a tufted growth form, with a basal cluster of thread-like leaves exceeded by one to several erect, 1.9 to 11.6 centimeter-long, stiff, thread-like stems. One to seven flowers are born together in a compact cluster at the tip of each stem. The flower clusters are subtended by small (0.7 to 2.4 millimeters) bract scales. Flowers are small (1.5 to 4.6 millimeters) and comprised of 6 to 10 dark brown, pointed scales, three stamens, and a single ovary with a long (1.5 to 3 millimeters), three-branched style. The mature fruit capsule is similar to the flower scales in color and is equal, or slightly exceeding them in length. Ahart's

dwarf rush (*J.leiospermus* var. *ahartii*) is distinguished from the rare Red Bluff dwarf rush (*J.leiospermus* var. *leiospermus*) on the basis of the former having only one to two flowers per cluster, overall smaller size and fewer parts (Ertter 1986).

Other small annual rushes also occur in vernal pool habitat and may co-occur with Ahart's dwarf rush. Dwarf rush is distinguished from the closely related Yosemite rush (*J. triformis*) by the latter having slightly narrower stems (less than 0.4 millimeter), capsules shorter than flower scales, and flower scales that are unequal in length. Dwarf rush is most easily distinguished from toad rush (*J. bufonius* vars.) on the basis of having a simple versus a branched stem and terminal versus axillary flowers. Dwarf rush is readily distinguished from leafy-bracted dwarf rush (*J. capitatus*) by the former having a shorter inflorescence bract (0.7 to 2.4 millimeters versus five to 15 millimeters). Dwarf rush is distinguished from inch-high rush (*J. uncialis*) and vernal pool dwarf rush (*J. hemiendytus* vars.) by its comparatively long (1.5 to 3 millimeters) long style.

Ahart's dwarf rush, and annual vernal pool rushes in general, have received little attention from biologists or ecologists. Other than observations of field botanists and basic taxonomic and biogeographic treatments (Ertter 1986), the biology and ecology of Ahart's dwarf rush remains unstudied.

Since all vernal pool plant species share similar environmental selective pressures, they likely also share similar adaptive traits. For this reason, studies addressing the life history and ecology of other more common vernal pool plant species may provide some insight into the life history and ecology of Ahart's dwarf rush.

Ahart's dwarf rush shares the annual growth habit with the vast majority of other endemic vernal pool plants. This adaptive trait confers to population's avoidance of the regular and extreme seasonal drought that characterizes vernal pool habitat and the Mediterranean climate (Griggs and Jain 1983; Holland 1987; Stone et al. 1988; Zedler 1990).

The specific timing of the germination of Ahart's dwarf rush seeds relative to the timing of the vernal pool inundation cycle has not been studied or described. In general, a given vernal pool species may germinate either during the wetting phase or the inundation-phase of the vernal pool cycle (Keeley and Zedler 1998). Based on the preference of Ahart's dwarf rush for the outer margins of larger vernal pools, the margins of shallow vernal pools, and shallow swales (CDFG 2010; Dittes and Guardino pers. obs.) and its relatively early flowering date (late March), it might be expected that it germinates relatively early in the hydrological season during the wetting or early inundated-phase, in saturated, as opposed to inundated soil. Germination requirements, optima and the potential presence of seed dormancy for Ahart's dwarf rush have not been investigated.

One of the challenges posed to "deeply adapted" vernal pool plants is the need to photosynthesize and grow while submersed, and then transition into a terrestrial growth phase. Many vernal pool species exhibit an aquatic juvenile growth form that is different from the adult form. These morphological adaptations, not exhibited by Ahart's dwarf rush, facilitate light exposure and gas exchange under aquatic conditions, thus lengthening the growing season by maximizing growth while vernal pools are still inundated. The lack of this specialized dimorphism is further indicative of preference to the less-extreme inundation regimes of those encountered in the spectrum of vernal wetland types.

Dwarf rush flowers and sets seeds during the terrestrial phase of the vernal pool hydrologic cycle, typically in March and April (CNPS 2010). The very long style, and large stamens generally indicate an outcrossing breeding strategy (Hickman 1993), although breeding system and pollination strategies have not been investigated for this species. It is likely that these and other outcrossing annual *Juncus* are mainly wind-pollinated, although the potential for flower-visiting insects has not been studied.

Mature fruit capsules dehisce and release mature seeds by late spring to early summer (Dittes pers. obs.). Unlike some other vernal pool species (e.g., Orcuttiae grasses, pincushion navarretia), Ahart's dwarf rush does not appear to exhibit anti-dispersal adaptations, although the species often appears in small discrete aggregations amid larger areas of available habitat (Dittes pers. obs.). Natural dispersal of seeds, however limited, likely occurs via flowing water, transport on feet and feathers of waterfowl, and in mud on hooves and legs of livestock. As with all other vernal pool species, natural dispersal of seeds was likely a more frequent event when there were many more vernal pools, more pool interconnectivity, exceedingly larger waterfowl migrations and unfenced roaming ungulates (Griggs 1980).

The existence of a dormant soil seed bank is unknown for Ahart's dwarf rush. The presence of a persistent soil seed bank provides insurance against localized extirpation resulting from the unpredictable occurrence and duration of appropriate growing conditions. If total seed crop failure occurs in a given year or set of years (failure to germinate, loss to late season flooding or fire, excessive grazing by livestock or grasshopper herbivory), additional stored seeds are available for another year's effort.

The population biology and genetics of Ahart's dwarf rush have not been investigated, so intra- and inter-population patterns of genetic variability are unknown. Elam (1996) provides a good overview of the myriad considerations in assessing the population genetics of vernal pool plants in the absence of empirical data for a given taxon. Given the highly limited number of occurrences and the scattered geographical distribution, all Ahart's dwarf rush populations should be considered unique, and important genetic entities.

ADR Habitat Requirements and Ecology

It is generally held that many of the endemic vernal pool plant species are relatively recent evolutionary derivations of more common and widespread upland progenitors (Stebbins 1976; Stone 1990; Raven and Axlerod 1978; Thorne 1984), likely including Ahart's dwarf rush. These neoendemic vernal pool species are thought to have evolved from terrestrial habitat into seasonally aquatic vernal pool habitat made available as the Mediterranean Climate developed and the inland Tertiary-age Sea dried.

In Eastern Sacramento County, the two Ahart's dwarf rush occurrences are associated with the Redding Gravelly Loam Series of the Arroyo Seco Formation. This soil series has a very gravelly hardpan approximately 28 inches below the surface and is strongly cemented with silica. These soils are typically acidic and conducive to the development of vernal pool hydrology).

Ahart's dwarf rush is strictly adapted to the vernal pool hydrologic cycle. It is of importance to conservation however, that in contrast to most of the more "deeply-adapted" vernal pool endemics, Ahart's dwarf rush occupies the more "flashy" hydrology of vernal pool margins, shallow vernal pools, and swales (Ahart pers. comm.; Dittes and Guardino pers. obs.; CDFG 2010). The closely related and comparatively more widespread Red Bluff dwarf rush is also known from vernally moist edges of groundwater seep areas as well. Quantified vernal pool dimensions are not given for any of the CNDDB occurrences.

Floristic associations provide further indication of preference for the more "flashy" portion of the spectrum of vernal pool hydrological cycles. In Butte County, Ahart's dwarf rush is most often observed with other "shallow pool" or "edge" species, including other annual rushes (toad rush; *Juncus bufonius*, leaf-bracted rush; *J. capitatus*, inch-high rush; *J. capitatus*), annual hairgrass (*Deschampsia danthonoides*), Sacramento Valley pogogyne (*Pogogyne zizyphoroides*), marigold navarretia (*Navarretia tagetina*), smooth cat's-ear (*Hypochaeris glabra*), hyssop loosestrife (*Lythrum hyssopifolium*), long-beaked hawkbit (*Leontodon taraxicoides*), cowbag clover (*Trifolium depauperatum*) and Fremont's goldfields (*Lasthenia fremontii*) (Dittes and Guardino pers. obs.; Ahart pers. comm.).

Although Ahart's dwarf rush is also recorded as occurring with the more "deeply-adapted" vernal pool endemics, including coyote thistle (*Eryngium castrense*), bractless hedge-hyssop (*Gratiola ebracteata*), tricolor monkey-flower (*Mimulus tricolor*), American pillwort (*Pilularia americana*), double-horned downingia (*Downingia bicornuta*), ornate downingia (*Downingia ornatissima*), white-headed navarretia (*Navarretia leucocephala*) and water pygmyweed (*Crassula aquatica*) (CDFG 2010), it usually is growing at the higher-drier edge of hydro-topographic position preferred by the latter species (Dittes and Guardino pers. obs.; Ahart pers. comm.). Interestingly,

Ahart's dwarf rush is also known to do well on disturbed gopher mounds along the margins of the wetlands as well (Ahart pers. comm.; Dittes and Guardino pers. obs.; CDFG 2010).

Hydrological stresses associated with vernal pools exclude the majority of non-native weedy species that characterize the present-day valley annual grassland, agricultural areas, and ruderal habitats. Italian wild rye (*Lolium multiflorum*) and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), two non-native facultative wetland species, typically dominate vernal pool portions of disturbed wetlands in the Central Valley and can be invasive around vernal pool margins and in smaller, more ephemeral vernal pool types. Similarly, long-beaked hawkbit (*Leontodon taraxicoides*), another non-native annual, can dominate the edges of vernal pool and the basins of smaller pools and swales. Some suggest that built-up thatch from Italian wild rye, Mediterranean barley, Medusa-head grass (*Taeniatherum caput-medusae*), and other non-native upland species may indirectly affect vernal pool species as well by lessening the amount of water entering the system through surface and subsurface flow (Robins and Vollmar 2002).

Since Ahart's dwarf rush occupies the margins of pools and smaller pools and swales, it may be more susceptible to the effects of excessive growth of Italian wild rye, Mediterranean barley, long-beaked hawkbit, and thatch buildup, than many of the other "more deeply-adapted" vernal pool rarities. As a case in point, Ahart mentions that some populations of Ahart's dwarf rush and other vernal pool species in his area have diminished over the years with concomitant increase in cover of European annual grasses (Ahart 2003 and pers. comm.).

Specific interactions between livestock grazing and Ahart's dwarf rush have not been investigated empirically. Some regimes of livestock grazing have been shown to benefit the floristic composition of vernal pools and associated upland annual grassland. Vernal pools included within livestock exclosures have demonstrated a "simplification" of floral composition with a shift towards dominance by Italian wild rye and Mediterranean barley (Robins and Vollmar 2002; Dittes pers. obs.). Uplands that are not grazed can shift in dominance towards Medusa-head grass and yellow-star thistle (*Centaurea solstitialis*). Appropriate livestock grazing regimes can result in reduction of cover by weedy grasses and thatch and opening of habitat at vernal pool margins by hoof-pocking. This in turn increases micro-habitat heterogeneity and provides germination and colonization opportunities for other native vernal pool species.

Field observations indicate that annual rushes, and many other associated vernal pool annuals do well on gopher mounds and between deep hoof print depressions in wetter areas, and within the puddled hoof prints around drier margins (Dittes pers. obs.). It has also been observed though, that in some cases at the Vina Plains Preserve in Tehama County, excessive trampling of shallow vernal pools can result in their obliteration as distinct topographical features, particularly on heavy clay soils (Schlising pers. comm.). Robins and Vollmer (2002)

provide a recent review of information pertaining to livestock grazing in vernal pool-annual grassland ecosystems.

Timing of grazing appears more important than stocking rates in affecting persistence of some vernal pool rarities (Stone *et. al*. 1988; Robins and Vollmer 2002). During the period when pools are inundated and upland forage is still green and attractive (late fall to early spring), cattle tend to not congregate in pools, and trampling and grazing pressures to vernal pool plant species in their seedling or juvenile aquatic phase are minimized. Once the upland forage cures and the vernal pools are in the flowering and seed-producing terrestrial phase (mid-spring to early summer), moist pools become more attractive to livestock, and trampling pressures are increased. Grazing in the summer and fall months, after seeds have set and plants have died likely has little negative effect on most vernal pool annuals, and may enhance the habitat by further reducing thatch and exposing soil for the following growing season (Ahart pers. comm.).

Ahart's dwarf rush is small enough to escape grazing pressures by livestock (except perhaps sheep). The most vulnerable stage of Ahart's dwarf rush is probably after pool margins have dried and the plant is in flower, before seed matures. It likely will not attract grazers, but if trampled at this point in the life cycle, seed production may be limited. However, with many vernal pool species of such small stature, at least some individuals escape livestock trampling pressures during most years except under all, but the most severe grazing regimes.

Although none are specifically reported to co-inhabit vernal pools with Ahart's dwarf rush, several non-native weedy hydrophytes may present future problems. Mannagrass (*Glyceria occidentalis*), an aggressive weed of irrigated agriculture and degraded vernal pools, has already been reported as a potential problem at vernal pools in the region. Additional species to consider include rosy lippia (*Phyla nodiflora* var. *rosea*), field bindweed (*Convolvulus arvensis*), common unicorn plant (*Probiscidea louisianica*), swamp pricklegrass (*Crypsis schoenoides*), crabgrass (*Cynodon dactylon*) and paradox canary-grass (*Phalaris paradoxa*). Cocklebur (*Xanthium strumarium*), another native species, can also dominate vernal pools (Schlising pers. comm.; Unger pers. comm.).

ADR Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Ahart's dwarf rush are identified in Table G-3.3-1 and have been derived from input from local species experts.

Table G-3.3-1. Habitat Elements for Ahart's Dwarf Rush

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

ADR Species Distribution and Population Trends

ADR Range Wide Distribution

Presently, Ahart's dwarf rush is recorded from 10 CNDDB occurrences scattered throughout the Great Central Valley, from Calaveras County in the south to Tehama County in the north (CDFG 2010). These occurrences are all situated at sites ranging from 100 to 320 feet in elevation, and with the exception of the occurrence in Calaveras County (San Joaquin Valley Subregion) and the occurrence in Tehama County (North Coast Ranges Subregion), all lie within the Sacramento Valley Subregion of the Great Valley Region of the California Floristic Province (Hickman 1993).

ADR Central Valley Distribution

The northernmost occurrence of Ahart's dwarf rush is located in Tehama County. Four occurrences are found in Butte County, one in the vicinity of the Oroville Municipal Airport, south of Chico and three on the Peter Ahart Ranch, near Honcut (CDFG 2010). The single occurrence in Yuba County is located south of Honcut Creek near the Butte County line. Two occurrences are located in central Sacramento County, and the southernmost occurrence is located in the northwest portion of Calaveras County (CDFG 2010).

ADR Distribution within the Planning Area

Currently, there are two documented CNDDB occurrences of Ahart's dwarf rush in Sacramento County and the two not-yet-recorded occurrences, each of which is found within both the Planning Area and UDA (CDFG 2010; Mather Field date unknown; Wetland Research Associates 2004). Figure ADR-1 shows these occurrences. One of the occurrences (CNDDB occurrence #7)

is located southeast of Rancho Cordova on private land southeast of the intersection of Kiefer Boulevard and Sunrise Boulevard. The other occurrence (CNDDB occurrence #8) is located approximately 1.75 miles to the northwest on Mather Field. The two occurrences not yet recorded are located on Mather Field north of Kiefer Boulevard.

It is important to note that owing to its small stature, preference for vernal pool margins and swales, early flowering season, and the area of remaining unsurveyed or partially surveyed habitat, moderate to high potential exists for discovery of additional populations of Ahart's dwarf rush within the Planning Area.

Table G-3.3-2 shows the soil series, geological formation and landform associations for the two Ahart's dwarf rush occurrences in Sacramento County that are recorded in the CNDDB. Generally, this species is associated with old terrace remnant alluvial deposits of ancestral river channels and pediment gravels, which were deposited during the early Pleistocene between 600,000 and 1,500,000 years ago. Though the distribution of the taxon is extremely disjunct, the modeled habitat of Ahart's dwarf rush is discussed in Section F-4 of this appendix.

Table G-3.3-2. Extant CNDDB Occurrence Numbers, Distribution, Associated Soil Series and Landform Formations For Ahart's dwarf rush In Sacramento County

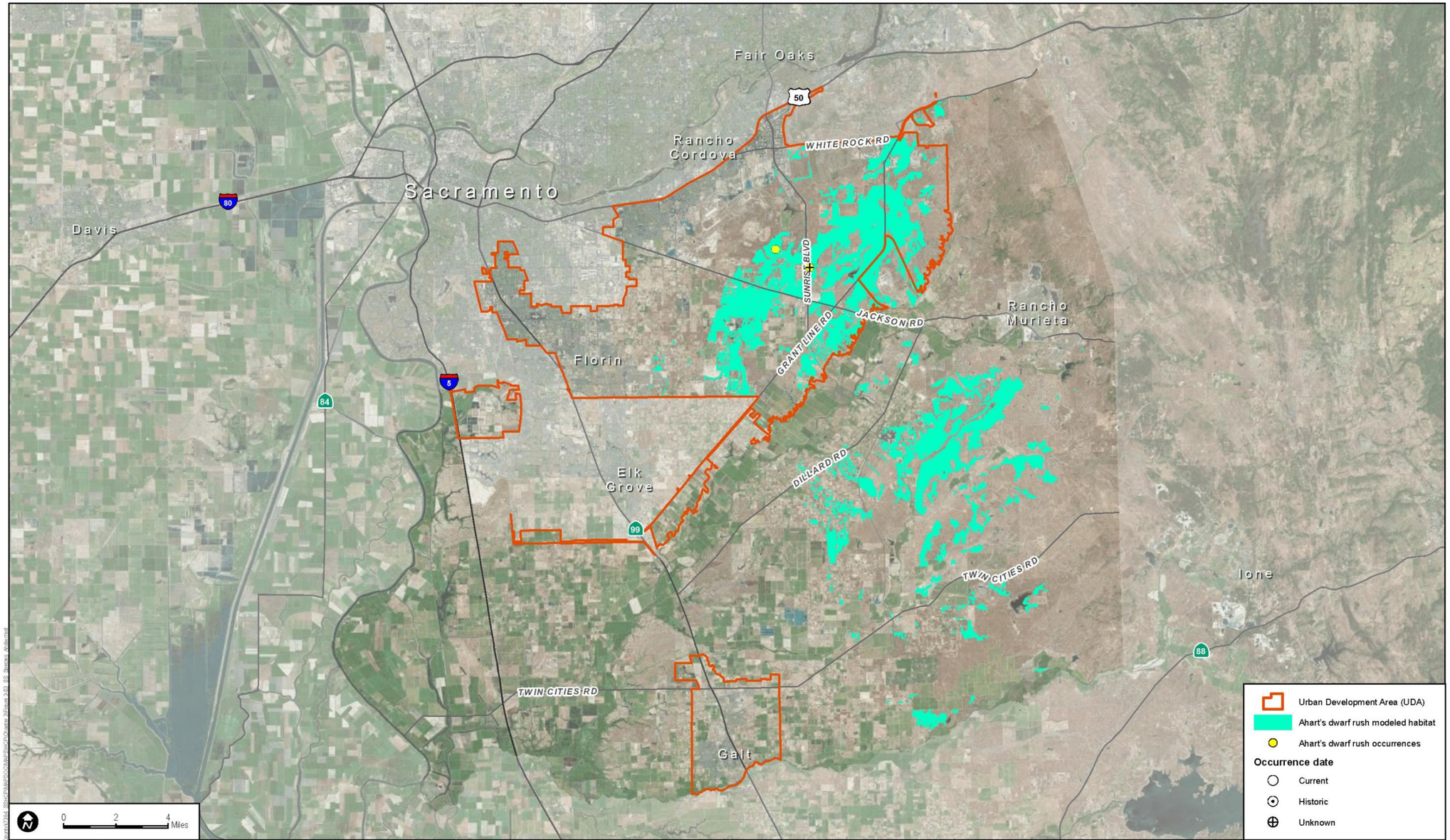
CNDDB Occurrence #	Quadrangle	Soil Series[a]	Geological Formation and Landform
7	Buffalo Creek	Redding gravelly loam	Arroyo Seco Formation Remnant high terraces
8	Carmichael	Redding gravelly loam	Arroyo Seco Formation Remnant high terraces

[a] Soil series information based on what USDA soil survey type occurs at the CNDDB species location (USDA 1993)

ADR Population Levels and Trends

Ahart's dwarf rush is known from a total of 10 CNDDB occurrences, all in California, including four in Butte County, two in Sacramento County, and one in each of Calaveras, Placer, Tehama and Yuba Counties (CDFG 2010).

Figure ADR-1 Ahart's Dwarf Rush Modeled Habitat and Documented Occurrences



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Of the 10 documented occurrences presumed extant, one in Sacramento County (CNDDB occurrence #7) is listed as "Possibly Extirpated" (CDFG 2010). The other Sacramento County occurrence, presumed extant (CNDDB occurrence #8), was observed to support approximately 300 plants in 2001 (CDFG 2010). The Tehama County occurrence is reported as supporting 750 plants as of 2004. The Calaveras County population was observed to support approximately 100 plants among three vernal pools in 1987, the last time this population was recorded (CDFG 2010). The Placer County occurrence, reported as supporting 45 plants in 1990, is on land proposed for development. The Yuba County occurrence was reported as supporting several hundred plants among three colonies in 1998 (CDFG 2010). The northernmost occurrence (CNDDB occurrence #4) was observed to support several hundred plants in the spring of 2003 (Dittes and Guardino pers. obs.). The occurrences on the Peter Ahart Ranch are presumed extant, but it and other vernal pool species in the area likely have diminished over the last few decades concomitant with an overall increase in range productivity and increasing abundance of weedy annual European grasses (Ahart pers. comm. 2003). Table G-3.3-3 shows the population estimates of the CNDDB occurrences.

Table G-3.3-3. Population Estimates for CNDDB Occurrences

CNDDB #	# of Pools Observed	Range of Population Estimates
7	Unknown	1999: 4 plants
8	Unknown	2000: 300 plants

It is impossible to determine the number of historically occurring Ahart's dwarf rush populations or the acreage of suitable habitat lost to historic agricultural and urban land-use conversions, since so much had happened before these species first received attention. Investigators have made estimates as to the acreage of vernal pool habitat lost since historic times (Holland 1978); however, owing to habitat specificity, only a subset of the vernal pool habitat lost within the natural range of the species may have provided suitable habitat for Ahart's dwarf rush. Effects of historic livestock grazing combined with drought and habitat alterations relating to development of non-native annual grassland are unknown as well.

There has been no comprehensive effort to monitor any of the known populations of Ahart's dwarf rush. Numbers of individuals have not been recorded for the populations since their discovery and the overall population dynamics for this plant are unknown.

Studies involving other vernal pool plant rarities, including Orcuttiae grasses and Hoover's Spurge have demonstrated marked fluctuation in numbers of individuals within populations between years (Griggs and Jain 1983; Holland 1987; Alexander and Schlising 1997). This extreme population variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as principally determined by seasonal and

between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). It is not known however, if Ahart's dwarf rush exhibits a similar between-year pattern.

Observations made over a decade or so may provide a reasonable indication of the short-term vigor of a given Ahart's dwarf rush population. It is important to consider however, that in order to assess the trend of the species, long-term monitoring of both habitat and populations conducted over multiple cycles of wet and dry years is needed. Another critical aspect of population demography is the presence and nature of the soil seed bank, which is unknown for Ahart's dwarf rush.

ADR Threats to the Species

Potential threats to Ahart's dwarf rush include loss of vernal pool habitat to agricultural or urban/industrial land-use conversions, hydrological alteration of sub-watersheds and associated vernal pool habitat, shifts in competitive interactions (hydrological mediated or invasive weedy species), inappropriate livestock grazing regimes (none, mid-spring rotations, sheep vs. cattle), recreational vehicle use, equestrian and pedestrian traffic, refuse dumping, windblown refuse accumulation, air pollution and global climate change.

Proposed development is a threat to one of the Sacramento County Occurrences (CNDDB occurrence # 7). This population is now listed as "Possibly Extirpated" (CDFG 2010). Proposed development of an aggregate mine was stated as a threat to the only other Sacramento County Occurrence (CNDDB occurrence #8) in 2000. This occurrence is now within the boundaries of the proposed Mather Field Vernal Pool Preserve. Off-road vehicle traffic, road construction, cattle grazing, surrounding development and a proposed subdivision are stated as threats for the single Placer County occurrence (CNDDB occurrence #3). Power line corridor maintenance activities are stated as a threat to the single Yuba County Occurrence (CNDDB occurrence #9). No threats are stated for the Calaveras County population (CNDDB occurrence #2). The Butte County occurrences in the vicinity of Honcut (CNDDB #1, #5, and #6) have no threats stated in the CNDDB. According to Ahart though (pers. comm. 2003), these populations may be experiencing a decline in vigor associated with increasing range productivity and increasing abundance of annual European grasses.

ADR Data Gaps and Conservation Implications

Despite its distinctive appearance and extreme rarity, Ahart's dwarf rush has received little research attention from botanists or ecologists. Aside from general observations of field workers provided in the CNDDB and the taxonomic work of Ertter (1986), nothing else exists regarding the biology, ecology, pollinators, breeding system, population genetics, habitat

relationships, population levels, trends or threats associated with this taxon. Pertinent data gaps, implications for conservation, and operating assumptions include:

ADR Unknown Number of Undiscovered Populations

Additional unsurveyed and partially surveyed potentially suitable habitat exists within the Planning Area and elsewhere within the range of the species. In the Planning Area, discovery of new populations may occur on the large dry-land ranchlands, public and quasi-public lands and vernal pool-grassland preserves already established in the eastern portion of Sacramento County.

ADR Unknown Relationship between Landform/Soil Chemistry and Bio-Geographic Distribution

Ahart's dwarf rush has a geographic association with old alluvial terraces possessing acidic soils primarily of the Redding Series. The exact nature of this relationship is however, unknown. It is unknown if soil pH or other edaphic factors influence Ahart's dwarf rush distribution and population vigor. It is possible that the presence of functioning vernal pools, regardless of landform, soil series and soil pH can provide suitable habitat.

ADR Unknown Pollination Ecology

The pollination ecology of Ahart's dwarf rush has not been studied. Floral morphology (long style and style branches, exerted anthers) suggests an outcrossing breeding strategy. The inconspicuous scale-like flower parts and lack of nectar suggest wind pollination, as with most other graminoids (grasses, sedges, rushes, and other grass-like plants). Without knowing specific aspects of pollination ecology, it is difficult to ascertain the importance of associated uplands in the design and management of preserves supporting Ahart's dwarf rush.

It is well documented that specific co-evolved bee species are depended on by a guild of vernal pool plant species. Conservation of these vernal pool plant communities depends on inclusion of adequate areas of surrounding functioning upland habitat to maintain populations of the co-evolved ground-dwelling bees. Some suggest that buffers of up to ½-mile around vernal pools might be needed (Robin Thorp, e-mail to D. Burmester 2003).

ADR What Constitutes Population Vigor, and How to Measure?

Population vigor and population dynamics, including year-to-year variability in abundance, have not been studied for Ahart's dwarf rush. The existence of a dormant soil seed bank, a critical contributor to population stability in some other vernal pool species, is unknown for Ahart's dwarf rush as well. Other rare vernal pool species have been shown to be highly variable in abundance from year-to-year (Holland 1987; Griggs pers. comm. 2003), and causative factors

contributing to year-to-year population fluctuations may be difficult to identify (Alexander and Schlising 1997). Trends may occur that are not discernable and trends that are discerned may be unexplainable. These factors will complicate attempts to change management for benefit of the species if measured vigor shows decline.

ADR Specific Hydrological Requirements of Ahart's dwarf rush

Data do not exist regarding specific parameters of the annual hydrological cycle of vernal pools supporting Ahart's dwarf rush populations (e.g., timing of rainfall, depth of ponding, duration of ponding and soil dry down rate).

The general lack of numerical hydrological data limits the ability to precisely monitor and/or assess hydrological suitability of Ahart's dwarf rush-vernal pool habitat within established preserves. Similarly, assessment of potentially suitable Ahart's dwarf rush habitat for preserve establishment or for detection of the species at this time must rely on generalities.

ADR Existing Hydrological Trend of Pools and Existing Indirect Effects

Extant Ahart's dwarf rush populations may have already experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds (CDFG 2010). Without complete protection of entire vernal pool watersheds, or precise hydrological monitoring and accurate modeling on a pool complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown Existing Conditions Ahart's dwarf rush conditions may not be pristine, so if trends in vigor or habitat quality become apparent over time, it may be difficult to attribute trend to any specific management activity.

ADR Definition of Appropriate Hydrology Buffer

There is no standard for appropriate scale of effective hydrologic buffers for vernal pool-annual grassland ecosystems, since the nature of vernal pool complexes and their geo-hydrological relations may vary substantially by geography (Holland and Dains 1990).Proposed preserve designs may not afford complete protection to the hydrological systems that support Ahart's dwarf rush and other species assemblages dependent on them.

ADR Definition of Appropriate Scale Ahart's dwarf rush-Vernal Pool-Annual Grassland Preserve

There is no standard for appropriate scale of effective Ahart's dwarf rush-vernal pool preserves. It is a paradigm of conservation biology that "bigger is better" for a variety of well-documented reasons. Conservation challenges associated with the relatively small-scale vernal pool preserve

at Phoenix Field and Phoenix Park are well documented and reflect consequences of increase edge effect associated with smaller preserves (Clark *et. al*. 1998).

ADR Determination of an Appropriate Livestock Grazing Regime

Specific grazing regimes have not been formulated for annual grassland pasture systems with Ahart's dwarf rush-occupied pools, although grazing and monitoring of vernal pool-annual grassland stems have been addressed (Barry 1998; TNC 2000; Griggs 2002; Robins and Vollmar 2002).

Ahart (2003 and pers. comm.) emphasizes the need to graze vernal pool-annual grasslands, particularly those supporting Ahart's dwarf rush, to maintain vernal pool diversity and the "vernal pool edge" habitat that Ahart's dwarf rush and many of the showy vernal pool annuals require. This upper, drier topographic-hydrologic microhabitat on the edge of a vernal pool has been termed the "transition zone" between the wetter vernal pool habitat and the surrounding upland annual grassland matrix (Schlising and Sanders 1982).

Since Ahart's dwarf rush occupies small and/or shallow vernal pools, or the edges of larger pools, management of Italian wild rye and Mediterranean barley in and around pools and Medusa-head grass in surrounding uplands should be of particular management concern. Ahart states that for this species, it is better to err on the side of overgrazing (Ahart pers. comm. 2003).

Specific livestock grazing regimes cannot be formulated until preserve size, configuration, and soil and vegetation conditions and vegetation management goals are determined.

ADR Interactions with Non-Native Weeds and Weed Management Activities

Non-native weeds, or weedy native species reported as occurring in vernal pools include western mannagrass, swamp pricklegrass, Bermuda grass, common spikerush, bindweed, lippia, paradox canary-grass, long-beaked hawkbit, cocklebur and cattails. None of these are reported to co-inhabit Ahart's dwarf rush-occupied vernal pools in Sacramento County. Any of these and others now unknown may appear or change in abundance in Ahart's dwarf rush-occupied pools over time. Italian Rye and Mediterranean Barley, two common non-native inhabitants of shallow vernal pools and vernal pool margins, might be of management concern to Ahart's dwarf rush, owing to the latter's preference for small to medium size vernal pools. Similarly, Medusa-head grass in uplands should be monitored and controlled. Potential competitive interactions with these species may affect the vigor of Ahart's dwarf rush populations. In addition, any eradication or control methods implemented for these species may in turn potentially affect Ahart's dwarf rush populations.

ADR Potential Association and Compatibility with Other Rare Vernal Pool Species

It is desirable to combine design preserves for multi-species conservation. Suitability of Ahart's dwarf rush habitat for supporting other rare plant species has not been specifically addressed. Many of these pool complexes also may provide habitat for rare invertebrates, amphibians, mammals, and bird species as well. Management for multiple species maximizes the effectiveness of habitat conservation and requires coordinated monitoring and actions. Management for the benefit of one species may conflict with management needs of other rare species. For instance, livestock grazing anytime after May 15 may be compatible with or even benefit some Ahart's dwarf rush-associated pool complexes, but may be detrimental to other later-flowering species depending on those complexes (e.g., slender Orcutt grass).

ADR Genetic Variation (Spatial and Temporal [Seed Bank], Genetic Drift, Genetic Bottlenecks)

Population genetics for Ahart's dwarf rush are completely unknown. Current limitations in our understanding of Ahart's dwarf rush population genetics have little immediate conservation implication, given the extreme rarity of Ahart's dwarf rush.

ADR Seed Longevity and Dynamics of Stored Soil Seed Bank

As previously mentioned, the existence and potential role of a dormant soil seed bank in population dynamics is completely unknown for Ahart's dwarf rush. There have been no studies addressing the presence of a soil seed bank, seed dormancy or longevity. From the perspective of conservation, knowledge of site specific soil seed bank characteristics would allow more accurate assessment of population size and stability (vigor). This is particularly true of populations that typically support the fewest standing individuals through time.

ADR Inoculation

Since there are so few natural populations of Ahart's dwarf rush in Sacramento County, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable pools and increasing the number of naturally self-sustaining populations. These additional populations would increase the likelihood of natural dispersal events into preserved but unoccupied Ahart's dwarf rush habitat, create meta-population structure at extant occurrences where single pools may support the species, and ensure existence should any natural populations become compromised.

ADR Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide)

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter. ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to vernal pool vegetation. Assuming that extant Ahart's dwarf rush occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of Ahart's dwarf rush, if existing air quality can be maintained. If however, California's human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively affect Ahart's dwarf rush and other native plant species.

ADR Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology. It is likely that given the expected global climate trends, a vigor response of some kind could be expected for Ahart's dwarf rush populations within the study period of this EIS/EIR, or at some time beyond.

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LEGENERE (LEG)

Legenere (LEG)

(Legenere limosae)

Status USFWS: None

Status CDFW: None

Status CNPS: 1B.1

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LEG Listing Status

Legenere (*Legenere limosa*), a vernal pool endemic, is considered to be rare, threatened or endangered throughout its range, thus qualifying its designation as a List 1B Species by the California Native Plant Society (CNPS) (CNPS 2010). It has been assigned an R-E-D Code of 2-3-3, meaning it is distributed in a limited number of occurrences, occasionally more if each occurrence is small, it is endangered throughout its range, and entirely restricted to California.

Being a CNPS List 1B plant species, legenere meets the California Department of Fish and Wildlife (CDFW) definition of a special plant though it has no formal protection status by the CDFW or United States Fish and Wildlife Service (USFWS).

LEG Life History and Ecology

LEG Species Description and Life History

Legenere is an inconspicuous annual in the Bellflower family (Campanulaceae). This species has slender, sprawling, sometimes branched stems that can grow from 10 to 30 centimeters in length. These stems may also root at the nodes. Small one to three centimeter-long leaves are arranged alternately on the stem; the lower (submersed) ones are linear and early deciduous and the upper ones (emersed) are proportionally shorter, wider and oblong-lanceolate to oblanceolate (Mason 1957), or narrowly triangular (Hickman 1993; Oswald 1994). The inflorescence is a terminal raceme with flowers and fruit born on slender six to 20 millimeter-long stalks (pedicels). These flowers are alternately arranged along an often zig-zag central axis. Each flower stalk is subtended by a six to 12 millimeter-long leaf-like bract. Flowers consist of an inferior ovary, five narrowly triangular green sepals that are 1/2 to 1/3 the length of the

ovary, and five greenish-white to yellowish petals (two to four millimeter-long) that are unequally united into a two-lipped, five-lobed corolla with a tubular base. The lower flowers often lack petals entirely. The +3.5 millimeter-long obconic ovary elongates as it matures, eventually becoming a cylindrical fruit that reaches six to 10 millimeter in length and one to two millimeter diameter.

Legenere is a monotypic genus with no close relatives in North America Stone (1990). When in full fruit and without petals present however, legenere might be confused with potentially co-occurring with downingia (*Downingia* spp.). Mature downingias, however, lack the often up-curved, narrow pedicel (stalk) that subtends each cylindrical fruit. Downingias also do not exhibit the often zig-zag central axis of the inflorescence.

The genus *Legenere* has received little empirical study from biologists or ecologists and other than basic taxonomic and biogeographic treatments, legenere remains mostly unstudied. Ecological information resulting from observations of field botanists exists primarily as a result of land management and Agency-related resource surveys (Holland 1983; Platenkamp 1998; CDFG 2010).

LEG Ecological Life Cycle

Legenere shares the annual growth habit with the vast majority of other endemic vernal pool plants. This adaptive trait confers to the population's avoidance of the regular and extreme seasonal drought that characterizes vernal pool habitat and the Mediterranean climate (Griggs and Jain 1983; Holland 1987; Stone et al. 1988; Zedler 1990).

LEG Seed Germination

The specific timing of germination of legenere seeds relative to the timing of the vernal pool inundation cycle has not been described in detail. Seeds are reported to germinate under water in late February to April (Holland 1983). Seed longevity, dormancy characteristics, germination requirements and germination optima for legenere have not been investigated.

LEG Vegetative Growth

One of the challenges to many vernal pool plant species is optimization of physiological processes in both the early season aquatic and later season terrestrial phases of the vernal pool cycle. For legenere, the principal structural adaptation to amphibious growth appears to be production of thin linear aquatic leaves, and thicker, proportionately wider aerial leaves. Although not determined for legenere, it has been shown in other amphibious vernal pool plants that the aquatic leaves lack both waxy cuticle and stomates, in this respect differing from adult aerial leaves (Keeley 1990). These juvenile leaves optimize photosynthesis in the aquatic

environment and maximize growth while vernal pools are still inundated, thus lengthening the vernal pool-growing season.

LEG Reproduction

Legenere flowers and sets seeds during the dry-down phase of the vernal pool hydrologic cycle, sometimes while shallow water or inundated soil remains in the deepest parts of the pool basin (Dittes pers. obs.). Flowering and fruit maturation occurs from April through June (CNPS 2010; CDFG 2010), and likely varies by vernal pool depth/ponding duration and conditions of the season. Although pollination and breeding experiments have not been carried out for legenere, the reduced white flowers and flowers without corollas suggest a self-pollinating breeding system. Oswald (1994) has observed completely cleistogamous plants (flowers never open) in the Northern Sacramento Valley, which further indicates self-compatibility. Plants typically produce from several to 10 or more fruit, with each fruit containing up to 20 small smooth brown seeds (Holland 1983).

LEG Dispersal

Short-distance seed dispersal in legenere appears to be naturally limited by the mature fruit capsule, which only partially opens at its apex. Seeds can remain in the mature capsule after disintegration of the mother plant, potentially being transported by flowing water during the following fall-winter inundation phase (Holland 1983). Seed dispersal is naturally limited in a suite of other vernal pool plant species. This adaptive trait is thought to represent an adaptation to spatially unpredictable and limited vernal pool habitat (Griggs 1974, 1980; Zedler 1990).

Evidence of long-distance dispersal and colonization exists in the overall geographic distribution of this species in northern California. Natural dispersal of legenere seeds likely occurs via flowing water, transport on feet and feathers of waterfowl, and in mud on hooves and legs of livestock. As with other vernal pool species, natural dispersal of seeds was likely a more frequent event when there were many more vernal pools, more pool interconnectivity, exceedingly larger waterfowl migrations and unfenced roaming native ungulates (Griggs 1980).

LEG Seed Dormancy

Seed dormancy and a stored soil seed bank is indicated by observation of multi-year periods with insufficient precipitation where legenere plants were absent, followed by reappearance during following favorable-hydrology growing seasons (Holland 1983; CDFG 2010). Seed longevity and seed abundance in the soil has not been investigated. The presence of a persistent soil seed bank provides insurance against localized extirpation resulting from the unpredictable occurrence and duration of appropriate growing conditions. If total seed crop failure occurs in a given year or set of years (failure to germinate, loss to late season flooding or

fire, excessive grazing by livestock or grasshopper herbivory), additional stored seeds are available for another year's effort.

LEG Population Genetics

Population genetics of legenere have not been investigated, so intra- and inter-population patterns of genetic variability are unknown. In general, self-pollinating species tend to exhibit low levels of intrapopulation variation and a high degree of between population divergences. Elam (1996) provides a good overview of the myriad considerations in assessing the population genetics of vernal pool plants in the absence of empirical data for a given taxon. Given the limited number of occurrences in the Planning Area and the scattered geographical distribution, all intra-pool legenere populations should be considered unique, and important genetic entities.

LEG Habitat Requirements and Ecology

LEG Biogeography and Landform Relations

Legenere is strictly associated with the vernal pool-type hydrologic cycle. Over its geographic range, this species is found in several vernal pool physiographic/edaphic settings, including northern basalt, northern claypan, northern hardpan, northern volcanic ashflow, and northern volcanic mudflow vernal pools (Holland 1983). In Sacramento County, legenere is associated with vernal pools located on various geologic surfaces, including the Laguna, Mehrten, Riverbank, Undifferentiated Surficial Alluvial Deposit and South Fork Gravels. For this reason, it is more likely that presence of wetland habitat with suitable vernal pool-type hydrology is a more important factor in determining the geographical distribution of this species than is geologic surface or soils. All well-developed vernal pools, regardless of landform association, should be considered potentially suitable habitat for legenere.

LEG Hydrology Relations

Legenere is a strict endemic of the vernal pool hydrologic cycle. This species grows in well-developed vernal pools and playa lakes, as well as along the seasonally fluctuating margins of more permanent water bodies (small lakes, ponds, stock ponds), and basins within seasonal drainages (Holland 1983; CDFG 2010). Legenere has been reported to inhabit vernal wetlands ranging in size from 40 square feet to 100 acres (Holland 1983). Topographical position within pools and associated plant species indicate tolerance of, or preference for, the more extreme (longer-duration) inundation regimes encountered in vernal wetlands. It is interesting to note however, that in the larger/deeper pools encountered by Holland (1983), legenere was reported as not inhabiting basin positions deeper than eight inches ponding depth.

LEG Biological Community Relations

Floristic associations provide further indication of preference for more extreme vernal pool hydrological cycles. Legenere most frequently co-occurs in micro-sites with smooth goldfields (*Lasthenia glaberrima*) and common spikerush (*Eleocharis macrostachya*) (CDFG 2010). Both are typically associated with well-developed large or deep pools with longer periods of inundation, as well as with vernal marshes, permanent marsh edges and the seasonally fluctuating margins of stockponds. Most rare plant species found with legenere are also inhabitants of pools with longer duration inundation, including slender Orcutt grass (*Orcuttia tenuis*), Bogg's Lake hedge-hyssop (*Gratiola heterosepala*), and Sanford's arrowhead (*Sagittaria sanfordi*). Other associates indicative of well-developed vernal pool hydrology include three-sepaled buttercup (*Ranunculus bonariensis* var. *trisepalus*), coyote thistle (*Eryngium castrense*, *E. vaseyi*), bractless hedge-hyssop (*Gratiola ebracteata*), downingias (*Downingia bicornuta*, *D. cuspidata, D. ornatissima*), flowering quillwort (*Lilaea scilloides*), and American pillwort (*Pilularia americana*).

Other vernal pool endemics reported as occurring with legenere include common inhabitants of shallower and/or smaller to medium-size vernal pools with shorter duration ponding, or the slopes and edges of larger or deeper pools. These species include Fremont's goldfields (*Lasthenia fremontii*), white-headed navarretia (*Navarretia leucocephala*), stalked popcorn-flower (*Plagiobothrys stipitatus*), bracted popcorn-flower (*P. bracteatus*), wooly marbles (*Psilocarphus brevissimus*), dwarf downingia (*Downingia pusilla*), annual hairgrass (*Deschampsia danthonioides*), and Douglas' meadowfoam (*Limnanthes douglasii*).

LEG Non-Native Weed Relations

Hydrological stresses associated with vernal pools exclude the majority of non-native weedy species that characterize the present-day valley annual grassland, agricultural fields, and ruderal habitats. Italian wild rye (*Lolium multiflorum*), and Mediterranean barley (*Hordeum marimum* ssp. *gussoneanum*), two non-native facultative wetland species, typically dominate disturbed wetlands and can be invasive in smaller, more ephemeral vernal pool types and the margins of larger/deeper ones as well. Some suggest that built-up thatch from Italian wild rye, Mediterranean barley, Medusa-head grass (*Taeniatherum caput-medusae*), and other non-native upland species may indirectly affect vernal pool species as well by lessening the amount of water entering the system through surface and subsurface flow (Robins and Vollmar 2002).

Since legenere occupies medium to larger or deeper vernal pools, it may not be particularly susceptible to the effects of excessive growth of Italian wild rye and Mediterranean barley and thatch build-up, as with the more deeply-adapted Orcuttiae grasses and Bogg's Lake hedge-hyssop.

Weedy hydrophytic species presently reported as growing with legenere include mannagrass (*Glyceria occidentalis declinata*) and lippia (*Phyla nodiflora*). Although not-yet reported to co-inhabit vernal pools with legenere, other non-native weedy hydrophytes may present future problems. These species include swamp pricklegrass (*Crypsis schoenoides*), field bindweed (*Convolvulus arvensis*), common unicorn plant (*Probiscidea louisianica*), Bermuda grass (*Cynodon dactylon*), and paradox canary grass (*Phalaris paradoxa*). Cocklebur (*Xanthium strumarium*), a native species, can also become weedy and dominate vernal pools (Schlising pers. comm.; Unger pers. comm.).

LEG Livestock Grazing Relations

In general, appropriately timed dry-pasture livestock grazing regimes are thought to be compatible with the persistence of vernal pool vegetation. Robins and Vollmer (2002) provide a review of information pertaining to livestock grazing in vernal pool ecosystems.

Livestock grazing is reported as a threat at a number of populations (CDFG 2010), however many extant populations of legenere inhabit long-operating cattle ranches. Persistence in un-irrigated pasture systems indicates tolerance for at least some level of grazing. In most cases, timing of livestock grazing is likely more important than stocking rates in affecting persistence of legenere, as it is for the Orcuttiae grasses (Stone et al. 1988). During the period when pools are inundated and upland forage is still green and attractive, cattle tend to not congregate in pools, and trampling and grazing pressures to vernal pool plant species in their seedling or juvenile aquatic phase are minimized. As the upland forage cures and the vernal pools are in their flowering and seed-producing terrestrial phase, moist pools become more attractive to livestock and grazing and trampling pressures are increased. Excessive trampling and grazing during this period may negatively affect legenere, and other vernal pool species. Grazing in the summer and fall months, after seeds have set and plants have died likely has little negative effect on legenere.

It should be noted however, of all vernal pool rarities, legenere is the only one with a decumbent or sprawling habit, and it tends to intermingle with a comparatively succulent mass of intertwined smooth goldfields (*Lasthenia glaberrima*) stems. This growth habit, combined with typically low population numbers may make legenere somewhat more susceptible to inappropriately timed livestock grazing. For most other vernal pool annuals, small stature and high plant densities ensure that in all but extreme cases, a portion of every year's cohort escapes destruction, matures, and sets seed.

LEG Disturbance Response

With exception to persistence of some populations within operating ranches, little is known about the potential response of legenere to other disturbances. One wetland in Sacramento

County, observed to support up to 1,000 to 10,000 plants in 1991 (CNDDB occurrence # 33), has been "…disked annually for firebreak" (CDFG 2010). Another "large vernal pool" in Tehama County, "ripped and filled in Fall of 1994," was observed to support an estimated 1,000 legenere plants in 1995 (CDFG 2010).

Populations of several other rare vernal pool species, including Orcuttiae grasses and dwarf downingia, as well as more common species, may persist despite periodic disking of their resident pools over decades (Hoover 1941; Crampton 1959; Stone et al. 1988; Ahart pers. comm.; Kelsey pers. comm.; Dittes pers. obs.; CDFG 2010). It is exceedingly important to note that in these cases, disking is not so deep as to significantly affect the subtending impermeable layer or the vernal pool hydrological cycle. In addition, the disking is performed in the late summer or fall months in preparation for dry land winter grain crops, so vernal pool plants have set seed and dried. If this disking occurs earlier in the growing season, before seeds are mature, over consecutive years population extirpation is probable through exhaustion of the soil seed bank.

LEG Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for legenere are identified in Table G-3.4-1 and have been derived from input from local species experts.

Table G-3.4-1. Habitat Elements for Legenere

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

LEG Species Distribution and Population Trends

LEG Species Distribution

Legenere was first collected in 1890 from Solano County, California. Since that time, 61 occurrences have been recorded in the California Natural Diversity Data Base (CNDDB) (CDFG 2010), ranging from Santa Clara County in the south to southern Shasta County at the northern edge of the Great Central Valley. Legenere occurrences are distributed among four of the Geographic Sub-regions of the California Floristic Province, as described by Hickman (1993), including the San Joaquin Valley, Sacramento Valley, Inner Coast Range and Cascade Range Foothills. Elevations of legenere occurrences range from one to 880 meters (three to 2,887 feet) (CNPS 2010).

Sacramento County has the largest number of legenere occurrences with 23 of the 61 occurrences (38 percent) represented. Solano County has the second largest number with 12 occurrences (~20 percent), followed by Tehama County with five occurrences reported (~eight percent). The remaining 21 occurrences are found in Lake, Placer, Yuba, Sonoma, Alameda, Napa, Santa Clara, Shasta, San Mateo, San Joaquin and Stanislaus Counties which each have three or fewer occurrences (CDFG 2010).

Legenere's comparatively wide geographic and elevation distribution may partially reflect comparatively broad habitat requirements, or preference for a more commonly occurring vernal pool hydro-period. It may also reflect a higher propensity for seed dispersal by waterfowl, or even a different "biogeographic legacy" (e.g., timeline of evolution and geographic distribution of ancestral taxon).

LEG Central Valley Distribution

The Central Valley supports 52 (85 percent) of the 61 recorded legenere occurrences. The two southernmost occurrences, one of which is extirpated, are located in the Central Valley in northern San Joaquin County, approximately three miles southeast of the City of Galt. The next occurrence to the north is in southern Sacramento County, located approximately 7.5 miles away, just south of the Cosumnes River. An additional 22 occurrences are recorded from Sacramento County, these being widely distributed from near Interstate 5 near the western edge of the county, to the vicinity of Arkansas Creek along the eastern county line, to just northeast of Rio Linda, near the county's northern boundary (CDFG 2010).

Another population center, comprised of 12 clustered occurrences is located approximately 15 miles to the west in Solano County. A gap of approximately 12 miles exists between the northernmost Sacramento County occurrence and the two closely situated occurrences in Placer County. Another two occurrences are located approximately 19 miles further north of the Placer County occurrences in southwest Yuba County. A distance of approximately 70 miles

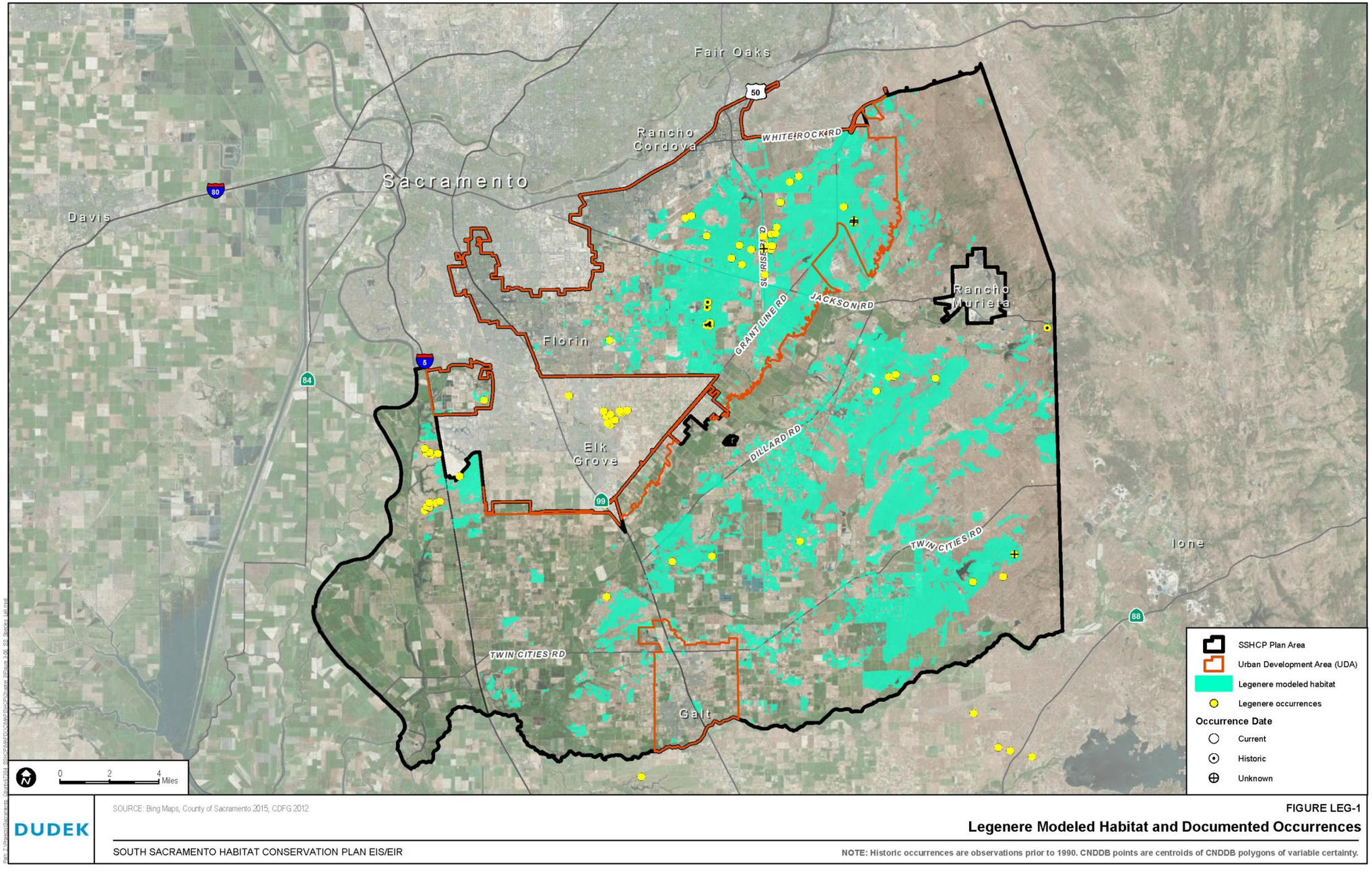
separates the southernmost of the two Tehama County occurrences from the Yuba County occurrences to the south. In Tehama County, the southern most of the two occurrences is located between Corning and Black Butte Lake in southern Tehama County, and the other is located approximately 15 miles to the northeast, west of the Sacramento River near Gerber. The northernmost Central Valley legenere population is comprised of a single occurrence southeast of Redding at the Stillwater Plains (CDFG 2010). Although suitable habitat exists in Butte County, legenere has not yet been encountered there.

LEG Distribution within the Planning Area

Of the 23 CNDDB legenere occurrences presently known in Sacramento County, 21 are located within the Planning Area (Figure LEG-1). The two outlying occurrences, one of which is extirpated, are located near the northern Sacramento County line, in the vicinity of Rio Linda (CNDDB occurrences #32 and #33). Of the 21 extant occurrences in the Planning Area, 15 are located within the UDA, and six are outside (CDFG 2010). One additional legenere occurrence not yet recorded in the CNDDB is located within the UDA (within the Sunrise-Douglas Mitigation Bank).

Within the UDA, the western-most CNDDB occurrence, located within the 2,465-acre Beach Lake Mitigation Site on the south side of Laguna Creek, is comprised of an unspecified number of vernal pools (CNDDB occurrence #41). Another occurrence is located approximately 3.5 miles to the east on private land, northeast of the intersection of State Highway 99 and Sheldon Road. This occurrence (CNDDB occurrence #31) is comprised of an unspecified number of occupied vernal pools as well (CNDDB 2010). A distance of less than two miles separates occurrence #31 from its nearest neighbor (CNDDB occurrence #27), located northwest of the intersection of Waterman and Bond Roads. Occurrence #27, comprised of five occupied natural pools and five occupied created pools, is located on private land (CDFG 2010). Another occurrence, supporting three colonies, is located on private land, approximately 0.75 miles to the east, northeast of the intersection of Waterman Road and Bond Road (CNDDB occurrence #30). Two occurrences, situated within 0.75 mile of each other, are located on the 320-acre Gene Andel Park, approximately five miles northeast of CNDDB occurrence #30. One of these (CNDDB occurrence #28) is comprised of four occupied vernal pools; the other (CNDDB occurrence #29), located approximately 1.3 miles to the north, is comprised of two colonies associated with vernally wet depressions along a seasonal drainage (CDFG 2010).

Figure LEG-1 Legenere Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2015, CDFG 2012

DUDEK

FIGURE LEG-1

Legenere Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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Four CNDDB occurrences are located three to four miles to the north of occurrence #29, in association with Mather Air Force Base (AFB); all are near the southern boundary, north of Kiefer Blvd. The westernmost of these occurrences (CNDDB occurrence #44), is comprised of four occupied vernal pools. The next occurrence to the southeast, located approximately one-mile distant within the 700-acre Mather Regional Park, is comprised of two occupied vernal pools (CNDDB occurrence #45). The two easternmost of the four Mather AFB occurrences, each support one occupied vernal pool (CNDDB occurrences #46 and #47) (CDFG 2010).

An additional occurrence, not yet registered in the CNDDB, is located east of Mather Field, northeast of the intersection of Sunrise Boulevard and Kiefer Boulevard. This occurrence, comprised of 12 occupied vernal pools, is included within the 400-acre Sunrise-Douglas Mitigation Bank (Sugnet and Associates 1998). Another occurrence, not yet registered in the CNDDB, is located within the UDA to the east (Cordova Hills Survey *date unknown*) and another occurrence is located outside the UDA in the southeastern portion of the Planning Area at Howard Ranch (TNC *date unknown*).

In Sacramento County, nine of the 23 legenere occurrences (39 percent) are associated with River Bank Formation. This Formation consists of alluvial deposits associated with the Sacramento, American and Cosumnes Rivers. Eight other legenere occurrences (40 percent) are associated with Redding and Red Bluff/Redding soils of the Laguna Formation. This geological landform is comprised of remnant old-terrace alluvial deposits of ancestral river channels and pediment gravels, which were deposited during the early Pleistocene, between 600,000 and 1,500,000 years ago. Laguna Formation and associated soils are strongly associated with the distribution of vernal pools. It is significant to note that owing to the diminutive size of the species, its ability to inter-mingle with more common species, and the area of unsurveyed or partially surveyed area of Riverbank and Laguna Formation, other occurrences are likely to be present in Sacramento County. In addition, well-developed vernal pools on landforms other than Riverbank and Laguna could provide suitable habitat. The modeled habitat of the species in the Planning Area is discussed in Section G-4 of this Appendix.

LEG Population Levels and Trends

Of the 61 documented CNDDB occurrences, six are now reported as “extirpated” (10 percent), including one occurrence in each of Sacramento County (CNNDB occurrence #32), Placer County (Occurrence CNDDB #14), and Sonoma County (occurrence #8). An occurrence on the San Joaquin and Stanislaus County line (CNDDB occurrence #4) is reported as extirpated, as well as two occurrences in Solano County (occurrence CNDDB #2 and #3). A single occurrence in Lake County (occurrence CNDDB #9) is reported as “possibly extirpated” (CDFG 2010).

Population trends are listed as unknown from all occurrences statewide, with the exception of one occurrence in Placer County (decreasing) and one occurrence in Lake County listed as possibly extirpated (CDFG 2010). Population trends for all extant legenere occurrences in Sacramento County are reported as unknown. In all but three cases, only one estimate for population numbers is recorded (Table G-3.4-2). Botanists making second visits to the other three sites did not observe any legenere plants during 1993 (CNNDB occurrence #5) and 1997 (CNNDB occurrences #46 and #47) (CDFG 2010).

Table G-3.4-2. Legenere Population Estimates for Sacramento County

CNDDB Occurrence #	Occurrence # of pools observed	Range of population estimates
5	Streambed	1976: Locally common 1983: none
12	Large vernal pool (> 1 Acre)	1983: 1000+
13	Vernal pool (~ 1000 sq. ft.)	1983: 100
21	Vernal pool Marsh	1991: >4100
22	Large vernal marsh	1991: 15
27	5 vernal pools and 5 created depressions	1991: 1000's
28	4 vernal pools	1988: <100
29	Ephemeral drainage	1988: <100
30	Seasonal wetland vernal pool	1991: 300+
31	Vernal pools	1993: 2500+
32	Artificial seasonal pond	1991: 150 1997: Site extirpated by subdivision
33	Seasonal wetland	1991: 1000-10,000 1997: none (too late for surveys?)
40	Vernal pool	1995: 50
41	Vernal pools	1995: 300
42	Vernal pools	1995: Unknown
44	4 vernal pools	1997: Several hundred
45	2 vernal pools	1997: Several hundred
46	1 deep vernal pool	1993: 1000 1997: none
47	1 vernal pool and swale	1993: 500 1997: none
50	Stock pond	2000: ?
60	Vernal pools	2002: thousands
62	Vernal pool	2002: ~1,000
63	Vernal pool	2003: 300-500

Source: CDFG 2010.

It should be noted that legenere is an inconspicuous and relatively ephemeral species that easily escapes the notice of botanists; it lacks showy flowers, and it most frequently grows

clambering and mixed with the stems of more common and superficially similar species. Given these considerations and the amount of unsurveyed or partially surveyed suitable habitat in the Planning Area, additional occurrences may have escaped notice during past surveys, and more populations likely remain to be discovered.

It is impossible to determine the number of historically occurring legenere populations lost or the acreage of suitable habitat lost to historic agricultural land-use conversions, since so much had happened before these species first received attention. Investigators have made estimates as to the acreage of vernal pool habitat lost since historic times (Holland 1978; Jones and Stokes 1990), however owing to habitat specificity (restriction to), only a subset of the vernal pool habitat lost within the natural range of the species likely provided suitable habitat for legenere.

There has been no comprehensive effort to monitor all populations of legenere. In summary, the following population estimates for the Sacramento County occurrences have been recorded (CDFG 2010). Observations, monitoring and research conducted on other rare vernal pool species indicate that abundance of individuals within populations may vary greatly between species, between populations within species, and within populations through years (Griggs and Jain 1983; Holland 1987; Alexander and Schlising 1997; CDFG 2010). For Orcuttiae grasses and other species, this extreme population variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as principally determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). Fluctuations of similar magnitude are also recorded for hairy Orcutt grass (*Orcuttia pilosa*), Hoover's spurge (*Chamaesyce hooveri*), and Greene's tuctoria (*Tuctoria greenei*) at the Vina Plains Preserve in Tehama County (Alexander and Schlising 1997).

Observations made over a decade or so may provide a reasonable indication of the short-term vigor of a given legenere population. It is important to consider however, that in order to assess the trend of the species, long-term monitoring of both habitat and populations conducted over multiple cycles of wet and dry years is needed. Another aspect of population demography is the quantity and age of stored seed in the soil profile. Undoubtedly, the number of stored seeds in the soil profile has bearing on how many plants can be produced in a given favorable year.

LEG Threats to the Species

Potential direct threats to legenere include loss of vernal pool habitat to agricultural or urban/industrial land-use conversions; construction and maintenance of firebreaks, roads, and utility corridors; inappropriate livestock grazing regimes (later spring/summer rotations); feral pigs, recreational target shooting, grassland fires; recreational vehicles; equestrian and pedestrian traffic; and refuse dumping (CDFG 2010).

Potential Indirect threats to legenere include hydrological alteration of sub-watersheds by surrounding developments and land uses; shifts in competitive interactions (hydrology-mediated or invasive weeds); windblown refuse accumulation; point and non-point source water pollution; air pollution, and global climate change.

LEG Data Gaps and Conservation Implications

With exception to observations of field workers (Holland 1983; Platenkamp 1998; Preston pers. comm.; CDFG 2010), legenere has received limited research attention. Detailed studies have not been conducted regarding the biology, ecology, potential for cross pollination, population genetics, habitat relationships, population dynamics, trends or threats associated with the species. Pertinent data gaps, implications for conservation, and operating assumptions include the following.

LEG Unknown Number of Undiscovered Populations

Additional unsurveyed and partially surveyed potentially suitable habitat exists within the Planning Area and elsewhere within the range of the species. In the Planning Area, discovery of new populations of legenere may occur on the large dry-land ranchlands, public quasi-public lands and vernal pool-grassland preserves already established in the eastern portion of the County.

LEG Unknown Relationship between Landform/Soil Chemistry and Bio-Geographic Distribution

In Sacramento County, legenere is associated primarily with the Riverbank and Laguna Formations, although it also occurs on Mehrten, Undifferentiated Surfucial Alluvial Deposits, and South Fork Gravels as well. Elsewhere within its range, legenere is associated with northern basalt flow, northern claypan, northern hardpan, northern volcanic ashflow, and northern volcanic mudflow vernal pool settings. Soil properties, including chemistry, likely vary substantially among these edaphic settings.

The exact nature of the relationship of Landform to species distribution is unknown. It is probable that functioning vernal pools with well-developed hydrology, regardless of landform, soil series and soil pH (except extremes) may provide suitable habitat for this species. In the Planning Area, vernal pools are most frequent and best developed on the Laguna Formation.

LEG Unknown Pollination Ecology

In general, plants with reduced flowers tend to be self-pollinators. In addition to plants producing flowers with no petals at all (Holland 1983; Mason 1957), Oswald (1994) mentions cleistogamous flowers present in northern California legenere populations. Pollination and

breeding studies have not been conducted, so the potential for outcrossing and potential pollinator relationships are unknown.

LEG What Constitutes Population Vigor, and How to Measure?

Population vigorand population dynamics, including year-to-year variability in abundance, has not been described in detail for any of the occurrences in Sacramento County, or elsewhere. The majority of CNDDB occurrences do not have population estimates recorded for single year observations. Where given, estimates range from 15 plants to 10,000 individuals, although most vernal pools are reported to support fewer than 1,000 individuals. At several sites, observations made over multiple years indicate that legenere populations can vary between years, with low numbers present during years with sub-optimal hydrology (CDFG 2010). Other rare vernal pool species have been shown to be variable in population abundance from year-to-year (Holland 1987; Griggs pers. comm. 2003), and causative factors contributing to year-to-year population fluctuations in rare species may be difficult to identify (Alexander and Schlising 1997).

Population vigor will be difficult to assess for this cryptic species, based on number of individuals present over short intervals of time. Trends occurring over longer periods may occur that are not discernable, and trends that are discerned may be unexplainable. These factors will complicate attempts to change management for benefit of the species if measured vigor shows decline.

LEG Specific Hydrological Requirements of Legenere

Numerical data do not exist regarding specific parameters of the annual hydrological cycle of vernal pools supporting legenere populations in the Planning Area (e.g., timing of rainfall, depth of ponding, duration of ponding and soil dry down rate).

The general lack of numerical hydrological data limits the ability to precisely monitor or assess hydrological suitability of legenere -vernal pool habitat within established preserves. Similarly, assessment of potentially suitable legenere habitat for preserve establishment or for detection of the species at this time must rely on generalities. Once preserves for existing legenere populations are established, assessed and monitored over time, a more quantifiable definition of suitable legenere-vernal pool hydrology will emerge based on the new information.

LEG Existing Hydrological Trend of Pools and Existing Indirect Effects

Extant legenere populations in the Planning Area may have already experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds (CDFG 2010). Without complete protection of entire vernal pool watersheds, or precise hydrological monitoring and accurate modeling on a pool complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown.

Existing legenere habitat conditions may not be pristine, so if trends in vigor or habitat quality become apparent during over time, it may be difficult to attribute trend to any specific management activity.

LEG Definition of Appropriate Hydrology Buffer

There is no standard for appropriate scale of effective hydrologic buffers for vernal pool-annual grassland ecosystems, since the nature of vernal pool complexes and their geo-hydrological relations are complex and may vary substantially by geography (Holland and Dains 1990).

Proposed preserve designs may not afford complete protection to the hydrological systems that support legenere and other species assemblages dependent on them.

LEG Definition of Appropriate Scale Legenere-Vernal Pool-Annual Grassland Preserve

There is no standard for appropriate scale of effective legenere-vernal pool preserves. It is a paradigm of conservation biology that "bigger is better" for a variety of well-documented reasons. Conservation challenges associated with the relatively small-scale vernal pool preserve that includes rare plant populations at Phoenix Field and Phoenix Park are well documented and reflect consequences of increase edge effect associated with smaller preserves (Clark et al. 1998).

LEG Determination of an Appropriate Livestock Grazing Regime

Livestock grazing will occur in at least some of the legenere-vernal pool preserves, primarily for upland annual grassland vegetation management. Specific grazing regimes have not been formulated for annual grassland pasture systems with legenere-occupied pools, although grazing and monitoring in similar systems have been addressed (Barry 1998; TNC 2000; Griggs 2002; Robins and Vollmar 2002). It is important to note that legenere does persist though, in historically and contemporary operating livestock ranches and United States Forest Service (USFS) and Bureau of Land Management (BLM) grazing allotments. At a minimum, compatibility with some level of grazing is evidenced by persistence of the species in these systems. Since legenere occupies medium to large-size vernal pools, management of Italian wild rye and Mediterranean barley around the margins of vernal pools, and Medusa-head grass in uplands should be monitored and managed, but not primarily for the needs of legenere specifically.

Specific livestock grazing regimes cannot be formulated until preserve size, configuration, and soil and vegetation conditions and vegetation management goals are determined.

LEG Interactions with Non-Native Weeds and Weed Management Activities

Non-native weeds, or weedy native species reported as occurring in vernal pools include western mannagrass and lippia. Others that may become problematic in the future include swamp pricklegrass, Bermuda grass, common spikerush, field bindweed, paradox canary grass, hairy hawkbit, cocklebur, and cattails. None of these species are reported to co-inhabit legenere-occupied vernal pools in Sacramento County. Any of these and others now unknown may appear and/or change in abundance in legenere -occupied pools over time. Italian wild rye and Mediterranean barley, two common non-native inhabitants of shallow vernal pools and vernal pool margins, might be of management concern to legenere if they are allowed to completely dominate the vernal pool margins and adjacent uplands. Potential competitive interactions with these species may affect the vigor of legenere populations. In addition, any eradication or control methods implemented for these species may in turn potentially affect legenere populations.

LEG Potential Association and Compatibility with Other Rare Vernal Pool Species

It is desirable to combine to design preserves for multi-species conservation. Within Sacramento County, legenere has been reported as sharing vernal pools and wetlands with other rare plant species, including slender Orcutt grass, Bogg's Lake hedge-hyssop, and Sanford's arrowhead. Many of these pool complexes supporting rare species also provide habitat for rare invertebrates, amphibians, mammals, and bird species as well.

Management for multiple species maximizes the effectiveness of habitat conservation and requires coordinated monitoring and actions. Management for the benefit of one species may conflict with management needs of other rare species. For instance, livestock grazing anytime between July 1st and April 1st may be compatible with or even benefit some legenere-associated pool complexes, but may be detrimental to ground-dwelling amphibians depending on those complexes (e.g., California tiger salamander).

LEG Genetic Considerations (Spatial and Temporal Variation, Seed Bank, Drift, Bottlenecks)

Population genetics for legenere are completely unknown. For an overview of genetic considerations of vernal pool plant species, see Elam (1998). Current limitations in our understanding of legenere population genetics have little immediate conservation implication, given the relatively few number of legenere occurrences in the Planning Area.

LEG Seed Longevity and Dynamics of Stored Soil Seed Bank

As previously mentioned, the existence and potential role of a dormant soil seed bank in population dynamics is indicated by the observation of multiple-year periods during which plants were absent, followed by reappearance during a following favorable hydrologic season. Beyond observations though, there have been no empirical studies addressing the presence of a soil seed bank, seed dormancy or longevity for legenere. From the perspective of conservation, knowledge of site-specific soil seed bank characteristics would allow more accurate assessment of population size and stability (vigor). This is particularly true of populations that typically support the fewest standing individuals through time.

LEG Inoculation

Since there are few populations of legenere in Sacramento County, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable pools and increasing the number of naturally self-sustaining populations. These additional populations would increase the likelihood of natural dispersal events into preserved but unoccupied legenere habitat, create meta-population structure at extant occurrences where single pools may support the species, and help ensure existence should any natural populations become compromised. Dispersal into, and colonization of re-established or established or enhanced seasonal wetlands and vernal pools, irrigation ditches, trenches next to railroad tracks has been documented (CDFG 2010). Legenere appears to be a self-compatible species, which is a pre-adaptation for colonization.

LEG Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide)

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter, ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to vernal pool vegetation. Assuming that extant legenere occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of legenere, if existing air quality can be maintained. If however, California's human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively affect legenere and other native plant species in the future.

LEG Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall

patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology.

It is likely that given the expected global climate trends, a vigor response of some kind could be expected for legenere populations within the study period of this EIS/EIR, or at some time beyond.

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PINCUSHION NAVARRETIA (PINA)

Pincushion Navarretia (PINA)

(Navarretia myersii)

Status USFWS: None

Status CDFW: None

Status CNPS: 1B.1

PINA Listing Status

Pincushion navarretia *(Navarretia myersii)* is considered to be rare, threatened or endangered throughout its range, thus qualifying its designation as a list 1B.1 species by the California Native Plant Society (CNPS 2010). I

t has been assigned an R-E-D Code of 3-3-3, meaning it is distributed in one to several highly restricted occurrences, endangered throughout its range, and entirely restricted to California.

Being a CNPS List 1B.1 plant species, pincushion navarretia meets the California Department of Fish and Wildlife's (CDFW's) definition of a special plant though it has no formal protection status by the California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS).

PINA Life History and Ecology

PINA Species Description and Life History

Pincushion navarretia, a strict vernal pool endemic, is an annual in the phlox family (Polemoniaceae). This distinctive species grows very low with aggregations attaining a mat-like

appearance. The typically low-growing stems can reach up to two centimeters in height. Long thread-like leaves reaching from four to eight centimeters in length radiate from the base of the inflorescence. The inflorescence is comprised of five to 60, long (1.2 to 2.1 centimeters), tubular, sessile (stalkless) white flowers (Day 1993). These sessile flowers, long flower tubes and low-growing stems are features that most readily distinguish pincushion navarretia from the co-occurring and much more common white-headed navarretia (*N. leucocephala* ssp. *leucocephala*).

Interestingly, pincushion navarretia specimens collected from the northern edge of its range (Sacramento and Amador Counties) possess slightly shorter flower tubes, and in Sacramento County, more lobing of the inflorescence bracts, than do specimens collected from the type locality in Merced County. Plants from these northern localities are considered to be morphologic and geographic intermediates between typical *N. myersii* ssp. *myersii* and the closely related and even more rare Small pincushion navarretia (*N. myersii* ssp. *deminuta* P.S Allen and Day), which only occurs in the Coast Ranges to the northeast (Day 1995).

Pincushion navarretia, and the genus in general, has received little attention from biologists or ecologists. Pincushion navarretia was included in an investigation of evolution of adaptive morphological and life history traits of vernal pool species, with the genus *Navarretia* used as a model (Spencer and Reiseberg 1998). Pincushion navarretia was determined to be one of the more highly adapted of the vernal pool specialists in the group. Other than this single study and basic taxonomic and biogeographic treatments, pincushion navarretia remains mostly unstudied.

Since all vernal pool plant species share similar environmental selective pressures, they likely also share similar adaptive traits. For this reason, studies addressing the life history and ecology of other more common vernal pool plant species may provide some insight into the life history and ecology of pincushion navarretia.

Pincushion navarretia shares the annual growth habit with the vast majority of other endemic vernal pool plants. This adaptive trait confers to populations avoidance of the regular and extreme seasonal drought that characterizes vernal pool habitat and the Mediterranean Climate (Griggs and Jain 1983; Holland 1987; Stone et al. 1988; Zedler 1990).

The specific timing of the germination of pincushion navarretia seeds relative to the timing of the vernal pool inundation cycle has not been studied or described. In general, a given vernal pool species may germinate either during the wetting phase or the inundation-phase of the vernal pool cycle (Keeley and Zedler 1998). Seeds of the more common and related white-headed navarettia germinate under water in pool basins or on saturated soil at pool margins in the late fall and winter months, after the soil profile is saturated and vernal pools have filled (Crampton 1959; Dittes pers. obs.).

Germination requirements and optima for pincushion navarretia have not been investigated. It has been shown however, that seeds readily germinate in the laboratory by cold-stratifying imbibed seeds at two to four degrees Celsius in the dark for two weeks and then subjecting them to a cycle of 16 hours of light at 21 degrees Celsius and eight hours of dark at 15 degrees Celsius (Spencer and Rieseberg 1998). Unlike Orcuttiae grasses, symbiosis with an aquatic fungus does not appear necessary to break seed dormancy in the lab. Seed dormancy and required environmental cues for in-situ germination may exist, but are presently unknown.

One of the challenges posed to vernal pool plants is the need to photosynthesize and grow while submersed, and then transition into a terrestrial growth phase. pincushion navarretia and some other vernal pool species exhibit a juvenile isoetid growth form defined by production of cylindrical, air-filled, erect/floating leaves while submersed. These leaves facilitate light exposure and gas exchange, thus lengthening the growing season by maximizing growth while vernal pools are still inundated. This juvenile morphology contrasts with that of "adult" plants, or those producing growth during the dry-down or terrestrial phase of the vernal pool cycle. In their study of adaptive traits of vernal pool navarretias, Spencer and Rieseberg (1998) found that pincushion navarretia was the only one possessing an "unambiguous" isoetid growth form. The others were found to exhibit an inducible isoetid growth form, likely indicating a less strict requirement for, or lower tolerance of more severe vernal pool inundation regimes.

Pincushion navarretia flowers and sets seeds during the terrestrial phase of the vernal pool hydrologic cycle, typically in May (CNPS 2010), although populations in eastern Merced County were fully flowering by April 15th (Dittes and Guardino 2001). The large flowers, long flower tubes, and exerted stamens and stigmas indicate an outcrossing breeding strategy, as do a high proportion of pollen grains per flower, a large pollen-ovule ratio, and a comparatively wide corolla limb (Spencer and Rieseberg 1998).

Considering the unusually long white flowers, a specific co-evolved insect pollinator of pincushion navarretia may exist, although this has not been investigated. The existence of pollinator guilds involving co-evolved native solitary bees has been reported as occurring with a variety of vernal pool plant species (Thorp 1990, 1996). Although pollinators of Navarretia have not been investigated specifically, native solitary bees have been frequently observed visiting the closely related White-Headed Navarretia (Dittes pers. obs.). Fecundity and variation in seed production have not been investigated in pincushion navarretia.

As with many other vernal pool species, seed dispersal is naturally limited, in the case of pincushion navarretia, by an indehiscent fruit capsule that is forced open only after the fiberous seed coats absorb water and expand (Spencer and Rieseberg 1998). Limited seed dispersal in vernal pool species is thought to represent an adaptation to spatially unpredictable and limited vernal pool habitat (Griggs 1974, 1980). Natural dispersal of seeds, however limited, likely

occurs via flowing water, transport on feet and feathers of waterfowl, and in mud on hooves and legs of livestock. As with all other vernal pool species, natural dispersal of seeds was likely a more frequent event when there were many more vernal pools, more pool interconnectivity, exceedingly larger waterfowl migrations and unfenced roaming ungulates (Griggs 1980).

The existence of a dormant soil seed bank is unknown for pincushion navarretia. The presence of a persistent soil seed bank provides insurance against localized extirpation resulting from the unpredictable occurrence and duration of appropriate growing conditions. If total seed crop failure occurs in a given year or set of years (failure to germinate, loss to late season flooding or fire, excessive grazing by livestock or grasshopper herbivory), additional stored seeds are available for another year's effort.

The population biology and genetics of pincushion navarretia have not been investigated, so intra- and inter-population patterns of genetic variability are unknown. Elam (1996) provides a good overview of the myriad considerations in assessing the population genetics of vernal pool plants in the absence of empirical data for a given taxon. Given the highly limited number of occurrences and the scattered geographical distribution, all intra-pool pincushion navarretia populations should be considered unique, and important genetic entities.

PINA Habitat Requirements and Ecology

It is generally held that many of the endemic vernal pool plant species are relatively recent evolutionary derivations of more common and widespread upland progenitors (Stebbins 1976; Stone 1990; Raven and Axlerod 1978; Thorne 1984), including pincushion navarretia (Spencer and Rieseberg 1998). These neoendemic vernal pool species are thought to have evolved from terrestrial habitat into seasonally aquatic vernal pool habitat made available as the Mediterranean Climate developed and the inland Tertiary-age Sea dried.

Most of the pincushion navarretia occurrences in eastern Merced County are associated with the ancient, weathered alluvial terraces comprising the Valley Springs and Ione Geologic Formations (Dittes and Guardino 2001). A small number of occurrences are also found in vernal pools on the North Merced Gravels Formation. In Sacramento County, pincushion navarretia is associated primarily with the Ione and Laguna Formations

Pincushion navarretia is a strict vernal pool endemic. It is of importance to conservation however, that in contrast to the "deeply-adapted" vernal pool grasses of the Orcuttiae Tribe, pincushion navarretia occupies more commonly occurring, smaller and/or shallower vernal pools with comparatively more "flashy" hydrology. In a survey involving 19 occupied vernal pools in eastern Merced County, pincushion navarretia was documented as occurring in small to medium size vernal pools that range from 16 to 283 square meters (0.004 to 0.07 acres) in

area and from 12.7 to 25.4 centimeters (five to 10 inches) in depth (Dittes and Guardino 2001). At the Phoenix Field Ecological Reserve in Sacramento County (CNDDB occurrence #3) pincushion navarretia is reported to inhabit the margins of "the more shallow, dry pools" in the complex (CDFG 2010). Vernal pool dimensions (or reference to size) are not given for any of the other CNDDB occurrences.

Floristic associations provide further indication of preference for less extreme (more typical) vernal pool hydrological cycles than the Orcuttiae grasses. In contrast to the latter, pincushion navarretia grows in the same hydro-topographical position as more commonly occurring vernal pool associates, while Common Spikerush (*Eleocharis macrostachya*, an indicator of longer duration inundation) is lacking. Pincushion navarretia grows mixed together with Fremont's goldfields (*Lasthenia fremontii*), wooly marbles (*Psilocarphus* spp.), annual hairgrass (*Deschampsia danthonoides*), stipitate popcorn-flower (*Plagiobothrys stipitatus*), double-horned downingia (*Downingia bicornuta*), bluestars (*Brodiaea minor*), toad rush (*Juncus bufomius*), capitate rush (*Juncus capitatus*), quillwort (*Isoetes howellii*), coyote thistle (*Eryngium* spp.), Sacramento Valley pogogyne (*Pogogyne zizyphoroides*), long-beaked stork's-bill (*Erodium botrys*), and succulent owl's clover (*Castilleja campestris* ssp. *succulenta*). Most of these species are commonly occurring vernal pool species that inhabit small to medium size vernal pools and swales, and the slopes and margins of larger or deeper pools that support Orcuttiae grasses and common spikerush.

Hydrological stresses associated with vernal pools exclude the majority of non-native weedy species that characterize the present-day valley annual grassland, agricultural fields, and ruderal habitats. Italian wild rye and Mediterranean barley, two non-native facultative wetland species, typically dominate disturbed wetlands and can be invasive in smaller, more ephemeral vernal pool types. Some suggest that built-up thatch from Italian wild rye, Mediterranean barley, Medusa-head grass, and other non-native upland species may indirectly affect vernal pool species as well by lessening the amount of water entering the system through surface and subsurface flow (Robins and Vollmar 2001).

Since pincushion navarretia occupies the smaller to medium size, "more typical" vernal pool types and the margins of larger and/or deeper pools, it may be more susceptible to the effects of excessive growth of Italian wild rye and Mediterranean barley and thatch buildup than the Orcuttiae grasses, or the more deeply-adapted legenere (*Legenere limosa*).

Although none are specifically reported to co-inhabit vernal pools with pincushion navarretia, several non-native weedy hydrophytes may present future problems. Mannagrass (*Glyceria declinata*), an aggressive weed of irrigated agriculture and degraded vernal pools, has already been reported as a potential problem at vernal pools in the region. Additional species to consider include rosy lippia (*Phyla nodiflora* var. *rosea*), field bindweed (*Convolvulus arvensis*),

common unicorn plant (*Probiscidea louisianica*), swamp pricklegrass (*Crypsis schoenoides*), crabgrass (*Cynodon dactylon*) and paradox canary grass (*Phalaris paradoxa*). Cocklebur (*Xanthium strumarium*), another native species, can also dominate vernal pools (Schlising pers. comm.; Unger pers. comm.).

Specific interactions between livestock grazing and pincushion navarretia are largely unknown. In general, appropriately timed dry-pasture livestock grazing regimes are thought to be compatible with the development and persistence of vernal pool vegetation. Robins and Vollmer (2001) provide a review of information pertaining to livestock grazing in vernal pool ecosystems.

All populations of pincushion navarretia located in eastern Merced County inhabit long-operating cattle ranches, so persistence indicates tolerance for at least some level of grazing. Observations made along fence-lines in the region indicate however, that sheep grazing may be responsible at least in part, for absence of pincushion navarretia and the co-occurring rare succulent owl's-clover in some areas (Dittes and Guardino 2001). Sheep exert a somewhat different selective pressure in vernal pools owing to very close cropping of vegetation and a tendancy to "nest" in pool basins during the terrestrial phase (Kelsey pers. comm.).

Timing of livestock grazing is likely more important than stocking rates in affecting persistence of pincushion navarretia. By limiting grazing to the period when pools are inundated and upland forage is still green and attractive, cattle tend to not congregate in pools and trampling and grazing pressures to vernal pool plant species in their seedling or juvenile aquatic phase are minimized. Once the upland forage cures and the vernal pools are in their flowering and seed-producing terrestrial phase, moist pools become more attractive to livestock and grazing and trampling pressures are increased. Grazing in the summer and fall months, after seeds have set and plants have died likely has little effect on pincushion navarretia.

Although responses to disturbance have not been described for pincushion navarretia, other pertinent examples exist. As an illustration of the role of timing in response of vernal pool species to potential disturbances, Hoover (1941) and Crampton (1959) have reported Orcuttieae grass populations being completely disked in dry-farmed grain fields in the late fall, without apparent detriment to the Orcuttieae populations the following growing season. It has been noted that the same disking performed during the late spring or summer growing periods may completely deplete the soil seed bank if performed over successive years (Stone et al. 1988). Similarly, a small vernal pool located in the middle of a winter-wheat field in eastern Merced County persists and continues to support the rare dwarf downingia (*Downingia pusilla*), despite annual disking and planting over decades (Kelsey pers. comm.; Dittes pers. obs.). It is very important to note that in these cases the disking is not disrupting the water-retaining capacity and hydrological cycle of the respective vernal pools. This is not always the case with disking.

PINA Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for pincushion navarretia are identified in Table G-3.5-1 and have been derived from input from local species experts.

Table G-3.5-1. Habitat Elements of Pincushion Navarretia

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

PINA Species Distribution and Population Trends

PINA Range Wide Distribution

Presently, pincushion navarretia is recorded from 14 CNDDB occurrences distributed along a narrow swath of the Great Central Valley, from Placer County in the north to Merced County in the south (CDFG 2010). These occurrences are all situated at sites ranging from 65 to 1,082 feet in elevation (CNPS 2010), and all lie within either the Sacramento Valley or San Joaquin Valley Subregions of the Great Valley Region of the California Floristic Province (Hickman 1993).

PINA Central Valley Distribution

The northernmost occurrence of pincushion navarretia is located near the City of Lincoln in Placer County. Six CNDDB occurrences are located in eastern Sacramento County, three in Amador County (one of these is shared with Sacramento County), one in Calaveras County, one in Placer County and four in Merced County (CDFG 2010).

PINA Distribution within the Planning Area

Currently, of the six documented CNDDB occurrences of pincushion navarretia recorded from Sacramento County, five are included within the Planning Area (CNDDB #7-10 and #16) (Figure PINA-1). These five are located outside of the UDA in the southeast corner of the County. Most of these occurrences are on the 13,000-acre Howard Ranch property. The Howard Ranch is managed by The Nature Conservancy (TNC) as part of the Cosumnes River Watershed Project. The remaining Sacramento County Occurrence (CNDDB occurrence #3) is located outside of the Planning Area, just north of the American River at the Phoenix Field Ecological Reserve.

It is important to note that owing to its small stature, preference for small to medium-sized vernal pools and the area of remaining unsurveyed or partially surveyed habitat, moderate to high potential exists for discovery of additional populations within the Planning Area.

Table G-3.5-2 shows the soil series, geological formation and landform associations for each known occurrence in Sacramento County. Generally, pincushion navarretia is associated with old terrace remnant alluvial deposits of ancestral river channels and pediment gravels, which were deposited during the early Pleistocene between 600,000 and 1,500,000 years ago (confirm). Though the distribution of the taxon is extremely disjunct, the modeled habitat of the taxon in the Planning Area is discussed in Section G-4 of this Appendix.

Table G-3.5-2. Extant CNDDB Occurrence Numbers, Distribution, Associated Soil Series and Landform Formations For Pincushion Navarretia In Eastern Sacramento County

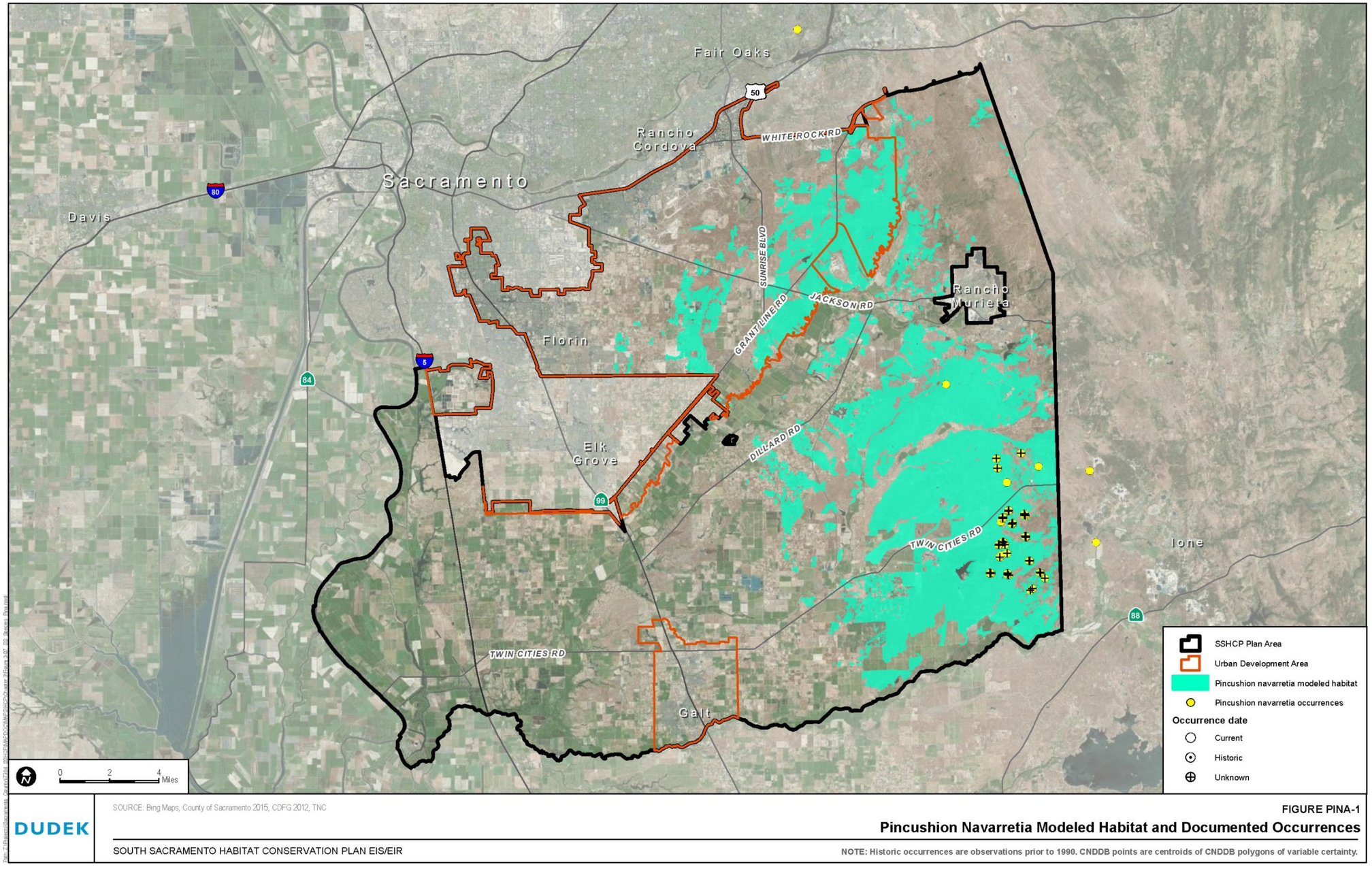
CNDDB Occurrence #	Quadrangle	Soil Series[a]	Geological Formation and Landform
3	Folsom	Red Bluff-Redding	Laguna Formation
7	Carbondale	Amador-Gillender	Valley Springs Formation
8	Carbondale	Amador-Gillender	Valley Springs Formation
9	Goose Creek	Corning	Laguna Formation
10	Goose Creek	Hadselville-Pentz	Modesto Formation

[a] Soil series information based on what USDA soil survey type occurs at the CNDDB species location (USDA 1993)

PINA Population Levels and Trends

Of the 15 documented occurrences presumed extant, one in Amador County (CNDDB occurrence #2) has not been observed since 1941; the Calaveras County population (CNDDB occurrence #13) has not been observed since 1957, and the Placer County population (CNDDB occurrence #12) has not been observed since 1971. The exact locations and status of these occurrences are unknown. The remaining 12 CNDDB occurrences presumed extant are also given a trend assessment of unknown (CDFG 2010).

Figure PINA-1 Pincushion Navarretia Modeled Habitat and Documented Occurrences



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It is impossible to determine the number of historically occurring pincushion navarretia populations or the acreage of suitable habitat lost to historic agricultural and urban land-use conversions, since so much had happened before these species first received attention. Investigators have made estimates as to the acreage of vernal pool habitat lost since historic times (Holland 1978); however, owing to habitat specificity, only a subset of the vernal pool habitat lost within the natural range of the species may have provided suitable habitat for pincushion navarretia. Effects of historic livestock grazing combined with drought and habitat alterations relating to development of non-native annual grassland are unknown as well.

There has been no comprehensive effort to monitor any of the known populations of pincushion navarretia. Numbers of individuals have not been recorded for any of the populations and year-to-year population dynamics are unknown (Table G-3.5-3).

Table G-3.5-3. Population Estimates of CNDDB Occurrences

CNDDB #	# of Pools Observed	Range of Population Estimates
3	Unknown	1994: 1000 plants
7	Unknown	2005: 1000's
8	Unknown	Unknown
9	Unknown	Unknown
10	Unknown	Unknown

Studies involving other vernal pool plant rarities, including Orcuttiae grasses and Hoover's Spurge have demonstrated marked fluctuation in numbers of individuals within populations between years (Griggs 1983; Holland 1987; Alexander and Schlising 1997). This extreme population variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as principally determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). It is not known however, if pincushion navarretia exhibits a similar between-year pattern.

Observations made over a decade or so may provide a reasonable indication of the short-term vigor of a given pincushion navarretia population. It is important to consider however, that in order to assess the trend of the species, long-term monitoring of both habitat and populations conducted over multiple cycles of wet and dry years is needed. Another critical aspect of population demography is the presence and nature of the soil seed bank, which is unknown for pincushion navarretia.

PINA Threats to the Species

Potential threats to pincushion navarretia include loss of vernal pool habitat to agricultural or urban/industrial land-use conversions, hydrological alteration of sub-watersheds and associated vernal pool habitat, shifts in competitive interactions (hydrological mediated or invasive weeds), inappropriate livestock grazing regimes (later spring/summer rotations, sheep vs. cattle), recreational vehicle use, equestrian and pedestrian traffic, refuse dumping, windblown refuse accumulation, air pollution and global climate change.

Irrigation runoff and invasive plants are listed as a threat at one occurrence (CNDDB occurrence #3) (CDFG 2010). Although no threats are listed for the remaining 12 occurrences, all are located on operating cattle ranches and are subject to potentially inappropriate livestock grazing regimes.

PINA Data Gaps and Conservation Implications

Despite its distinctive appearance and extreme rarity, pincushion navarretia has received little research attention from botanists or ecologists. Aside from general observations of field workers provided in the CNDDB and the study of vernal pool adaptive traits in the genus *Navarretia* (Spencer and Rieseberg 1998), nothing else exists regarding the biology, ecology, pollinators, breeding system, population genetics, habitat relationships, population levels, trends or threats associated with this taxon. Pertinent data gaps, implications for conservation, and operating assumptions include:

PINA Unknown Number of Undiscovered Populations

Additional unsurveyed and partially surveyed potentially suitable habitat exists within the Planning Area and elsewhere within the range of the species. In the Planning Area, discovery of new populations may occur on the large dry-land ranchlands, public quasi-public lands and vernal pool-grassland preserves already established in the eastern portion of the County.

PINA Unknown Relationship between Landform/Soil Chemistry and Bio-Geographic Distribution

Pincushion navarretia has a geographic association with old alluvial terraces possessing acidic soils primarily of the Ione, and to a lesser extent, Red Bluff Families (Arroyo Seco and Laguna Geological Formations). The exact nature of this relationship is however, unknown. It is unknown if soil pH or other edaphic factors influence pincushion navarretia distribution and population vigor. It is possible that the presence of functioning vernal pools, regardless of landform, soil series and soil pH can provide suitable habitat.

PINA Unknown Pollination Ecology

Pincushion navarretia possesses the longest flowers of any of the species in the genus. Floral morphology generally reflects breeding systems and pollinator relationships. It may be expected that the very long flower tubes select for a particular pollinator, perhaps even a specialized co-evolved species. Bumble-bee flies (family Bombylidae), butterflies, and moths all have feeding apparatus long enough to reach potential nectar rewards located at the base of the floral tube. Since the stigma and anthers are exerted though, it may also be possible that solitary bees, small beetles, or some insect with less specialized mouthparts collects the pollen from the exerted stamens for use and incidentally spreads it to the exerted stigmas of nearby flowers.

PINA What Constitutes Population Vigor, and How to Measure?

Population vigor and population dynamics, including year-to-year variability in abundance, have not been studied for pincushion navarretia. The existence of a dormant soil seed bank, a critical contributor to population stability in some other vernal pool species, is unknown for pincushion navarretia as well. Other rare vernal pool species have been shown to be highly variable in abundance from year-to-year (Holland 1987; Griggs pers. comm. 2003), and causative factors contributing to year-to-year population fluctuations may be difficult to identify (Alexander and Schlising 1997).

Trends may occur that are not discernable and trends that are discerned may be unexplainable. These factors will complicate attempts to change management for benefit of the species if measured vigor shows decline.

PINA Specific Hydrological Requirements of Pincushion Navarretia

Numerical data do not exist regarding specific parameters of the annual hydrological cycle of vernal pools supporting pincushion navarretia populations (e.g., timing of rainfall, depth of ponding, duration of ponding, and soil dry down rate).

The general lack of numerical hydrological data limits the ability to precisely monitor and/or assess hydrological suitability of pincushion navarretia -vernal pool habitat within established preserves. Similarly, assessment of potentially suitable pincushion navarretia habitat for preserve establishment or for detection of the species at this time must rely on generalities. Once preserves for existing pincushion navarretia populations are established, assessed and monitored over time, a more quantifiable definition of suitable pincushion navarretia -vernal pool hydrology will emerge based on the new information.

PINA Existing Hydrological Trend of Pools and Existing Indirect Effects

Extant pincushion navarretia populations may have already experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds (CDFG 2010). Without complete protection of entire vernal pool watersheds, or precise hydrological monitoring and accurate modeling on a pool complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown.

Existing pincushion navarretia conditions may not be pristine, so if trends in vigor or habitat quality become apparent over time, it may be difficult to attribute trend to any specific management activity.

PINA Definition of Appropriate Hydrology Buffer

There is no standard for appropriate scale of effective hydrologic buffers for vernal pool-annual grassland ecosystems, since the nature of vernal pool complexes and their geo-hydrological relations may vary substantially by geography (Holland and Dains 1990). Proposed preserve designs may not afford complete protection to the hydrological systems that support pincushion navarretia and other species assemblages dependent on them.

PINA Definition of Appropriate Scale pincushion navarretia -Vernal Pool-Annual Grassland Preserve

There is no standard for appropriate scale of effective pincushion navarretia -vernal pool preserves. It is a paradigm of conservation biology that “bigger is better” for a variety of well-documented reasons. Conservation challenges associated with the relatively small-scale vernal pool preserve that includes pincushion navarretia at Phoenix Field and Phoenix Park are well documented and reflect consequences of increase edge effect associated with smaller preserves (Clark et. al. 1998).

PINA Determination of an Appropriate Livestock Grazing Regime

Livestock grazing will occur in at least some of the pincushion navarretia -vernal pool preserves, for upland annual grassland vegetation management. Specific grazing regimes have not been formulated for annual grassland pasture systems with pincushion navarretia-occupied pools, although grazing and monitoring in similar systems have been addressed (Barry 1998; TNC 2000; Griggs 2002; Robins and Vollmar 2002). It is important to note that pincushion navarretia does persist though, in historically and contemporary operating livestock ranches. At a minimum, compatibility with some level of grazing is evidenced by persistence of the species in these systems. Since pincushion navarretia occupied small to medium size vernal pools,

management of Italian Rye and Mediterranean Barley around the margins of vernal pools, and Medusa-head grass in uplands should be of particular management concern.

Specific livestock grazing regimes cannot be formulated until preserve size, configuration, and soil and vegetation conditions and vegetation management goals are determined.

PINA Interactions with Non-Native Weeds and Weed Management Activities

Non-native weeds, or weedy native species reported as occurring in vernal pools include western mannagrass, swamp pricklegrass, Bermuda grass, common spikerush, field bindweed, lippia, paradox canary grass, hairy hawkbit, cocklebur and cattails. None of these are reported to coinhabit pincushion navarretia -occupied vernal pools in Sacramento County. Any of these and others now unknown may appear or change in abundance in pincushion navarretia -occupied pools over time. Italian wild rye and Mediterranean barley, two common non-native inhabitants of shallow vernal pools and vernal pool margins, might be of management concern to pincushion navarretia, owing to the latter's preference for small to medium size vernal pools.

Potential competitive interactions with these species may affect the vigor of pincushion navarretia populations. In addition, any eradication or control methods implemented for these species may in turn potentially affect pincushion navarretia populations.

PINA Potential Association and Compatibility with Other Rare Vernal Pool Species

It is desirable to combine design preserves for multi-species conservation. Suitability of pincushion navarretia habitat for supporting other rare plant species has not been specifically addressed, although natural populations of the rare Sacramento Orcutt grass (Orcuttia viscida), legenere (*Legenere limosa*), and succulent owl's-clover (*Castilleja campestris* ssp. *succulenta*) are documented as sharing vernal pools with it. Many of these pool complexes also may provide habitat for rare invertebrates, amphibians, mammals, and bird species as well. Management for multiple species maximizes the effectiveness of habitat conservation and requires coordinated monitoring and actions. Management for the benefit of one species may conflict with management needs of other rare species. For instance, livestock grazing anytime between November 1st and April 15th may be compatible with or even benefit some pincushion navarretia -associated pool complexes, but may be detrimental to ground-dwelling amphibians depending on those complexes (e.g., California tiger salamander).

PINA Genetic Variation (Spatial and Temporal [Seed Bank], Genetic Drift, Genetic Bottlenecks)

Population genetics for pincushion navarretia are completely unknown. Current limitations in our understanding of pincushion navarretia population genetics have little immediate conservation implication, given the extreme rarity of pincushion navarretia.

PINA Seed Longevity and Dynamics of Stored Soil Seed Bank

As previously mentioned, the existence and potential role of a dormant soil seed bank in population dynamics is completely unknown for pincushion navarretia. There have been no studies addressing the presence of a soil seed bank, seed dormancy or longevity. From the perspective of conservation, knowledge of site specific soil seed bank characteristics would allow more accurate assessment of population size and stability (vigor). This is particularly true of populations that typically support the fewest standing individuals through time.

PINA Inoculation

Since there are so few natural populations of pincushion navarretia in Sacramento County, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable pools and increasing the number of naturally self-sustaining populations. These additional populations would increase the likelihood of natural dispersal events into preserved but unoccupied pincushion navarretia habitat, create meta-population structure at extant occurrences where single pools may support the species, and ensure existence should any natural populations become compromised.

PINA Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide)

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter. ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to vernal pool vegetation. Assuming that extant pincushion navarretia occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of pincushion navarretia, if existing air quality can be maintained. If however, California's human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively affect pincushion navarretia and other native plant species.

PINA Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology. It is likely that given the expected global climate trends, a vigor response of some kind could be expected for pincushion navarretia populations within the study period of this EIS/EIR, or at some time beyond.

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SLENDER ORCUTT GRASS (SLOG)

Slender Orcutt Grass (SLOG)

(Orcuttia tenuis)

Status USFWS: Threatened

Status CDFW: Endangered

Status CNPS: List 1B.

Joe Molter, BLM

SLOG Listing Status

Slender Orcutt grass (*Orcuttia tenuis*) was first listed as state Endangered by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act in 1988 (Stone et al. 1988), and on March 26, 1997 the species received Listing as Threatened under the Federal Endangered Species Act by the United States Fish and Wildlife Service (USFWS) (USFWS 1997). The California Native Plant Society (CNPS) includes slender Orcutt grass as a CNPS List 1B.1 species and has assigned an R-E-D Code of 2-3-3, meaning it is distributed in a limited

number of occurrences, occasionally more if each occurrence is small, it is endangered throughout its range, and found only in California (CNPS 2010).

SLOG Life History and Ecology

SLOG Species Description and Life History

Slender Orcutt grass is a member of the distinctive *Orcuttieae* Tribe of the grass family (Poaceae), a group of nine vernal pool species endemic to California and northern Baja California. The Orcutt grasses have been long recognized by botanists as highly evolved, ecologically unusual and naturally restricted (Hoover 1941; Crampton 1959; Reeder 1965, 1980, 1982).

As with other members of the tribe, slender Orcutt grass is a relatively small-stature annual species. Its five to 15 centimeter-long, sparsely hairy-sticky stems are weakly tufted and mostly erect. Like the stems and inflorescences, the 1-2 mm wide, one to five centimeters-long leaves are sparsely hairy and covered with a sticky, highly aromatic exudate. Small scale-bracted flowers (florets) are arranged in erect, two-ranked, flattened spikelets that are usually separated from each other along the exserted terminal five to 10 centimeter-long spikes (Hickman 1993). Often, the flowering stems branch from the upper nodes, with each branch terminating in a single spike-like inflorescence (Stone et al. 1988).

Slender Orcutt grass is most readily distinguished from its closest relative hairy Orcutt grass (*O. pilosa*) on the basis of the stem branching mostly from the upper nodes, the spikelets being evenly spaced rather than congested along the inflorescence axis, and being only sparsely hairy (Reeder 1982; Hickman 1993). Other than the arrangement of spikelets, slender Orcutt grass is similar to hairy Orcutt grass with respect to floral characteristics. Both have similar-sized irregularly toothed glumes and equally five-toothed lemmas, also of similar size. Although morphologically similar, specific status of slender Orcutt grass is further substantiated by a chromosome number of 2n=26, versus 2n=30 for hairy Orcutt grass (Reeder 1982).

All Orcutt grasses are very highly evolved and uniquely adapted members of the endemic vernal pool flora. Their anatomy and physiology (Keeley 1981, 1990, 1998), morphology, and life history traits (Crampton 1959; Griggs 1974, 1976, 1980, 1981) are highly adapted to the stressful, more extreme portions of the vernal pool niche. Some adaptive traits (physiology, anatomy, morphological-distinct life history stages) confer ability of individuals to survive the varied stresses of a single hydrological season, while others (e.g., annual habit, precise germination cues, stored soil seed bank, indeterminate flowering, dispersal-limiting traits) confer population stability through time in the context of year-to-year hydrological uncertainties that characterize the Mediterranean climate (Griggs 1980; Stone et al. 1988).

Evolution of the annual growth habit is a key adaptation of slender Orcutt grass to vernal pool habitat, as is the case with almost all other vernal pool plants (Griggs and Jain 1983; Holland 1987). The annual growth habit allows populations to persist through the regular and extreme summer drought that is characteristic of California's vernal pool landscape (Stone et al. 1988).

Slender Orcutt grass seeds germinate during the fall or winter months, generally 2-4 weeks after standing water has been present in the vernal pool (Griggs 1980). Germination can continue after cessation of winter rains and as the shallow water at the pool margins begins to warm and recede (Griggs 1974; Holland 1987; Stone et al. 1988). A requirement of cold stratification followed by increasingly warm fluctuating diurnal temperatures and the presence of a symbiotic aquatic fungus (*Alternaria* sp., *Curvilaria* sp.) that has been determined necessary for Orcutt grass seed germination (Griggs 1980, 1981; Keeley 1988). Sensitivity to these environmental cues ensures germination only during years with hydrological conditions favorable for plants to complete their entire life cycle (Griggs 1980, 1981; Stone et al. 1988).

Slender Orcutt grass is thought to be one of the least specifically adapted of the genus with regard to hydrology and habitat breadth (Stone et al. 1988). It has been observed to be more likely than other Orcutt grasses to germinate during years of marginal precipitation, although seedling mortality can be high during such years (Griggs 1981).

Members of the genus *Orcuttia* develop long (approximately ten centimeters), thin (one to two millimeters-wide) juvenile leaves that float on the water surface when seeds germinate under shallow water or when seeds become submersed shortly after germination (Hoover 1941; Griggs 1974, 1980, 1981; Reeder 1982). By facilitating light exposure and atmospheric gas exchange for photosynthesis while submersed, these amphibious juvenile leaves maximize vegetative growth before vernal pool dry-down (Griggs 1981; Stone et al. 1988; Keeley 1990).

Orcutt grass plants are able to produce most of their aboveground vegetative growth, as well as flowers and seed as the vernal pools dry down in late spring and early to mid-summer (Crampton 1959). Vegetative and phenological demographics appear to be largely determined by pool dry-down rate (Griggs 1974, 1980; Stone et al. 1988). Thus, mature fruiting plants in drying soil above the waterline and submersed seedlings further toward the center can occur simultaneously in a single pool.

Indeterminate growth of new stems and spikelets provides for prolonged productivity as seasonally available water allows (Griggs 1974, 1980). This habit may result in smaller plants with fewer flowers and seeds maturing earlier in the season at the pool margins, and later maturing, larger, more fecund plants towards the pool center. This morphological and phenological plasticity confers an adaptive advantage in the context of extreme seasonal

fluctuations and the unpredictable year-to-year variability of the Mediterranean Climate (Griggs 1980; Griggs and Jain 1983; Stone et al. 1988).

Since Orcutt grasses mature in a terrestrial setting during the hotter, more xeric late spring and summer months, possession of the C_4 photosynthetic pathway and Krantz Anatomy (Griggs 1980; Keeley 1990, 1998) are important adaptive traits. This photosynthetic pathway allows plants to exchange atmospheric gasses with increased efficiency and concomitant reduction in water loss to evaporative transpiration. This permits the extended period of vegetative growth and reproduction of Orcutt grasses into the hot arid summer months after most other vernal pool associates have completely desiccated (Griggs 1980; Stone et al. 1988).

All Orcutt grasses possess an aromatic sticky glandular exudate on the stems, leaves and inflorescences. This trait is thought to be advantageous both as an anti-desiccation (Hoover 1941; Crampton 1959) and anti-herbivory adaptation (Griggs 1974, 1980). Grasshoppers can exert significant herbivory pressures late in the season although it has not been noted for slender Orcutt grass specifically.

Slender Orcutt grass plants flower and set seed as the margins and basin of the vernal pools dry from May through October (CNPS 2010). Detailed pollination and breeding experiments have not been conducted on this species. Like most other grasses, Orcutt grasses are thought to be primarily wind-pollinated out-breeders as indicated by protogynous floral maturation, strongly exserted anthers and measured patterns of genetic variation (Griggs 1980; Griggs and Jain 1983; Stone et al. 1988). In one instance, native solitary bees of the family Halictidae were observed collecting pollen from one of its relatives, slender Orcutt grass (Griggs 1974).

Seed production of Orcutt grass plants is known to vary greatly between individuals along moisture gradients within single pools, among populations between pools, and within pools between years (Griggs 1980; Griggs and Jain 1983). Fully mature slender Orcutt grass individuals can produce from 11 to over 164 seeds per plant, with an average of 58 seeds estimated. Seed set in Orcutt grasses appears uncertain and dependent on precise synchrony of appropriate environmental conditions and phenological development (Stone et al. 1988).

After the growing season, the mature slender Orcutt grass seeds are held tightly within maternal floral structures (lemma and pelea) on the inflorescence until the mechanical action of wind, heavy rain and winter inundation shatter the inflorescences and release the mature florets. This lack of dispersal is thought to be an adaptation to the sparsely scattered distribution of suitable large vernal pools (Griggs 1974, 1980). It is an advantage for a large proportion of the seed crop to remain within the available large-pool habitat, rather than chance loss to unsuitable uplands. Even though dispersal is naturally limited, Orcutt grass colonization of pools was probably a more frequently occurring event in the historic past when

there were likely more populations, many more pools, more pool interconnectivity, exceedingly larger waterfowl migrations, and unfenced roaming ungulates (Griggs 1980). Of the Genus *Orcuttia*, slender Orcutt grass exhibits the greatest propensity for colonizing newly available habitat, most likely the result of seed transport by livestock (Stone et al. 1988).

Not all *Orcuttia* seeds germinate every year, resulting in the buildup of a dormant soil seed bank (Griggs 1974, 1980, 1981). The soil seed bank is a critical adaptive barrier against local extinction events that could otherwise result from the unpredictable occurrence and duration of favorable growing conditions (Stone et al. 1988). In a study of five slender Orcutt grass populations, 14 seeds were found dormant in the soil for every 1 growing plant present (Griggs 1980; Griggs and Jain 1983). Between-population and between-year variation in soil seed bank density and the duration of seed viability in the soil is unknown. The soil seed bank also may contribute to overall genetic diversity of populations, as seeds stored over multiple years produced under varying growth conditions may harbor adaptive allelic combinations that are infrequently expressed or selected.

Studies of seed weight and allozyme electrophoresis indicate that Orcutt grasses possess low levels of gene flow between populations, and high levels of gene flow within (Griggs 1980, 1984; Griggs and Jain 1983). This is to be expected given the highly insular distribution and seasonally dynamic nature of vernal pool habitat (Stone et al, 1988). These studies also revealed very high levels of genetic diversity within the seed families of individual plants, with almost 50 percent of each species' genetic variation represented in samples from one plant. In addition, approximately 80 to 90 percent of the total genetic diversity of each species was represented in each population (Griggs 1980, 1984; Griggs and Jain 1983). It should be noted that this study was limited to assaying seven enzyme systems from two populations of slender Orcutt grass.

SLOG Habitat Requirements and Ecology

Like all grasses in the genus *Orcuttia*, slender Orcutt grass is strictly adapted to the vernal pool hydrological cycle. The tribe is thought to be a relatively ancient evolutionary group (Griggs 1981; Reeder 1982), descendant from a perennial ancestor related to the Chlorideae Tribe (Keeley 1998). The ancestral entity is thought to have inhabited the marshy margins of the Tertiary-age sea formerly covering the Great Central Valley (Axelrod 1973; Raven and Axelrod 1978). The evolving Orcuttieae lineage adapted to the increasing seasonal stresses as the Mediterranean climate developed and the inland water body receded.

Interestingly and of potential significance to conservation, slender Orcutt grass appears to be the least specific of the genus *Orcuttia* with regard to niche breadth and habitat specificity. This is indicated by occupation of a wider range of vernal pool sizes and vernal wetland types, occurrence over a greater geographical area and landform types, a larger number of occurrences,

and a marked tendency to colonize newly available habitats (where seed sources are available), including constructed stock-ponds and hydrology-enhanced vernal pools (Stone et al. 1988).

Over its geographic range, slender Orcutt grass is associated with a number of distinct physiographic/edaphic settings (Stone et al. 1988). In eastern Sacramento County (southernmost populations) and on the Stillwater and Millville Plains of Shasta County, slender Orcutt grass is associated with vernal pools located on ancient weathered alluvial terraces with soils of the Redding and related Series (Stone et al. 1988). Soils of the Redding series tend to be strongly acidic (indication of age and weathering) and are generally gravelly with cobble. These soils also typically possess a shallow, water-impermeable iron-silica hardpan that favors the development of vernal pools (SCS 1993). In Tehama County, slender Orcutt grass occurs in vernal pools associated with cemented hardpan of the Tuscan, Toomes and related Series, as well as in more shallow volcanic soils and in volcanic bedrock depressions (Stone et al. 1988; CDFG 2010). The montane Occurrences of Lassen and Shasta Counties are also associated with volcanic soils, but in addition to mudflow and bedrock substrates, wetlands formed on large clay flats also support the species.

Orcutt grasses are strongly adapted to the more extreme hydrological cycles encountered in the spectrum of vernal pool types, e.g., they are typically associated with larger or deeper vernal pools that tend to possess more extreme regimes of inundation (Crampton 1959; Griggs 1974). Of the members of the genus *Orcuttia*, slender Orcutt grass tends to occupy the widest range of vernal pool sizes and types (Stone et al. 1988). Vernal pools occupied by slender Orcutt grass documented prior to 1988 range in size from 840 square meters to 45 hectares at Boggs Lake, and among the 39 pools measured, the median pool size was found to be 6,500 square meters (Stone et al. 1988). Upslope watershed area (Area of Drainage) associated with occupied pools was reported by Stone et al. (1988) to range from 0.4 to 1,145 acres among the known occurrences. It should be noted that a number of occurrences have been discovered since 1988.

Vernal pool hydrology has not been precisely defined for any of the Orcutt grasses. In general, ponding must be of sufficient duration and under the appropriate seasonal temperature regime to release the seeds from dormancy through decomposition of maternal floral structures in the presence of a symbiotic aquatic fungus (Griggs 1980; Griggs and Jain 1983; Keeley 1988). The depth or duration of pool inundation are not only critical for germination, but are likely strong determinants excluding other less specialized, but obligate vernal pool species from the barren micro-sites located in the deeper parts of pools that are inhabited by Orcutt grass species.

Ponding cannot be so excessive though, as to foster the recruitment and proliferation of native perennial marsh species, in particular common spikerush (*Eleocharis macrostachya*) (Crampton 1959; Stone et al. 1988; CDFG 2010) and cattail (*Typha* spp.). Common spikerush, a potentially aggressive rhizomatous species, is usually only found in the deepest portions of the more well

developed natural vernal pools. In such cases where it co-occurs with slender Orcutt grass, the latter grows mostly in barren areas lacking the spikerush, or at topographical positions just above the spikerush zone (Stone et al. 1988). Prolonged duration of ponding resulting from placement of berms, construction of road surfaces, or other alterations in the vicinity of natural pools has been cited as potential impacts at a number of slender Orcutt grass occurrences (CDFG 2010).

In the Sacramento Valley, slender Orcutt grass occurs in pools with other vernal pool endemics, including stalked popcorn-flower (*Plagiobothrys stipitatus*), common spikerush, coyote thistle (*Eryngium castrense*), white-headed navarretia (*Navarretia leucocephala*), water shamrock (*Marsilea vestida*), dwarf wooly marbles (*Psilocarphus brevissimus*), downingia (*Downingia* spp.), California damasonium (*Damasonium californicum*), vernal pool foxtail (*Alopecurus saccatus*), annual hairgrass (*Deschampsia danthonioides*), doveweed (*Eremocarpus setigerus*), smooth spike-primrose (*Epilobium pygmaeum*), Fitch's spikeweed (*Hemizonia fitchii*), Fremont's Goldfields (*Lasthenia fremontii*), and rabbitsfoot grass (*Polypogon monspeliensis*) (Stone et al. 1988; CDFG 2010). Many of these other vernal pool species however, do not appear to tolerate the hydrologic extremes of prime Orcutt grass habitat. They complete their lifecycle earlier in the season, and are therefore confined to the shallower margins or slopes of the deeper pools that support Orcutt grasses (Crampton 1959; Stone et al. 1988).

Hydrological stresses associated with vernal pools, and Orcutt grass pools specifically, exclude the majority of non-native weedy species that characterize the present-day valley annual grassland, agricultural fields, and ruderal habitats. Italian rye grass (*Lolium multiflorum*) and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), are two non-native facultative wetland species that typically dominate disturbed wetlands and can be invasive in smaller, more ephemeral vernal pool types. They cannot however, tolerate the more extreme inundation regimes of deeper Orcutt pools. Thatch build-up from Italian rye grass, Mediterranean barley, medusa-head grass (*Taeniatherum caput-medusae*), and other non-native upland species may indirectly affect vernal pool species by lessening the amount of water entering the system through surface and subsurface flow (Robins and Vollmar 2002).

Although none are specifically reported to co-inhabit vernal pools with slender Orcutt grass "weedy species" are mentioned as a threat at several of the occurrences (CDFG 2010). Several non-native weedy hydrophytes may present future problems within the deeper portions of occupied Orcutt grass pools through competitive exclusion (as with common spikerush). Mannagrass (*Glyceria occidentalis*), an aggressive weed of irrigated agriculture and degraded vernal pools, has already been reported as a potential problem at several of the known related Sacramento Orcutt grass (*Orcuttia viscida*) populations. Additional species to consider include rosy lippia (*Phyla nodiflora* var. *rosea*), field bindweed (*Convolvulus arvensis*), common unicorn plant (*Probiscidea louisianica*), swamp pricklegrass (*Crypsis schoenoides*), Bermuda grass (*Cynodon dactylon*) and paradox canary grass (*Phalaris paradoxa*). Cocklebur (*Xanthium*

strumarium), another native species, can also dominate portions of Orcutt grass-type pools (Schlising, Unger pers. comm.).

Appropriately timed dry-pasture livestock grazing regimes are generally thought to be compatible with Orcutt grass populations, and may even enhance habitat in situations where Common Spikerush may otherwise predominate (Stone et al. 1988; CDFG 2010). By grazing from late fall, into early to mid-spring months, livestock are generally kept from the occupied portions of Orcutt grass pools by standing water, inundated soil and attraction to abundant green forage in the uplands. Most problems with livestock grazing arise from later spring and summer grazing regimes, when the Orcutt grass pools have dried and flowering and fruiting plants are exposed and vulnerable to trampling and cropping (Stone et al. 1988). In addition, during the later season when the upland forage has dried, the moist bottoms of vernal pools become highly attractive and may suffer increased trampling and hoof-pocking (Dittes pers. obs).

As an example of the role of timing in response to potential disturbances, Hoover (1941) and Crampton (1959) have reported Orcuttieae populations being completely disked in dry-farmed grain fields in the late fall, without apparent detriment to the Orcuttieae populations the following growing season. It has been noted that the same disking performed during the late spring or summer growing periods may completely deplete the soil seed bank and extirpate the population if performed over successive years (Stone et al. 1988).

SLOG Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Sacramento Orcutt grass are identified in Table G-3.6-1 and have been derived from the USFWS's list of primary constituent elements in the final rule designating critical habitat for the species (USFWS 2005) as well as input from local species experts.

Table G-3.6-1. Habitat Elements for Slender Orcutt Grass

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

SLOG Species Distribution and Population Trends

SLOG Species Distribution

Slender Orcutt grass is distributed in the Sacramento Valley from eastern Sacramento County in the south, to the vicinity of Redding in Shasta County to the north. The species also occupies the adjacent Cascade Range Foothills in the region north and northeast of Red Bluff, as well as sites in the Pit River Drainage, located northeast of the Sacramento Valley. Another concentration of occurrences is located in the montane region of northern Plumas, western Lassen and eastern Shasta Counties, extending from the vicinity of Lake Almanor, north to the plateau region east and northeast of Lassen Peak. Two disjunct populations, comprising the westernmost occurrences, are located in the Inner Coast Range region of Lake County. Slender Orcutt grass is among the most widespread of the Orcuttiae grasses and exhibits the widest range in elevations (85 to 5,760 feet).

Slender Orcutt grass occurrences are distributed among five of the Geographic Subregions of the California Floristic Province, as described by Hickman (1993); the Sacramento Valley (Sacramento, Butte and Tehama Counties), Inner Coastal Range (Lake County), Cascade Range Foothill (Tehama County), High Cascade Range (Tehama, Shasta, Siskiyou, Plumas and Lassen Counties), and the non-Warner Mountain Subregion of the Modoc Plateau Region (Modoc County) (CNPS 2010).

This comparatively wide distribution may partially reflect the previously mentioned observations of Stone et al. (1988) regarding its comparatively broad habitat requirements relative to some of the other Orcutt grasses (e.g., Sacramento Orcutt grass). It may also reflect a different propensity for seed dispersal by waterfowl, or perhaps even a different “biogeographic legacy” (e.g., timeline of evolution and geographic distribution of ancestral taxon).

SLOG Central Valley Distribution

In the Central Valley, slender Orcutt grass occurs among five population centers. The southernmost of these, comprising three CNNDB occurrences and one yet to be recorded occurrence, is located in eastern Sacramento County. The next population center, comprised of two occurrences, is located approximately 65 miles to the north in southern Butte County. The next population center to the north, comprised of 30 occurrences, is located in Tehama County (CDFG 2010).

A large portion of the extant slender Orcutt grass occurrences are distributed among the remaining two Central Valley population centers. The northernmost, extends from the Stillwater Plains near Redding, to the Millville Plains in the vicinity of Cottonwood and Anderson to the south. The remaining Central Valley population center is located at slightly higher

elevations in the Cascade Range Foothills of Tehama County, north and northeast of Red Bluff in the vicinity of Manton, Dales Lake, Dales, and Hog Lake Plateau.

SLOG Distribution within the Planning Area

Currently, there are three recorded CNDDB occurrences of slender Orcutt grass presently known within the Planning Area (Figure SLOG-1), and one occurrence that is not yet registered with the CNDDB (Witham pers. comm.). One of these (CNDDB occurrence #16) is situated on the alluvial terrace at the northern edge of Laguna Creek, southeast of the intersection of Gerber and Excelsior Roads. This occurrence, comprised of a single occupied natural vernal pool, is situated within a proposed 300-acre habitat preserve (Klotz Property). This occurrence is located within the Planning Area as well as within the Sacramento UDA. The second slender Orcutt grass occurrence within the Planning Area is located just south of the Klotz property and is also located on a property that is proposed for a preserve (occurrence #90).

The third slender Orcutt grass occurrence located within the Planning Area is situated on the terrace landscape to the east of Mather Field, between Douglas Road and Kiefer Boulevard (CNDDB occurrence #71). This occurrence, comprised of one occupied natural vernal pool, is also located within the UDA. This occurrence is not currently protected, but is proposed for inclusion within a 20-acre vernal pool mitigation preserve (Radmacher pers. comm., 2003)

A fourth occurrence not yet reported in the CNDDB is located at the Unico Radio Facility on the south side of White Rock Road. This occurrence is within the Planning Area as well as within the UDA (Radmacher pers. comm. 2003).

In Sacramento County, slender Orcutt grass is associated with the Laguna Formation. This geological landform is comprised of remnant old-terrace alluvial deposits of ancestral river channels and pediment gravels, which were deposited during the early Pleistocene, between 600,000 and 1,500,000 years ago. Though the distribution of the species is extremely disjunct, the modeled habitat of the species in the Planning Area is discussed in Section G-4 of this Appendix.

SLOG Population Levels and Trends

Alice Eastwood collected the type collection for slender Orcutt grass in Shasta County in 1912. Since then, a total of 90 occurrences have been recorded (CDFG 2010), including 31 in Tehama County, 24 in Shasta County, a shared occurrence in Shasta and Tehama counties, five in Lassen County, 18 in Modoc County, four in Plumas County, three in Sacramento County and two occurrences in each of Siskiyou, Butte, and Lake counties. It should be noted that an additional population not yet recorded in the CNDDB is known from Sacramento County (CDFG 2010).

Of the 90 documented CNDDB occurrences, one is possibly extirpated from Shasta County and the shared Shasta/Tehama County occurrence is possibly extirpated. In addition, downward population trends have been reported for six populations in Shasta County, two in Tehama County, and one in Plumas County. Of the 90 known occurrences, only two have been classified as "stable." The population trends for the remaining 79 occurrences are classified as "unknown." By 1991, the CDFG stated that the trend for slender Orcutt grass is one of decline (USFWS 1997).

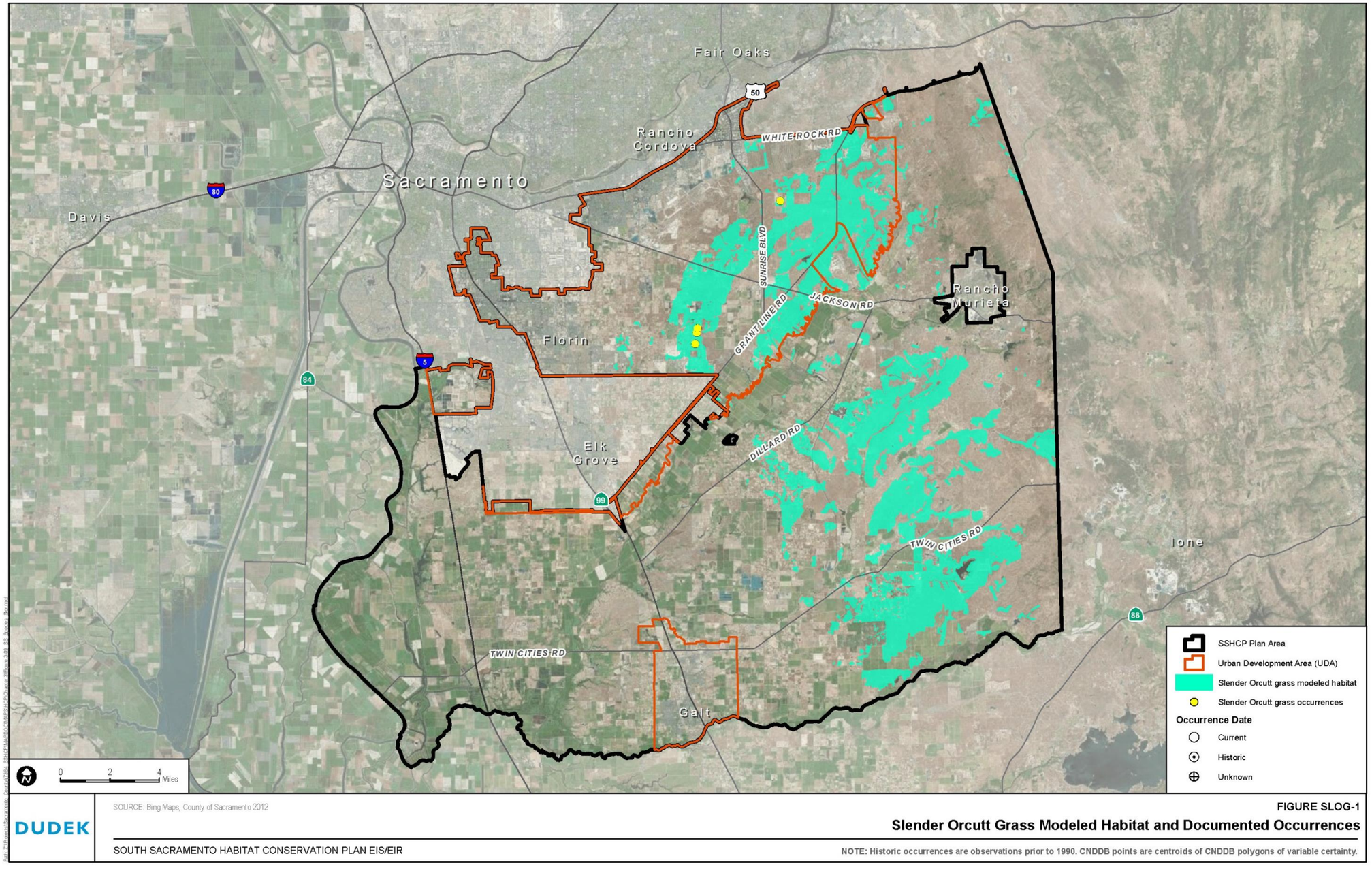
It is impossible to determine the number of historically occurring slender Orcutt grass populations or the acreage of suitable habitat lost to historic agricultural land-use conversions, since so much had happened before these species first received attention (Stone et al. 1988). Investigators have made estimates as to the acreage of vernal pool habitat lost since historic times (Holland 1978, Jones & Stokes 1990), however owing to habitat specificity (restriction to), only a subset of the vernal pool habitat lost within the natural range of the species likely provided suitable habitat for slender Orcutt grass (Stone et al. 1988). Concerns over loss of Orcutt grass populations and habitat were expressed beginning with some of the earliest investigators (Hoover 1941; Crampton 1959, 1976; Griggs 1974).

There has been no comprehensive effort to monitor all populations of slender Orcutt grass. Various monitoring projects have been conducted by BLM, USFS, and CDFW. Stone et al. (1988) also provided estimates of populations at all Occurrences visited in 1986 and 1987.

Research conducted at other sites and on other Orcuttiae species indicate that abundance of individuals within Orcutt grass populations varies greatly between species, between populations within species, and within populations through years (Griggs and Jain 1983). This extreme population variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as principally determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). Fluctuations of similar magnitude are also recorded for hairy Orcutt grass (*Orcuttia pilosa*), slender Orcutt grass (*Orcuttia tenuis*), and Greene's tuctoria (*Tuctoria greenei*) at the Vina Plains Preserve in Tehama County (Alexander and Schlising 1997).

Observations made over a decade or so may provide a reasonable indication of the short-term vigor of a given Orcutt grass population. It is important to consider however, that in order to assess the trend of the species, long-term monitoring of both habitat and populations conducted over multiple cycles of wet and dry years is needed. Another aspect of population demography is the quantity and age of stored seed in the soil profile. Undoubtedly, the number of stored seeds in the soil profile has bearing on how many plants can be produced in a given favorable year.

Figure SLOG-1 Slender Orcutt Grass Modeled Habitat and Documented Occurrences



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SLOG Threats to the Species

Potential direct threats to slender Orcutt grass include loss of vernal pool habitat to agricultural or urban/industrial land-use conversions, construction and maintenance of firebreaks, roads, and utility corridors, timber harvest activities (in montane occurrences), inappropriate livestock grazing regimes (later spring/summer rotations), grassland fires, recreational vehicles, equestrian and pedestrian traffic, and refuse dumping.

Potential Indirect threats to slender Orcutt grass include hydrological alteration of sub-watersheds by surrounding developments and land uses, shifts in competitive interactions (hydrology-mediated or invasive weeds), windblown refuse accumulation, point and non-point source water pollution, air pollution, and global climate change.

The proposed Klotz Preserve encompasses approximately 300 acres of vernal pool habitat supporting one CNDDB Occurrence of slender Orcutt grass (CNDDB Occurrence #16). The proposed Were preserve encompasses approximately 160 acres of vernal pool habitat supporting one CNDDB Occurrence of slender Orcutt grass (CNDDB Occurrence #90) The other Sacramento County CNDDB Occurrence (CNDDB Occurrence #71) is currently unprotected, but is planned for inclusion within a proposed 20-acre vernal pool preserve. The fourth slender Orcutt grass occurrence known in Sacramento County, located at the Unica Radio Facility Site, is currently unprotected.

The USFWS has designated critical habitat areas for slender Orcutt grass that encompasses all of the known occurrences and a large portion of the remaining potentially suitable habitat.

SLOG Data Gaps and Conservation Implications

Grasses of the Tribe Orcuttieae, including slender Orcutt grass, are among the most studied and best known of all vernal pool plant species and vernal pool species assemblages. As previously discussed, researchers have variously addressed taxonomy and biogeography, biology, ecology, breeding system, population genetics, habitat relationships, population levels, trends and threats. Even with the attention of researchers and relatively extensive body of information, data gaps with varying implications for conservation remain including:

SLOG What Constitutes Population Vigor, and How to Measure?

A good measure of Orcutt grass population vigor is difficult to define, given the highly variable year-to-year abundance within populations (Holland 1987; Griggs pers. comm. 2003). The contribution of the stored soil seed bank to population numbers and population genetic diversity is an important, but currently unknown factor as well. Furthermore, even if a trend at

the population level is discerned, causative factors contributing to year-to-year population fluctuations may be very difficult to identify (Alexander and Schlising 1997).

Trends may occur that are not discernable and trends that are discerned may be unexplainable. These factors will complicate attempts to change management for benefit of the species if measured vigor shows decline.

SLOG Specific Hydrological Requirements of Slender Orcutt Grass

Numerical data do not exist regarding specific parameters of the annual hydrological cycle of vernal pools supporting slender Orcutt grass populations (e.g., timing of rainfall, depth of ponding, duration of ponding and soil dry down rate). At the same time, It is also important to note that slender Orcutt grass is cited as one of the more broadly adapted species of the genus, inhabiting a wider array of vernal pool sizes and types, and one of the most likely to germinate during years with marginal precipitation (Holland 1987; Griggs pers. comm.).

The general lack of numerical hydrological data limits the ability to precisely monitor or assess hydrological suitability of slender Orcutt grass-vernal pool habitat within established preserves. Similarly, assessment of potentially suitable slender Orcutt grass habitat for preserve establishment or for detection of the species at this time must rely on generalities. Once preserves for existing slender Orcutt grass populations are established, assessed and monitored over time, a more quantifiable definition of suitable slender Orcutt grass-vernal pool hydrology may be developed.

SLOG Existing Hydrological Trend of Pools and Existing Indirect Effects

Several slender Orcutt grass populations throughout the state have already experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds (CDFG 2010). Without complete protection of entire vernal pool watersheds, or precise hydrological monitoring and accurate modeling on a pool complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown.

Existing slender Orcutt grass conditions are not pristine, so if trends in vigor or habitat quality become apparent over time, it may be difficult to attribute trend to any specific management activity.

SLOG Definition of Appropriate Hydrology Buffer

There is no standard for appropriate scale of effective hydrologic buffers for vernal pool-annual grassland ecosystems, since the nature of vernal pool complexes and their geo-hydrological relations may vary substantially by geography (Holland and Dains 1990). The geo-hydrologic investigation of Hanes and Stromberg (1998), conducted at a single site over three years in

eastern Sacramento County, addresses aspects of vernal pool hydrology that are important to consider in formulation of hydrological buffers (e.g., relationship between pool basin hydrology and surrounding upland soil profile).

Proposed preserve designs may not afford complete protection to the hydrological systems that support slender Orcutt grass and other species assemblages dependent on them without more information on appropriate scale hydrologic buffers.

SLOG Definition of Appropriate Scale Slender Orcutt Grass-Vernal Pool-Annual Grassland Preserve

There is no standard for appropriate scale of effective slender Orcutt grass-vernal pool preserves. It is a paradigm of conservation biology that "bigger is better" for a variety of well-documented reasons. Conservation challenges associated with the relatively small-scale Sacramento Orcutt grass pool preserve at Phoenix Field and Phoenix Park are well documented and reflect consequences of increase edge effect associated with smaller preserves (Clark et al. 1998).

Proposed preserve designs may not afford complete protection to the ecosystems that slender Orcutt grass and other species assemblages depend on without more information on appropriate scale of preserve area.

SLOG Determination of an Appropriate Livestock Grazing Regime

Livestock grazing will occur in at least some of the slender Orcutt grass-vernal pool preserves, primarily for upland annual grassland vegetation management. Specific grazing regimes have not been formulated for annual grassland pasture systems with slender Orcutt grass-occupied pools, although grazing and monitoring in similar systems have been addressed (Barry 1998, TNC 2000; Griggs 2002; Robins and Vollmar 2002; Burmester pers. comm.). It is important to note that slender Orcutt grass and other members of the Orcuttiae tribe do persist though, in historically and contemporary operating livestock ranches. At a minimum, compatibility with some level of grazing is evidenced by persistence of the species in these systems.

. Specific livestock grazing regimes cannot be formulated until preserve size, configuration, and soil and vegetation conditions and vegetation management goals are determined.

With regard to compatible grazing regimes, timing of grazing appears far more important than stocking rate, grazing intensity, or duration of rotation in annual grassland pasture systems that support Orcutt grass-occupied vernal pools (Stone et al. 1988; Griggs 2000; Griggs pers. comm.). During the inundated period of the vernal pool cycle (generally late fall through mid-to late spring), germinating seed and establishing aquatic-phase seedlings are afforded protection from trampling and grazing by a general aversion of cattle to standing water, as well as

attractive forage in uplands. Even if some cattle congregate at the edge or meander into or across the pools while inundated, germinating seeds in the deeper portions of the pools are unaffected, the vast majority of the pool substrate escapes trampling and nothing is eaten.

Conversely, grazing during the dry-down period or terrestrial phase, when plants are flowering and setting seed can be detrimental to the season's flowering effort and seed crop (generally mid-to late spring through the summer and early fall months). Given multiple years of improperly timed grazing and seed loss (both from standing crop and exhaustion of soil seed bank), populations may decline in vigor and may even be extirpated.

SLOG Interactions with Non-Native Weeds and Weed Management Activities

Non-native weeds, or weedy native species reported as occurring in Orcuttiae-occupied vernal pools include western mannagrass, swamp pricklegrass, Bermuda grass, common spikerush, field bindweed, Lippia (*Phyla nodiflora*), paradox canary grass, cocklebur, and cattails. Of these, common spikerush presently co-inhabit slender Orcutt grass-occupied vernal pools in Sacramento County. Any of these and others now unknown may appear or change in abundance in slender Orcutt grass-occupied pools over time.

Potential competitive interactions with these species may affect the vigor of slender Orcutt grass populations. In addition, any eradication or control methods implemented for these species may in turn potentially affect slender Orcutt grass populations.

SLOG Unknown Relationship Between Landform/Soil Chemistry And Bio-Geographic Distribution

In Sacramento County, slender Orcutt grass has a geographic association with old alluvial terraces possessing soils primarily of the Redding Family (Laguna Geological Formation). Occurrences in Tehama, Lassen and Modoc Counties are associated with other landforms and soils as well. The exact nature of this relationship to landform and soil is however, unknown. Given the relatively wide distribution of this species though, it is unlikely that soil pH or other parameter of soil chemistry strongly influences slender Orcutt grass distribution and population vigor. It is more likely that large or deep vernal pools, regardless of landform, soil series and soil pH may provide suitable habitat.

From the perspective of slender Orcutt grass conservation, this uncertainty has bearing on the definition of potentially suitable habitat, which guides surveys and establishment of habitat preserves.

SLOG Potential Association and Compatibility with Other Rare Vernal Pool Species

It is desirable to design preserves for multi-species conservation. Suitability of slender Orcutt grass habitat for supporting other rare plant species has not been specifically addressed, although natural populations of the rare pincushion navarretia (*Navarretia myersii* ssp. *myersii*), Bogg's Lake hedge-hyssop (*Gratiola heterosepala*), and legenere (*Legenere limosa*) are documented as sharing specific vernal pools with slender Orcutt grass. Many of these pool complexes also may provide habitat for rare invertebrates, amphibians, mammals and bird species as well.

Management for the benefit of one species may conflict with management needs of other rare species. For instance, livestock grazing anytime between November 1st and May 1st may benefit slender Orcutt grass-associated pool complexes, but may be detrimental to ground-dwelling amphibians depending on those complexes (e.g., California tiger salamander).

SLOG Genetic Considerations (Spatial and Temporal Variation, Seed Bank, Drift, Bottlenecks)

It has been determined that *Orcuttia* populations are genetically isolated as well as diverse, the latter both within and between pools (populations), and within the "seed family" of a single reproductive plant. In addition, there is a high degree of localized adaptation and strong intra-pool selective pressures (Griggs 1980; Griggs and Jain 1983). However, investigations of slender Orcutt grass population genetics have been limited to measures of seed size and weight (genetically fixed traits) within and among populations, and electrophoretic study of seven enzyme systems in only two populations. These analyses represent a very small portion of the genome and allow limited interpretation of patterns of genetic diversity and limited inference as to uniqueness of a given population. Another potentially important consideration is that there has been no assessment of the "genetic memory" potentially associated with stored seeds in the soil seed bank. Elam (1996) provides a good overview of the myriad considerations in assessing the population genetics of vernal pool plants in the absence of empirical data for a given taxon.

SLOG Seed Longevity and Dynamics of Stored Soil Seed Bank

As previously mentioned, it appears that slender Orcutt grass populations depend on a substantial reserve of dormant seed stored in the soil as a buffer against single year and multiple-year cycles of unfavorable hydrological conditions. This population parameter has only been measured in a few pools during one growing season (Griggs 1980). There have been no other studies addressing spatial or temporal variability of seed abundance in the soil seed bank or longevity of dormant seeds.

From the perspective of conservation, knowledge of site-specific soil seed bank characteristics would allow more accurate assessment of population size and stability (vigor). This is particularly true of populations that typically support the fewest standing individuals through time.

SLOG Inoculation

Since there are so few natural populations of slender Orcutt grass in Sacramento County, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable pools and increasing the number of naturally self-sustaining populations. These additional populations would increase the likelihood of natural dispersal events into preserved but unoccupied slender Orcutt grass habitat, create meta-population structure at extant occurrences where single pools now support the species, and ensure existence should any natural populations become compromised.

In addition to complete protection and enhancement of natural populations, it has been suggested that experimental inoculations may be desirable for Orcuttieae conservation (Griggs and Jain 1983; Griggs pers. comm.). The experimental establishment of a Sacramento Orcutt grass population at Phoenix Field (CNDDB occurrence #15), now 25 years-old, provides some indication of the probable success of inoculating suitable habitat and creating self-sustaining populations. However, not all experimental inoculations attempted during the research of Griggs were “successful.” (Griggs pers. comm.). Inoculations of slender Orcutt grass planted in Tehama County into re-established or established pools have had marginal success due to excessive ponding and competitive exclusion from Cattails. These Occurrences (CNDDB Occurrence # 72, #73 and #74) are rank as “poor” and the current population trends are “unknown.” The population genetics and long-term viability of artificially inoculated population for Orcutt grasses are unknown.

SLOG Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide)

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter, ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to vernal pool vegetation. Assuming that extant slender Orcutt grass occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of slender Orcutt grass, if existing air quality can be maintained. If however, California’s human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively affect slender Orcutt grass and other native plant species.

If air pollution becomes such a problem that slender Orcutt grass is affected, few management options will exist to change conditions for this species.

SLOG Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology.

It is likely that given the expected global climate trends, a vigor response of some kind could be expected for slender Orcutt grass populations within the EIS/EIR Study Period, or at some time beyond.

SLOG Unknown Number of Undiscovered Populations

Additional unsurveyed potentially suitable habitat exists within the Planning Area, principally on the larger private dry-land ranches that harbor well-developed vernal pools and vernal pool complexes. Authorities generally consider slender Orcutt grass as one of the more completely understood species with regard to distribution and frequency (Stone, Taylor, Macdonald, Griggs, 2002 pers. comm.), owing primarily to typical association with only the best developed of vernal pools and seemingly natural restricted range; however, it is also acknowledged that a limited number of additional populations could be yet discovered as the remaining large tracts become surveyed.

It is very unlikely however, that enough populations remain to be discovered to justify a future change in the conservation status of slender Orcutt grass (Stone, Taylor, Witham, Griggs pers. comm.).

It is assumed that most, but perhaps not all extant populations of slender Orcutt grass are already known. It is further assumed that since there are so few natural populations and the probability of finding a substantial number more is low, that all populations yet discovered are of great conservation importance and should receive the same protection and management.

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SACRAMENTO ORCUTT GRASS (SAOG)

Sacramento Orcutt Grass (SAOG)

(Orcuttia tenuis)

Status USFWS: Endangered

Status CDFW: Endangered

Status CNPS: 1B.1

SAOG Listing Status

Sacramento Orcutt grass (*Orcuttia viscida*), also commonly called sticky Orcutt grass, was first listed as state Endangered by the California Department of Fish and Wildlife (CDFW) under the California Endangered Species Act in 1988 (Stone et al. 1988), and on March 26, 1997 the species received listing by the United States Fish and Wildlife Service (USFWS) as Endangered under the Federal Endangered Species Act (USFWS 1997). The California Native Plant Society

(CNPS) includes Sacramento Orcutt grass as a CNPS List 1B.1 species and has assigned an R-E-D Code of 3-3-3, meaning it is distributed in several highly restricted occurrences, or present in such small numbers that it is seldom found and reported, it is endangered throughout its range, and found only in California (CNPS 2010).

SAOG Life History and Ecology

SAOG Species Description and Life History

Sacramento Orcutt grass is a member of the distinctive Orcuttieae Tribe of the grass family (Poaceae), a group of nine vernal pool species endemic to California and northern Baja California. The Orcutt grasses have been long recognized by botanists as highly evolved, ecologically unusual and naturally restricted (Hoover 1941; Crampton 1959; Reeder 1965, 1980, 1982).

As with other members of the tribe, Sacramento Orcutt grass is a relatively small-stature annual species. Its three to 10 centimeter-long, densely hairy-sticky stems are tufted and mostly erect to spreading with age. Like the stems and inflorescences, the two to four millimeter-wide leaves are also hairy and densely covered with a sticky, highly aromatic exudate. Small scale-bracted flowers (florets) are arranged in dense two-ranked, flattened spikelets that are more or less overlapping and clustered together into exserted terminal three to five centimeter-long spikes (Hickman 1993).

Sacramento Orcutt grass is most readily distinguished from its closest relatives California Orcutt grass (*O. californica)* and San Joaquin Valley Orcutt grass (*O. inaequalis*) on the basis of having five unequal lemma lobes with the central lobe being the longest, the large lemma size (six to seven millimeter), lemma awn length (greater than one millimeter), and comparatively long fruit ($\pm$ 2.5 millimeter) (Hickman 1993). These morphological characters were first used to circumscribe the taxon as *O. californica* var. *viscida* (Hoover 1941). Subsequent study of morphology, chromosome number, and seed protein composition justified elevation of both varieties *O. tenuis* and *O*. *inaequalis* to specific rank (Reeder 1980, 1982).

All Orcutt grasses are very highly evolved and uniquely adapted members of the endemic vernal pool flora. Their anatomy and physiology (Keeley 1981, 1990, 1998), morphology, and life history traits (Crampton 1959; Griggs 1974, 1980, 1981) are highly adapted to the stressful, more extreme portions of the vernal pool niche. Some adaptive traits (physiology, anatomy, morphological-distinct life history stages) confer ability of individuals to survive the varied stresses of a single hydrological season, while others (e.g., annual habit, precise germination cues, stored soil seed bank, indeterminate flowering, dispersal-limiting traits) confer population stability through time in the context of year-to-year hydrological uncertainties that characterize the prevailing Mediterranean Climate (Griggs 1980; Stone et al. 1988).

Evolution of the annual growth habit is a key adaptation of Sacramento Orcutt grass to vernal pool habitat, as is the case with almost all other vernal pool plants (Griggs and Jain 1983; Holland 1987). The annual growth habit allows populations to persist through the regular and extreme summer drought that is characteristic of California's vernal pool landscape (Stone et al. 1988).

Sacramento Orcutt grass seeds germinate during the later spring months after cessation of winter rains and as the shallow water at the pool margins begins to warm and recede (Griggs 1974; Holland 1987; Stone et al. 1988). A requirement of cold stratification followed by increasingly warm fluctuating diurnal temperatures and the presence of a symbiotic aquatic fungus that has been determined necessary for Orcutt grass seed germination (Griggs 1980, 1981; Keeley 1988). Sensitivity to these environmental cues ensures germination only during years with hydrological conditions favorable for plants to complete their entire life cycle (Griggs 1980, 1981; Stone et al. 1988).

Sacramento Orcutt grass is thought to be the most specifically adapted of the genus with regard to suitable hydrology (Stone et al. 1988). It has been observed to be the least likely to germinate during years of marginal precipitation (Holland 1987). During a 14 year-long observation period at one population (CNDDB Occurrence #15), it was determined that Sacramento Orcutt grass numbers peaked in years when heavy rains (greater than 40 centimeters [15.7 inches]) occurred in the period from November through April and vernal pools remained inundated longer than usual (Holland 1987).

Members of the genus *Orcuttia* develop long (approximately 10 centimeters), thin (one to two millimeters-wide) juvenile leaves that float on the water surface when seeds germinate under shallow water or when seeds become submersed shortly after germination (Hoover 1941; Griggs 1974, 1980, 1981; Reeder 1982). By facilitating light exposure and atmospheric gas exchange for photosynthesis while submersed, these amphibious juvenile leaves maximize vegetative growth before vernal pool dry-down (Griggs 1981; Stone et al. 1988; Keeley 1990).

Orcutt grass plants are able to produce most of their above-ground vegetative growth, as well as flowers and seed as the vernal pools dry down in late spring and early to mid-summer (Crampton 1959). Vegetative and phenological demographics appear to be largely determined by pool dry-down rate (Griggs 1974, 1980; Stone et al. 1988). Thus, mature fruiting plants in drying soil above the waterline and submersed seedlings further toward the center can occur simultaneously in a single pool.

Indeterminate growth of new stems and spikelets provides for prolonged productivity as seasonally available water allows (Griggs 1974, 1980). This habit may result in smaller plants with fewer flowers and seeds maturing earlier in the season at the pool margins, and later maturing, larger, more fecund plants towards the pool center. This morphological and

phenological plasticity confers an adaptive advantage in the context of extreme seasonal fluctuations and the unpredictable year-to-year variability of the Mediterranean Climate (Griggs 1980; Griggs and Jain 1983; Stone et al. 1988).

Since Orcutt grasses mature in a terrestrial setting during the hotter, more xeric late spring and summer months, possession of the C_4 photosynthetic pathway and Krantz Anatomy (Griggs 1980; Keeley 1990, 1998) are important adaptive traits. This photosynthetic pathway allows plants to exchange atmospheric gasses with increased efficiency and concomitant reduction in water loss to evaporative transpiration. This permits the extended period of vegetative growth and reproduction of Orcutt grasses into the hot arid summer months after most other vernal pool associates have completely desiccated (Griggs 1980; Stone et al. 1988).

All Orcutt grasses possess an aromatic sticky glandular exudate on the stems, leaves and inflorescences. This trait, particularly well developed in Sacramento Orcutt grass, is thought to be advantageous both as an anti-desiccation (Hoover 1941; Crampton 1959) and anti-herbivory adaptation (Griggs 1974, 1980). Grasshoppers can exert significant herbivory pressures late in the season although it has not been noted for Sacramento Orcutt grass specifically.

Sacramento Orcutt grass plants flower and set seed as the margins and basin of the vernal pools dry from April through July (CNPS 2010). Detailed pollination and breeding experiments have not been conducted on this species. Like most other grasses, Orcutt grasses are thought to be primarily wind-pollinated out-breeders as indicated by protogynous floral maturation, strongly exserted anthers and measured patterns of genetic variation (Griggs 1980; Griggs and Jain 1983; Stone et al. 1988). In one instance, native solitary bees of the family Halictidae were observed collecting pollen from Sacramento Orcutt grass plants (Griggs 1974).

Seed production of Orcutt grass plants is known to vary greatly between individuals along moisture gradients within single pools, among populations between pools, and within pools between years (Griggs 1980; Griggs and Jain 1983). Fully mature Sacramento Orcutt grass individuals can produce from 0 to over 600 seeds per plant. Seed set in Orcutt grasses appears uncertain and dependent on precise synchrony of appropriate environmental conditions and phenological development (Stone et al. 1988).

After the growing season, the mature Sacramento Orcutt grass seeds are held tightly within maternal floral structures (lemma and pelea) on the inflorescence until the mechanical action of wind, heavy rain and winter inundation shatter the inflorescences and release the mature florets. This lack of dispersal is thought to be an adaptation to the very sparsely scattered distribution of suitable large vernal pools (Griggs 1974, 1980). It is an advantage for a large proportion of the seed crop to remain within the available large-pool habitat, rather than chance loss to unsuitable uplands. Even though dispersal is naturally limited, Orcutt grass

colonization of pools was probably a more frequently occurring event in the historic past when there were likely more populations, many more pools, more pool interconnectivity, exceedingly larger waterfowl migrations, and unfenced roaming ungulates (Griggs 1980).

Not all *Orcuttia* seeds germinate every year, resulting in the buildup of a dormant soil seed bank (Griggs 1974, 1980, 1981). The soil seed bank is a critical adaptive barrier against local extinction events that could otherwise result from the unpredictable occurrence and duration of favorable growing conditions (Stone et al. 1988). In a study of one Sacramento Orcutt grass population, 44 seeds were found dormant in the soil for every one growing plant present (Griggs 1980; Griggs and Jain 1983). Between-population and between-year variation in soil seed bank density and the duration of seed viability in the soil is unknown. The soil seed bank also may contribute to overall genetic diversity of populations, as seeds stored over multiple years produced under varying growth conditions may harbor adaptive allelic combinations that are infrequently expressed or selected for.

Studies of seed weight and allozyme electrophoresis indicate that Orcutt grasses possess low levels of gene flow between populations, and high levels of gene flow within (Griggs 1980, 1984; Griggs and Jain 1983). This is to be expected given the highly insular distribution and seasonally dynamic nature of vernal pool habitat (Stone et al, 1988). These studies also revealed very high levels of genetic diversity within the seed families of individual plants, with almost 50 percent of each species' genetic variation represented in samples from one plant. In addition, approximately 80 to 90 percent of the total genetic diversity of each species was represented in each population (Griggs 1980, 1984; Griggs and Jain 1983). It should be noted that this study was limited to assaying four enzyme systems from two populations of Sacramento Orcutt grass.

SAOG Habitat Requirements and Ecology

Like all grasses in the genus *Orcuttia*, Sacramento Orcutt grass is strictly adapted to habitats possessing vernal pool-type hydrology. The tribe is thought to be a relatively ancient evolutionary group (Griggs 1981; Reeder 1982), descendant from a perennial ancestor related to the Chlorideae Tribe (Keeley 1998). The ancestral entity is thought to have inhabited the marshy margins of the Tertiary-age sea formerly covering the Great Central Valley (Axelrod 1973; Raven and Axelrod 1978). The evolving Orcuttieae lineage adapted to the increasing seasonal stresses as the Mediterranean climate developed and the inland water body receded.

Interestingly and of potential significance to conservation, Sacramento Orcutt grass appears to be the most specific of the genus *Orcuttia* with regard to niche breadth, as indicated by restriction to the largest of pools (Stone et al. 1988), comparatively poor seed germination

during marginal hydrologic-seasons (Stone et al. 1988; Holland 1987), and highly limited geographic distribution.

Sacramento Orcutt grass is restricted to the older and more weathered high terrace alluvial landform that comprises the Laguna Geologic Formation (SCS 1993). Soils associated with Sacramento Orcutt grass vernal pools include the Red Bluff-Redding Complex (0 to 5 percent slopes), Redding Gravelly Loam (0 to 8 percent slopes), Corning Complex (0 to 8 percent slopes), and Xerarents-Urban Land San Joaquin Complex (0 to 5 percent slopes). These soils tend to be strongly acidic, an indication of age and weathering (SCS 1993). In addition to being acidic, these soils are gravelly with cobble, and in many places, they possess a shallow, water-impermeable iron-silica hardpan that favors the development of vernal pools (SCS 1993).

Natural restriction of Sacramento Orcutt grass to these alluvial terrace landforms and associated soil series may reflect the propensity of these soils and landforms to develop suitably large vernal pools with appropriate hydrological regimes. Holland and Dains (1990) have shown how landform and soil relate to hydrological characteristics of vernal pools, and how these factors may influence floristic composition. This distribution may also reflect on the biogeography of an old geological surface that has remained exposed and relatively undisturbed over geological time, away from lower elevation, more recent alluvial depositions.

Orcutt grasses are strongly adapted to the more extreme hydrological cycles encountered in the spectrum of vernal pool types (e.g., they are typically associated with larger or deeper vernal pools that tend to possess more extreme regimes of inundation) (Crampton 1959; Griggs 1974). Of the members of the genus *Orcuttia*, Sacramento Orcutt grass tends to occupy the larger, more hydrologic-extreme pools. Vernal pools occupied by Sacramento Orcutt grass documented prior to 1988 range in size from 100 square meters (~120 square yards) to 10 hectares (~25 acres), and among the 10 pools measured, the median pool size was found to be 2,800 square meters (~3,349 square yards) (Stone et al. 1988). Upslope watershed area (Area of Drainage) associated with occupied pools was reported by Stone et al. (1988) to range from 0.5 to 123 acres among the known occurrences.

Since 1988, additional smaller pools within one of the pool complexes located east of Mather Air Force Base were found to support this species (CNDDB Occurrence #6) (CDFG 2010). Even though Sacramento Orcutt grass can be found in smaller pools (as measured by surface area), it is important to consider that even these are relatively deep, exhibit characteristics of well-developed vernal pool hydrology (Preston 2002 pers. comm.), and are situated in relatively close proximity to more typical, large pools within the 123-acre drainage area reported by Stone et al. (1988).

Vernal pool hydrology has not been precisely defined for any of the Orcutt grasses. In general, ponding must be of sufficient duration and under the appropriate seasonal temperature regime to release the seeds from dormancy through decomposition of maternal floral structures in the presence of a symbiotic aquatic fungus (Griggs 1980; Griggs and Jain 1983; Keeley 1988). The depth or duration of pool inundation are also likely factors excluding other less specialized, but obligate, vernal pool species from the barren micro-sites located in the deeper parts of pools that are inhabited by Sacramento Orcutt grass.

Ponding cannot be so excessive though, as to foster the recruitment and proliferation of native perennial marsh species, in particular common spikerush (*Eleocharis macrostachya*) (Crampton 1959; Stone et al. 1988; CDFG 2010). This potentially aggressive rhizomatous species is usually only found in the deepest portions of the more well developed natural vernal pools. In such cases where it co-occurs with Sacramento Orcutt grass, the latter grows mostly in barren areas lacking the spikerush (Stone et al. 1988). Prolonged duration of ponding resulting from placement of berms, construction of road surfaces, or urban development in the vicinity of natural pools appears to have resulted in increase vigor of common spikerush with concomitant loss of Sacramento Orcutt grass vigor in three pools in the complex east of Grant Line Road (CNDDB Occurrence #6) (Jones and Stokes 1990, 1998). Hydrological alteration and proliferation of common spikerush may also have negatively affected Sacramento Orcutt grass habitat at two Phoenix Field occurrences (CNDDB Occurrences #5 and 15) and the occurrence immediately east of Mather Air Force Base (CNDDB Occurrence #17; Preston pers. comm.).

Sacramento Orcutt grass occurs in pools with other vernal pool endemics, including Howell's quillwort (*Isoetes howelii*), coyote thistle (*Eryngium castrense*), dwarf wooly marbles (*Psilocarphus brevissimus*), flowering quillwort (*Lilaea scilloides*), stalked popcorn-flower (*Plagiobothrys stipitatus*), common spikerush, pincushion navarretia (*Navarretia myersii* ssp. *myersii*), Bogg's Lake hedge-hyssop (*Gratiola heterosepala*), legenere (*Legenere limosa*), white-headed navarretia (*Navarretia leucocephala*), double-horned downingia (*Downingia bicornuta*), goldfields (*Lasthenia* spp.) and hairy pepperwort (*Marsilea vestida*) (CDFG 2010). Many of these other vernal pool species however, do not appear to tolerate the hydrologic extremes of prime Sacramento Orcutt grass habitat. They complete their life cycle earlier in the season, and are therefore confined to the shallower margins or slopes of the deeper pools that support Sacramento Orcutt grass (Crampton 1959; Stone et al. 1988).

Hydrological stresses associated with vernal pools, and Orcutt grass pools specifically, exclude the majority of non-native weedy species that characterize the present-day valley annual grassland, agricultural fields, and ruderal habitats. Italian wild rye (*Lolium multiflorum*) and Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*) are two non-native facultative wetland species that typically dominate disturbed wetlands and can be invasive in smaller, more ephemeral vernal pool types. They cannot however, tolerate the more extreme

inundation regimes of deeper Orcutt pools. Thatch build-up from Italian rye grass, Mediterranean barley, Medusa-head grass (*Taeniatherum caput-medusae*), and other non-native upland species may indirectly affect vernal pool species by lessening the amount of water entering the system through surface and subsurface flow (Robins and Vollmer 2001)

Several non-native weedy hydrophytes may however, present problems within the deeper portions of occupied Orcutt pools through competitive exclusion (as with common spikerush). Mannagrass (*Glyceria occidentalis*), an aggressive weed of irrigated agriculture and degraded vernal pools has already been reported as a potential problem at two of the known Sacramento Orcutt grass populations (CNDDB Occurrences #16 and #17). Although not recorded from any Sacramento Orcutt grass populations, other non-native aggressive species that can become problematic in deeper Orcutt grass-type vernal pools include rosy Lippia (*Phyla nodiflora* var. *rosea*), field bindweed (*Convolvulus arvensis*), swamp pricklegrass (*Crypsis schoenoides*), Bermuda grass (*Cynodon dactylon*) and paradox canary grass (*Phalaris paradoxa*) (Dittes pers. obs.). Cocklebur (*Xanthium strumarium*), another native species, can also come to dominate portions of Orcutt grass-type pools (Schlising, Unger pers. comm.).

Appropriately timed dry-pasture livestock grazing regimes are generally thought to be compatible with Orcutt grass populations, and may even enhance habitat in situations where Common spikerush may otherwise predominate (Stone et al. 1988; CDFG 2010). By grazing from late fall, into early to mid-spring months, livestock are generally kept from the occupied portions of Orcutt grass pools by standing water, inundated soil and attraction to abundant green forage in the uplands. Most problems with livestock grazing arise from later spring and summer grazing regimes, when the Orcutt grass pools have dried and flowering and fruiting plants are exposed and vulnerable to trampling and cropping (Stone et al. 1988). In addition, during the later season when the upland forage has dried, the moist bottoms of vernal pools become highly attractive and may suffer increased trampling and hoof-pocking (Dittes pers. obs).

As an example of the role of timing in relation to potential disturbance response, Hoover (1941) and Crampton (1959) have reported Orcuttieae populations being completely disked in dry-farmed grain fields in the late fall, without apparent detriment to the populations the following growing season. It has been noted that the same disking performed during the late spring or summer growing periods may completely deplete the soil seed bank and extirpate the population if performed over successive years (Stone et al. 1988).

SAOG Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Sacramento Orcutt grass are identified in Table G-3.7-1 and have been derived from the USFWS's list of primary constituent elements in

the final rule designating critical habitat for the species (USFWS 2005) as well as input from local species experts.

Table G-3.7-1. Habitat Elements for Sacramento Orcutt Grass

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously, or intermittently, flowing surface water in the depressional features including swales connecting the pools, providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and non-native upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

SAOG Species Distribution and Population Trends

SAOG Species Distribution

Sacramento Orcutt grass occurs only in southeastern Sacramento County near the juncture of the Sierra Nevada foothills and eastern edge of the Sacramento Valley, qualifying it as the most geographically restricted member of the genus *Orcuttia*. There are no historic records or collections of this species made outside of this area (Stone et al. 1988; CDFG 2010). This distinction may partially reflect the previously mentioned observations of Holland (1987) and Stone et al. (1988) regarding its relatively high level of ecological specialization and comparatively narrow habitat requirements. This distribution also may reflect the fact that the largest, most hydrological stable pools located at lower topographical positions in the Central Valley were the first to have been lost to agriculture in the latter 19th and early 20th centuries, before the pioneering collections of Hoover and Crampton were made.

SAOG Central Valley Distribution

Sacramento Orcutt grass occurs within a narrow swath of remnant high terraces that lay near the juncture of the Northern Sierra Nevada Foothill and Sacramento Valley Biogeographic Provinces (Hickman 1993), between 110 and 270 feet in elevation (CDFG 2010). The recorded range of the species extends in a narrow band of habitat from the terrace just north of the American River in the vicinity of Orangevale, south approximately 26 miles to the vicinity of Rancho Seco Lake on the Arroyo Seco Mesa.

Nine extant (and one extinct) CNDDB occurrences are recorded from within this narrow north-to-south oriented band (CDFG 2010). These ten CNDDB occurrences are clustered among three geographically defined regions, hereafter referred to as the northernmost, central, and southernmost population centers (CDFG 2010).

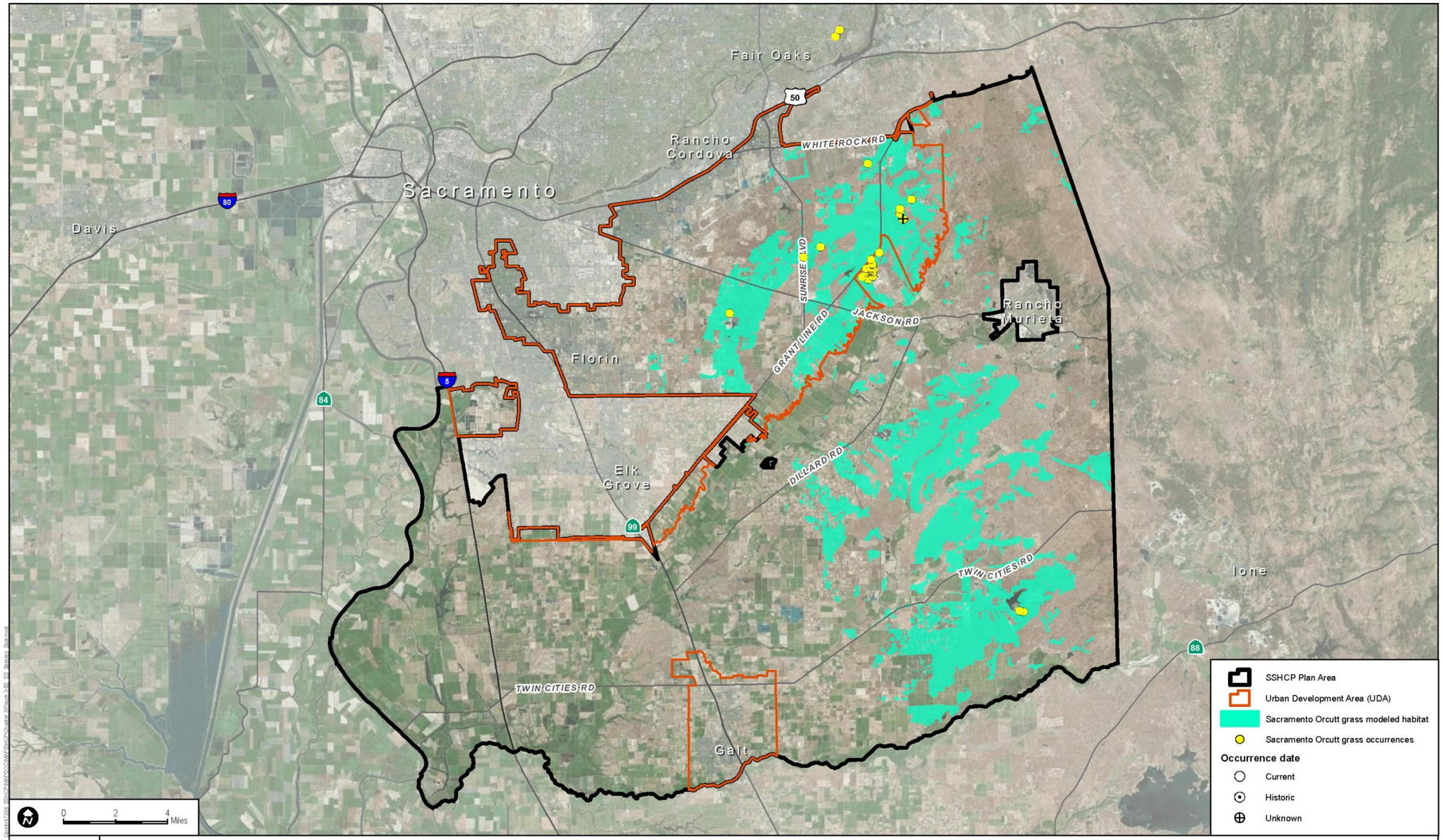
The northernmost of the three Sacramento Orcutt grass population centers, located on the alluvial terrace north of the American River, is comprised of three CNDDB occurrences. The northernmost occurrence, located near Orangevale, is extinct (CNDDB occurrence #4). One occurrence, comprised of one occupied vernal pool, is located further south at Phoenix Field (CNDDB occurrence #5). An artificially introduced population is located in a single vernal pool at nearby Phoenix Park (CNDDB occurrence # 15). It has been suggested that since the Phoenix Park Occurrence has established from seed derived from the Phoenix Field occurrence, the two are best considered as one genetic population. The northernmost population center (CNDDB occurrences #4, #5, and #15) is located outside of the Planning Area.

SAOG Distribution within the Planning Area

The central population center is located on the terrace landscape east of Mather Air Force Base in the vicinity of the Laguna Creek watershed. As measured by the number of CNDDB occurrences, number of occupied pools and past estimates of the number of individuals, this population center comprises the core of the species' currently known distribution (CDFG 2010; Stone pers. comm. 2002). Within an area spanning approximately seven miles by four miles, six CNDDB occurrences are known. This central Sacramento Orcutt grass population center lies within the Planning Area, however four of the occurrences are included within the UDA (CNDDB occurrences #17, #18, #19 and #20) and two occurrences are in the Keifer Landfill area outside of the UDA (CNDDB occurrences #1 and #6) (Figure SAOG-1).

The southernmost population center, comprised of just one occurrence (CNDDB occurrence #16), is located approximately three miles north of the Sacramento-San Joaquin County Line near Rancho Seco Lake. This population is located approximately 14 miles south of the next nearest population. This southernmost site is located within the Planning Area, but outside of the Sacramento UDA. The distribution of the species is extremely disjunct. The modeled habitat of the species in the Planning Area is discussed in Section G-4 of this Appendix.

Figure SAOG-1 Sacramento Orcutt Grass Modeled Habitat and Documented Occurrences



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SAOG Population Levels and Trends

It is impossible to determine the number of historically occurring Sacramento Orcutt grass populations or the acreage of suitable habitat lost to historic agricultural land-use conversions, since so much had happened before these species first received attention (Stone *et. al*. 1988). Investigators have made estimates as to the acreage of vernal pool habitat lost since historic times (Holland 1978). Owing to habitat specificity (restriction to largest pools), only a subset of the vernal pool habitat lost within the natural range of the species likely provided suitable habitat for Sacramento Orcutt grass (Stone et al. 1988). Concerns over loss of Orcutt grass populations and habitat were expressed beginning with some of the earlier investigators (Hoover 1941; Crampton 1959, 1976; Griggs 1974).

The first collections of Sacramento Orcutt grass were made by Hoover in 1941. At that time, much habitat had already been lost, including some of the larger, lower terrace pools that occupied sites most favorable to agricultural development. Since 1941, a total of only 30 occupied vernal pools have been recorded, two of which (CNDDB occurrence #4 and portion of CNDDB occurrence # 6) were extirpated by 1988 (Stone et al. 1988, CDFG 2010). By 1991, the USFWS stated that the trend for Sacramento Orcutt Grass is one of rapid decline (USFWS 1997).

There has been no comprehensive effort to monitor all populations of Sacramento Orcutt grass. Informal monitoring projects have been conducted by the CDFW at the Phoenix Field Ecological Preserve, by Holland at the Phoenix Park Vernal Pool Preserve, and by Jones and Stokes at the Kiefer Landfill sites (Preston pers. comm.). Stone et al. (1988) also provided estimates of populations at all occurrences visited in 1986 and 1987. Population estimates recorded for Sacramento Orcutt Grass are summarized in Table G-3.7-2.

Table G-3.7-2. Sacramento Orcutt Grass Population Estimates for Eastern Sacramento County

CNDDB Occurrence #	Occurrence # of pools observed	Range of population estimates
1	1	1986-87: "numerous" 1995: 400,000 1998: 138,000
5	1	1986: >200,000 1994-96: >100,000 1997: 9,500
6	6-19	1990: "thousands" 1995: >1,000,000 1998: 129,000
15	1	1978: (0) pool seeded 1985: >1,000 1986: >10,000 1991: >1,000 1995: ~ 100,000 1996: 35 1997: 1,000
16	1	1986: ~500 1987:200 1993: < 20 (M. Gause) 1995: 300
17	1	1987: >10,000 1995: >10,000
18	1	1987: 1,000
19	4	1994: "hundreds" 1995: 1,200,000
20	Unknown	Unknown

Source: CDFG 2010; Stone et al. 1988

These data, and research of others, indicate that abundance within Orcutt grass populations varies greatly between populations, and within populations from year to year (Griggs and Jain 1983; Holland 1987). This extreme population variability is attributable to interactions of seed dormancy, early seedling survivorship, and average seed set per plant, as principally determined by seasonal and between-year limitations in available moisture (Griggs and Jain 1983; Holland 1987). Fluctuations of similar magnitude are also recorded for hairy Orcutt grass (*Orcuttia pilosa*), slender Orcutt grass (*Orcuttia tenuis*), and Greene's tuctoria (*Tuctoria greenei*) at the Vina Plains Preserve in Tehama County (Alexander and Schlising 1997).

Observations made over a decade or so may provide a reasonable indication of the short-term vigor of a given Orcutt grass population. It is important to consider however, that in order to assess the trend of the species, long-term monitoring of both habitat and populations conducted over multiple cycles of wet and dry years is needed. Another aspect of population demography is

the quantity and age of stored seed in the soil profile. Undoubtedly, the number of stored seeds in the soil profile has bearing on how many plants can be produced in a given favorable year.

SAOG Threats to the Species

Potential direct threats to Sacramento Orcutt grass include loss of vernal pool habitat to agricultural or urban/industrial land-use conversions, construction and maintenance of firebreaks, roads, and utility corridors, inappropriate livestock grazing regimes (later spring/summer rotations), grassland fires, recreational vehicles, equestrian and pedestrian traffic, and refuse dumping.

Potential Indirect threats to Sacramento Orcutt grass include hydrological alteration of sub-watersheds by surrounding developments and land uses, shifts in competitive interactions (hydrology-mediated or invasive weeds), windblown refuse accumulation, point and non-point source water pollution, air pollution, and global climate change.

Preserves currently established or in the process of becoming established that include Sacramento Orcutt grass are the Sunrise-Douglas Mitigation Bank and the Kiefer Landfill Wetland Preserve. The Sunrise-Douglas preserve encompasses approximately 480 acres of vernal pool annual grassland habitat supporting two CNDDB occurrences (CNDDB occurrence #17 and #18). The proposed Kiefer Wetland Preserve will encompass two CNDDB occurrences (CNDDB occurrence #1 and #6), encompassing 19 occupied pools, and an undetermined number of acres of annual grassland vernal pool habitat. The remaining Sacramento Orcutt Grass Occurrences in the Planning Area (CNDDB occurrences #16, #19 and #20) remain unprotected.

The USFWS has designated critical habitat areas for Sacramento Orcutt grass that encompasses all of the known 0ccurrences and a large portion of the remaining potentially suitable habitat.

SAOG Data Gaps and Conservation Implications

Grasses of the Tribe Orcuttieae, including Sacramento Orcutt grass, are among the most studied and best known of all vernal pool plant species and vernal pool species assemblages. As previously discussed, researchers have variously addressed taxonomy and biogeography, biology, ecology, breeding system, population genetics, habitat relationships, population levels, trends and threats. Even with the attention of researchers and relatively extensive body of information, data gaps with varying implications for conservation remain including:

SAOG What Constitutes Population Vigor, and How to Measure?

A good measure of Orcutt grass population vigor is difficult to define, given the highly variable year-to-year abundance within populations (Holland 1987; Griggs pers. comm. 2003). The contribution

of the stored soil seed bank to population numbers and population genetic diversity is an important, but currently unknown factor as well. Furthermore, even if a trend at the population level is discerned, causative factors contributing to year-to-year population fluctuations may be very difficult to identify (Alexander and Schlising 1997). Therefore, trends may occur that are not discernable and trends that are discerned may be unexplainable. These factors will complicate attempts to change management for benefit of the species if measured vigor shows decline.

SAOG Specific Hydrological Requirements of Sacramento Orcutt Grass

Numerical data do not exist regarding specific parameters of the annual hydrological cycle of vernal pools supporting Sacramento Orcutt Grass populations (e.g., timing of rainfall, depth of ponding, duration of ponding and soil dry down rate). At the same time, It is also important to note that Sacramento Orcutt Grass is cited as one of the more specifically adapted species of the genus, inhabiting the more well-developed of vernal pools, and one of the least likely to germinate during years with marginal precipitation (Holland 1987; Griggs pers. comm.). The general lack of numerical hydrological data limits the ability to precisely monitor or assess hydrological suitability of Sacramento Orcutt Grass-vernal pool habitat within established preserves. Similarly, assessment of potentially suitable Sacramento Orcutt grass habitat for preserve establishment or for detection of the species at this time must rely on generalities. Once preserves for existing Sacramento Orcutt grass populations are established, assessed and monitored over time, a more quantifiable definition of suitable Sacramento Orcutt grass -vernal pool hydrology may be developed.

SAOG Existing Hydrological Trend of Pools and Existing Indirect Effects

Most of the Sacramento Orcutt grass populations have already experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds. Without complete protection of entire vernal pool watersheds, or precise hydrological monitoring and accurate modeling on a pool complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown. Existing Sacramento Orcutt grass conditions for are not pristine, so if trends in vigor or habitat quality become apparent over time, it may be difficult to attribute trend to any specific management activity.

SAOG Definition of Appropriate Hydrology Buffer

There is no standard for appropriate scale of effective hydrologic buffers for vernal pool-annual grassland ecosystems, since the nature of vernal pool complexes and their geo-hydrological relations may vary substantially by geography (Holland and Dains 1990). The geo-hydrologic investigation of Hanes and Stromberg (1998), conducted at a single site over three years in eastern Sacramento County, addresses aspects of vernal pool hydrology that are important to

consider in formulation of hydrological buffers (e.g., relationship between pool basin hydrology and surrounding upland soil profile).

Proposed preserve designs may not afford complete protection to the hydrological systems that support Sacramento Orcutt grass and other species assemblages dependent on them without more information on appropriate scale hydrologic buffers.

SAOG Definition of Appropriate Scale Sacramento Orcutt Grass -Vernal Pool-Annual Grassland Preserve

There is no standard for appropriate scale of effective Sacramento Orcutt grass -vernal pool preserves. It is a paradigm of conservation biology that "bigger is better" for a variety of well-documented reasons. Conservation challenges associated with the relatively small-scale Sacramento Orcutt grass -vernal pool preserve at Phoenix Field and Phoenix Park are well documented and reflect consequences of increase edge effect associated with smaller preserves (Clark et al. 1998). Proposed preserve designs may not afford complete protection to the ecosystems that Sacramento Orcutt grass and other species assemblages depend on without more information on appropriate scale of preserve area.

SAOG Determination of an Appropriate Livestock Grazing Regime

Livestock grazing will occur in at least some of the Sacramento Orcutt grass -vernal pool preserves, primarily for upland annual grassland vegetation management. Specific grazing regimes have not been formulated for annual grassland pasture systems with Sacramento Orcutt grass -occupied pools; although grazing and monitoring in similar systems have been addressed (Barry 1998; TNC 2000; Griggs 2002; Robins and Vollmar 2002; Burmester pers. comm.). It is important to note that Sacramento Orcutt grass and other members of the Orcuttiae tribe do persist though, in historically and contemporary operating livestock ranches. At a minimum, compatibility with some level of grazing is evidenced by persistence of the species in these systems.

Specific livestock grazing regimes cannot be formulated until preserve size, configuration, and soil and vegetation conditions and vegetation management goals are determined.

With regard to compatible grazing regimes, timing of grazing appears far more important than stocking rate, grazing intensity, or duration of rotation in annual grassland pasture systems that support Orcutt grass-occupied vernal pools (Stone et al. 1988; Griggs 2000; Griggs pers. comm.). During the inundated period of the vernal pool cycle (generally late fall through mid-to late spring), germinating seed and establishing aquatic-phase seedlings are afforded protection from trampling and grazing by a general aversion of cattle to standing water, as well as attractive forage in uplands. Even if some cattle congregate at the edge or meander into or

across the pools while inundated, germinating seeds in the deeper portions of the pools are unaffected, the vast majority of the pool substrate escapes trampling and nothing is eaten.

Conversely, grazing during the dry-down period or terrestrial phase, when plants are flowering and setting seed can be detrimental to the season's flowering effort and seed crop (generally mid-to late spring through the summer and early fall months). Given multiple years of improperly timed grazing and seed loss (both from standing crop and exhaustion of soil seed bank), populations may decline in vigor and may even be extirpated.

SAOG Interactions with Non-Native Weeds and Weed Management Activities

Non-native weeds, or weedy native species reported as occurring in Orcuttiae-occupied vernal pools include western mannagrass, swamp pricklegrass, Bermuda grass, common spikerush, field bindweed, lippia, paradox canary grass and cocklebur. Of these, western mannagrass and common spikerush presently co-inhabit Sacramento Orcutt grass -occupied vernal pools. Any of these, as well as currently unknown, species may appear or change in abundance in Sacramento Orcutt grass -occupied pools over time.

Potential competitive interactions with these species may affect the vigor of Sacramento Orcutt grass populations. In addition, any eradication or control methods implemented for these species may in turn potentially affect Sacramento Orcutt grass populations

SAOG Unknown Relationship Between Landform/Soil Chemistry and Bio-Geographic Distribution

As previously mentioned, Sacramento Orcutt Grass has a strong geographic association with old alluvial terraces possessing soils primarily of the Redding, and to a lesser extent, Red Bluff Families (Laguna Geological Formation). This association has proven useful in predicting the location of new populations, as indicated by the southernmost discovery on Llano Seco Mesa (Stone 2002 pers. comm.). The exact nature of this relationship is however unknown. Does pH or some other factor influence Orcutt grass population vigor, or do soil associations with tendency to develop and support large vernal pools/hydrology, regardless of landform and soil pH, provide suitable habitat? From the perspective of Sacramento Orcutt grass conservation, this uncertainty has bearing on the definition of potentially suitable habitat, which guides surveys and establishment of habitat preserves.

SAOG Potential Association and Compatibility with Other Rare Vernal Pool Species

It is desirable to design preserves for multi-species conservation. Suitability of Sacramento Orcutt grass habitat for supporting other rare plant species has not been specifically addressed,

although natural populations of the rare pincushion navarretia, Bogg's-Lake hedge hyssop, and legenere are documented as sharing specific vernal pools with Sacramento Orcutt grass. Many of these pool complexes also may provide habitat for rare invertebrates, amphibians, mammals, and bird species as well. Management for the benefit of one species may conflict with management needs of other rare species. For instance, livestock grazing anytime between November 1st and May 1st may benefit Sacramento Orcutt grass -associated pool complexes, but may be detrimental to ground-dwelling amphibians depending on those complexes (e.g., California tiger salamander).

SAOG Genetic Considerations (Spatial and Temporal Variation, Seed Bank, Drift, Bottlenecks)

It has been determined that *Orcuttia* populations are genetically isolated as well as diverse, the latter both within and between pools (populations), and within the "seed family" of a single reproductive plant. In addition, there is a high degree of localized adaptation and strong intra-pool selective pressures (Griggs 1980; Griggs and Jain 1983). However, investigations of Sacramento Orcutt grass population genetics have been limited to measures of seed size and weight (genetically fixed traits) within and among populations, and electrophoretic study of four enzyme systems in only two populations. These analyses represent a very small portion of the genome and allow limited interpretation of patterns of genetic diversity and limited inference as to uniqueness of a given population. Another potentially important consideration is that there has been no assessment of the "genetic memory" potentially associated with stored seeds in the soil seed bank. Elam (1996) provides a good overview of the myriad considerations in assessing the population genetics of vernal pool plants in the absence of empirical data for a given taxon.

Current limitations in our understanding of Sacramento Orcutt grass population genetics have little immediate conservation implication, , however; ifinoculation of pools is proposed for any alternatives analyzed in this EIS/EIR, or as part of the *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005), appropriate measures will be developed to ensure that seed collection, seed treatment and pool inoculation methods are consistent with what we know and do not know about Sacramento Orcutt grass ecology and population genetics.

SAOG Seed Longevity and Dynamics of Stored Soil Seed Bank

As previously mentioned, it appears that Sacramento Orcutt Grass populations depend on a substantial reserve of dormant seed stored in the soil as a buffer against single year and multiple-year cycles of unfavorable hydrological conditions. This population parameter has only been measured in a few pools during one growing season (Griggs 1980). There have been no other studies addressing spatial or temporal variability of seed abundance in the soil seed bank

or longevity of dormant seeds. From the perspective of conservation, knowledge of site-specific soil seed bank characteristics would allow more accurate assessment of population size and stability (vigor). This is particularly true of populations that typically support the fewest standing individuals through time.

SAOG Inoculation

Since there are so few natural populations of Sacramento Orcutt Grass, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable pools and increasing the number of naturally self-sustaining populations. These additional populations would increase the likelihood of natural dispersal events into preserved, but unoccupied Sacramento Orcutt grass habitat, create meta-population structure at extant occurrences where single pools now support the species, and ensure existence should any natural populations become compromised.

In addition to complete protection and enhancement of natural populations, it has been suggested that experimental inoculations may be desirable for Orcuttieae conservation (Griggs and Jain 1983; Griggs pers. comm.). The experimental establishment of one population at Phoenix Field (CNDDB occurrence #15), now 25 years-old, provides some indication of the probably success of inoculating suitable habitat and creating self-sustaining populations. However, not all experimental inoculations attempted during the research of Griggs were "successful" (Griggs pers. comm.), and the population genetics and long-term viability of the inoculated population are unknown.

SAOG Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter. ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to vernal pool vegetation. Assuming that extant Sacramento Orcutt grass occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of Sacramento Orcutt grass, if existing air quality can be maintained. If however, California's human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively effect Sacramento Orcutt grass and other native plant species. If air pollution becomes such a problem that Sacramento Orcutt grass is affected, few management options will exist to change conditions for this species.

SAOG Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature

over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology. It is likely that given the expected global climate trends, a vigor response of some kind could be expected for Sacramento Orcutt grass populations within the 50-year study period of the EIS/EIR or at some time beyond.

SAOG Unknown Number of Undiscovered Populations

Additional unsurveyed potentially suitable habitat exists within the Planning Area, principally on the larger private dry-land ranches that harbor well-developed vernal pools and vernal pool complexes. Authorities generally consider Sacramento Orcutt grass as one of the more completely understood species with regard to distribution and frequency (Stone, Taylor, Macdonald, Griggs, 2002 pers. comm.), owing primarily to typical association with only the most developed vernal pools and seemingly natural restricted range. However, it is also acknowledged that a limited number of additional populations could be yet discovered as the remaining large tracts become surveyed. It is very unlikely however, that enough populations remain to be discovered to justify a future change in the conservation status of Sacramento Orcutt grass (Stone, Taylor, Witham, Griggs pers. comm.).

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SANFORD'S ARROWHEAD (SAAR)

Sanford's Arrowhead (SAAR)

(Sagittaria sanfordii Green)

Status USFWS: None

Status CDFW: None

Status CNPS: List 1B.2

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SAAR Listing Status

Sanford's Arrowhead (*Sagittaria sanfordii*), an obligate wetland species, is considered to be rare, threatened or endangered throughout its range, thus qualifying its designation as a list 1B.2 species by California Native Plant Society (CNPS 2010). It has been assigned an R-E-D Code of 2-2-3, meaning it is distributed in a limited number of occurrences, occasionally more if each occurrence is small, it is endangered in a portion of its range, and entirely restricted to California.

Being a CNPS List 1B.2 plant species, Sanford's Arrowhead meets the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 of the California Endangered Species Act (CESA) of the California Department of Fish and Wildlife (CDFW) Code, and is eligible for state listing. It is mandatory that all CNPS 1B species be fully considered during preparation of environmental documents relating to California Environmental Quality Act (CEQA) (CNPS 2010). Owing to its relatively limited geographic range and ongoing and potential future threats, Sanford's Arrowhead may become a candidate for future agency listing.

SAAR Life History and Ecology

SAAR Species Description and Life History

SAAR Physical Description

Sanford's Arrowhead is a perennial member of the water plantain family (*Alismataceae*). This emergent marsh species possesses a thin elongate underground stem (rhizome) that produces small [8-15 millimeters (0.3-0.6 inches) –wide] spherical tubers (corms) at their apices. New plants (clones), comprised of a cluster of leaves and one to several inflorescence stalks, grow from these tubers at the onset of the growing season. Emergent leaves possess sheathing stalks

and range from two to ten decimeters (~8-39 inches) in length. The leaves are completely linear and three-angled, or they may possess a narrowly elliptic to lanceolate blade that ranges from five to 15 centimeters (~2-5.9 inches) in length (Mason 1957; Hickman 1993). Plants tend to grow in colonial patches.

The inflorescence is comprised of a naked stem bearing several whorled-series of flowers near the apex. The lowermost inflorescence whorls are typically comprised of three female flowers and the upper whorls are comprised entirely of male flowers. Both male and female flowers possess three white roundish petals with entire margins, as well as three small green narrowly triangular sepals. The petals are deciduous, and as the fruits mature, the flower stalks elongate to two to three centimeters (0.8-1.2 inches) and curve downward relative to the inflorescence axis. Fruits are arranged in dense ovoid head-like clusters, and from a distance superficially resemble green berries. Individual fruit are narrowly flattened side-to-side and possess a small lateral beak at the apex (Mason 1957). Initially, the emergent inflorescence stalk is erect and shorter than the leaves. As the fruits mature the entire inflorescence may recline and float on the surface of the water.

Sanford's Arrowhead is distinguished from its close relatives on the basis of its emergent leaves being narrowly linear to narrow-ovate or lanceolate, in contrast to the sagittate (arrowhead-shaped) leaves of the other Arrowhead species. In addition, only in Sanford's Arrowhead do the stalks of the maturing fruit thicken and curve downward relative to the inflorescence axis; the others possess stalks that remain un-thickened and curved upward (Hickman 1993).

Other than basic taxonomic and biogeographic treatments (Mason 1957; Hickman 1993), Sanford's Arrowhead is mostly unstudied. Existing biological and ecological information is derived mostly from observations of field botanists, primarily as a result of land management and agency-related resource surveys (Gause and Burmester pers. comms.).

Other species in the genus *Sagittaria*, have been variously studied with respect to breeding systems and reproduction (Wooten 1971; Kaul 1985; Delesalle and Muenchow 1992; Muenchow and Blum 1994; Muenchow 1998; Sarkissian et al. 2001; Huang 2003), dispersal and population dynamics (Gordon 1996), seed germination (Keddy and Constabel 1986; Gordon 1996; Leck 1996), seedling-hydrology relations (Keddy and Ellis 1985; Delesalle and Blum 1994), fish and wildlife interactions (Gruenhagen and Fredirickson 1990; Hohman et al. 1990; Muenchow and Delesalle 1992; Gough and Grace 1998; Evers et al. 1998), competitive interactions and community relations (Shaffer et al. 1992), and population genetics and rare plant conservation (Newberry 1991; Edwards and Sharitz 2000). Where applicable, information derived from studies of related Sagittaria species is referenced here for Sanford's Arrowhead.

SAAR Ecological Life Cycle

Sanford's Arrowhead shares the perennial clonal growth habit with the vast majority of other endemic emergent marsh plants. Thin elongate rhizomes produce ovoid tubers (corms) at their tips that allow the plant to persist within the submersed substrate through the dormant winter season. New plants (clones) are produced from these tubers at the onset of favorable growing conditions (Mason 1957). Observations have also been made of a Sanford's Arrowhead colony reappearing with vigor following a year during which the habitat failed to flood and aerial leaves and stems were completely absent (Gause pers. comm.). The ability of this colony to withstand at least one year of unfavorable hydrologic conditions and then reappear with vigor is likely attributable to the dormant rhizome and associated tubers/corms.

SAAR Seed Germination

Seed longevity, after-ripening, dormancy characteristics, germination requirements and optima for Sanford's Arrowhead have not been investigated. Similarly, no observations have been recorded or are otherwise available relating to seed ecology, germination or seedling growth in the field. Many marsh species exhibit soil-seed banking as a dynamic of their population ecology. This trait is unknown for Sanford's Arrowhead.

SAAR Vegetative Growth

Little is known regarding the dynamics of vegetative growth of Sanford's Arrowhead (e.g., growth rates, rhizome elongation rate or rhizome length, time to reproduction, clone longevity, physiological adaptations, etc.). Sanford's Arrowhead colonies have been observed to persist in a vegetative state throughout the year, without significant seasonal dieback of leaves (Gause pers. comm.).

SAAR Reproduction

Like many perennial marsh species, Sanford's Arrowhead reproduces asexually by dispersal of fragmented rhizomes and tubers, as well as sexually, via flowering and seed production. The relative contributions of asexual and sexual reproduction to population dynamics (e.g., dispersal, colonization, population growth and maintenance) likely vary by the type of aquatic system (isolated and static versus interconnected and flowing), and the nature of seasonal disturbances (flood, scour, trampling, waterfowl foraging, dredging and other ditch maintenance, etc.).

Sanford's Arrowhead flowers from May through October. As previously mentioned, this species has separate male and female flowers within a single inflorescence. Although pollination and breeding experiments have not been carried out for Sanford's Arrowhead specifically, the separate male and female flowers and well-developed petals suggest an out-crossing breeding

system. Pollination ecology of Sanford's Arrowhead has not been investigated. For two other Sagittaria species, principal flower visitors appeared to be generalist bees as well as assorted wasps and flies (Muenchow and Delesalle 1994). Fecundity has not been addressed for Sanford's Arrowhead.

SAAR Dispersal

Many perennial marsh species exhibit a comparatively wide geographic range and low morphologic variability (Mason 1957). This may reflect high dispersal potential associated with interconnected watercourses and with actions of migratory waterfowl. Waterfowl, muskrats, beavers and other wildlife readily consume all parts of some Sagittaria species, including seeds and tubers (Mason 1957). In addition, floodwaters likely disperse mature fruits and seeds, as well as fragmented rhizomes and associated tubers.

Evidence of long-distance dispersal and colonization exists in the overall geographic distribution of Sanford's Arrowhead in California, with disjunct northern and southern populations in Del Norte and Orange Counties, respectively. As with other wetland species, natural dispersal of seeds was likely a more frequent event when there were many more wetland acres, more interconnectivity, exceedingly larger waterfowl migrations and unfenced roaming native ungulates.

SAAR Seed Dormancy

Seed dormancy and stored soil seed banks are characteristics shared by many perennial marsh species. These traits however have not been investigated for Sanford's Arrowhead specifically. In perennial marsh species, the presence of a persistent soil seed bank may facilitate recolonization following prolonged periods of drought. A soil seed bank also ensures germination within barren topographic-hydrologic positions made newly available as water levels recede within drought-affected basins. Perenniating tubers/corms and rhizomes may buffer colonies against at least one year of drought; dormant seeds in the soil profile may further assure persistence over longer periods. Recruitment from persistent seed banks may also contribute over time to genetic diversity of populations that are potentially dominated by clones arising through high rates of vegetative reproduction (Edwards and Sharitz 2000).

SAAR Population Genetics

Population genetics of Sanford's Arrowhead have not been investigated, so intra- and inter-population patterns of genetic variability are unknown. Given the limited number of occurrences in the Planning Area and the widely scattered geographical distribution, all Sanford Arrowhead occurrences should be considered unique, and important genetic entities.

SAAR Habitat Requirements and Ecology

SAAR Biogeography and Landform Relations

Sanford's Arrowhead is strictly associated with freshwater marsh hydrology. Since this topographic-hydrologic setting occurs on nearly all landforms supporting rivers, creeks, lakes, ponds and irrigation channels, strong correlations with landforms should not be expected. In addition to numerous Central Valley settings, Sanford's Arrowhead is also recorded from marsh habitats in Orange and Ventura Counties of southern California and from the coastal region of Del Norte County. Sanford's Arrowhead also occurs on the Tuscan Volcanic Formation in the Cascade Range Foothills. Modeled habitat for Sanford's arrowhead is discussed in Section G-4 of this Appendix.

SAAR Hydrology Relations

As previously noted, Sanford's Arrowhead is strictly associated with hydrologic systems supporting emergent marsh vegetation. These include the margins of rivers, streams, ponds, reservoirs, irrigation and drainage canals and ditches, and stock-ponds. This species is reported to inhabit the cracks in concrete-lined irrigation/drainage ditches as well. Sanford's Arrowhead is also reported to occur in several seasonal wetlands with sufficient hydrology for persistence of emergent marsh species. As with other perennial marsh species, Sanford's Arrowhead likely inhabits specific zones defined by depth of ponding. Water depths are reported for only three of the 68 occurrences reported in CNDDB in 2010 (CDFG 2010); these range from four inches to two feet in depth (CDFG 2010). Observations made by some indicate preference for the relatively shallow margins o f deeper marsh systems (Gause pers. comm.).

SAAR Biological Community Relations

Plant species reported as occurring with Sanford's Arrowhead include regionally common emergent marsh species, as well as non-emergent wetland species more typically associated with marsh edges, saturated soil and even disturbed irrigated pastures. At one occurrence, Sanford's Arrowhead is reported as co-occurring with species more typically associated with vernal pools, including the rare legenere (*Legenere limosa*) and dwarf downingia (*Downingia pusilla*) (CDFG 2010).

Regionally common emergent marsh species associated with Sanford's Arrowhead include cattail (*Typha* spp.), other arrowheads (*Sagittaria latifolia*, *S. montevidensis, S. rigida*), water plantain (*Alisma plantago-aquatica*), tule (*Scirpus acutus*), yellow or Montevido waterweed (*Ludwigia peploides* ssp. *peploides* or *L.p.* ssp. *montevidensis*, respectively), parrot's-feather (*Myriophyllum aquaticum*), and willow-weed (*Polygonum lapathifolium*).

Co-occurring non-emergent wetland species more typically associated with the margins of permanent marshes, and/or with seasonal marshes, include various umbrella sedges (*Cyperus difformis, C. eragrostis, Cyperus* sp.), lady's-thumb (*Polygonum persicaria*) and assorted native bearded spangletop (*Leptochloa fascicularis*), and non-native perennial grasses barnyard grass (*Echinochloa crus-galli*, purple love grass (*Eragrostis diffusa*), dallisgrass (*Paspalum dilatatum*), Johnsongrass (*Sorghum halepense*) and bristlegrass (*Setaria* sp.). Willow (*Salix* spp.) is reported to share habitat with Sanford's Arrowhead as well (CDFG 2010).

SAAR Non-Native Weed Relations

Many of the previously mentioned emergent marsh associates, native and non-native alike, can be aggressive competitors. This trait results from vigorous lateral vegetative growth, either underground via rhizomes or stolons, with branching and elongating stems in the water column, or sprawling clambering aerial stems. Some floating species can completely cover the surface of water and mud as well such as mosquito fern (*Azolla* spp.), duckweed (*Lemma* spp.), water hyacinth (*Eichornia crassipes*), young mannagrass (*Glyceria* spp.), and others. Unlike terrestrial habitats, water availability is not a limiting factor for emergent marsh species. Rather, competition between species for available rooting substrate and light impose limits on population establishment, growth and persistence.

As mentioned previously, some of the commonly reported species associated with Sanford's Arrowhead are non-native perennial grasses, many of which are relatively aggressive weeds of marsh edges, irrigation ditches, irrigated pastures, rice fields and seasonal wetlands. In addition, other aggressively weedy wetland species in the region may present competitive problems with Sanford's Arrowhead, including other arrowheads (*Sagittaria* spp.), water plantains (*Alisma* spp., *Damasonium* spp.), water pepperweeds (*Polygonum* spp.), water hyacinth, water-nymph (*Najas* spp.), burhead (*Echinodorus berteroi*), water-milfoil (*Myriophyllum* spp.), waterweeds (*Elodea* spp., *Hydrilla verticillata, Ottelia alismoides*), Brazilian waterweed (*Egeria densa*), pondweed (*Potamogeton* spp.), purple loosestrife (*Lythrum salicaria*), and others.

The perennial marsh wetland habitat is highly productive, with much potential for intense interspecies competitive interactions. Many of the component species, including Sanford's Arrowhead, can be aggressive spreaders by rhizomes, stolons, or by dispersal of fragments/propagules. Ability for rapid lateral overtopping growth is the norm in this habitat. Sanford's Arrowhead is reported to be weedy and troublesome at the Rancho Cordova Golf Course ponds (CDFG 2010); however, other information on competitive interactions is lacking.

SAAR Livestock Grazing Relations

Interactions of livestock grazing with Sanford's Arrowhead have not been specifically addressed. As with other species though, interactions likely vary according to a variety of site-specific factors and timing. For example, marsh habitats located within irrigated pastures are likely to receive less grazing and trampling pressure than would the same habitat if it were located within a non-irrigated upland annual grassland setting. Within non-irrigated upland pastures, grazing and trampling pressures within the marshy shallows probably vary by season, with relatively little tendency of livestock to enter the marshy shallows during late winter to mid-spring months when forage and water is abundant and an increased pressure from livestock as the weather dries and warms into the summer months (Dittes pers. obs.). The capacity of colonies to recover from grazing and trampling is not known; however many rhizomatous perennial marsh species have the marked capacity to re-sprout after fragmentation of rhizome mats.

Among all of the CNDDB occurrences, livestock grazing is reported as a potential threat at only two (CNDDB occurrence # 14 and 15) (CDFG 2002). Nutrient loading, algae blooms and eutrophication associated with runoff from irrigated and overstocked pastures may potentially negatively affect some aquatic plant species, including Sanford's Arrowhead.

SAAR Disturbance Response

Owing to high vegetative productivity, rhizomatous or stoloniferous spread, subterranean tubers, and seed production, many emergent marsh species are well-adapted to, and may even benefit from periodic disturbances. In the absence of disturbances and a limiting deep-water edge, some marsh habitats may diminish in emergent species diversity, and may eventually transition into semi-terrestrial and terrestrial habitat. It is likely that in addition to basin topography, periodic disturbances (sediment scour and deposition) associated with seasonal flood events are an important determinant in the succession and species composition of any given marsh, as well as the meta-population dynamics of a given emergent marsh species. These dynamics are unknown as they relate to Sanford's Arrowhead.

The foraging activities of ducks and other waterfowl have been cited as loosening the rhizome tubers of Sagittaria, thus facilitating dispersal and potential colonization events. One mention of significant foraging of Sanford's Arrowhead by ducks is given in Tehama County (CDFG 2002). All parts of some Sagittaria species are edible for waterfowl, and dispersal is facilitated by wildlife breaking off tubers and perhaps spreading seeds while foraging (Mason 1954).

SAAR Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Sanford' Arrowhead are identified in Table G-3.8-1 and have been derived from input from local species experts.

Table G-3.8-1. Habitat Elements for Sanford's Arrowhead

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Freshwater marsh, open water, streams/creeks.	Strictly associated with hydrologic systems supporting emergent marsh vegetation, including the margins of rivers, streams, ponds, reservoirs, irrigation and drainage canals and ditches, and stock-ponds. Sanford's Arrowhead is also reported to occur in several seasonal wetlands with sufficient hydrology for persistence of emergent marsh species. As with other perennial marsh species, Sanford's Arrowhead likely inhabits specific zones defined by depth of ponding; however, additional information is needed to determine depth requirements.

SAAR Species Distribution and Population Trends

SAAR Species Distribution

Sanford's Arrowhead is distributed from Orange and Ventura Counties in southern California to Butte and Tehama Counties at the northern edge of the Great Central Valley. A disjunct population occurs in the most northwestern part of the state near Crescent City in Del Norte County (CNPS 2010).

Sanford's Arrowhead occurrences are distributed among six of the Geographic Sub-regions of the California Floristic Province, as described by Hickman (1993), including the San Joaquin Valley, Sacramento Valley, Cascade Range Foothills, Outer North Coast Range, Western Transverse Range, and South Coast. Sanford's Arrowhead ranges from sea level to 2,132 feet above mean sea level (CNPS 2010).

Sacramento County has the largest number of Sanford Arrowhead occurrences with 40 of the 68 occurrences (59%) represented (CDFG 2010). Calflora reports 86 records within California, 10 of which are within Sacramento County (Calflora 2010). Fresno County has the second largest number with eight occurrences (12%), followed by Butte and Merced Counties each having five occurrences reported (7% each) (CDFG 2010). Of the remaining 10 occurrences, San Joaquin and Tehama each have three (4% each), Del Norte, El Dorado, Madera, Mariposa, Orange, Placer, Shasta, and Ventura Counties each support one occurrence (<2% each) (CDFG 2010).

SAAR Central Valley Distribution

The Central Valley supports the majority of Sanford's Arrowhead occurrences. The northernmost Central Valley occurrences are located approximately 28 miles apart from each other in east-central and southern Butte County (CDFG 2002). Forty occurrences are located in Sacramento County (CDFG 2010). Another 15 Occurrences are distributed in the Central Valley along an arc of approximately 65 miles, extending from central Merced to northern Madera counties (CDFG 2002).

SAAR Distribution within the Planning Area

Of the 40 total (32 extant) Sanford's Arrowhead CNDDB occurrences presently recorded from Sacramento County, 23 occurrences (58%) are located within the Planning Area, 15 of which are located within the Urban Development Area (UDA) (Figure SAAR-1) (CDFG 2010). Figure SAAR-1 shows occurrence records within and adjacent to the Planning Area from the CNDDB (CDFG 2010), with one additional occurrence recorded by Wetland Research Associates (2004).

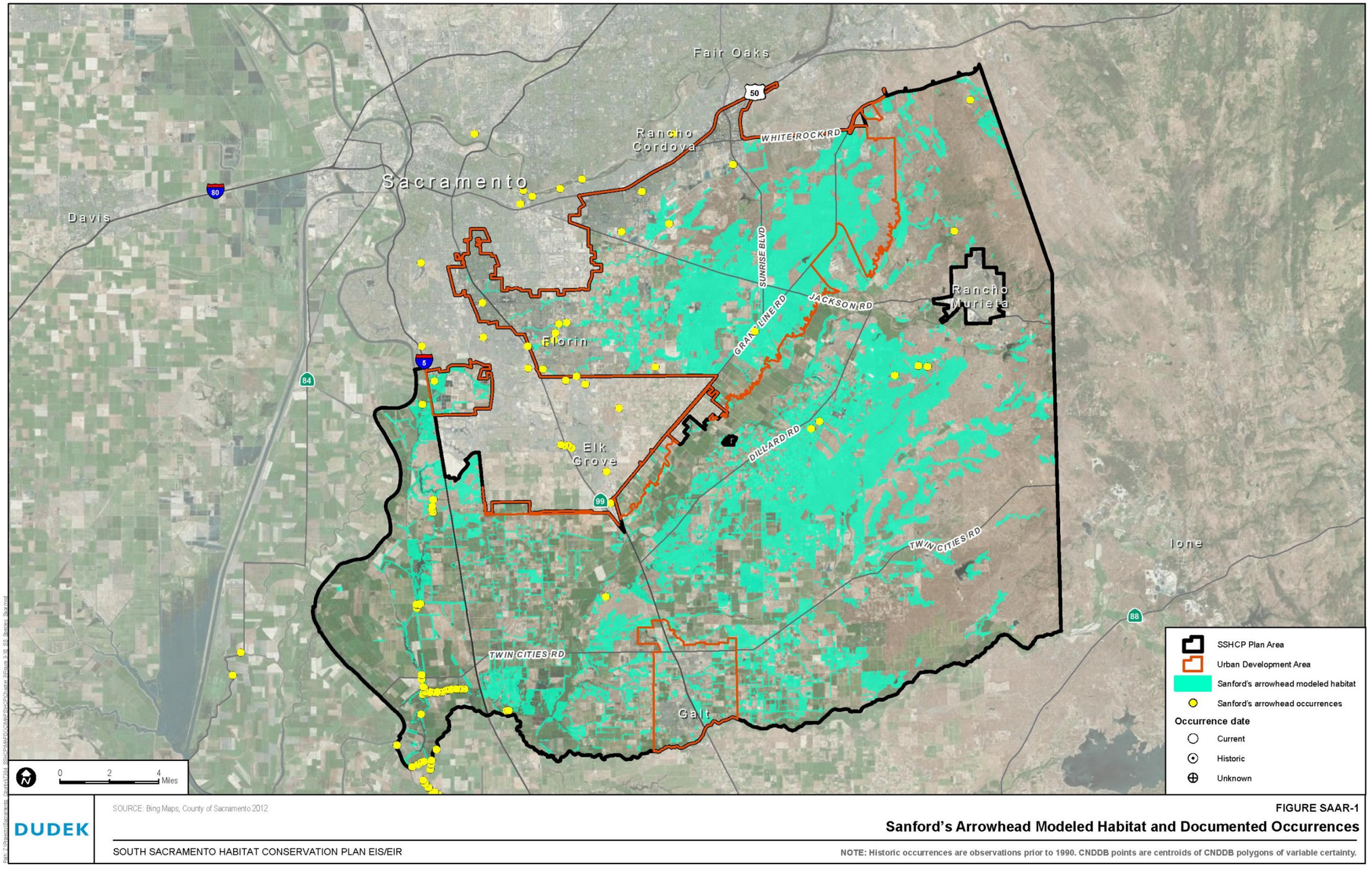
Occurrences of Sanford's Arrowhead in Sacramento County have been documented in the following Landform Formations: Basin deposits, lower and middle units in the Riverbank Formation, stream channel deposits, Turlock Lake Formation, and upper unit Modesto Formation/Alluvial deposits (CDFG 2002).

SAAR Population Levels and Trends

Of the 68 documented CNDDB Sanford's Arrowhead occurrences, one (CNDDB occurrence #2) located in Ventura County, is now reported as "extirpated." Another eight occurrences located in Sacramento County are reported as possibly extirpated (CDFG 2010). It is important to note though, that of the remaining 59 occurrences presumed extant, 11 have not been observed since between 1940 and 1958, even though the habitats were resurveyed in 1980 (CDFG 2002; none of these are in Sacramento County). One occurrence observed in 1975 was resurveyed in 1993 with no plants found (CDFG 2002). Twenty CNDDB occurrences are historic; they have not been observed in the last 20 years (CDFG 2010). Population trends are listed as unknown for all Sanford's Arrowhead Occurrences statewide.

It should be noted that Sanford's Arrowhead is a relatively cryptic emergent marsh species, the habitats are not easily surveyed, and much unsurveyed habitat is associated with agricultural and urbanized areas, neither of which are frequented by botanists. For these reasons, additional as-yet undiscovered Sanford's Arrowhead occurrences should be expected within the Planning Area.

Figure SAAR-1 Sanford's Arrowhead Modeled Habitat and Documented Occurrences



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It is impossible to determine the number of historically occurring Sanford's Arrowhead lost or the acreage of suitable habitat lost to historic agricultural land-use conversions, since so much had happened before this species first received attention. The Great Central Valley marsh system once extended from the southern edge of the Tulare Lake Basin in the southern San Joaquin Valley, almost interrupted, to the Sacramento River basin of Butte and Tehama counties in the north. Early explorers write about the extensive Tule Marsh that impeded east-west travel at most of these latitudes within the Great Central Valley. Mason reports of a 100-acre population of Sanford's Arrowhead observed in 1912 from near Tracy that by 1954 was gone and the habitat entirely under cultivation (Mason 1954). It has been estimated that by 1978 only 4% of California's pre-settlement Central Valley wetlands remained (Airola and Messick 1987 as cited by Snyder 1994). Loss of Sanford's Arrowhead populations and habitat since pre-settlement times is incalculable and without doubt, substantial.

There has been no comprehensive effort to monitor any populations of Sanford's Arrowhead over years, so variations in abundance and other population dynamics are unknown.

Observations, monitoring and research conducted on other perennial marsh species indicate that abundance of individuals within populations can vary greatly between years, with some species exhibiting even transitory behavior (Mason 1957). Furthermore, successional changes can be relatively rapid in marshes, and if a deep-water edge is not available to impede spread, and if disturbances do not remove accumulated biomass, transition into terrestrial or semi-terrestrial habitats may result. Owing to these dynamics, long-term management and monitoring of Sanford's Arrowhead and other aquatic and emergent marsh species pose unique challenges.

SAAR Threats to the Species

Potential direct threats to Sanford's Arrowhead include: loss of emergent marsh habitat owing to agricultural and urban land-use conversion, irrigation and drainage ditch maintenance, flood control activities, road widening and maintenance, inappropriate livestock grazing regimes, recreational vehicles, bicycle traffic, and refuse dumping (CDFG 2010).

Potential indirect threats to Sanford's Arrowhead include: hydrological alteration of sub-watersheds by surrounding developments and land uses; shifts in competitive interactions (hydrology-mediated or invasive non-native and weedy native species); sedimentation; windblown refuse accumulation; herbicides, nutrient loading and other point and non-point source water pollution; recreational boat waves; foraging damage by wildlife; ecological succession, air pollution, and global climate change.

Note that of the 32 occurrences presumed extant in Sacramento County (CDFG 2010), none are included within established preserves, and at least 15 are habitants of artificial or otherwise

maintained irrigation, drainage, or flood control conveyances (CDFG 2002). Only 10 appear to be associated with relatively natural wetland systems (CDFG 2002).

With regard to the remaining 27 presumed extant CNNDB occurrences outside of Sacramento County, only two are encompassed within established preserves; one of these is associated with a stockpond at The Nature Conservancy's (TNC) Vina Plains Preserve in Tehama County (CNDDB occurrence # 33), and another is located on Bureau of Land Management (BLM) land at Hog Lake, Tehama County (CNDDB occurrence # 34). Of the 19 remaining occurrences, eight are associated with irrigation/drainage canals, two are in man-made reservoirs, one is located in a groundwater recharge basin, and one is associated with a stockpond (CDFG 2002). Of the remaining seven occurrences, three do not have habitat notes included (CDFG 2002). In summary, of the 27 presumed extant occurrences outside of Sacramento County (CDFG 2010), only four are associated with presumably "natural" hydrological features (CDFG 2002).

SAAR Data Gaps

It is significant to note that Sanford's Arrowhead is difficult to survey for, and it can be difficult to see when growing with other emergent marsh species. Furthermore, since it occurs in association with a variety of water body-types, including irrigation and drainage ditches and canals (habitats seldom surveyed), other occurrences are likely to be present within Sacramento County. All marsh habitats, regardless of landform association, should be considered as potentially suitable habitat for Sanford's Arrowhead. It is likely that as additional surveys are conducted, new occurrences/populations will be discovered within the Planning Area. It is impossible however, to predict the number of future discoveries in Sacramento County or elsewhere.

With exception to observations of field workers (CDFG 2010), Sanford's Arrowhead has received limited research attention. Detailed studies have not been conducted regarding the biology, ecology, breeding system, population genetics, habitat-hydrology relationships, population dynamics, trends or threats. Investigations have been conducted on the biology and ecology of other Arrowhead species, including the sometimes co-occurring wide-leaved arrowhead or tule potato (*Sagittaria latifolia*). Pertinent data gaps for Sanford's Arrowhead specifically, along with implications for conservation, and operating assumptions include:

SAAR Unknown Number of Undiscovered Occurrences

Additional unsurveyed and partially surveyed potentially suitable habitat exists within the Planning Area and elsewhere within the range of the species. In the Planning Area, discovery of new populations of Sanford's Arrowhead may occur anywhere that emergent marsh habitat is present, including natural drainages, created irrigation/drainage conveyances, reservoir and lake margins

and stockponds. Potential habitat is also present within channelized natural, and artificially excavated drainages within urbanized areas. In these situations, Sanford's Arrowhead can colonize reaches that are concrete-lined; here inhabiting cracks or rooting on accumulated sediments.

SAAR Unknown Relationship between Landform/Soil Chemistry and Bio-Geographic Distribution

In the 2002 CNDDB in Sacramento County, 11 of the 28 Sanford's Arrowhead occurrences are associated with Lower and Middle Units of the River Bank Formation. Another four occurrences are associated with Stream Channel Deposits, three are associated with the Turlock Formation, two with the Upper Unit Modesto Formation, and one occurrence is associated with each of the Quaternary Fanglomerate (Qfa) and Basin Deposits (CDFG 2002). The nature of relationship of landform to Sanford's Arrowhead is likely attributable to factors affecting the development and persistence of emergent marsh habit. Recent alluvial deposits are associated with active watercourses.

SAAR Unknown Breeding System and Pollination Ecology

Pollination and breeding studies have not been conducted for Sanford's Arrowhead and specific pollinator relationships are unknown. It may be important to note that the flowers of Sanford's Arrowhead closely resemble those found in other Sagittaria species, as well as those in other genera of the family Alismataceae (*Alisma, Damasonium, Echinodorus*). Separate male and female flowers and relatively large flower petals suggest an outcrossing breeding strategy, although self-compatibility has been demonstrated for other species of Sagittaria (Muenchow and Delesalle 1994).

An investigation of pollination ecology involving the common arrowheads (*Sagittaria latifolia* and *S. australis*) in Colorado revealed that flower visitors there are principally generalist bees of the genera *Bombus, Lasioglossum, Ceratina and Augochlora*, as well as assorted flies and wasps (Muenchow and Delesalle 1994).

SAAR Specific Hydrological Requirements of SAAR

Numerical data do not exist regarding specific hydrological parameters associated with emergent marsh habitats supporting Sanford's Arrowhead populations in the Planning Area, or elsewhere (e.g., maximum and minimum inundation tolerances; optimal ponding depth; response to water level fluctuations; tolerance of dry-down/desiccation; wave action and other water current relationships, etc.).

SAAR Interactions with Non-Native Weeds (and Aggressive Natives) and Weed Management Activities

Non-native weeds, or aggressive native species reported as occurring in emergent marsh habitats with Sanford's Arrowhead are listed in Section 2.2. All of these and others not-yet known may become problematic in Sanford's Arrowhead-occupied emergent marsh preserves owing to aggressive lateral growth and strong competitive abilities. Other aquatic weeds not yet known from the region or even from North America may become problematic following potential future introductions. Interactions between Sanford's Arrowhead and associated emergent marsh species are unknown.

SAAR Interactions with Non-Native and Native Wildlife Species and Wildlife Management Activities

Wildlife interactions with Sanford's Arrowhead are mostly unknown. One reference is made of waterfowl heavily utilizing a Sanford's Arrowhead population (CDFG 2010). Other Sagittaria species are well documented with regard to food utilization by waterfowl (Mason 1957). In addition to waterfowl, muskrats likely utilize all parts of Sagittaria plants as well. Grazing of seedlings or young vegetation by crayfish is not known, but is likely. Other aquatic pest invertebrate and fish species not-yet known from the region, but which could become established if introduced, could threaten Sanford's Arrowhead emergent marsh habitats in the future (e.g. Asian mitten crab, jumping carp, etc.).

SAAR Genetic Considerations (Spatial and Temporal Variation, Seed Bank, Drift, Bottlenecks)

Population genetics for Sanford's Arrowhead are completely unknown.

SAAR Seed Longevity and Dynamics of Stored Soil Seed Bank

There have been no empirical studies addressing the presence of a soil seed bank, seed dormancy or longevity for Sanford's Arrowhead.

Since there are few populations of Sanford's Arrowhead in Sacramento County that are not threatened, species viability may be significantly enhanced by inoculating unoccupied, apparently suitable emergent marsh habitat and increasing the number of naturally self-sustaining populations. In addition, so much Sanford's Arrowhead habitat within the Planning Area is not protected and is subject to potential impacts resulting from routine maintenance (irrigation and drainage channels).

Any additional populations would increase the likelihood of natural dispersal events into preserved but unoccupied emergent marsh habitat, create meta-population structure at extant occurrences where single colonies may support the species, and help ensure existence should any natural populations become compromised. Dispersal into, and colonization of artificially created or enhanced irrigation ditches, excavations next to railroad tracks and artificial ponds has been documented (CDFG 2010). Sanford's Arrowhead has been successfully transplanted elsewhere in Sacramento County by the U.S. Army Corp of Engineers (USACE) (Burmester pers. comm.). The common tule potato and many other clonal emergent marsh species are readily transplantable where suitable marsh habitat exists.

SAAR Water Quality

Sanford's Arrowhead occupies habitats that are particularly subject to a variety of types of point and non-point-source water pollutants. Specific examples include sediment transport in storm-water runoff; myriad hydrocarbons from road, highway and rooftop surfaces; nutrient runoff from dairies and stockyards; fertilizer runoff from golf courses, residential landscaping and agricultural areas; herbicide runoff from roadside and highway shoulder maintenance activities; chemical and material spills from road and highway surfaces industrial areas and construction sites; myriad rain-borne air pollutants; recreational watercraft, and others. In addition, the relationship between Sanford's Arrowhead and relationships to basic physical properties of water are unknown as well, including turbidity, conductivity, pH, Biological Oxygen Demand (BOD), and others. Interestingly, the common tule potato, and several other emergent marsh species have been investigated and variously utilized in small-scale non-conventional wastewater treatment systems.

SAAR Air Pollution (Dust/Ozone/Nitric Oxide, Sulphur Dioxide, etc.)

Portions of the Central Valley of California frequently exceed State and Federal safety levels for a variety of air pollutants, including particulate matter, ozone, and others. Some of these pollutants are known to negatively affect plant physiology and health, although none have been investigated as they relate to emergent marsh vegetation. Assuming that extant Sanford's Arrowhead occurrences are maintaining their vigor at existing ambient pollution levels, air pollution will probably not present a major threat to the viability of Sanford's Arrowhead, if existing air quality can be maintained. If however, California's human population increases as projected and air pollution control measures are not developed and implemented concomitantly and effectively, these pollutants may negatively affect Sanford's Arrowhead and other native plant species in the future.

SAAR Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology.

SAAR Existing Hydrological Trend of Emergent Marshes and Existing Indirect Effects

Extant Sanford's Arrowhead populations in the Planning Area have undoubtedly experienced some degree of hydrological modification resulting from development-related alterations to sub-watersheds (CDFG 2010). Without complete consideration and management/protection at the level of watershed, or precise hydrological monitoring and accurate modeling on a wetland complex-scale, long-term indirect effects resulting from existing alterations to sub-watershed hydrology are unknown.

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MID-VALLEY FAIRY SHRIMP (MVFS)

Mid-Valley Fairy Shrimp (MVFS)

(Branchinecta mesovallensis)

Status USFWS: None

Status CDFW: None

MVFS Listing Status

The mid-valley fairy shrimp meets the requirements as a "rare, threatened or endangered species" under the California Environmental Quality Act (CEQA); however, they have no formal State or Federal protected species status. Mid-valley fairy shrimp was petitioned for endangered status under the Federal Endangered Species Act (USFWS 2003), but rejected for listing (USFWS 2004)

MVFS Life History and Ecology

MVFS Species Description and Life History

The mid-valley fairy shrimp is a typical Branchinecta anostracan. The female's second antennae are smooth, and there are no cephalic ridges or cornices. The female's thoracic surface has two paired dorsolateral projections on the fifth to seventh segments, and a pair of single dorsolateral conical projections on the fourth segment. The brood pouch is pyriform (Eriksen and Belk 1999; Belk and Fugate 2000; Rogers 2002c). The basal fourth of the male mid-valley fairy shrimp's second antennal proximal segment bears an anteriomedial pulvillus, but otherwise is smooth (Eriksen and Belk 1999; Belk and Fugate 2000). The distal segment of the male second antennae is flattened laterally, with the bilobed apex bent medially. This bilobed apex is asymmetrical: the anterior lobe is larger than the posterior. Live animals are typically off-white to grey, although the brood pouch may be green or yellow (Rogers pers. obs.). Depending upon the rapidity of development, mature animals may vary in length from three to 38 millimeters (Rogers pers. obs.). Animals may shrink as much as 11 to 32 percent upon preservation (Rogers 2002b).

Anostracans like the mid-valley fairy shrimp are a component of the zooplanktonic community within episodic, ephemeral aquatic habitats and can occur in densities as high as 200 per liter of water (Rogers pers. obs.). The vast majority of fairy shrimp are omnivorous, indiscriminately

filtering particles from the water column, including bacteria, unicellular algae, and micrometazoa (Eriksen and Belk 1999). Fairy shrimp will attempt to consume whatever material they can fit into their feeding groove, and do not discriminate based upon taste as do some other crustacean groups (Eriksen and Belk 1999). Mid-valley fairy shrimp will also rasp periphyton from sticks, stems and slender leaves (Rogers pers. obs.).

During the dry phase of their habitat, the anostracans survive as diapausing cysts (resting eggs) in and on the substrate (Sars 1896, 1898; Eriksen and Belk 1999; Rogers and Fugate 2001). When the habitat inundates from seasonal rainfall, some of the cysts hatch, and the nauplii (early larval form of anostraca) swim into the upper water column (Eriksen and Belk 1999). These larval forms are typically indistinguishable between species.

The maturation rates of the animal vary extensively depending upon temperature, and habitat type (Helm 1998; Eriksen and Belk 1999; Rogers *In review*), and the mid-valley fairy shrimp can reach maturity in as little as four days (Rogers *In review*; Rogers pers. obs.). In the genus Branchinecta, the brood pouch is truncate and as wide as the thoracic genital segments. However, when oocytes are present in the lateral pouches, the brood pouch is wider than the genital segments, forming an amplexial groove, and males can amplex the female successfully. If the oocytes are not present in the lateral pouches the female is sometimes able to wriggle out of the male's grasp (Rogers 2002b). Males approach the females from beneath to amplex. Amplexus is sustained for a second or two, as mating is rapid and the female is released immediately afterwards (Rogers 2002b). The female typically sheds her cysts as the shell forms over the fertilized oocyte (Murugan et al. 1996) and the cysts fall to the substrate.

The cysts lay dormant in the substrate until the pool dries and re-inundates during the subsequent rains. Beyond inundation of the habitat, the specific cues for hatching are unknown although temperature (Hall 1959; Belk 1977; Al-Tikrity and Grainger 1990; Belk and Nelson 1995; Helm 1998; Eriksen and Belk 1999; Rogers *In review*) and conductivity (Anderson 1958; Bowen et al. 1988; Broch 1969, 1988; Brown and Carpelan 1971; Brown 1972) are believed to play a large role. The mid-valley fairy shrimp is typically univoltine (i.e., one generation per year); however, animals of different ages may be present if a pool partially inundates allowing some cysts to hatch, and then later increases in volume, hydrating cysts that were further up-slope (Rogers pers. obs.).

Planktonic crustaceans are important in the food web, as they represent a high fat, high protein resource for migratory waterfowl. Mallard (*Anas platyrhynchos*), green-winged teal (*A. carolinensis*), bufflehead (*Bucephala albeola*), greater yellowlegs (*Tringa melanoleuca*), and killdeer (*Charadrius vociferus*) all forage actively in Central Valley vernal pools on the invertebrate and amphibian fauna during the winter months (Proctor 1964; Horne1966; Mellors, 1975; Silveira 1996; Dumont and Negrea 2002).

Predator consumption of fairy shrimp cysts aids in distributing populations of fairy shrimp. Predators (e.g., birds, amphibians) expel viable cysts in their excrement, often at locations other than where they were consumed (Proctor 1964; Wissinger et al. 1999). If conditions are suitable, these transported cysts may hatch at the new location and potentially establish a new population. Cysts are also transported by wind, and in mud carried on the feet of animals, including livestock that may wade through the habitat (Rogers in prep). This type of dispersal aids ephemeral pool crustaceans to exploit a wide variety of ephemeral habitats (Rogers 2000).

Being prey items of birds, mid-valley fairy shrimp are an intermediate host for avian cestodes (Rogers *In review*). Anostracans that are hosting a cestode tend to be bright pink in color. The change in color is due to the presence of cestode cysticercoides. The parasitic tapeworm castrates the host, which causes the host animal to accumulate lipids (probably linked to carotenoid pigments) that would otherwise be expended by the host during reproduction (Amat et al. 1991).

No specific bacterial, viral or protozoan diseases have been reported for the mid-valley fairy shrimp. Occasionally, specimens with black markings or lesions will appear in collections. These black markings, sometimes referred to as 'black disease', are actually evidence of the normal immune response of all crustacea to any bacteria, where any foreign bacteria is infused with melanin to lethal levels (Bang 1983). Branchiopod crustaceans are commonly found with phoretic ciliate protozoan colonies around the mouth and posterioventral portions of the head, which are abandoned with the exuvia by the crustacean with each molt.

Mid-valley fairy shrimp commonly co-occur with the California fairy shrimp (*Linderiella occidentalis* Dodds, 1923) (Eriksen and Belk 1999; Rogers *In review*). This species has also been reported co-occurring with the vernal pool fairy shrimp (*Branchinecta lynchi* Eng, Belk and Eriksen 1990) on three occasions, where the mid-valley fairy shrimp was probably washed into the vernal pool fairy shrimp habitat by abnormally high rainfall (Eriksen and Belk 1999). Other species of Branchinecta (*B. lindahli* Packard, 1883, *B. coloradensis* Packard, 1874, *B. mackini* Dexter, 1956, *B. lynchi*, *B. conservatio* Eng, Belk and Eriksen, 1990) occur within the range of the vernal pool fairy shrimp, but are typically found in different, although similar, vernal pool habitats (Rogers *In review*).

MVFS Habitat Requirements and Ecology

This species is entirely dependent upon the aquatic environment provided by vernal pool wetland ecosystems. The mid-valley fairy shrimp depends upon the presence of water in the winter and early spring and the absence of water during the summer. These specific vernal pool wetlands are dependent upon intact sub-watersheds, and the surrounding uplands that support

those watersheds. Vernal pool habitat is a component of the larger grassland ecosystem of the California Great Central Valley.

The mid-valley fairy shrimp needs the cold winter waters to hatch and grow in, typically appearing after the first frosts, and the dry summers to dry the resting cysts and prevent them from being attacked by fungi. Habitats supporting the mid-valley fairy shrimp are typically in Central Valley California floristic provinces below 300 meters in elevation. Typical habitat for mid-valley fairy shrimp in California includes vernal pools and seasonally ponded areas within vernal swales (Eng et al. 1990). Vernal pools that support these fairy shrimp are often grass or mud-bottomed, with clear to tea-colored water, and are often in basalt flow depression pools in grasslands (Eriksen and Belk 1999).

Mid-valley fairy shrimp have been found in habitats ranging from 0.001 to 0.5 acre in area, and typically utilizes habitats shorter in duration than is used by congeners (Eriksen and Belk 1999; Rogers pers. obs.).

Various physiochemical factors have been examined in laboratory experiments and existing mid-valley fairy shrimp habitats including alkalinity, total dissolved solids (TDS), and pH (Rogers *In review*). The importance of many of these parameters has recently been called into question with evidence that type and amount of dissolved salts may be a more important habitat requirement (Rogers *In review*). Considering the daily fluctuations in pH of a given habitat, this is to be expected. During the daylight hours, the hydrophytes are photosynthesizing, removing the CO_2 (from HCO_3) from the water, and raising the pH. During the night, the hydrophytes are respiring, increasing the CO_2 (and thereby, the HCO_3) in the water lowering the pH. If there is rainfall, the distilled precipitation will lower the pH, as will winds that cause surface action. When the habitats are drying and losing volume through evaporation, the pH, alkalinity, TDS, and electrical conductivity will increase, just as they decrease when the pools inundate or reinundate (Rogers *In review*).

Some vernal pools need a certain amount of grazing. Vernal pools that have all grazing removed become overgrown with native and exotic plants that generate deep thatch layers on the pool substrate, unless some other disturbance (i.e., weed control programs, vehicular use of pools, fire fuels control) prevents thatch deposition. As this thatch layer decomposes, it also oxidizes the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Therefore, moderate grazing may be a necessary habitat component. Conversely, excessive livestock grazing can be detrimental to mid-valley fairy shrimp. Over-grazing tends to result in a large amount of manure in vernal pools. The organic waste reduces the dissolved oxygen in the water, leaving the gill-breathing invertebrates like the mid-valley fairy shrimp without oxygen (Rogers 1998, pers. obs,). It is important not to alter grazing regimes in conservation areas until the importance of grazing to those particular systems are assessed.

Common wetland plant species that co-occur with mid-valley fairy shrimp generally need the same hydrological conditions. Therefore, the presence of these plant species within a potential habitat would imply a greater potential for a population of these shrimp to be present. These plants may include: coyote thistle (*Eryngium* spp.), downingia (*Downingia* spp.), goldfields (*Lasthenia* spp.), wooly-marbles (*Psilocarphus* spp.), hair grass (*Deschampsia* spp.), and toad rush (*Juncus bufonius*).

Similarly, pools that are dominated by vernal pool plant species that require short inundation periods may have hydrology that cannot support shrimp species. These plants may include Mediterranean barley (*Hordeum marinum* ssp, *gussoneanum*) and Italian rye grass (*Lolium multiflorum*).

Conversely, wetland habitats that support plant species that need water year round cannot support special-status shrimp species because the shrimp's cysts must dry out before they can hatch (Eriksen and Belk 1999), or if they remain wet or moist through the warmer summer months, the cysts will fungus (Rogers pers. obs.). These plants include cattails (*Typha* spp.), willow (*Salix* spp.), Fremont's cottonwood (*Populus fremontii*), duckweed (*Lemna* spp.), nut grass (*Cyperus* spp.), Baltic rush (*Juncus balticus*), and bulrush (*Schenoplectus* spp.).

Fairy shrimp are a component of a larger invertebrate community structure (Rogers 1998). This invertebrate community includes mostly planktonic crustacea dependent upon temporary wetlands including copepods, cladocerans, and ostracodes, as well as flatworms, and a suite of insect species, including: vernal pool haliplid beetle (*Apterliplus parvulus*), Scimitar backswimmers (*Buenoa scimitra*), Ricksecker's hydrochara (*Hydrochara rickseckeri*), and many others (Rogers 1998). These habitats are usually low in opportunistic species like mosquitoes and chironomid midges in the genus *Chironomus* (Rogers 1998).

Therefore, potential special-status shrimp habitat is defined as vernal pools and seasonal wetlands of sufficient size (depth and area) and seasonality that may also support specific vegetation and invertebrate community structure that indicate the potential for ponding for a sufficient duration to allow special-status shrimp species to complete their life cycles and to maintain water temperatures conducive to special-status shrimp species.

Optimal mid-valley fairy shrimp habitat tends to be small, with an abbreviated hydroperiod, neutral to slightly alkaline, clear vernal pools, low in dissolved salts, dominated with vernal pool plants, and sustains a complex vernal pool invertebrate community (Eriksen and Belk 1999; Rogers pers. obs., 1998, *In review*).

MVFS Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Vernal Pool Fairy Shrimp are identified in Table G-3.9-1 and are largely based on the habitat elements for mid-valley fairy shrimp.

Table G-3.9-1. Habitat Elements for Mid-Valley Fairy Shrimp

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by mounds and swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction.

MVFS Species Distribution and Population Trends

There are more than 40 species of *Branchinecta* world-wide (Belk and Brtek 1995, 1997; Rogers and Fugate 2001; Belk and Rogers 2002) distributed throughout the Holarctic and Neotropical regions, with one species ranging into the Antarctic. The mid-valley fairy shrimp is endemic to California (Eriksen and Belk 1999; Belk and Fugate 2000).

Habitat occupied by fairy shrimp tends to exist on level open ground. This geomorphic setting tends to be the most desirable for agricultural, urban or industrial development. As a result, the grassland plateaus and floor of the Great Central Valley has been broadly converted by human use. Consequently, an unknown amount of vernal pool habitat has been lost, and an unknown number of mid-valley fairy shrimp occurrences as well, although there have been attempts to calculate the lost acreages (Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California, more mid-valley fairy shrimp habitat will and is being encroached upon and impacted throughout the species range.

MVFS Range Wide Distribution

The earliest collections of the mid-valley fairy shrimp were made by Clyde Eriksen in the late 1960's at Mather Air Force Base. Eriksen collected the mid-valley fairy shrimp with specimens of the vernal pool tadpole shrimp, *Lepidurus packardi*. The mid-valley fairy shrimp was not recognized as a new species until Anne Huber collected material from south of Mather Field

and sent the specimens to Mike Fugate for identification. Fugate sent the material on to Denton Belk, who identified them as an undescribed species.

The mid-valley fairy shrimp is found in California from southern Sacramento County, west to Solano and Contra Costa Counties, and along the east side of the Central Valley south to Fresno County (Eriksen and Belk 1999). The entire range of this species is within the Central Valley.

MVFS Central Valley Distribution

The mid-valley fairy shrimp is endemic to California Central Valley grassland vernal pools (Belk and Fugate 2000). Known occurrences include: scattered occurrences from Mather Field area of Sacramento, south through Galt from Sacramento County; Jepson Prairie, Travis Air Force Base and Vacaville areas in Solano County: from Lodi north to the county border in San Joaquin County; the Byron Airport in Contra Costa County; the Virgina Smith Trust (Haystack Mountain) and Arena Plains National Wildlife Reserve in Merced County; one location in central Madera County; and one in northern Fresno County (Erickson and Belk 1999; Belk and Fugate 2000; Rogers in prep.).

MVFS Distribution within the Planning Area

The mid-valley fairy shrimp was first officially reported from the Planning Area in the species' original description (Belk and Fugate 2000). Specimens were collected from Mather Air Force Base as early as 1967 by Dr. Clyde Eriksen (Eriksen, pers. comm.). Numerous surveys related to development projects have been conducted within and adjacent to the Planning Area (USFWS records; CDFG 2010), but the area has not been thoroughly surveyed for mid-valley fairy shrimp, and the total extent of potential habitat is unknown. Figure MVFS-1 illustrates the known recorded occurrences of mid-valley fairy shrimp within and adjacent to the Planning Area. The modeled habitat of the species in the Planning Area is discussed in Section G-4 of this Appendix.

MVFS Population Levels and Trends

An unknown amount of vernal pool habitat has been lost and with it, an unknown number of mid-valley fairy shrimp occurrences. Attempts have been made to calculate lost vernal pool acreages (Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California, more mid-valley fairy shrimp habitat will and is being encroached upon and impacted throughout the species' range.

Adequate determination of remaining mid-valley fairy shrimp occurrences throughout the animal's range as well as population trends is difficult. Eriksen and Belk (1999) present a map of localities for the mid-valley fairy shrimp with less than 30 localities represented, with the greatest density of occurrences in southern Sacramento County.

The California Natural Diversity Data Base (CNDDB) vernal pool crustacean records (CDFG 2010) may be somewhat misleading, due to the inconsistency of the data presented. Some records refer to individual pools, while others refer to pool complexes, and others still refer to groups of complexes. Additionally, the CNDDB does is not updated when a particular site or population is extirpated. Because of issues such as these, it is difficult to determine what actually constitutes a "population" or "occurrence" in any attempt at impact analysis.

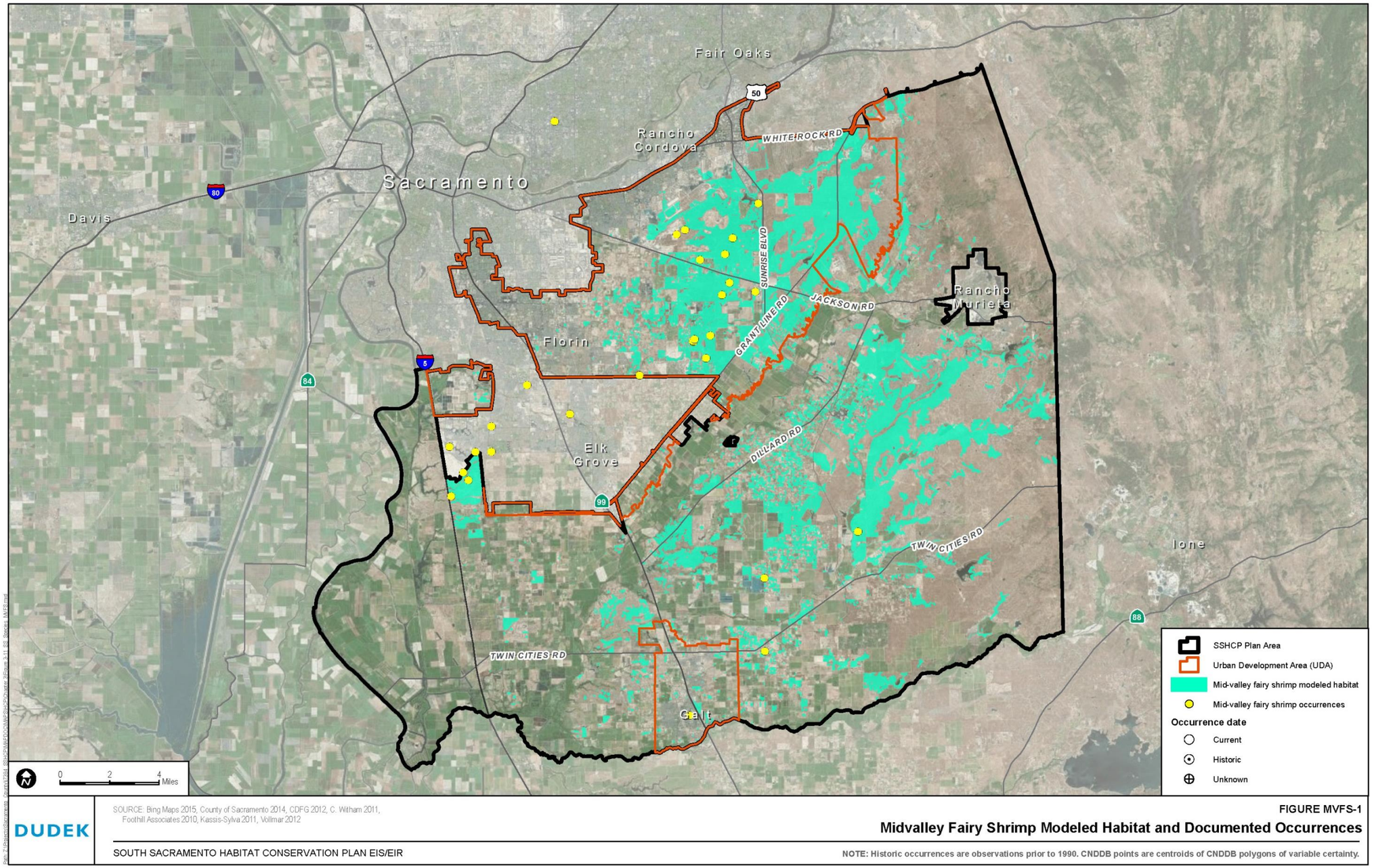
In addition, survey maps and records tend to show where vernal pool crustaceans are, and do not emphasize where they are not. Compounding these difficulties, records are typically a reflection of where surveys have been conducted, rather than a delineation of special-status shrimp distribution. Therefore, it is difficult to establish existing conditions for this species across the entire species range, as well as within the Planning Area. None of this is to say that vernal pool crustaceans are not threatened, endangered, or should not be protected. The issue is that where a paucity of adequate data exists, consistent data reporting would help prevent ambiguous interpretation or mischaracterization of species conservation needs.

MVFS Threats to the Species

As described previously, the greatest threat to vernal pool invertebrates is the elimination, loss, or modification of their habitat by development. The filling of vernal pools or modification of the watershed that supports those pools either eliminates the habitat or disrupts the pool ecosystem to where it is overcome by opportunistic invertebrate species and invasive, opportunistic and non-native plants, that out compete the obligatory vernal pool species (Rogers 1998).

Excessive livestock grazing in vernal pool terrain can be detrimental to vernal pool invertebrate communities. Over grazing tends to result in large amounts of manure in vernal pools. The organic waste reduces the dissolve oxygen in the water during decomposition, leaving gill-breathing invertebrates without oxygen (Rogers 1998, pers. obs,). Conversely, vernal pool grasslands are disturbance systems, and need a certain amount of grazing. Vernal pools that have all grazing removed may become overgrown with native (i.e.; Eleocharis sp., Eryngium sp.) and exotic plants (i.e.; Glyceria sp. Lolium multiflorum) that generate deep thatch layers on the pool substrate. As this thatch layer decomposes, it also reduces the dissolved oxygen in the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Both lack of and excessive grazing cause an increase in organic matter in the habitat that eliminates the natural vernal pool invertebrate community, and promotes opportunistic and invasive species, that outcompete the obligatory vernal pool species (Rogers 1998). Therefore, moderate grazing, or other disturbance may be a necessary habitat suitability component, and the removal of grazing or excessive grazing are threats to the mid-valley fairy shrimp.

Figure MVFS-1 Midvalley Fairy Shrimp Modeled Habitat and Documented Occurrences



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Damage to the watershed that supports vernal pools and vernal pool complexes will impact vernal pool invertebrate communities. Elimination of the watershed will not allow the pools to pond properly and will curtail the movement of nutrients into the pool from overland flow (Rogers 1998). Road run-off entering the watershed and conveyed to occupied habitat through the watershed may carry petroleum by-product residue or sediment from vehicles or paving or road maintenance activities. Furthermore, pesticide, herbicide, fertilizer, and sediment run-off from agricultural activities that may enter the watershed and be conveyed to occupied habitat, and may be injurious to vernal pool invertebrates. Ground disturbance from development activities may loosen soil that that may enter the watershed and be conveyed to occupied habitat as sediment.

Non-native invasive species are a threat to vernal pool invertebrate communities. There is concern that Bullfrogs (Rana catesbeiana) may feed upon federally protected vernal pool crustaceans (Balfour and Morey 1999). Manna grass and Italian rye grass are both exotic plants that occur in vernal pools. These species tend to produce heavy thatch and eventually organic loads upon decomposition, which reduce available oxygen in the water (Rogers 1998). In addition, people may introduce the non-discriminating predatory mosquitofish (Gambusia affinis) into vernal pools to control perceived local mosquito problems (Rogers pers. obs.).

Habitat fragmentation is a threat to vernal pool invertebrates in that the development surrounding small pool complexes may prevent waterfowl or shorebirds from feeding at the pools, thereby preventing genetic flow between occupied habitats. Furthermore, small pool complexes surrounded by development will not be buffered against the run-off from developed areas, and concomitant changes in the watershed hydrology.

Additional threats to the vernal pool invertebrate community structure include off-road vehicle use of vernal pool habitat for recreational “mud-bogging,” conversion of vernal pools into deep stock tanks that do not dry during the summer, and draining of vernal pools.

MVFS Data Gaps and Conservation Implications

Restoration and creation of mid-valley fairy shrimp habitat has been demonstrated to be feasible (Rogers 1998). Specific habitat parameters for this and other vernal pool invertebrate species are still poorly understood. For example, there appears to be a need by this species to have a minimum pool volume and a minimum pool surface area within a given habitat to be occupied. Since this species has been found in a wide variety of natural and re-established or established vernal pool habitats, it is likely that it is in some respects an opportunist, as most temporary water fauna must be.

The primary data gap regarding conservation of vernal pool invertebrates is lack of distributional data for the species within and adjacent to the Planning Area. It is not feasible economically or temporally to survey the entire Planning Area.

Other data gaps include the role of the surrounding uplands in vernal pool habitats, and the role, seasonality and intensity of grazing and other disturbances in vernal pool ecosystems. Furthermore, quantitative bioassessment may be necessary to determine the ecological functions and values of selected preserve area vernal pools to assess their suitability and value as preservation habitats.

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VERNAL POOL FAIRY SHRIMP (VPFS)

Vernal Pool Fairy Shrimp (VPFS)

(Branchinecta lynchi)

Status USFWS: Threatened

Status CDFW: None

www.nd.water.ca.gov

VPFS Listing Status

The vernal pool fairy shrimp (*Branchinecta lynchi*) was federally listed as threatened on 19 September 1994 (56 CFR 48136).

VPFS Life History and Ecology

VPFS Species Description and Life History

The vernal pool fairy shrimp is a typical Branchinecta anostracan. The female's second antennae are smooth, and there are no cephalic ridges or cornices. The female's thoracic surface has two paired dorsolateral projections on the third, and fifth to eleventh segments, and a pair of single dorsolateral conical projections on the fourth segment. The broodpouch is pyriform (Eng et al. 1990; Rogers 2002c). The basal fourth of the male vernal pool fairy shrimp's second antennal proximal segment bears an anteriomedial pulvillus and a posteriobasal transverse 'ridge-like' apophysis (Eng et al. 1990; Eriksen and Belk 1999). The medial surface of the distal third of the proximal second antennal segment has a small sparsely spined tubercle. Live animals are typically off-white to grey, although the broodpouch may be green or yellow (Rogers pers. obs.). Depending upon the rapidity of development, mature animals may vary in length from three to 38 millimeters (Rogers pers. obs.). Animals may shrink as much as 11 to 32 percent upon preservation (Rogers 2002b).

Anostracans like the vernal pool fairy shrimp are a component of the zooplanktonic community within episodic, ephemeral aquatic habitats and can occur in densities as high as 200 per liter of water (Rogers pers. obs.). The vast majority of fairy shrimp are omnivorous, indiscriminately filtering particles from the water column, including bacteria, unicellular algae, and micrometazoa (Eriksen and Belk 1999). Vernal pool fairy shrimp will attempt to consume whatever material they can fit into their feeding groove, and do not discriminate based upon taste as do some other crustacean groups (Eriksen and Belk 1999). Vernal Pool Fairy shrimp will also rasp periphyton from sticks, stems and slender leaves (Rogers pers. obs.).

During the dry phase of their habitat, the anostracans survive as diapausing cysts (resting eggs) in and on the substrate (Sars 1896, 1898; Eriksen and Belk 1999; Rogers and Fugate 2001). When the habitat inundates from seasonal rainfall, some of the cysts hatch, and the nauplii (early larval form of anostraca) swim into the upper water column (Eriksen and Belk 1999). These larval forms are typically indistinguishable between species.

The maturation rates of the animal vary extensively depending upon temperature and habitat (Gallagher 1996; Helm 1998; Eriksen and Belk 1999; Rogers 2002a). Gallegher (1996) and Helm (1998) reported the vernal pool fairy shrimp as reaching maturity in 14 and 18 days respectively; however, Rogers (pers. obs.) observed this species reaching maturity in as little as six days under high temperatures. In the genus *Branchinecta*, the brood pouch is truncate and as wide as the thoracic genital segments. When oocytes are present in the lateral pouches, the brood pouch is wider than the genital segments, forming an amplexial groove, and males can amplex the female successfully. If the oocytes are not present in the lateral pouches the female is sometimes able to

wriggle out of the male's grasp (Rogers 2002b). Males approach the females from beneath to amplex. Amplexus is sustained for a second or two, as mating is rapid and the female is released immediately afterwards (Rogers 2002b). The female typically sheds her cysts as the shell forms over the fertilized oocyte (Murugan et al. 1996) and the cysts fall to the substrate.

The cysts lay dormant in the substrate until the pool dries and re-inundates during the subsequent rains. Beyond inundation of the habitat, the specific cues for hatching are unknown although temperature (Hall 1959; Belk 1977; Al-Tikrity and Grainger 1990; Belk and Nelson 1995; Eriksen and Belk 1999) and conductivity (Anderson 1958; Bowen et al. 1988; Broch 1969, 1988; Brown and Carpelan 1971; Brown 1972) are believed to play a large role. The vernal pool fairy shrimp is typically univoltine (i.e., one generation per year); however animals of different ages may be present if a pool partially inundates allowing some cysts to hatch, and then later increases in volume, hydrating cysts that were further up-slope (Rogers pers. obs.).

Planktonic crustacea are important in the food web, as they represent a high fat, high protein resource for migratory waterfowl. Mallard, Green-Winged Teal, Bufflehead, Greater Yellowlegs, and Killdeer all forage actively in Central Valley vernal pools on the invertebrate and amphibian fauna during the winter months (Proctor 1964; Horne1966; Mellors, 1975; Silveira 1996; Dumont & Negrea 2002).

Predator consumption of fairy shrimp cysts aids in distributing populations of fairy shrimp. Predators (e.g., birds, amphibians) expel viable cysts in their excrement, often at locations other than where they were consumed (Proctor 1964; Wissinger et al. 1999). If conditions are suitable, these transported cysts may hatch at the new location and potentially establish a new population. Cysts are also transported by wind, and in mud carried on the feet of animals, including livestock that may wade through the habitat (Rogers *in prep*). This type of dispersal aids ephemeral pool crustaceans to exploit a wide variety of ephemeral habitats (Rogers 2000).

Being prey items of birds, vernal pool fairy shrimp are an intermediate host for avian cestodes (Rogers 2002a). Anostracans that are hosting a cestode tend to be bright pink in color. The change in color is due to the presence of cestode cysticercoides. The parasitic tapeworm castrates the host, which causes the host animal to accumulate lipids (probably linked to carotenoid pigments) that would otherwise be expended by the host during reproduction (Amat et al. 1991).

No specific bacterial, viral or protozoan diseases have been reported for the vernal pool fairy shrimp. Occasionally, specimens with black markings or lesions will appear in collections. These black markings, sometimes referred to as "black disease," are actually evidence of the normal immune response of all crustacea to any bacteria, where any foreign bacteria is infused with melanin to lethal levels (Bang 1983). Branchiopod crustaceans are commonly found with

phoretic ciliate protozoan colonies around the mouth and posterioventral portions of the head, which are abandoned with the exuvia by the crustacean with each molt.

Vernal pool fairy shrimp commonly co-occur with the California fairy shrimp (*Linderiella occidentalis*) (Dodds 1923; Eriksen and Belk 1999). This species has also been reported co-occurring with the mid-valley fairy shrimp (*Branchinecta mesovallensis* Belk and Fugate 2001) on three occasions, where the Mid-Valley Fairy Shrimp was probably washed into the vernal pool fairy shrimp habitat by abnormally high rainfall (Eriksen and Belk 1999). Other species of Branchinecta (*Branchinecta lindahli* Packard 1883, *B. coloradensis* Packard 1874, *B. mackini* Dexter 1956*, B. mesovallensis, B. conservatio* Eng, Belk and Eriksen 1990, *B. longiantenna* Eng, Belk, and Eriksen 1990) occur within the range of the vernal pool fairy shrimp, but are typically found in different, although similar, habitats (Rogers 2002a).

VPFS Habitat Requirements and Ecology

This species is entirely dependent upon the aquatic environment provided by vernal pool wetland ecosystems. The vernal pool fairy shrimp depends upon the presence of water in the winter and early spring and the absence of water during the summer. These specific vernal pool wetlands are dependent upon intact sub-watersheds, and the surrounding uplands that support those watersheds. Vernal pool habitat is a component of the larger grassland ecosystem of the California Great Central Valley.

The vernal pool fairy shrimp needs the cold winter waters to hatch and grow in, typically appearing after the first frosts, and the dry summers to dry the resting cysts and prevent them from being attacked by fungi. Habitats supporting the vernal pool fairy shrimp are typically in Central Valley California floristic provinces below 300 m elevation. Typical habitat for vernal pool fairy shrimp in California include vernal pools, seasonally ponded areas within vernal swales, rock outcrop ephemeral pools, playas and alkali flats (Eng et al. 1990). Vernal pool fairy shrimp have also been found in water pooled in sandstone outcrops and in alkaline vernal pools. Vernal pools that support these fairy shrimp are often grass or mud bottomed, with clear to tea-colored water, including basalt flow depression pools in grasslands (USFWS 1994; Eriksen and Belk 1999).

Pool volume is important in determining potential shrimp habitat because deeper pools with a large surface area can more easily maintain their dissolved oxygen levels. Similarly, deep pools will pond long enough to allow the shrimp to complete their life cycle. Vernal pool fairy shrimp have been found in pools ranging from 0.1 to 1.5 ac (Eriksen and Belk 1999; Rogers pers. obs.).

Various physiochemical factors have been examined in existing vernal pool fairy shrimp habitats including alkalinity, total dissolved solids (TDS), and pH (Keely 1984; Collie and Lathrop 1976; Eriksen and Belk 1999). The USFWS (1994) described the water in pools occupied by vernal pool fairy shrimp as having low conductivity and chloride; however, specific data were not provided. Eriksen and Belk (1999) presented a range of attributes measured by different workers,

reporting alkalinity ranging from 22 to 274 parts per million (ppm), TDS of 48 to 481 ppm, and pH ranging from 6.3 to 8.5 inches occupied habitats. However, the importance of many of these parameters has recently been called into question with evidence that type and amount of dissolved salts may be a more important habitat requirement (Rogers 2002a). Considering the daily fluctuations in pH of a given habitat, this is to be expected. During the daylight hours, the hydrophytes are photosynthesizing, removing the CO2 (from HCO3) from the water, and raising the pH. During the night, the hydrophytes are respiring, increasing the CO2 (and thereby, the HCO3) in the water lowering the pH. If there is rainfall, the distilled precipitation will lower the pH, as will winds that cause surface action. When the habitats are drying and losing volume through evaporation, the pH, alkalinity, TDS, and electrical conductivity will increase, just as they decrease when the pools inundate or reinundate (Rogers 2002a).

Some vernal pools need a certain amount of grazing. Vernal pools that have all grazing removed become overgrown with native and exotic plants that generate deep thatch layers on the pool substrate, unless some other disturbance (i.e., weed control programs, vehicular use of pools, fire fuels control) prevents thatch deposition. As this thatch layer decomposes, it also oxidizes the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Therefore, moderate grazing may be a necessary habitat suitability component. Conversely, excessive livestock grazing can be detrimental to vernal pool fairy shrimp. Over-grazing tends to allow a great deal of manure into vernal pools. The organic waste oxidizes the water, leaving the gill-breathing invertebrates like the vernal pool fairy shrimp without oxygen (Rogers 1998). It is important not to alter grazing regimes in conservation areas until the importance of grazing to those particular systems are assessed.

Common wetland plant species that co-occur with special-status shrimp species generally need the same hydrological conditions. Therefore, the presence of these plant species within a potential habitat would imply a greater potential for a population of these shrimp to be present. These plants may include coyote thistle (*Eryngium* spp.), downingia (*Downingia* spp.), goldfields (*Lasthenia* spp.), common spikerush (*Eleocharis macrostachya*), wooly-marbles (*Psilocarphus* spp.), hair grass (*Deschampsia* spp.), and aquatic buttercup (*Ranunculus aquatilis*).

Similarly, pools that are dominated by vernal pool plant species that require short inundation periods may have hydrology that cannot support shrimp species. These plants may include Mediterranean barley (*Hordeum marinum* ssp, *gussoneanum*), toad rush (*Juncus bufonius*), false dandelion (*Hypochoeris radicata*), and Italian rye grass (*Lolium multiflorum*).

Conversely, wetland habitats that support plant species that need water year round cannot support special-status shrimp species because the shrimp's cysts must dry out before they can hatch (Eriksen and Belk 1999), or if they remain wet or moist through the warmer summer months, the cysts are subject to attack by fungi (Rogers pers. obs.). These plants include cattails (*Typha* spp.), willow (*Salix* spp.), Fremont's cottonwood (*Populus fremontii*), duckweed (*Lemna* spp.), nut grass (*Cyperus* spp.), Baltic rush (*Juncus balticus*), and bulrush (*Schenoplectus* spp.).

The vernal pool fairy shrimp is a component of a larger invertebrate community structure (Rogers 1998). This invertebrate community includes mostly planktonic crustacea dependent upon temporary wetlands including copepods, cladocerans, and ostracodes, as well as flatworms, and a suite of insect species, including vernal pool haliplid beetle (*Apterliplus parvulus*), Scimitar backswimmers (*Buenoa scimitra*), Ricksecker's hydrochara (*Hydrochara rickseckeri*), and many others (Rogers, 1998). These habitats are usually low in opportunistic species like mosquitoes and chironomid midges in the genus *Chironomus* (Rogers 1998).

Therefore, potential habitat for special-status shrimp is defined as vernal pools and seasonal wetlands of sufficient size (depth and area) and seasonality that may also support specific vegetation and invertebrate community structure that indicate the potential for ponding for a sufficient duration to allow special-status shrimp species to complete their life cycles and to maintain water temperatures conducive to development and reproduction.

Optimal habitat for vernal pool fairy shrimp tends to be neutral to slightly alkaline, clear vernal pools, low in dissolved salts, dominated with vernal pool plants, and sustains a complex vernal pool invertebrate community (Eriksen and Belk 1999; Rogers pers. obs., 1998, 2001a). Unfortunately, little effort has been made to accurately quantify these parameters.

VPFS Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for vernal pool fairy shrimp are identified in Table G-3.10-1 and have been derived from the USFWS's list of primary constituent elements in the final rule designating critical habitat for the species (USFWS 2005) as well as input from local species experts.

Table G-3.10-1. Habitat Elements for Vernal Pool Fairy Shrimp

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by mounds and swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction.

VPFS Species Distribution and Population Trends

There are more than 40 species of *Branchinecta* world-wide (Belk and Brtek 1995, 1997; Rogers and Fugate 2001; Belk and Rogers 2002) distributed throughout the Holarctic and Neotropical regions, with one species ranging into the Antarctic. The vernal pool fairy shrimp is endemic to Oregon and California (Eng et al. 1990; Eriksen and Belk 1999).

Habitat occupied by fairy shrimp tends to exist on level open ground. This geomorphic setting tends to be the most desirable for agricultural, urban or industrial development. As a result, the grassland plateaus and floor of the Great Central Valley has been broadly converted by human use. Consequently, an unknown amount of vernal pool habitat has been lost, and an unknown number of vernal pool fairy shrimp occurrences as well, although there have been attempts to calculate the lost acreages (Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California and Oregon, more vernal pool fairy shrimp habitat will and is being encroached upon and impacted throughout the species range.

VPFS Range Wide Distribution

The earliest collections of the vernal pool fairy shrimp on record were made by Dr. G. Eisen at "San Francisco" in 1874 (Lilljeborg 1889; Linder 1941), which were misidentified as *Branchinecta coloradensis* (Eng et al. 1990). Linder (1941) used Eisen's misidentified material for his sketch of *B. coloradensis*; on page 191 of Linder's definitive monograph of the anostraca the vernal pool fairy shrimp is clearly pictured.

The vernal pool fairy shrimp is found in California from the Redding/Bella Vista area of Shasta County in the north, throughout the Central Valley, and west to the central Coast Ranges, from northern Solano County to Pinnacles National Monument in San Benito County. Disjunct occurrences were also reported to occur in San Luis Obispo County, Santa Barbara County, and Riverside County, and from near Rancho California and the Santa Rosa Plateau in Riverside County. A disjunct population(s) has been reported in Jackson County near Medford Oregon (Eng et al. 1990; USFWS 1994; Eriksen and Belk 1999).

The existence of recently discovered occurrences near Medford, Oregon (Eriksen and Belk 1999) may indicate that there are other undiscovered occurrences between Shasta County, California and Medford.

VPFS Central Valley Distribution

In 1994, the USFWS reported that there were 32 occurrences of the vernal pool fairy shrimp ranging from the Stillwater Plain in Shasta County through most of the length of the Central Valley to Paisley in Tulare County (USFWS 1994).

Since then, vernal pool fairy shrimp have been reported from throughout Sacramento, Colusa and Glenn Counties, as well as Central Valley portions of the following counties: Tehama, Butte, Sutter, Yuba, Placer, Stanislaus, Madera, Fresno and Tulare on the east side of the valley (Eriksen and Belk 1999), and Alameda, Solano, Yolo, Colusa and Glenn on the west side (Eriksen and Belk 1999).

VPFS Distribution within the Planning Area

The vernal pool fairy shrimp were first officially reported from the Planning Area in 1982 (CDFG 2010). Specimens were collected from near Mather Air Force Base as early as 1967 by Dr. Clyde Eriksen (Eriksen, pers. comm.). Numerous surveys related to development projects have been conducted within and adjacent to the Planning Area (USFWS records; CDFG 2010), but the area has not been thoroughly surveyed for vernal pool fairy shrimp, and the total extent of potential habitat is unknown. Figure VPFS-1 illustrates the known recorded occurrences of vernal pool fairy shrimp within and adjacent to the Planning Area. The modeled habitat of the species in the Planning Area is described in Section G-4 of this Appendix.

VPFS Population Levels and Trends

An unknown amount of vernal pool habitat has been lost and with it, an unknown number of vernal pool fairy shrimp occurrences. Attempts have been made to calculate lost vernal pool acreages (Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California and Oregon, more vernal pool fairy shrimp habitat will and is being encroached upon and impacted throughout the species' range.

Adequate determination of remaining vernal pool fairy shrimp occurrences throughout the animal's range as well as population trends is difficult. The USFWS (1994) listed 32 known occurrences of the vernal pool fairy shrimp. These data were collected during a prolonged drought in California. Sugnet and Associates (1993) submitted a study claiming 178 "discrete locations" supporting the vernal pool fairy shrimp, however as specific localities were not divulged, the data are unverifiable and therefore not scientifically useful in any type of analyses. Eriksen and Belk (1999) present a map of localities for the vernal pool fairy shrimp with more than 200 localities represented, with the greatest density of occurrences in Sacramento County.

The California Natural Diversity Data Base (CNDDB) vernal pool crustacean records (CDFG 2010) may be somewhat misleading, due to the inconsistency of the data presented. Some records refer to individual pools, while others refer to pool complexes, and others still refer to groups of complexes. Additionally, the CNDDB is not updated when a particular site or population is

extirpated. Because of issues such as these, it is difficult to determine what actually constitutes a "population" or "occurrence." when using this data.

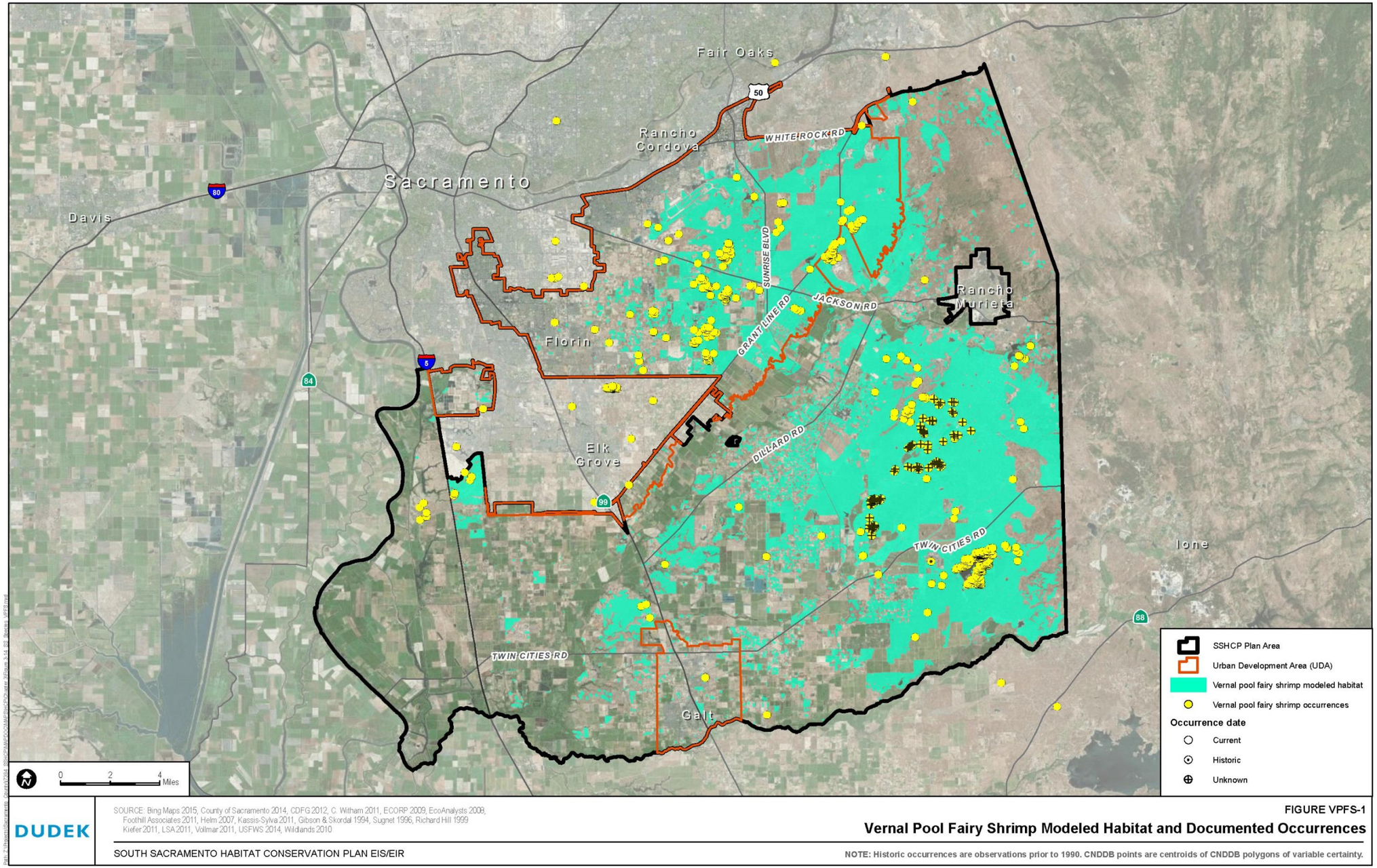
In addition, survey maps and records tend to show where vernal pool crustaceans are, and do not emphasize where they are not. Compounding these difficulties, records are typically a reflection of where surveys have been conducted, rather than a delineation of special-status shrimp distribution. Therefore, it is difficult to establish existing conditions for this species across the entire species range, including within the Planning Area. None of this is to say that vernal pool crustaceans are not threatened, endangered, or should not be protected. The issue is that where a paucity of adequate data exists, consistent data reporting would help prevent ambiguous interpretation or mischaracterization of species conservation needs.

VPFS Threats to the Species

As described previously, the greatest threat to vernal pool invertebrates is the elimination, loss, or modification of their habitat by development. The filling of vernal pools or modification of the watershed that supports those pools either eliminates the habitat or disrupts the pool ecosystem to where it is overcome by opportunistic invertebrate species and invasive, opportunistic and non-native plants, that out compete the obligatory vernal pool species (Rogers 1998).

Excessive livestock grazing in vernal pool terrain can be detrimental to vernal pool invertebrate communities. Overgrazing tends to result in a large amount of manure in vernal pools. The organic waste oxidizes the water, leaving gill-breathing invertebrates without oxygen (Rogers 1998). Conversely, vernal pool grasslands are disturbance systems, and need a certain amount of grazing. Vernal pools that have all grazing removed may become overgrown with native (e.g., *Eleocharis* sp., *Eryngium* sp.) and exotic plants (e.g., *Glyceria* sp. *Lolium multiflorum*) that generate deep thatch layers on the pool substrate. As this thatch layer decomposes, it lowers the dissolved oxygen in the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Both lack of and excessive grazing cause an increase in organic matter in the habitat that eliminates the natural vernal pool invertebrate community, and promotes opportunistic and invasive species, that outcompete the obligatory vernal pool species (Rogers 1998). Therefore, moderate grazing, or other disturbance may be a necessary habitat component, and the removal of grazing or excessive grazing are threats to the vernal pool fairy shrimp.

Figure VPFS-1 Vernal Pool Fairy Shrimp Modeled Habitat and Documented Occurrences



DUDEK

SOURCE: Bing Maps 2015, County of Sacramento 2014, CDFG 2012, C. Witham 2011, ECORP 2009, EcoAnalysts 2008, Foothill Associates 2011, Helm 2007, Kassis-Sylva 2011, Gibson & Skordal 1994, Sugnet 1996, Richard Hill 1999 Kiefer 2011, LSA 2011, Vollmar 2011, USFWS 2014, Wildlands 2010

FIGURE VPFS-1

Vernal Pool Fairy Shrimp Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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Damage to the watershed that supports vernal pools and vernal pool complexes will impact vernal pool invertebrate communities. Elimination of the watershed will not allow the pools to pond properly and will curtail the movement of nutrients into the pool from overland flow (Rogers 1998). Road run-off entering the watershed and conveyed to occupied habitat through the watershed may carry petroleum by-product residue or sediment from vehicles, paving or road maintenance activities. Furthermore, pesticide, herbicide, fertilizer, and sediment run-off from agricultural activities may enter the watershed and be conveyed to occupied habitat, and may be injurious to vernal pool invertebrates. Ground disturbance from development activities may loosen soil that that may enter the watershed and be conveyed to occupied habitat as sediment.

Non-native invasive species are a threat to vernal pool invertebrate communities. There is concern that bullfrogs (*Rana catesbeiana*) may feed upon federally protected vernal pool crustaceans (Balfour and Morey 1999). Manna grass (*Glyceria declinata*) and Italian rye grass are both exotic plants that occur in vernal pools, tend to produce heavy thatch and eventually create organic loads upon decomposition which reduce dissolved oxygen in the water (Rogers 1998). In addition, people may introduce the non-discriminating predatory mosquitofish (*Gambusia affinis*) into vernal pools to control perceived local mosquito problems (Rogers pers. obs.).

Habitat fragmentation is a threat to vernal pool invertebrates in that the development surrounding small pool complexes may prevent waterfowl or shorebirds from feeding at the pools, thereby preventing genetic flow between occupied habitats. Furthermore, small pool complexes surrounded by development will not be buffered against the run-off from developed areas, and concomitant changes in the watershed hydrology.

Additional threats to the vernal pool invertebrate community structure includes: off-road vehicle use of vernal pool habitat for recreational “mud-bogging;” conversion of vernal pools into deep stock tanks that do not dry during the summer; and draining of vernal pools.

VPFS Data Gaps and Conservation Implications

Restoration and creation of vernal pool fairy shrimp habitat has been demonstrated to be feasible (Rogers 1998). However, specific habitat parameters for this and other vernal pool invertebrate species are still poorly understood. For example, there appears to be a need by this species to have a minimum pool volume and a minimum pool surface area within a given habitat to be occupied. Since this species has been found in a wide variety of natural and re-established or established vernal pool habitats, it is likely that it is in some respects an opportunist, as most temporary water fauna must be.

The primary data gap regarding conservation of vernal pool invertebrates is lack of distributional data for the species within and adjacent to the Planning Area, because it is not feasible economically or temporally to survey the entire Planning Area.

Other data gaps include the role of the surrounding uplands in vernal pool habitats, and the importance of seasonality and intensity of grazing and other disturbances in vernal pool ecosystems.

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VALLEY ELDERBERRY LONGHORN BEETLE (VELB)

Valley Elderberry Longhorn Beetle (VELB)

(Desmocerus californicus dimorphus)

Status USFWS: Threatened

Status CDFW: None

VELB Listing Status

The Valley Elderberry Longhorn Beetle (*Desmocerus californicus dimorphus*) (VELB) was federally listed as a threatened species on August 8, 1980 (50 CFR part 17, 52803 – 52807).

VELB Life History and Ecology

VELB Physical Description and Taxonomy

VELB is an atypical lepturine Cerambycid beetle. The Cerambycidae are the longhorned wood boring beetles. The subfamily Lepturinae is comprised mostly of small, showy, diurnal, species that are commonly found on flowers through the spring and summer, although they are generally more abundant at higher altitudes. Elderberry beetles are in the genus *Desmocerus*, the sole genus in the Lepturine tribe (*Desmocerini* Linsley and Chemsak 1972; Monné and Hovore 2001). This tribe is separated from all other Lepturine tribes by the form of the mandibles, which are broad and short, without internal pubescence (Linsley and Chemsak 1972).

The California elderberry longhorn beetle (*D. californicus*) was originally described by Horn in 1881. This beetle is black in color, with red to orange margins on the elytra in living animals,

fading to yellow in death. The pronotum disc is plane, with confluent punctations. The elytra are densely punctate or rugose. Adult beetles range from 14 to 25 millimeters in length (Linsley and Chemsak 1972).

VELB was described as a separate species by Fisher (1921) and was reduced to subspecific status by Doane et al. (1936). The majority of male VELB can be separated from the nominate subspecies by the short, suberect, pale setae on the antennae (as opposed to dark setae), and having the black elytral markings reduced to a single elongated apical dot and a single elongated basal dot per each elytron (Linsley and Chemsak 1972). Although it has been reported that a percentage of VELB males have identical elytral patterns to the nominate form (Linsley and Chemsak 1972; Eya 1976; Barr 1991), there is no explanation as to how this percentage is separated from the nominate form. The female VELB cannot be separated morphologically from the nominate subspecies. The larva has not been described, but the life history and immature stages of the nominate taxon were detailed by Davis and Comstock (1924).

This species has been confused with females of the common and widespread Lepturine *Anastrangalia laetifica* (LeConte) 1859, which is smaller (8 to 13 millimeters), much more elongated, and is similarly colored, except that the elytra have a subbasal, sutural, elongated black marking, and an elongated black marking near the elytral margin.

VELB Reproduction

The VELB is univoltine. The female oviposits between eight and 20 eggs in bark crevices on the host plant (Burke 1921; Barr 1991). The host plant is the elderberry (*Sambucus* spp.) (Burke 1921; Linsley and Chemsak 1972, 1997; Barr 1991). The eggs are 3.5 to 1.25 millimeters in diameter, oblong (football shaped), with a small knob at each end, and have wavy, longitudinal ridges, white initially, and then darkening to reddish brown (Burke 1921; Barr 1991). The egg is attached to the shrub by a thin secretion and the larva ecloses within 30 to 40 days (Burke 1921).

The newly emerged larvae bore into the wood of the host plant (Linsley and Chemsak 1972; Barr 1991). Burke (1921) and Eya (1976) reported that the larvae take two years to mature, however Halstead (1991) believes that one year is the norm. The larva typically bores into the central pith of stems and feeds there; however, on large trunks the larvae feed upon the wood (Burke 1921). The larvae create an elongated, longitudinal gallery through the heart of the stems, filling it with frass and shredded wood (Barr 1991). When the larva is ready to pupate it chews a circular to slightly oval exit hole (7 to 10 millimeters in diameter) to the outside, which it plugs with frass. Then the larva backs up into the gallery and constructs a pupal chamber out of shredded wood and frass (Barr 1991). Jones and Stokes (1985, 1986, 1987a, and 1987b) and Halstead (1991) reported that 70 percent of exit holes are within 1.2 meters of the ground in stems greater than 13 mm in diameter; however holes may be as high as three meters above

the ground (Barr 1991, Rogers pers. obs.). Pupae can be found between January and April, and the pupal stage lasts about one month (Burke 1921).

After pupation, the teneral adult remains in the pupal cell for several weeks prior to emergence (Burke 1921). The adult eventually emerges from the pupal chamber, through the exit hole (Barr 1991). The adults readily fly from shrub to shrub. VELB is most often seen on, in, or immediately under the host plant's inflorescences; however, copulation occurs on the lower parts of the stems (Barr 1991; Rogers pers. obs.). The adults feed on the leaves, and to a lesser extent on the flowers (Linsley and Chemsak 1972; Barr 1991). The adults are active from March to early June.

VELB Ecological Relationships

There are no known diseases of VELB. Numerous species of Cleridae (checkered beetles), Cucujidae (flat bark beetles), Ostomatidae (bark-gnawing beetles), Elateridae (click beetles), Asilidae (robber flies), Phymatidae (ambush bugs), Reduviidae (ambush bugs), and some Thysanoptera (thrips) are known predators of Cerambycid beetles (Linsley 1961). All are common in the Central Valley, but none have been reported feeding on VELB.

The non-native invasive Argentine ant (*Linepithema humile*) has been observed attacking and killing VELB larvae. The ants enter the exit hole that the beetle makes prior to pupation, and remove the larva (Huxel 2000).

Birds that hunt insect larvae in wood, such as woodpeckers, creepers, and nuthatches, may also prey upon VELB, but no observations of this have been reported. Adult beetles may not be taken by birds due to their warning colors. Whether these warning colors are genuine or represent Batesian mimicry is unknown.

VELB Habitat Requirements and Ecology

The VELB is completely dependent upon its host plant, the elderberry (*Sambucus glauca, S. mexicana, S. caerulea*) (Linsley and Chemsak 1972, 1997; Eng 1984; Barr 1991; Collinge et al. 2001) using no other recorded larval host plant. This shrub is a component of riparian forests throughout the Central Valley. Although this shrub occasionally occurs outside of riparian areas, shrubs supporting the greatest beetle densities are where the shrubs are abundant and interspersed among dense riparian forest, including species such as Fremont's cottonwood (*Populus fremontii*), box elder (*Acer negundo*), western sycamore (*Platanus racemosa*), California black walnut (*Juglans hindsii* var. *californica*), white alder (*Alnus rhombifolia*), willow (*Salix* spp.), button-willow (*Cephalanthus occidentalis*), Oregon ash (*Fraxinus latifolia*), wild grape (*Vitis californicus*), California hibiscus (*Hibiscus lasiocarpos*), and western poison-oak (*Toxicodendron diversilobum*) (Barr 1991; USFWS 1999; Collinge *et a*l. 2001). Isolated elderberry

shrubs separated from contiguous habitat by extensive development are not typically considered to provide viable habitat for VELB (USFWS 1998; Collinge et al. 2001).

Although VELB can be found wherever elderberry shrubs are found, the VELB is also a component of a larger community structure dependent upon riparian forest (Eya 1976; USFWS 1984, 1999; Barr 1999; Huxel 2000; Collinge et al. 2001). This community includes numerous other invertebrates dependent upon riparian corridors including other invertebrates like the Sierra sideband snail *(Monodenia mormonum)*, bumblebee scarab *(Licnanthe rathvoni)*, flat headed borers (*Buprestis viridisuturalis* and *Buprestis laeviventris)*, the oak root borers *(Prionus lecontei* and *Prionus californicus)*, monarch butterfly (*Danaus plexippus)*, California dogface *(Zerene eurydice)*, western tiger swallowtail (*Papilio rutulus)*, and Argiope orb weavers (Rogers, pers, obs.), as well as vertebrates such as yellow-billed cuckoo and least Bell's vireo.

Therefore, suitable VELB habitat is defined as elderberry shrubs that are adjacent to, or contiguous with riparian forest, flood plains or relict elderberry savannah that measure greater than or equal to one inch in diameter measured at ground level.

VELB Habitat Elements

Habitat elements are those basic aspects of the environment which are needed for survival and propagation of the species. The habitat elements for VELB are identified in Table G-3.11-1 and have been derived from input from local species experts.

Table G-3.11-1. Habitat Elements for Valley Elderberry Longhorn Beetle

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Mine tailing riparian woodland, valley oak riparian woodland, mixed riparian woodland, and mixed riparian scrub.	Requires elderberry shrubs (*Sambucus glauca*, *S. mexicana, S. caerulea*); generally in a matrix of other continuous to semi-continuous riparian vegetation.

VELB Species Distribution and Population Trends

Habitat occupied by VELB tends to form and exist in riparian corridors and on the level open ground of periodic flood plains. This geomorphic setting historically has been desirable for agricultural, urban or industrial development. As a result, much of this habitat type has been converted through dams and levees for use as developable land. Although it has been estimated that 90 percent of California riparian habitat has been lost over the last century and a half (Barr 1991; Barbour et al. 1991; Smith 1980; Reiner and Griggs 1989; TNC 1990; Jacobs 1992; Naiman et al. 1993; Naiman and Décamps 1997) it is difficult to accurately quantify in terms of direct VELB habitat losses. Therefore, an unknown amount of riparian forest and

elderberry savannah habitat has been lost, and an unknown number of VELB metapopulations as well (Collinge et al. 2001).

Long-term datasets on VELB occupancy are limited to those collected by Collinge et al. (2001) who, in 1997, re-surveyed sites visited by Barr (1991). Both found about 25 percent occupancy of elderberry groups and 20 percent occupancy of sites. However, decreases in the number of sites with elderberry (at seven fewer re-visited sites: a 10 percent decline) and in density of elderberry between surveys, resulted in lower total numbers of occupied sites and shrub groups (Collinge et al. 2001). Considering elderberry loss, and VELB extirpations (exit holes no longer found) and colonizations (exit holes found in 1997 where there were none in 1991) at sites that still had elderberry, Collinge et al. (2001) counted extirpations at nine of 72 re-visited sites (12.5 percent over six years, or about 2.5 percent of sites per year), and colonizations at four of 43 previously unoccupied sites revisited (nine percent over six years or about 1.5 percent of sites per year). colonizations only were identified within major drainage systems.

Lang et al. (1989) found much lower occupancy rates along the southern half of the Sacramento River than in the northern half and attributed the lower rates to the loss and narrowing of riparian corridors associated with agricultural development. This pattern may also reflect changes that have occurred through time. Loss of over 90 percent of riparian habitat (Katibah et al. 1984; GIC 2003) and subsequent fragmentation in the VELB's range may have resulted in not only loss of populations occurring in destroyed areas, but also degradation and declines in occupancy rates within remnants of habitat.

VELB Range Wide Distribution

Desmocerus californicus is one of three species of *Desmocerus* in North America. VELB is one of two subspecies of *D. californicus*. The nominate subspecies is widespread in coastal California, ranging from Mendocino County southward to western Riverside and northern San Diego Counties, and also into the southern Sierra Nevada range (Kern and Tulare Counties). The VELB subspecies is a narrowly defined endemic taxon, limited distributionally to portions of the California Central Valley and Sacramento-San Joaquin River Delta (USFWS 1999). Studies to assess the distribution and extent of the valley subspecies began in the late 1970's (Eya 1976) and the USFWS proposed the species for listing in 1978. Since VELB was listed in 1980, numerous distributional studies have been conducted (summarized in Barr 1991; Halstead and Oldham 2000). This subspecies is endemic to California, occurring below 900 meters elevation (USFWS 1999).

VELB Central Valley Distribution

In the Central Valley proper, VELB was first collected from "Sacramento, California," the precise location being unknown (Fisher 1921). Additional material was identified from Putah Creek in

Solano and Yolo counties, and from along the Lower American River in Sacramento County (Linsley and Chemsak 1972). Linsley and Chemsak (1972) also reported a single female from the Merced River; however, since the females cannot be separated to subspecific level, the identification is considered unverified.

Subsequent to various surveys throughout the Central Valley, the USFWS (1999) prepared a map of the presumed range of VELB. This map encompasses the entire Central Valley, and the Sacramento-San Joaquin River Delta, below 900 meters in elevation. Additionally the CNDDB identifies 201 occurrences in a continuous band from Shasta County in the north to Kern County in the southern portion of the State (CDFG 2010).

VELB Distribution within Planning Area

Because comprehensive surveys for VELB in the Planning Area have not been conducted and because known occurrences throughout the species range are based mostly on incidental observations, the population size and locations of this species in the Planning Area are not known. Few surveys focused on VELB have been conducted within and adjacent to the Planning Area, and the total extent of potential habitat (i.e., elderberry shrubs) is unknown. Of the 22 known occurrences of VELB recorded within the CNDDB from Sacramento County 15 are located north and outside of the Planning Area in proximity to the American River. Of the remaining seven CNDDB occurrences located within the Planning Area, five CNDDB occurrences are located along the Cosumnes River/Deer Creek riparian corridor, one along Highway 50 in Rancho Cordova, and one is located along Dry Creek east of the City of Galt (CDFG 2010). There were also several documented exit holes within the mine tailing riparian woodland in Rancho Cordova on the Aerojet property (Talley et al. 2007) and along the Cosumnes River near Rancho Murieta (Talley 2003). There are no previously recorded occurrences along the Sacramento River within the County (CDFG 2010).

It is important to note that much of the Planning Area encompasses privately owned property, a majority of which has not been surveyed for the presence of VELB; therefore, there is a high probability that future surveys will identify additional occurrences within the Planning Area.

Figure VELB-1 illustrates the recorded distribution of known VELB occurrences (based primarily on exit holes) within and adjacent to the Planning Area (CDFG 2010; Talley et al. 2007; Talley 2003). Recently made exit holes can be identified and are commonly used as an indicator of species presence. As noted above, extensive mapping efforts on public and private lands within the Planning Area have not been conducted and would be needed to fully characterize the distribution of VELB in the Planning Area. The modeled habitat of the species within the Planning Area is discussed in Section G-4 of this Appendix.

VELB Population Levels and Trends

The VELB is known from a total of 201 CNDDB occurrences, which include 23 in Fresno County; 22 in Sacramento County; 21 in Tehama County; 18 each in Butte and Yolo Counties; 17 in San Joaquin County; 13 Yuba County; 12 in Glenn County; ten in Tulare County; nine in Solano County; eight in Stanislaus County; seven each in Colusa, Placer, and Sutter Counties; six each in Madera and Tuolumne Counties, four each in Kern, Merced, Napa, and Shasta Counties; two in El Dorado County; and one each in Amador Calaveras, and Mariposa Counties (CDFG 2010).

Of the 201 CNDDB occurrences recorded, all are listed as presumed extant (CDFG 2010). Only one recorded occurrence, which is located in Sacramento County along State Highway 50, is listed as experiencing a decreasing trend the rest are listed as trend unknown (CDFG 2010); this occurrence has Argentine ants which have killed two newly emerged VELB (Calderaro pers.obs.).

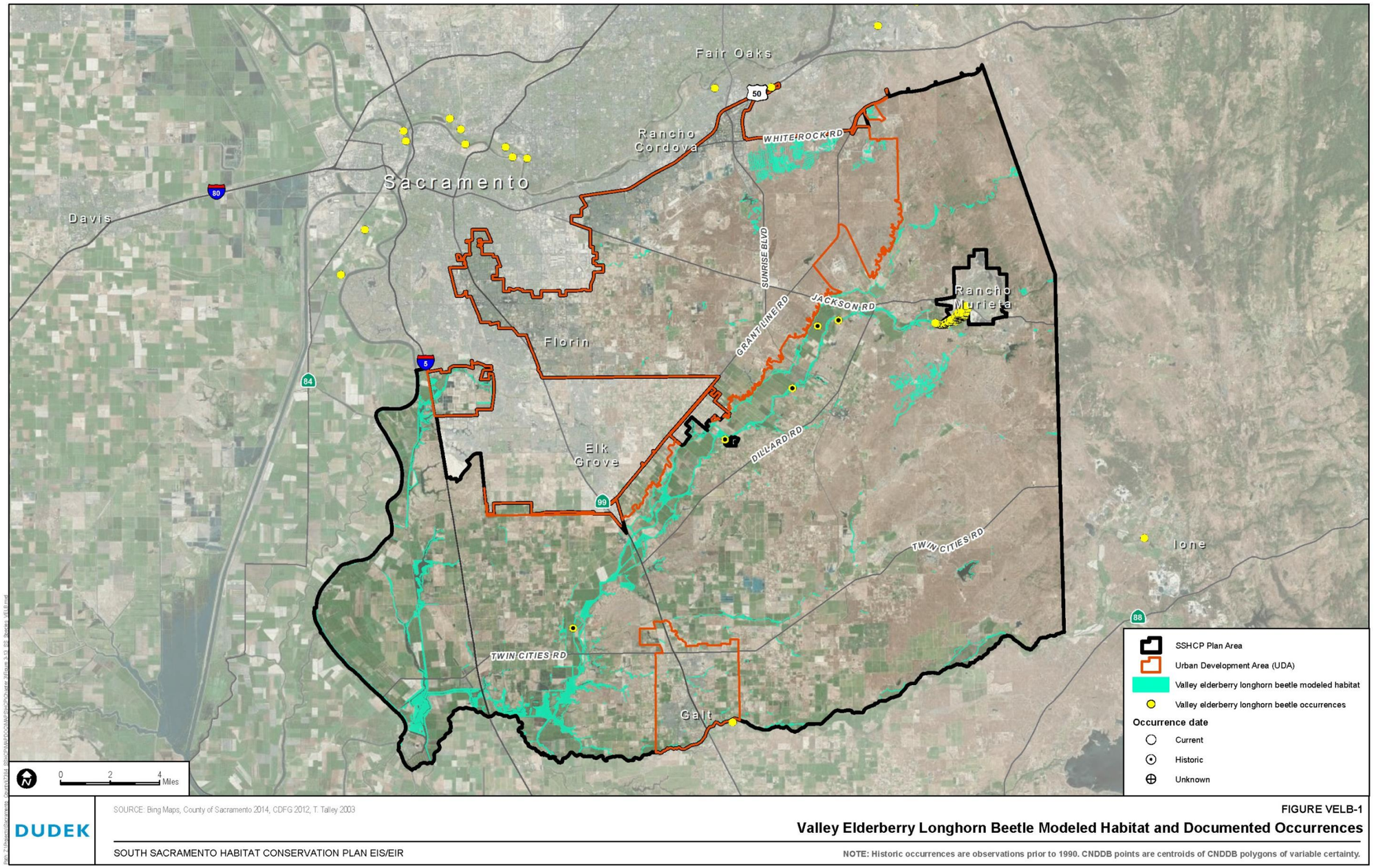
An unknown amount of riparian forest and elderberry savannah has been lost, and with it, an unknown number of VELB occurrences. Due to current pressures of the increasing human populations in California, more VELB habitat is being and will continue to be encroached upon and impacted throughout the species range. Although it has been estimated that 90 percent of California riparian habitat has been lost over the last century and a half (Barr 1991) it is difficult to adequately quantify. It is not unreasonable to assume that as riparian habitat is lost, VELB will experience a decreasing trend in population.

VELB Threats to the Species

The greatest threat to VELB is the elimination, loss, or modification of their habitat by development and other activities, which reduce or eliminate their host plants. Levees, dams or other structures or activities that alter the hydrology of riparian areas may lead to the direct loss of riparian forests and elderberry shrubs. Habitat fragmentation also may pose a threat to the VELB, as development which isolates small patches of riparian forest may prevent VELB movement and genetic flow between occupied areas of habitat, isolating metapopulations (Collinge et al. 2001). Furthermore, small areas of habitat, which are surrounded by development may not be buffered against run-off and other degrading effects from adjacent developed areas, such as storm run-off contaminants.

Opportunistic invasive non-native plants like the Himalayan blackberry (*Rubus discolor*) may overwhelm elderberry shrubs by the sheer mass of their growth form, and may shade out the leaves, killing the shrub, or prevent VELB from moving between shrubs, or dispersing to other shrubs. Excessive livestock grazing in riparian areas can be detrimental to riparian communities. Cattle and horses chew on elderberry and other riparian forest species, often girdling shrubs and trees, and eventually killing them.

Figure VELB-1 Valley Elderberry Longhorn Beetle Modeled Habitat and Documented Occurrences



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Pesticide drift from agriculture or direct fogging of riparian areas by mosquito abatement districts or the State Health Department to control encephalitis mosquitoes may affect VELB.

VELB Data Gaps and Conservation Implications

The ecology, status, and management of VELB have received increased attention in recent years; however, there are several sources of uncertainty regarding VELB and its requirements in the Planning Area. The primary data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

VELB Population and Habitat Distribution within the Planning Area

VELB occur in suitable habitat within the Planning Area; however, comprehensive surveys for VELB in the Planning Area have not been conducted and the existing occurrence data are based primarily on incidental observations (particularly the presence of exit holes which may or may not be associated with VELB). Consequently, the population size and distribution of the species throughout the Planning Area are not known. Although the distribution of different land cover-types is mapped and quantifiable, the quality of habitat (particularly as it relates to habitat components such as elderberry shrubs and stem size) for VELB within most of these areas is unknown. These information gaps limit our ability to identify the best lands available for preserving VELB habitat and accurately estimate the impacts resulting from covered activities.

Until this data gap is remedied, the conservation value for VELB will be considered relatively high in lands that support (or recently supported) known occurrences and/or are adjacent to these areas.

VELB Determining Threat Severity

Although certain factors are known to contribute to VELB decline range wide, exactly how and to what extent these factors contribute to the decline of the VELB are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population (e.g., adjacent use of pesticides and herbicides); therefore, to improve conservation planning efforts for VELB in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats.

VELB Effectiveness of Habitat Enhancement and Restoration Techniques in Creating Suitable Habitat for VELB

Achieving the conservation goals and objectives for VELB will require successful enhancement and restoration of suitable habitat as well as maintenance of dispersal corridors. The function of habitat

(e.g., connectivity, biodiversity, etc.) is an important factor for suitability of VELB. Whether restored or enhanced habitats can retain the structural attributes suitable for VELB is unknown.

If habitat restoration and enhancement techniques cannot eventually create habitats with functional characteristics suitable for VELB, then those lands would not support sustainable populations.

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RICKSECKER'S HYDROCHARA/WATER SCAVENGER BEETLE (RWSB)

Ricksecker's Hydrochara/Water Scavenger Beetle (RWSB)

(Hydrochara rickseckeri)

Status USFWS: None

Status CDFW: None

RWSB Listing Status

The Ricksecker's hydrochara (*Hydrochara rickseckeri*), or Ricksecker's water scavenger beetle, meets the requirements as a "rare, threatened or endangered species" under the California Environmental Quality Act (CEQA); however, they have no formal State or Federal protected species status.

RWSB Life History and Ecology

RWSB Species Description and Life History

Ricksecker's hydrochara was originally described in the genus *Hydrocharis* (in error) by Horn in 1895. Leech (1956) moved it to the genus *Hydrochara*. The Ricksecker's hydrochara is a typical aquatic Hydrophilid beetle. The sexes are not readily separable. The Ricksecker's hydrochara is 10 to 12 millimeters in length, and dorsally convex. The overall color is black. Dorsally the beetle has metallic green reflections, and the lateral margins of the pronotum and elytra are testaceous to yellow. Ventrally, the keel is short, ending in a sharp spine (Smetana 1980). Underwater, the black ventral surface appears silvery due to the air trapped on the ventral setae. This species can readily be confused with the widespread *Tropisternus lateralis* Fabricius 1775, which is slightly smaller, is less convex, and has a much more elongated ventral keel. The larva has not yet been formally described; however, it can be separated from all other Hydrophilid genera by the five segmented legs, symmetrical mandibles, reduced gula, lateral abdominal projections, and tracheal gills absent (Archangelski 1997; Rogers and Serpa *in prep*).

The vast majority of Hydrophilid beetles, including the Ricksecker's hydrochara, are predatory as larvae and omnivorous as adults. Ricksecker's hydrochara is a component of the benthic community within episodic, ephemeral aquatic habitats (Rogers pers. obs.). Ricksecker's

hydrochara larvae indiscriminately attack anything their size or smaller, and attempt to consume it, including other insects, crustaceans, amphibian larvae, and other Ricksecker's hydrochara larvae (Rogers pers. obs.; Serpa pers. obs.). Like other Hydrophilid species, the larvae tend to keep to shallow margins and heavily vegetated areas, and upon making a kill, carry the prey item to the surface and hold it out of the water while consuming it (Plague 1996; Rogers pers. obs.). Adults feed on common frog-fruit (*Phyla nodiflora*), and dead insects and tadpoles (Serpa pers. obs; Rogers pers. obs.).

The Ricksecker's hydrochara is univoltine. Oviposition and eclosion have not been observed. Early instar larvae appear in the pools three to four weeks after the pools first fill (Rogers pers. obs.). The larvae grow quickly, usually requiring only two or three meals to molt to each subsequent instar. When temperatures begin to rise (typically March) the late instar larvae leave the pool, and construct a burrow in the adjacent uplands, typically where the soil is slightly moist, and pupate therein (Rogers pers. obs.). Pupation lasts two to four days, depending upon temperature. Upon emergence, the adults fly to a different vernal pool and mate (Rogers pers. obs.). The ovisac of other *Hydrochara* spp. is constructed by the female at the water surface, in vegetation. The ovisac is typically off-white, roughly subspherical, 10 to 18 millimeters in length, with a slender mast (Archangelski 1997). The mast and operculum are brownish. The adults may die after mating and oviposition, as dead adults have been found as the pools are drying (Rogers pers. obs).

There are no known diseases, parasites or predators of the Ricksecker's hydrochara, other than the species' own cannibalistic larvae.

Ricksecker's hydrochara co-occurrs with the following fairy shrimps: California fairy shrimp (*Linderiella occidentalis* Dodds, 1923), mid-valley fairy shrimp (*Branchinecta mesovallensis* Belk and Fugate 2001), vernal pool fairy shrimp (*B. lynchi* Eng, Belk and Eriksen, 1990) and Conservancy fairy shrimp (*B. conservatio* Eng, Belk and Eriksen, 1990), as well as vernal pool tadpole shrimp (*Lepidurus packardi* Simon, 1886) (Rogers pers. obs.).

RWSB Habitat Requirements and Ecology

This species is entirely dependent upon the aquatic environment provided by vernal pool wetland ecosystems. The Ricksecker's hydrochara depends upon the presence of water in the winter and early spring and the absence of water during the summer. These specific vernal pool wetlands are dependent upon intact sub-watersheds, and the surrounding uplands that support those watersheds. Vernal pool habitat is a component of the larger grassland ecosystem of the California Great Central Valley.

Habitats supporting the Ricksecker's hydrochara are typically in Central Valley California floristic provinces below 300 meters in elevation. The physical parameters that affect the suitability of aquatic habitats for Ricksecker's hydrochara have not been described. Collection records suggest that the Ricksecker's hydrochara is not sensitive to the size of vernal pools or other aquatic habitats, and primarily utilizes vernal pools and swales, seasonal wetlands and other ephemeral habitats, as well as constructed vernal pools (Serpa pers. obs.; Rogers pers. obs.). Adults have been observed to burrow into the substrate at the bottoms of pools (Serpa pers. obs.; Rogers pers. obs.). It is probable that, like other vernal pool insects, the larvae, pupae or adults may over-summer in burrows at or above the vernal pool water line, or the eggs may be dessication resistant and lay dormant in the pool bottom. Neither larvae nor adults have been found in similar habitat in nearby permanent waters, although similar Hydrophilid beetle species have been found in these situations.

Excessive livestock grazing may be detrimental to Ricksecker's hydrochara. Overgrazing tends to result in large amounts of manure in vernal pools. The decomposition of this organic waste reduced the dissolved oxygen in the water, leaving the gill-breathing invertebrates like the Ricksecker's hydrochara without oxygen (Rogers 1998). Conversely, most vernal pool grasslands need a certain amount of grazing. Vernal pools that have all grazing removed become overgrown with native and exotic plants that generate deep thatch layers on the pool substrate, unless some other disturbance (i.e., weed control programs, vehicular use of pools, fire fuels control) prevents thatch deposition. As this thatch layer decomposes, it also reduces the dissolved oxygen in the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Therefore, moderate grazing may be a necessary habitat suitability component.

Common wetland plant species that co-occur with Ricksecker's hydrochara generally need the same hydrological conditions. Therefore, the presence of these plant species within a potential habitat would imply a greater potential for a population of this species to be present. These plants may include coyote thistle (*Eryngium* spp.), downingia (*Downingia* spp.), common frogfruit (*Phyla* spp.), goldfields (*Lasthenia* spp.), common spikerush (*Eleocharis macrostachya*), wooly-marbles (*Psilocarphus* spp.), hair grass (*Deschampsia* spp.), and aquatic buttercup (*Ranunculus aquatilis*).

Similarly, pools that are dominated by vernal pool plant species that require short inundation periods will have hydrology that cannot support this species. These plants may include Mediterranean barley (*Hordeum marinum* ssp, *gussoneanum*), toad rush (*Juncus bufonius*), false dandelion (*Hypochoeris radicata*), and Italian rye grass (*Lolium multiflorum*).

Conversely, wetland habitats that support plant species that need water year round do not appear to support Ricksecker's hydrochara (Rogers pers. obs.). These plants include cattails

(*Typha* spp.), willow (*Salix* spp.), Fremont's cottonwood (*Populus fremontii*), duckweed (*Lemna* spp.), nut grass (*Cyperus* spp.), Baltic rush (*Juncus balticus*), and bulrush (*Schenoplectus* spp.).

The Ricksecker's hydrochara is a component of a larger invertebrate community structure dependant on vernal pools (Rogers, 1998). This invertebrate community includes mostly planktonic crustacea dependant upon temporary wetlands including copepods, cladocerans, and ostracodes, as well as Flatworms, and a suite of insect species, including vernal pool haliplid beetle (*Apterliplus parvulus*), Scimitar backswimmers (*Buenoa scimitra*), Ricksecker's hydrochara (*Hydrochara rickseckeri*), and many others (Rogers, 1998). These habitats are usually low in opportunistic species like mosquitoes and chironomid midges in the genus *Chironomus* (Rogers, 1998).

Therefore, potential Ricksecker's hydrochara habitat is defined as vernal pools and seasonal wetlands of sufficient size (depth and area) and seasonality that also support specific vegetation and invertebrate community structure that indicate the potential for ponding for a sufficient duration to allow Ricksecker's hydrochara to complete its life cycle.

Optimal Ricksecker's hydrochara habitat tends to be neutral to slightly alkaline, clear vernal pools, low in dissolved salts, dominated with vernal pool plants, sustaining a complex vernal pool invertebrate community (Rogers pers. obs., 1998). Unfortunately, little effort has been made to accurately quantify these parameters.

RWSB Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Ricksecker's hydrochara are identified in Table G-3.12-1 and have been derived from input from local species experts.

Table G-3.12-1. Habitat Elements for Ricksecker's hydrochara

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by mounds and swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction.

RWSB Species Distribution and Population Trends

Habitat occupied by Ricksecker's hydrochara tends to exist on level open ground. This geomorphic setting tends to be the most desirable for agricultural, urban or industrial development. As a result, the grassland plateaus and floor of the Great Central Valley has been broadly converted by human use. Consequently, an unknown amount of vernal pool habitat has been lost, and an unknown number of Ricksecker's hydrochara occurrences as well, although there have been attempts to calculate the lost acreages (Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California, more Ricksecker's hydrochara habitat is being and will be encroached upon and impacted throughout the species range.

RWSB Range Wide Distribution

Ricksecker's hydrochara is the smallest species in the genus Hydrochara, which currently has 22 currently recognized species reported from North America, Eurasia, and Africa (Smetana 1980; Archangelski 1997). Only two species occur in California.

Ricksecker's hydrochara was redescribed by Smetana in 1980, at which time only 14 specimens were known, all of which were collected from the San Francisco Bay region. Smetana grouped Ricksecker's hydrochara with Hydrochara similis (d'Orchymont), a species from India, into the Similis Group, a sub-group within the genus Hydrochara.

Ricksecker's hydrochara was originally described as endemic to the San Francisco Bay region, occurring in Alameda, Marin, San Mateo, and Sonoma Counties (Smetana 1980). Recent collections have been made in Solano County at the Jepson Prairie Preserve, and from vernal pools in Sacramento and Placer counties (Rogers pers. obs.; Serpa pers. obs.; CDFG 2010).

RWSB Central Valley Distribution

In the Central Valley proper, Ricksecker's hydrochara have been collected from Solano, Sacramento and Placer Counties (Rogers pers. obs., Serpa pers. obs.). In Solano County, all records are from the Jepson Prairie Preserve and vicinity (Rogers pers. obs.; Serpa pers. obs.). In Sacramento County, this species has been collected from Planning Area (Rogers pers. obs.; Serpa pers. obs.; Witham pers. obs.), and from Blue Ravine in Folsom (Rogers pers. obs.). The single Placer County record comes from just south of Lincoln, at the Twelve Bridges Preserve (Rogers pers. obs.).

RWSB Distribution in the Planning Area

Figure RWSB-1 illustrates the known recorded occurrences of Ricksecker's water scavenger beetle within the Planning Area. The Ricksecker's hydrochara were first reported from the Planning Area from Mather Field (Rogers pers. obs.). This species has been collected from Mather Field on three additional occasions (Rogers pers. obs.; Serpa pers. obs.; Witham pers. obs.), from Ranch Seco (Rogers pers. obs.), Howard's Ranch (TNC Rare Species Survey) and from Peterson Ranch (Serpa pers. obs.).

No surveys focused on Ricksecker's hydrochara have been conducted within and adjacent to the Planning Area and the total extent of potential habitat is unknown. The modeled habitat of the species in the Planning Area is described in Section G-4 of this Appendix.

RWSB Population Levels and Trends

An unknown amount of vernal pool habitat has been lost, and with it, an unknown number of Ricksecker's hydrochara occurrences. Attempts have been made to calculate lost vernal pool acreages (Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California, more Ricksecker's hydrochara habitat will be and is being encroached upon and impacted throughout the species range. Adequate determination of remaining Ricksecker's hydrochara populations throughout the animal's range as well as population trends is difficult, as no specific surveys have ever been conducted outside of the locations listed above

RWSB Threats to the Species

As described previously, the greatest threat to vernal pool invertebrates is the elimination, loss, or modification of their habitat by development. The filling of vernal pools or modification of the watershed that supports those pools either eliminates the habitat or disrupts the pool ecosystem until it is overcome by opportunistic invertebrate species and invasive, opportunistic and non-native plants, that out compete the obligatory vernal pool species (Rogers 1998).

Excessive livestock grazing in vernal pool terrain can be detrimental to vernal pool invertebrate communities. Overgrazing tends to result in large amounts of manure in vernal pools. The organic waste oxidizes the water, leaving gill breathing invertebrates without oxygen (Rogers 1998). Conversely, vernal pool grasslands are disturbance systems, and need a certain amount of grazing. Vernal pools that have all grazing removed may become overgrown with native (e.g., *Eleocharis* sp., *Eryngium* sp.) and exotic plants (e.g., *Glyceria* sp. *Lolium multiflorum*) that generate deep thatch layers on the pool substrate. As this thatch layer decomposes, it lowers the dissolved oxygen in the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Both lack of grazing and excessive grazing cause an increase in organic matter in the habitat that

eliminates the natural vernal pool invertebrate community, and promotes opportunistic and invasive species, that out compete the obligate vernal pool species (Rogers 1998). Therefore, moderate grazing, or other disturbance may be a necessary habitat component, and the removal of grazing or excessive grazing may be threats to the Ricksecker's hydrochara .

Damage to the watershed that supports vernal pools and vernal pool complexes will impact vernal pool invertebrate communities. Elimination of the watershed will not allow the pools to pond properly and will curtail the movement of nutrients into the pool from overland flow (Rogers 1998). Road run-off entering the watershed and conveyed to occupied habitat through the watershed may carry petroleum by-product residue or sediment from vehicles, paving or road maintenance activities. Furthermore, pesticide, herbicide, fertilizer, and sediment run-off from agricultural activities may enter the watershed and be conveyed to occupied habitat, and may be injurious to vernal pool invertebrates. Ground disturbance from development activities may loosen soil that that may enter the watershed and be conveyed to occupied habitat as sediment.

Non-native invasive species are a threat to vernal pool invertebrate communities. manna grass and Italian rye grass are both exotic plants that occur in vernal pools, tend to produce heavy thatch and eventually create organic loads upon decomposition, which reduce dissolved oxygen in the water upon decomposition (Rogers 1998). In addition, people may introduce the non-discriminating predatory mosquitofish into vernal pools to control perceived local mosquito problems (Rogers pers. obs.).

Habitat fragmentation is a threat to vernal pool invertebrates in that the development surrounding small pool complexes may prevent waterfowl or shorebirds from feeding at the pools, thereby preventing genetic flow between occupied habitats. Furthermore, small pool complexes surrounded by development will not be buffered against the run-off from developed areas, and concomitant changes in the watershed hydrology.

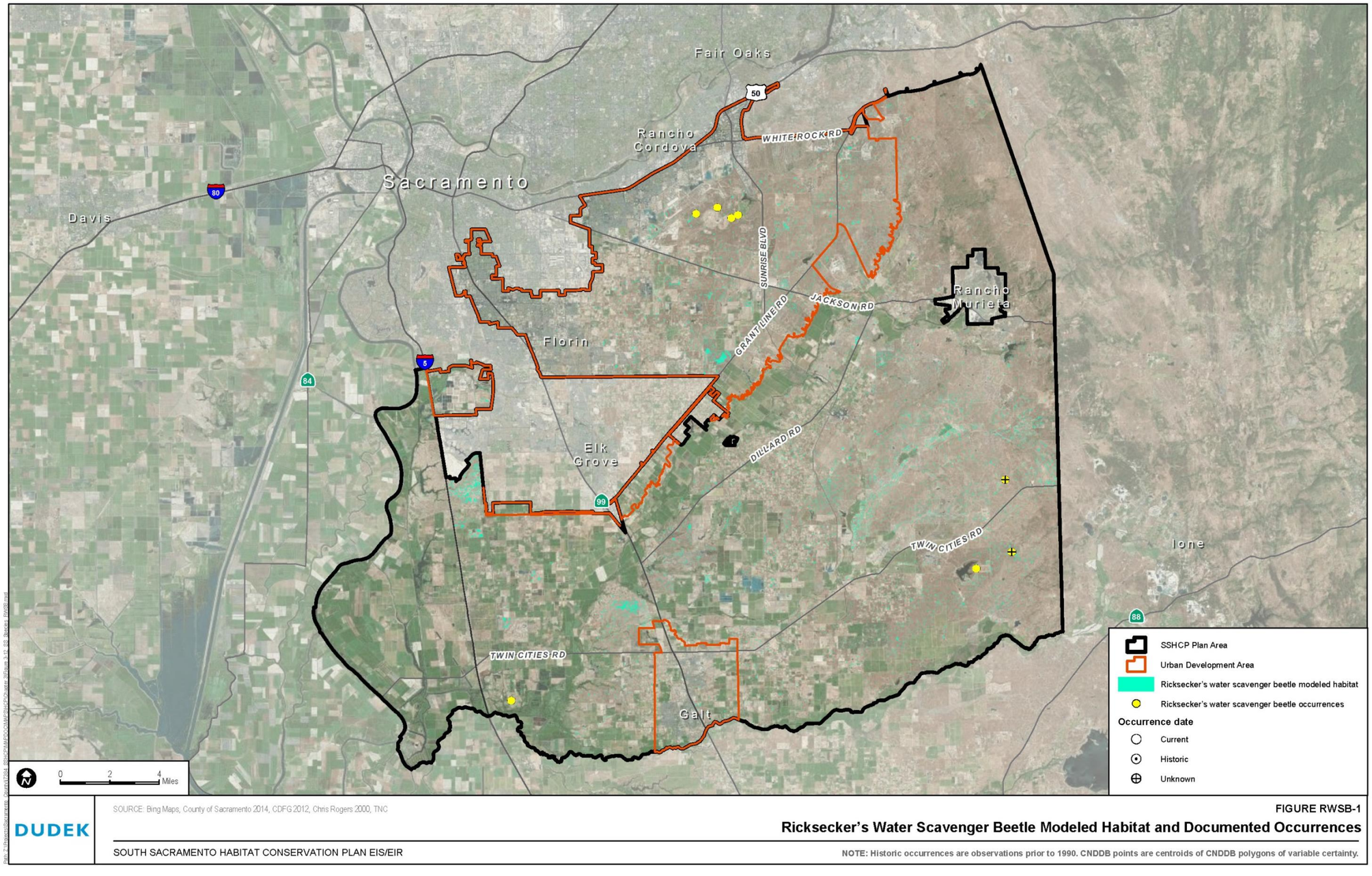
Additional threats to the vernal pool invertebrate community structure includes: off-road vehicle use of vernal pool habitat for recreational 'mud-bogging'; conversion of vernal pools into deep stock tanks that do not dry during the summer; and draining of vernal pools.

RWSB Data Gaps and Conservation Implications

Restoration and creation of vernal pool habitat has been demonstrated to be feasible (Rogers 1998). Specific habitat parameters for this and other vernal pool invertebrate species are still poorly understood.

The primary data gap regarding conservation of vernal pool invertebrates is lack of distributional data for the species within and adjacent to the Planning Area. It is not feasible economically or temporally to survey the entire Planning Area.

Figure RWSB-1 Ricksecker's Water Scavenger Beetle Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, Chris Rogers 2000, TNC

FIGURE RWSB-1

Ricksecker's Water Scavenger Beetle Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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Other data gaps include the role of the surrounding uplands in vernal pool habitats, and the importance of seasonality and intensity of grazing and other disturbances in vernal pool ecosystems. Furthermore, quantitative bioassessment may be necessary to determine the ecological functions and values of selected preserve area vernal pools to assess their suitability and value as preservation habitats.

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VERNAL POOL TADPOLE SHRIMP (VPTS)

Vernal Pool Tadpole Shrimp (VPTS)

(Lepidurus packardi)

Status USFWS: Endangered

Status CDFW: None

VPTS Listing Status

The vernal pool tadpole shrimp (*Lepidurus packardi*) was federally listed as endangered on 19 September 1994 (56 CFR 48136).

VPTS Life History and Ecology

VPTS Species Description and Life History

The vernal pool tadpole shrimp is a typical member of the genus *Lepidurus*. Like some other tadpole shrimp species, this species appears to be unisexual (Rogers 2001).

The vernal pool tadpole shrimp was considered a subspecies of the Eurasian *Lepidurus apus* by Longhurst (1955). Lynch (1972) commented that the vernal pool tadpole shrimp was separate from *L. apus*, but did not provide a quantitative analysis. Rogers quantitatively reinstated the vernal pool tadpole shrimp as a separate species in 2001.

The vernal pool tadpole shrimp is separated from most other nearctic *Lepidurus* species by having the nuchal organ (a large tubercle behind the eyes) intersected by a line drawn between the posterior apices of eyes, and 24 to 29 body rings and 30 to 35 pairs of legs. The caudal lamina is truncate, 0.3 to 0.1 times the length of carapace. Mature specimens have the sulcus spines triangular, as long as broad, separated by at least twice their width, with numerous small spines of varying shapes, sometimes in double rows, separating the larger spines. Smaller specimens have large acute spines, 1.2 to 1.5 times as long as broad. Old specimens may have the largest sulcus spines rounded. The endites three, four and five of the second thoracic appendages project beyond the carapace margin. The adult length is 15 to 86 millimeters from anterior margin of carapace to tip of caudal lamina.

Lepidurus cryptus Rogers 2001 is inseparable morphologically from the vernal pool tadpole shrimp. This species had been previously confused with The vernal pool tadpole shrimp (Linder 1952; Lynch 1972). Analysis of 12S rDNA and allozyme data, performed by King and Hanner (1998), demonstrates that it is genetically distinct from the vernal pool tadpole shrimp (Rogers 2001).

The vernal pool tadpole shrimp may vary in coloration depending upon habitat, although it is most commonly green. In highly turbid water, this species may be nearly translucent to buff colored with brown mottles. In slightly turbid to clear water it may range from light green to dark green, dark green mottled with brown, chocolate brown, brown with green mottles, and black. The vernal pool tadpole shrimp can on occasion reach very large sizes. One specimen from Stanislaus County measured 86 millimeters from the anterior carapace margin to the apex of the caudal lamina (Rogers 2001).

Notostracans like the vernal pool tadpole shrimp are a component of the zooplanktonic community within episodic, ephemeral aquatic habitats; although the larger they grow the more time they spend at or near the bottom (Rogers pers. obs.). Tadpole shrimp are omnivorous, with a strong preference for animal matter, and will capture and consume live invertebrates, amphibian larvae, or carrion (Longhurst 1955). Vernal pool tadpole shrimp will also filter detritus for micrometazoa (Rogers pers. obs.).

During the dry phase of their habitat, Notostracans survive as diapausing cysts (resting eggs) in and on the substrate (Sars 1896, 1898; Eriksen and Belk 1999; Rogers and Fugate 2001). When the habitat inundates from seasonal rainfall, some of the cysts hatch, and the nauplii (early larval form of crustacea) swim into the upper water column (Eriksen and Belk 1999). These early instars are typically indistinguishable between species. The maturation rates of vernal pool crustaceans vary extensively depending upon temperature (Eriksen and Belk 1999; Rogers 2002), and the vernal pool tadpole shrimp can reach maturity in 19 days (Rogers pers. obs.). Vernal pool tadpole shrimps may persist as adults right up to the point when the pool dries.

Contrary to Ahl (1991), each individual is capable of producing viable cysts without sexual reproduction (Longhurst 1955; Rogers 2001). Populations are probably made up of either parthenogenic females, amphigenic females (females with lobes of testicular tissue on the ovaries) or both (Bernard 1889; Longhurst 1954; Sassaman 1991, 1995; Maeda-Martinez, et al., 2000; Rogers 2001). The cysts are produced by the ovaries into a marsupium on the 11th thoracopods, made from a modification of the subapical lobe, which holds the cysts, and the exopodite, which forms the “lid” of the marsupium (Fryer 1988). The female typically sheds her cysts as the shell forms over the fertilized oocyte (Murugan et al. 1996) and the cysts fall to the substrate.

The cysts lay dormant in the substrate until the pool dries and re-inundates during the subsequent rains. Beyond inundation of the habitat, the specific cues for hatching are unknown

although temperature (Hall 1959; Belk 1977; Al-Tikrity and Grainger 1990; Belk and Nelson 1995; Eriksen and Belk 1999) and conductivity (for example: Anderson 1958; Bowen et al. 1988; Broch 1969, 1988; Brown and Carpelan 1971; Brown 1972) are believed to play a large role. The vernal pool tadpole shrimp is typically univoltine (i.e., one generation per year), however animals of different ages may be present if a pool partially inundates allowing some cysts to hatch, and then later increases in volume, hydrating cysts that were further up-slope (Rogers pers. obs.).

Planktonic crustacea are important in the food web, as they represent a high fat, high protein resource for migratory waterfowl. Mallard, Green-winged Teal, Bufflehead, Greater Yellowlegs, and Killdeer all forage actively in Central Valley vernal pools on the invertebrate and amphibian fauna during the winter months (Proctor 1964; Horne1966; Mellors, 1975; Silveira 1996; Dumont and Negrea 2002).

Predator consumption of cysts aids in distributing populations of vernal pool crustaceans. Predators (e.g., birds, amphibians) expel viable cysts in their excrement, often at locations other than where they were consumed (Proctor 1964; Wissinger et al. 1999). If conditions are suitable, these transported cysts may hatch at the new location and potentially establish a new population. Cysts are also transported by wind, and in mud carried on the feet of animals, including livestock that may wade through the habitat (Rogers in prep). This type of dispersal aids ephemeral pool crustaceans to exploit a wide variety of ephemeral habitats (Rogers 2000).

Vernal pool tadpole shrimp are an intermediate host for the metacercariae of an echinostome fluke (Ahl 1991) which also infects co-occurring gastropods. The parasitic fluke castrates the vernal pool tadpole shrimp. This fluke is most likely a bird parasite.

No specific bacterial, viral or protozoan diseases have been reported for the vernal pool tadpole shrimp. Occasionally, specimens with black markings or lesions will appear in collections. These black markings, sometimes referred to as “black disease,” are actually evidence of the normal immune response of all crustacea to any bacteria, where any foreign bacteria is infused with melanin to lethal levels (Bang 1983). Branchiopod crustaceans are commonly found with phoretic ciliate protozoan colonies around the mouth and posterioventral portions of the head, which are abandoned with the exuvia by the crustacean with each molt.

Vernal pool tadpole shrimp commonly co-occur with fairy shrimp such as *Linderiella occidentalis* (Dodds 1923), *Branchinecta conservatio* Eng, Belk, and Eriksen 1990, *B. lindahli* Packard 1883, *B. coloradensis* Packard 1874, and vernal pool fairy shrimp (*B. lynchi* Eng, Belk, and Eriksen 1990). The mid-valley fairy shrimp (*B. mesovallensis* Belk and Fugate 2001) and *B. longiantenna* Eng, Belk, and Eriksen 1990 both occur within the range of the vernal pool tadpole shrimp, but are typically found in different habitats (Rogers pers. obs.).

VPTS Habitat Requirements and Ecology

This species is entirely dependent upon the aquatic environment provided by vernal pool wetland ecosystems. The Vernal pool tadpole shrimp depends upon the presence of water in the winter and early spring and the absence of water during the summer. These specific vernal pool wetland characteristics are dependent upon intact sub-watersheds, and the surrounding uplands that support those watersheds. Vernal pool habitat is a component of the larger grassland ecosystem of the California Great Central Valley.

The Vernal pool tadpole shrimp needs the cold winter waters to hatch and develop, typically appearing after the first frosts, and the dry summers to dry the resting cysts and prevent them from being attacked by fungi. Habitats supporting the Vernal pool tadpole shrimp are typically in Central Valley California floristic provinces below 300 m elevation. Typical habitat for Vernal pool tadpole shrimp in California include vernal pools, seasonally ponded areas within vernal swales, rock outcrop ephemeral pools, playas and alkali flats (Eriksen and Belk 1999; Rogers 2001). Vernal pool tadpole shrimp have also been found in alkaline vernal pools. Vernal pools that support these shrimp may be grass or mud-bottomed with clear to tea-colored or highly turbid water, and are often in grassland depression pools (USFWS 1994; Rogers 2001).

Pool volume is important in determining potential shrimp habitat because deeper pools with a large surface area can more easily maintain their dissolved oxygen levels. Similarly, deeper pools will pond long enough to allow the shrimp to complete their life cycle. Vernal pool tadpole shrimp have been found in pools ranging from 0.1 to 80+ acres (USFWS 1994; Eriksen and Belk 1999; Rogers pers. obs.).

Various physiochemical factors have been examined in existing Vernal pool tadpole shrimp habitats including alkalinity, total dissolved solids (TDS), and pH (Collie and Lathrop 1976; Eriksen and Belk 1999). The U.S. Fish and Wildlife Service (1994) described the water in pools occupied by vernal pool tadpole shrimp as having low conductivity and chloride, however specific data were not provided. In addition, the importance of many of these parameters has recently been called into question with evidence that type and amount of dissolved salts may be a more important habitat requirement for vernal pool crustaceans (Rogers 2002). Considering the daily fluctuations in pH of a given habitat, this is to be expected. During the daylight hours, the hydrophytes are photosynthesizing, removing the CO_2 (from HCO_3) from the water, and raising the pH. During the night, the hydrophytes are respiring, increasing the CO_2 (and thereby the HCO_3) in the water lowering the pH. If there is rainfall, the distilled precipitation will lower the pH, as will winds that cause surface action. When the habitats are drying and losing volume through evaporation, the pH, alkalinity, TDS, and electrical conductivity will increase, just as they decrease when the pools inundate or reinundate (Rogers 2002).

Some vernal pools need a certain amount of grazing. Vernal pools that have all grazing removed become overgrown with native and exotic plants that generate deep thatch layers on the pool substrate, unless some other disturbance (i.e., weed control programs, vehicular use of pools, fire fuels control) prevents thatch deposition. As this thatch layer decomposes, it reduces the dissolved oxygen in the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Therefore, moderate grazing may be a necessary habitat suitability component. Conversely, excessive livestock grazing can be detrimental to vernal pool tadpole shrimp. Over-grazing tends to result in a large amount of manure in vernal pools. The decomposition of this organic waste removes oxygen from the water, leaving the gill-breathing invertebrates like the vernal pool tadpole shrimp without oxygen (Rogers 1998). It is important not to alter grazing regimes in conservation areas until the importance of grazing to those particular systems are assessed.

Common wetland plant species that co-occur with special-status shrimp species generally need the same hydrological conditions. Therefore, the presence of these plant species within a potential habitat would imply a greater potential for a population of these shrimp to be present. These plants may include coyote thistle (*Eryngium* spp.), downingia (*Downingia* spp.), goldfields (*Lasthenia* spp.), common spikerush (*Eleocharis macrostachya*), wooly-marbles (*Psilocarphus* spp.), hair grass (*Deschampsia* spp.), and aquatic buttercup (*Ranunculus aquatilis*).

Similarly, pools that are dominated by vernal pool plant species that require short inundation periods may have hydrology that cannot support shrimp species. These plants may include Mediterranean barley (*Hordeum marinum* ssp, *gussoneanum*), toad rush (*Juncus bufonius*), false dandelion (*Hypochoeris radicata*), and Italian rye grass (*Lolium multiflorum*).

Conversely, wetland habitats that support plant species that need water year round cannot support special-status shrimp species because the shrimp's cysts must dry out before they can hatch (Eriksen and Belk 1999), or if they remain wet or moist through the warmer summer months, the cysts will be attacked by fungi (Rogers pers. obs.). These plants include cattails (*Typha* spp.), willow (*Salix* spp.), Fremont's cottonwood (*Populus fremontii*), duckweed (*Lemna* spp.), nut grass (*Cyperus* spp.), Baltic rush (*Juncus balticus*), and bulrush (*Schenoplectus* spp.).

The vernal pool tadpole shrimp is a component of a larger invertebrate community structure (Rogers 1998). This invertebrate community includes mostly planktonic crustacea dependant upon temporary wetlands including copepods, cladocerans, and ostracodes, as well as flatworms, and a suite of insect species, including vernal pool haliplid beetle (*Apterliplus parvulus*), Scimitar backswimmers (*Buenoa scimitra*), Ricksecker's hydrochara (*Hydrochara rickseckeri*), and many others (Rogers 1998). These habitats are usually low in opportunistic species like mosquitoes and chironomid midges in the genus *Chironomus* (Rogers 1998).

Therefore, potential special-status shrimp habitat is defined as vernal pools and seasonal wetlands of sufficient size (depth and area) and seasonality that may also (but does not have to) support specific vegetation and invertebrate community structure that indicate the potential for ponding for a sufficient duration to allow special-status shrimp species to complete their life cycles and to maintain water temperatures conducive to development and reproduction.

Optimal vernal pool tadpole shrimp habitat tends to be neutral to slightly alkaline, clear vernal pools, low in dissolved salts, dominated with vernal pool plants, and sustains a complex vernal pool invertebrate community (Rogers pers. obs., 1998, 2001). Unfortunately, little effort has been made to accurately quantify these parameters.

VPTS Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Vernal pool tadpole shrimp are identified in Table G-3.13-1 and have been derived from the USFWS's list of primary constituent elements in the final rule designating critical habitat for the species (USFWS 2005) as well as input from local species experts.

Table G-3.13-1. Habitat Elements for Vernal Pool Tadpole Shrimp

Essential Activities	Land Cover Types	Habitat Elements
Entire life cycle	Vernal impoundment, vernal pool, and vernal swale.	Topographic features characterized by mounds and swales, and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools providing for dispersal and promoting hydroperiods of adequate length in the pools. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and that continuously hold water for a minimum of 18 days, in all but the driest years; thereby providing adequate water for incubation, maturation, and reproduction.

VPTS Species Distribution and Population Trends

There are six species of *Lepidurus* in North America (Rogers 2001) distributed throughout arctic Canada, Alaska, and Greenland and western portions of the United States and Mexico. The vernal pool tadpole shrimp is endemic to California (Rogers 2001).

Habitat occupied by tadpole shrimp tends to exist on level open ground. This geomorphic setting tends to be the most desirable for agricultural, urban or industrial development. As a result, the grassland plateaus and floor of the Great Central Valley has been broadly converted by human use. Consequently, an unknown amount of vernal pool habitat has been

lost, and an unknown number of vernal pool tadpole shrimp occurrences as well, although there have been attempts to calculate the lost acreages (Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California, more habitat for vernal pool tadpole shrimp will and is being encroached upon and impacted throughout the species range.

VPTS Range Wide Distribution

The vernal pool tadpole shrimp was originally described by Simon (1886) from "California," and the types were apparently lost (Rogers 2001). Linder (1952) reported the vernal pool tadpole shrimp from the California Central Valley one mile north of Davis, Yolo County, and from the California Great Basin. Longhurst (1955) synonymized both the vernal pool tadpole shrimp and *Lepidurus couesii* with the Eurasian *L. apus* (Linneaus) 1756. Lynch (1972) redescribed *L. couesii* and provided specific morphological characters for the genus *Lepidurus* in North America, emphasizing that both the vernal pool tadpole shrimp and *L. couesii* are taxa distinct from each other and from *L. apus.* Lynch deposited material at the U. S. National Museum of Natural History identified as the vernal pool tadpole shrimp from the Great Basin Regions of south central Oregon.

The USFWS gave the vernal pool tadpole shrimp protection as an endangered species in 1994 (59 FR 48153). It was reported at that time that the vernal pool tadpole shrimp was known only from 14 occurrences in the Central Valley of California, but did not mention the Linder or Lynch references or material, although the references were cited.

Helm (1998) reported *L. couesii* from the east side of the Cascade Mountains in Lassen County, California, and *Lepidurus* n. sp., the "Modoc Plateau Tadpole Shrimp" from two locations in Modoc County, California, citing King pers. comm. as his source for the shrimp's identification. King and Hanner (1998) performed 12S rDNA and allozyme analysis of *Lepidurus* populations throughout western North America, reporting a taxon they referred to as "*L. couesii*-1" from Klamath County, Oregon, and the east side of the Casacade Mountains in Shasta and Lassen counties, California. In addition, they mention Linder's Lassen County vernal pool tadpole shrimp material, but do not comment on its implications. King and Hanner concluded that *L. couesii* populations from Manitoba, Canada may represent a separate species from "*L. couesii*-1" in the Sierra Nevada, Cascade Mountains and Great Basin regions of northeastern California and south-central Oregon. Furthermore, King and Hanner stated: "Because our Oregon locality. seems to be the same as one of the sites from which Linder (1952) examined material (i.e., near Klamath Falls, OR) we suggest that the California/Oregon clade should retain the name *L. couesii*." However, Rogers (2001) demonstrated that the specimens from King and Hanner's "*L. couesii*-1" localities are morphologically distinct from the type specimens of *L. couesii* from Montana and thus their suggestion that the specific name *couesii* be applied to the taxon they

call "*L. couesii*-1"cannot be accepted. Furthermore, Rogers demonstrated that the *Lepidurus* that Linder and Lynch had identified as the vernal pool tadpole shrimp were actually an unrecognized cryptic species, which he described. This cryptic species *Lepidurus cryptus* Rogers 2001, is morphologically indistinguishable from the vernal pool tadpole shrimp, and hence the confusion. Rogers (2001) quantitatively established the vernal pool tadpole shrimp as endemic to the Central Valley of California.

VPTS Central Valley Distribution

In 1994, the USFWS reported that there were 14 known occurrences of the vernal pool tadpole shrimp ranging from the Vina Plains in Tehama County, through most of the length of the Sacramento Valley to Sacramento, and west to Solano County at the Jepson Prairie (59 FR 48153).

Since then, vernal pool tadpole shrimp have been reported from throughout Sacramento, Colusa and Glenn Counties, as well as Central Valley portions of Tehama County, Butte County, Sutter County, Yuba County, Placer County, Stanislaus County, Madera County, Fresno County and Tulare County on the east side of the valley (Eriksen and Belk 1999), and Alameda County, Solano County, Yolo County, Colusa County and Glenn County on the west side (Rogers 2001).

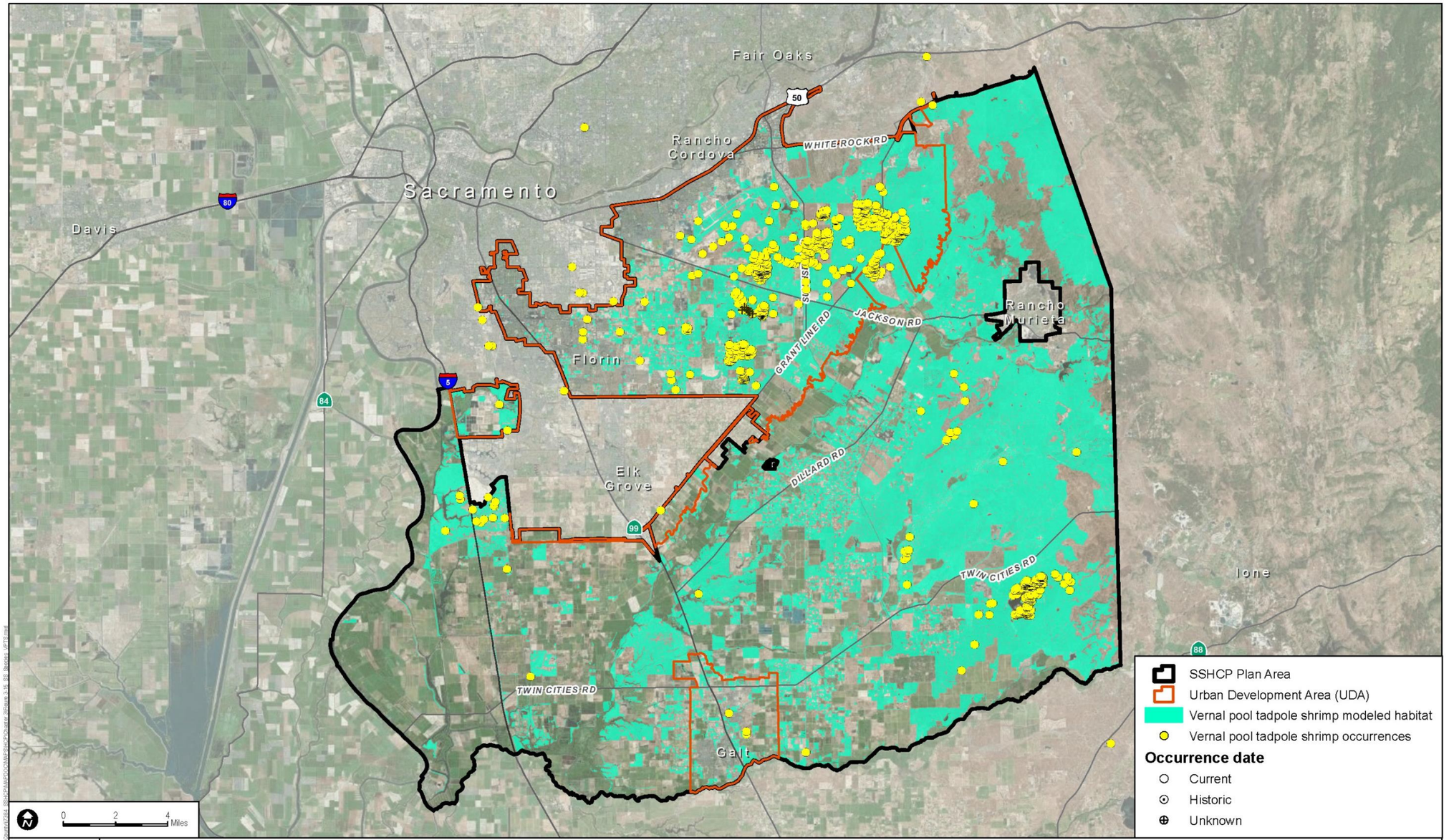
VPTS Distribution within the Planning Area

The vernal pool tadpole shrimp was first officially reported from the Planning Area in 1982 (CDFG 2010); however, specimens were collected from near Mather Air Force Base as early as 1967 by Dr. Clyde Eriksen (Eriksen, pers. comm.). Numerous surveys related to development projects have been conducted within and adjacent to the Planning Area (USFWS records; CDFG 2010), but the area has not been thoroughly surveyed for vernal pool tadpole shrimp, and the total extent of potential habitat is unknown. Figure VPTS-1 illustrates the known recorded occurrences of vernal pool tadpole shrimp within and adjacent to the Planning Area. The modeled habitat of the species in the Planning Area is discussed in Section G-4 of this Appendix.

VPTS Population Levels and Trends

An unknown amount of vernal pool habitat has been lost and with it an unknown number of vernal pool tadpole shrimp occurrences. Attempts have been made to calculate lost vernal pool acreages (for example: Holland 1978, 1988, 1998; Bauder and McMillan 1988). Due to current pressures of the increasing human populations in California and Oregon, more habitat for vernal pool tadpole shrimp will be and is being encroached upon and impacted throughout the species range.

Figure VPTS-1 Vernal Pool Tadpole Shrimp Modeled Habitat and Documented Occurrences



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Adequate determination of remaining vernal pool tadpole shrimp occurrences throughout the animal's range as well as population trends is difficult. The USFWS (1994) listed 14 known occurrences of the vernal pool tadpole shrimp. These data were collected during a prolonged drought in California. Sugnet and Associates (1993) submitted a study claiming 345 'discrete locations' supporting the vernal pool tadpole shrimp, however as specific localities were not divulged, the data are unverifiable and therefore not scientifically useful in any type of analyses. Rogers (2001) presents a map and a list of 23 specific localities for the vernal pool tadpole shrimp represented.

The California Natural Diversity Data Base (CNDDB) vernal pool crustacean records (CDFG 2010) may be somewhat misleading, due to the inconsistency of the data presented. Some records refer to individual pools, while others refer to pool complexes, and others still refer to groups of complexes. Additionally, the CNDDB does is not updated when a particular site or population is extirpated. Because of issues such as these, it is difficult to determine what actually constitutes a "population" or "occurrence" in any attempt at impact analysis.

In addition, survey maps and records tend to show where vernal pool crustaceans are, and do not emphasize where they are not. Compounding these difficulties, records are typically a reflection of where surveys have been conducted, rather than a delineation of special-status shrimp distribution. Therefore, it is difficult to establish existing conditions for this species across the entire species range, as well as within the Planning Area. None of this is to say that vernal pool crustaceans are not threatened, endangered, or should not be protected. The issue is that where a paucity of adequate data exists, consistent data reporting would help prevent ambiguous interpretation or mischaracterization of species conservation needs.

VPTS Threats to the Species

As described previously, the greatest threat to vernal pool invertebrates is the elimination, loss, or modification of their habitat by development. The filling of vernal pools or modification of the watershed that supports those pools either eliminates the habitat or disrupts the pool ecosystem so that it is overcome by opportunistic invertebrate species and invasive, opportunistic and non-native plants, that outcompete the obligatory vernal pool species (Rogers 1998).

Excessive livestock grazing in vernal pool terrain can be detrimental to vernal pool invertebrate communities. Overgrazing tends to result in large amounts of manure in vernal pools. The decomposition of organic waste removes oxygen from the water, leaving gill-breathing invertebrates without oxygen (Rogers 1998, pers. obs,). Conversely, vernal pool grasslands are disturbance systems, and need a certain amount of grazing. Vernal pools that have all grazing removed may become overgrown with native (e.g., *Eleocharis* sp*., Eryngium* sp.) and exotic plants (e.g., *Glyceria* sp*. Lolium multiflorum*) that generate deep thatch layers on the pool

substrate. As this thatch layer decomposes, it also removes oxygen from the water, which can suffocate gill-breathing invertebrates (Rogers 1998). Both lack of and excessive grazing cause an increase in organic matter in the habitat that eliminates the natural vernal pool invertebrate community, and promotes opportunistic and invasive species, that outcompete the obligatory vernal pool species (Rogers 1998). Therefore, moderate grazing, or other disturbance may be a necessary habitat suitability component, and the removal of grazing or excessive grazing are threats to the vernal pool tadpole shrimp.

Damage to the watershed that supports vernal pools and vernal pool complexes will impact vernal pool invertebrate communities. Elimination of the watershed will not allow the pools to pond properly and will curtail the movement of nutrients into the pool from overland flow (Rogers 1998). Road run-off entering the watershed and conveyed to occupied habitat through the watershed may carry petroleum by-product residue or sediment from vehicles, paving, or road maintenance activities. Furthermore, pesticide, herbicide, fertilizer, and sediment run-off from agricultural activities may enter the watershed and be conveyed to occupied habitat, and may be injurious to vernal pool invertebrates. Ground disturbance from development activities may loosen soil that that may enter the watershed and be conveyed to occupied habitat as sediment.

Non-native invasive species are a threat to vernal pool invertebrate communities. There is concern that bullfrogs (*Rana catesbeiana*) may feed upon federally protected vernal pool crustaceans (Balfour and Morey 1999). Manna grass (*Glyceria declinata*) and Italian rye grass are both exotic plants that occur in vernal pools, tend to produce heavy thatch and eventually create organic loads upon decomposition, which reduce dissolved oxygen in the water (Rogers 1998). In addition, people may introduce the non-discriminating predatory mosquitofish (*Gambusia affinis*) into vernal pools to control perceived local mosquito problems (Rogers pers. obs.).

Habitat fragmentation is a threat to vernal pool invertebrates in that the development surrounding small pool complexes may prevent waterfowl or shorebirds from feeding at the pools, thereby preventing genetic flow between occupied habitats. Furthermore, small pool complexes surrounded by development will not be buffered against the run-off from developed areas, and concomitant changes in the watershed hydrology.

Additional threats to the vernal pool invertebrate community structure includes: off-road vehicle use of vernal pool habitat for recreational “mud-bogging;” conversion of vernal pools into deep stock tanks that do not dry during the summer; and draining of vernal pools.

VPTS Data Gaps and Conservation Implications

Restoration and creation of habitat for vernal pool tadpole shrimp has been demonstrated to be feasible (Rogers 1998). However, specific habitat parameters for this and other vernal pool

invertebrate species are still poorly understood. For example, there appears to be a need by this species to have a minimum pool volume and a minimum pool surface area within a given habitat to be occupied. Since this species has been found in a wide variety of natural and re-established or established vernal pool habitats, it is likely that it is in some respects an opportunist, as most temporary water fauna must be.

The primary data gap regarding conservation of vernal pool invertebrates is lack of distributional data for the species within and adjacent to the EIS/EIR Study Areas, because it is not feasible economically or temporally to survey the entire Chapters 4-16 Study Areas.

Other data gaps include the role of the surrounding uplands in vernal pool habitats, and importance of seasonality and intensity of grazing and other disturbances in vernal pool ecosystems. Furthermore, quantitative bioassessment may be necessary to determine the ecological functions and values of selected preserve area vernal pools to assess their suitability and value as preservation habitats.

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CALIFORNIA TIGER SALAMANDER (CTS)

California Tiger Salamander (CTS)

(Ambystoma californiense)

Status USFWS: Threatened

Status CDFW: Threatened

CTS Listing Status

In August 2004, the United States Fish and Wildlife Service (USFWS) listed the California tiger salamander (*Ambystoma californiense)* as threatened range-wide, downgrading the status of the Santa Barbara and Sonoma Counties populations from endangered to threatened. To promote conservation efforts of the California Tiger Salamander (CTS), the USFWS also adopted a special rule under section 4(d) of the Federal Endangered Species Act (ESA) of 1973, which allows the Secretary of the Interior to issue a "special rule" tailored to meet the conservation needs of a particular threatened species (special rules cannot be issued for endangered species). Based on the 4d rule, "take" of the threatened CTS caused by existing routine ranching activities on private, State or tribal lands is exempt from the prohibitions of the ESA. The intent of the 4d rule is to allow landowners and ranchers to continue activities that are important for livestock operations, as those activities also maintain habitat for the CTS.

The CTS was listed as threatened under the California Endangered Species Act (CESA) on August 19, 2010.

CTS Life History and Ecology

CTS Species Description and Life History

Taxonomy

In 1853, Gray first described CTS as *Ambystoma californiense* based on specimens that he collected in Monterey, California (Grinnell and Camp 1917). Storer (1925) and Bishop (1943) also considered CTS to be a distinct species; however, Dunn (1940), Gehlbach (1967) and Frost (1985) believed CTS to be a subspecies of the more widespread eastern tiger salamander (*A. tigrinum*). Nonetheless, based on recent studies of the geographic distribution, phylogenetics, and ecological differences among the members of the *A. tigrinum* complex, the CTS has been

determined to represent a distinct species (Shaffer and Stanley 1991; Jones 1993; Shaffer et al. 1993; Shaffer and McKnight 1996; Irschick and Shaffer 1997; Petranka 1998). Furthermore, the range of this amphibian does not naturally overlap with any other species of tiger salamander (*Ambystoma* spp.) (Stebbins 1985; Petranka 1998).

Species Description

CTS is a large, stocky terrestrial salamander with small eyes and a broad, rounded snout. Adults may reach a total length of 208 millimeters (8.2 inches), with males generally averaging 203 millimeters (8 inches) in total length, and females averaging 173 millimeters (6.8 inches) in total length. For both sexes, the average snout-to-vent length is approximately 91 millimeters (3.6 inches). The small eyes have black irises and protrude from the head. Coloration consists of white or pale yellow spots or bars on a black background on the back and sides. Ventral coloration varies from almost uniform white or pale yellow to a variegated pattern of white or pale yellow and black. Males can be distinguished from females, especially during the breeding season, by their swollen cloacae, larger tails, and larger overall size (Stebbins 1962; Loredo and Van Vuren 1996).

Reproduction

Adult CTS breed in vernal pools and similar seasonal water bodies. The females lay their eggs in the water (Twitty 1941; Shaffer et al. 1993; Petranka 1998) in groups of two to four, on twigs, grass stems, vegetation, or debris (Storer 1925; Twitty 1941). In ponds with little or no vegetation, females may attach eggs to objects under the water, such as rocks and boards on the pool's bottom (Jennings and Hayes 1994). In the East San Francisco Bay Area (Bay Area), CTS may lay eggs twice, once in December and again in February (Bobzien 2003). After breeding, adults leave the pool and return to small mammal burrows in surrounding uplands (Loredo et al. 1996; Trenham 1998a), where they may continue to come out nightly for approximately the next two weeks to feed (Shaffer et al. 1993). In drought years, seasonal pools may not form and the adults may not breed (Barry and Shaffer 1994).

The eggs hatch in 10 to 14 days with newly hatched CTS larvae ranging in size from 11.5 to 14.2 millimeters (0.5 to 0.6 inches) in total length (Petranka 1998). The larvae are aquatic, yellowish gray in color and have a broad fat head, large, feathery external gills, and broad dorsal fins that extend well onto the back. They feed on zooplankton, small crustaceans, and aquatic insects for approximately six weeks after hatching, after which time they begin foraging for larger prey (P. Anderson 1968). Larger larvae have been known to consume smaller tadpoles of Pacific treefrogs (*Pseudacris regilla*) and California red-legged frogs (*Rana draytonii*) (J. Anderson 1968). CTS larvae are among the top aquatic predators in seasonal pool ecosystems. Often resting on pool bottoms in shallow water, larvae also may be found at different layers in the

water column in deeper water. Young CTS are wary and commonly dart into vegetation on the bottom of pools when approached by potential predators (Storer 1925).

As most seasonal ponds and pools dry up during the summer, the larval stage of CTS usually lasts three to six months (Petranka 1998), although some larvae in Contra Costa and Alameda Counties may remain in their breeding sites over the summer (Shaffer and Trenham 2002). The absence of paedomorphism (mature adults that retain larval characteristics) in the species suggests that CTS are unable to express this life history trait, presumably because most of their evolutionary history has been spent in seasonal vernal pool habitats (Shaffer and Trenham 2002).

Before they can metamorphose (change into a different physical form) into the terrestrial stage, amphibian larvae must reach a critical minimum body size (Wilbur and Collins 1973). Larvae collected near Stockton in the Central Valley during the spring varied from 47 to 58 millimeters (1.9 to 2.3 inches) in length (Storer 1925). Feaver (1971) found that larvae metamorphosed and left the breeding pools 60 to 94 days after the eggs had been laid, with larvae developing faster in smaller, more rapidly drying pools. The longer the inundation period, the larger the larvae and metamorphosed juveniles are able to grow, and the more likely they are to survive and reproduce (Semlitsch et al. 1988; Pechmann et al. 1989; Morey 1998; Trenham 1998b). Pechmann et al. (1989) found a strong positive correlation between inundation period and total number of metamorphosing juvenile amphibians. P. Anderson (1968) and Feaver (1971) determined that CTS larvae perish, if a site dries before they complete metamorphosis. In Madera County, Feaver (1971) found that only 11 of 30 pools sampled supported larval CTS, and five of these dried before metamorphosis could occur. Out of the original 30 pools, only six (20 percent) provided suitable conditions for successful reproduction that year. Size at metamorphosis is positively correlated with stored body fat and survival of juvenile amphibians, and negatively correlated with age at first reproduction (Semlitsch et al. 1988; Scott 1994; Morey 1998).

Lifetime reproductive success for CTS and other tiger salamanders is low. Trenham et al. (2000) found the average female bred 1.4 times and produced 8.5 young that survived to metamorphosis per reproductive effort. This resulted in roughly 11 metamorphic offspring over the lifetime of a female. Preliminary data suggest that most individuals of CTS require two years to become sexually mature, but some individuals may be slower to mature (Shaffer et al. 1993). Some animals do not breed until they are four to six years old. While individuals may survive for more than 10 years, many breed only once, and in some populations, less than five percent of marked juveniles survive to become breeding adults (Trenham 1998b). With such low recruitment, isolated populations can decline greatly from unusual, randomly occurring natural events as well as from human caused factors that reduce breeding success and individual survival. Furthermore, factors that repeatedly lower breeding success in isolated ponds that are

too far from other ponds for migrating individuals to replenish the population have the potential of quickly extirpating a population.

Diet and Foraging

Post-metamorphic juveniles and adults of CTS appear to be "sit-and-wait" predators similar to the closely related *Ambystoma tigrinum*, taking earthworms, snails, insects, fish, and even small mammals (Stebbins 1972). CTS larvae prey on vernal pool macroinvertebrates (Stebbins 1972), but also take other amphibian larvae once they attain sufficient size.

Dispersal and Migration

Movements made by CTS can be grouped into two main categories: (1) breeding migration, and (2) post-metamorphosis dispersal. Breeding migration is the movement of adult CTS between a breeding pond and the surrounding upland habitat during a reproductive cycle while post-metamorphosis dispersal involves recently metamorphosed individuals leaving their natal pond and moving into the surrounding upland habitat. CTS are also known to exhibit what has been termed interpond dispersal, but this is considered to be a breeding migration. Though not yet supported by empirical data, it is believed that dispersing post-metamorphs sometimes encounter other suitable breeding ponds during dispersal and then return to these other ponds upon maturing rather than return to their natal pond (Bumgardner pers. comm.). The benefits of such an evolutionary strategy are apparent when considering that seasonal wetlands appear and disappear over time as older pools fill and new pools are created. Following breeding, adult CTS return to upland habitats, where they may live for one or more years before breeding again (Trenham et al. 2000). Adult CTS have been observed up to 2,092 meters (1.3 miles) from breeding ponds (S. Sweet *in litt.* 1998), which may be vernal pools, stock ponds, or other seasonal or perennial water bodies. A recent trapping effort in Contra Costa County captured CTS 805 meters (2,641 feet) to 1,207 meters (3,960 feet) from the nearest breeding aquatic habitat (USFWS 2004b). Trenham et al. (2001) observed CTS moving up to 670 meters (2,200 feet) between breeding ponds in Monterey County. Similarly, in an experimental study, Trenham and Shaffer (2005) found that 95 percent of CTS resided within 640 meters (2,100 feet) of their breeding pond at Jepson Prairie in Solano County. Trenham et al. (2001) recommended that plans to maintain local populations of CTS should include pond(s) surrounded by at least 173-meter (567-feet) wide buffers of terrestrial habitat occupied by burrowing mammals. The distance between the upland and breeding sites is thought to depend on local topography and vegetation, and the distribution of California ground squirrel or other rodent burrows (Stebbins 1989). The rate of natural movement of salamanders among breeding sites depends on the distance between the ponds or complexes of ponds and on the quality of intervening habitat (e.g., salamanders may move more quickly through sparsely covered and open grassland than they can through densely vegetated lands) (Trenham 1998a).

After metamorphosis, juveniles move away from breeding ponds into the surrounding uplands, where they live continuously for several years. Upon reaching sexual maturity, most individuals return to their natal (birth) pond to breed, while others disperse to other ponds (Trenham et al. 2001). Some data suggest that juvenile CTS disperse further into upland habitats than adult CTS. A trapping study conducted in Solano County during winter 2002–03 found that juveniles used upland habitats further from breeding ponds than adults (Trenham and Shaffer 2005). More juvenile CTS were captured at distances of 100, 200, and 400 meters (300, 600, and 1,300 feet) respectively, from a breeding pond than at 50 meters (160 feet). Approximately 20 percent of the total captures were found 400 meters (1,300 feet) from a breeding pond. Fitting a distribution curve to the data revealed that 95 percent of juvenile CTS could be found within 640 meters (2,000 feet) of the pond, with the remaining five percent being found at even greater distances. In the same study, post-breeding movements away from breeding ponds by adults appear to be much shorter. During post-breeding emigration, radio-equipped adult CTS were tracked to burrows 19 to 248 meters (62 to 813 feet) from their breeding ponds (Trenham 2001). These reduced movements may be due to adult CTS having depleted physical reserves post-breeding, the drier weather conditions that are typical of the period when adults leave the ponds, or reduced reproductive/bioenergetic benefits from traveling further away from a breeding pond.

When studying interpond dispersal, documented dispersers moved no more than 670 meters (2,200 feet) from breeding sites in Monterey County, and based on a projected exponential relationship between dispersal probability and distance, less than one percent of dispersers were likely to move between ponds separated by 1,160 meters (0.70 miles) (Trenham et al. 2001). The frequency of dispersal among known extant occurrences or subpopulations ultimately depends on the distance between the ponds or complexes and on the intervening habitat (Trenham et al. 2001). Moreover, the distance between upland refugia and breeding sites depends on local topography and vegetation, and the distribution of California ground squirrel or other rodent burrows (Stebbins 1989). Unlike other ambystomatid salamanders, CTS and other tiger salamanders are grassland animals and do not favor forested areas as corridors for movement or long-term residence. Trenham (2001) found that radio-tracked adults favored grasslands with scattered large oaks over more densely wooded areas. Based on the Monterey County study, Trenham et al. (2001) recommends that plans to maintain local populations of CTS should include pond(s) surrounded by at least 173-meter (567-foot) wide buffers of terrestrial habitat occupied by fossorial (burrowing) mammals.

Survivorship

Individual CTS have been known to live more than 10 years (Stebbins 1951; Trenham et al. 2000) and at least one specimen was known to live beyond 20 years (USFWS 2004a). CTS eggs are susceptible to desiccation, and predation by fish, crayfish, and insect larva (Stebbins 1972; Zeiner et al. 1988). CTS larvae are preyed upon by native frogs, garter snakes, egrets, herons

(Zeiner et al. 1988) and the introduced bullfrog (*Rana catesbeiana*) (Anderson 1968). In addition, current research has suggested a negative correlation between larvae and the presence of predatory fishes including mosquitofish (*Gambusia affinis*) (USFWS 2004b). During their seasonal migration to ponds, adult CTS are preyed upon by raccoons (*Procyon lotor*) (USFWS 2004a). Adults are also highly susceptible to mortality from vehicle traffic if roads are constructed between their breeding and aestivation sites (Shaffer et al. 1993).

CTS Habitat Requirements and Ecology

Rangewide, suitable habitat for CTS includes vernal pools, and seasonal and perennial ponds, and surrounding upland areas in grassland, oak savannah, edges of mixed hardwood-conifer woodland and low elevation coniferous forest plant communities from sea level to about 1,067 meters (3,600 feet) (Stebbins 1989; Stebbins 2003; Shaffer et al. 1993; Jennings and Hayes 1994; Petranka 1998; CDFG 2010; Bobzien 2003; USFWS 2004a).

Wetland Habitat and Aquatic Ecology

Once fall or winter rains begin, adult CTS emerge from their upland refugia at night to feed and migrate to the breeding ponds (Stebbins 1985, 1989; Shaffer et al. 1993). Males migrate to the breeding ponds before females (Twitty 1941; Shaffer et al. 1993; Loredo and Van Vuren 1996; Trenham 1998b) and usually remain there for approximately six to eight weeks, while females stay for approximately one to two weeks. In dry years, both sexes may stay for shorter periods (Loredo and Van Vuren 1996; Trenham 1998b). Most marked salamanders have been recaptured at the pond where they were initially captured. In one study, approximately 80 percent were recaptured at the same pond over the course of three breeding seasons (Trenham 1998b). A CTS breeding site is defined as a location where CTS are able to successfully breed in years of normal rainfall and persist during the dry months of the year. Therefore, suitable habitat includes both suitable wetlands and surrounding uplands.

Historically, vernal pools and other natural seasonal ponds and surrounding uplands constituted primary breeding sites utilized by CTS (Storer 1925; Feaver 1971; Zeiner et al. 1988; Trenham et al. 2000). Vernal pools typically form in topographic depressions underlain by an impervious layer such as claypan, hardpan, or volcanic strata that prevents the downward percolation of water. Vernal pool hydrology is characterized by inundation of water during the late fall, winter, and spring, followed by complete desiccation during the summer dry season (Holland and Jain 1988). Vernal pools support a diverse and highly evolved biota that has adapted to the ever-changing water regime and benefits from the lack of predation by non-native fish. Twenty-nine other federally or State-listed species within the range of CTS are vernal pool specialists, including 24 plants, four crustaceans, and one insect (Keeler-Wolf et al. 1998). CTS, like listed vernal pool crustaceans, inhabit these seasonally inundated habitats. However, listed vernal

pool crustaceans require a relatively short period of inundation to complete their life cycle (USFWS 2004b). Therefore, many pools that support crustaceans may not hold water long enough to allow successful metamorphosis of CTS. In a study of amphibians located in eastern Merced County, CTS larvae were only observed in the largest vernal pools (Laabs et al. 2001). Unlike vernal pool crustaceans, CTS can breed and metamorphose in perennial ponds.

Stock ponds for cattle, sheep, horses, and other livestock have been, and continue to be, built to supply local water needs, especially in rural grazing lands in coastal and Sierra Nevada foothill areas (Bennett 1970) and in the absence of historical breeding ponds, have become important aquatic habitats for the CTS throughout its range (USFWS 2004a). These created water bodies have become especially important to CTS breeding success in the Bay Area and Coast Range regions where vernal pool complexes have been largely extirpated (Stebbins 1985; Zeiner et al. 1988; Shaffer et al. 1993; CDFG 2004). Of the 155 CTS locality records in the East Bay Area (Alameda and Contra Costa Counties) where the wetland type was identified, 85 percent (131 sites) were located in stock ponds (CDFG 2004). However, management of these water bodies ultimately determines their suitability as CTS breeding habitat (USFWS 2004a). As is true of natural vernal pools, the inundation period of stock ponds can be insufficient in allowing larvae to metamorphose (e.g., when early drawdown of irrigation ponds occurs). Conversely, in contrast to natural vernal pools, stock ponds may be perennial in nature and support predatory fish and bullfrogs, known predators of CTS (Shaffer et al. 1993; Seymour and Westphal 1994). In addition, inappropriate management of ponds can threaten CTS rangewide by increasing sedimentation of breeding ponds and impacts from stock animals (Hamilton and Jepson 1940; Prunuske 1987). In addition, stock ponds may be geographically isolated from other seasonal wetlands occupied by CTS, and newly created ponds may be located beyond the maximum dispersal distances of juvenile or adult salamanders. However, it is possible that during this species' lifetime, individuals from sub-populations could migrate between aquatic and upland habitats, colonizing newly created and geographically isolated ponds provided the intervening habitat could be successfully traversed by dispersing CTS (USFWS 2004a).

Upland Habitat and Terrestrial Ecology

The upland component of CTS habitat typically consists of grassland or oak savannah (Shaffer et al. 1993; USFWS 2004a); however, in Santa Barbara and eastern Contra Costa Counties, some CTS breeding ponds occur in grasslands within scrub or chaparral habitats (Shaffer et al. 1993; USFWS 2004a). CTS typically utilize burrows in open grassland or under isolated oaks, and less commonly in woodlands (Shaffer et al. 1993). CTS cannot dig their own burrows and depend on fossorial mammals such as California ground aquirrel (*Spermophilus beecheyi*) and Botta's pocket gopher (*Thomomys bottae*) (Storer 1925; Seymour and Westphal 1994; Loredo and Van Vuren 1996; Petranka 1998; Trenham 1998a) for upland wintering sites.

A key component of CTS habitat, upland wintering sites are where subadult and adult CTS spend the dry summer and fall months of the year aestivating (a state of dormancy or inactivity in response to hot, dry weather). During this time, CTS eat very little (Shaffer et al. 1993). In Sonoma County, occurrence of CTS is significantly associated with occurrence of gophers (USFWS 2004b). The utilization of ground squirrel and gopher burrows by CTS suggests a commensal relationship between these species (Loredo et al. 1996); therefore, active fossorial rodent populations are likely required to sustain CTS as inactive burrow systems become progressively more unsuitable over time. Loredo et al. (1996) found that California Ground Squirrel burrow systems collapsed within 18 months following abandonment by, or loss of, fossorial mammals. CTS use both occupied and unoccupied burrows and movement within and between burrow systems continues for at least several months after CTS return from the breeding ponds (Trenham 2001; Shaffer and Trenham 2004).

Metamorphosed juveniles leave their natal ponds in the late spring or early summer. Before the ponds dry completely, these individuals settle in small mammal burrows, to which they return at the end of nightly movements (Zeiner et al. 1988; Shaffer et al. 1993; Loredo et al. 1996). Similar to the adults, juveniles may emerge from these retreats to feed during nights of high relative humidity (Storer 1925; Shaffer et al. 1993) before settling in their selected upland sites for the dry, hot summer months. While most CTS rely on rodent burrows for shelter, some individuals may utilize soil crevices as temporary shelter during dispersal or migration (Lorendo et al. 1996).

Habitat Elements

Habitat elements are those basic aspects of the environment which are needed for survival and propagation of the species. The habitat elements for CTS are identified in Table G-3.14-1 and have been derived from the USFWS's list of primary constituent elements identified in the Designation of Critical Habitat for the CTS, Central Population: Final Rule (USFWS 2005) as well as input from local species experts.

Table G-3.14-1. Habitat Elements for California Tiger Salamander

Essential Activities	Land Cover Types	Habitat Elements
Breeding and larval development	Vernal impoundment, vernal pool, and seasonal impoundment.	Provide suitable wetlands (i.e., wetlands must be inundated with winter rain for a minimum of 12 weeks in a year of average rainfall). Seasonal wetlands are preferred, but permanent man-made ponds may be used so long as predatory fish are absent.
Foraging, dispersal, migration, and summer Inactivity	Blue oak savanna, blue oak woodland, and valley grassland.	Provide upland habitat suitable for dispersal, migration, and over-summering. Must also contain small mammal burrows or other underground habitat that CTS depend upon for food, shelter, and protection from the elements and predation.

CTS Species Distribution and Population Trends

CTS Range-wide Distribution

Genetic studies of the CTS suggest that levels of interchange among populations are very low, and that populations or groups of subpopulations (metapopulations) are genetically isolated from one another (Shaffer et al. 1993; Shaffer and Trenham 2002). Studies of mitochondrial DNA and allozymes (proteins) indicate that there are six populations of *A. californiense*, which are found in the following areas: (1) Santa Rosa area of Sonoma County; (2) Bay Area (central and southern Alameda, Santa Clara, western Stanislaus, western Merced, and the majority of San Benito counties); (3) Central Valley (Yolo, Sacramento, Solano, eastern Contra Costa, northeast Alameda, San Joaquin, Stanislaus, Merced, and northwestern Madera counties); (4) southern San Joaquin Valley (portions of Madera, central Fresno, and northern Tulare and Kings counties); (5) Central Coast Range (southern Santa Cruz, Monterey, northern San Luis Obispo, and portions of western San Benito, Fresno, and Kern counties); and (6) Santa Barbara County (Shaffer and Trenham 2002).

Along the Coast Ranges, the species occurs in the Santa Rosa area of Sonoma County, southern San Mateo County south to San Luis Obispo County, and the vicinity of northern Santa Barbara County (CDFG 2010). In the Central Valley and surrounding Sierra Nevada foothills and Coast Ranges, the species occurs from northern Yolo County (Dunn 1940) southward to northwestern Kern County and northern Tulare and Kings Counties (CDFG 2010). Other occurrences of CTS from Lake and Mono Counties outside the range of the CTS have been identified as non-native Tiger Salamanders (Shaffer et al. 1993). CTS at Grass Lake in Siskiyou County (Mullen and Stebbins 1978) have been identified as the northwestern tiger salamander (*A. t. melanostictum*) (USFWS 2004b). The USFWS notes several historical occurrences of individual CTS outside its current range. In the northeastern Sacramento Valley, there is a single occurrence located at the Gray Lodge Waterfowl Management Area in southern Butte County and northern Sutter County, and there is also a single occurrence located in Glenn County; both of these records are from the mid 1960s (CDFG 2010). There are two records from 1939 and another, from an unknown date, of CTS recorded from the edge of the range in southwestern San Luis Obispo County (CDFG 2010; Shaffer and Trenham 2002); however, it should be noted that these latter two records have recently been shown to be misidentified specimens (Hunt 2009). There is also a historic record of CTS from outside the species' range in Riverside County that was recorded in the late 1800's (CDFG 2010); however, subsequent surveys have not been able to verify the presence of CTS from this latter location (Stebbins 1989; Shaffer et al. 1993).

Although the area between Butte County and the Cosumnes River contains suitable vernal pools and has been surveyed extensively, the species has only been recorded along the southern edge of Sacramento County, south of the Cosumnes River and in northern Yolo

County (CDFG 2010). It is likely that the species is uncommon or absent in much of the southernmost San Joaquin Valley because of unsuitable habitat. This includes areas to the south of Los Banos in Merced County, and the foothills of the Sierra Nevada south of Visalia in Tulare County (Shaffer et al. 1993). The factors that restrict the CTS in the northern and southern extent of its range are not fully understood, but may include low rainfall in the southern San Joaquin Valley and a greater abundance of non-native predatory fish in the northern Sacramento Valley (Hayes 1977). Studies suggest that the present patchy distribution pattern was caused by a combination of the extreme anthropogenic changes in and around the Central Valley, and the restrictive breeding requirements of the species (Dahl 1990; Fisher and Shaffer 1996; Frayer et al. 1989; Holland 1978, 1998; Jones and Stokes 1987; Shaffer et al. 1993; Trenham et al. 2000). Because there are only a few historic collections of the species from the 1800's, and the majority of collections have occurred in the last 25 years (CDFG 2010) subsequent to significant changes in historic habitat-types (Shaffer et al. 1993), documentation of the historic distribution of the CTS does not exist. The USFWS based the analysis associated with listing on estimated current distribution and habitat availability and then assumed the available habitat was populated (USFWS 2004a).

CTS Distribution within Planning Area

The California Natural Diversity Database (CNNDB) has 22 occurrence records of CTS in Sacramento County (CDFG 2010). An additional four occurrences, not reported in the CNDDB, have been recorded at Gill Ranch (Gill Ranch Survey 2003). Figure CTS-1 shows the recorded occurrences of CTS within and adjacent to the Planning Area. Twenty-one occurrences of CTS are outside the Urban Development Area (UDA) within the Planning Area; all of which are located south of the Cosumnes River and east of Interstate 5. Although the eastern edge of the Sacramento Valley between Butte County and the Cosumnes River contains suitable vernal pools and associated upland, and has been surveyed extensively, the species has only been recorded in the southeastern-most portion of Sacramento County in this part of the valley (USFWS 2004a).

The distribution of CTS in the Planning Area includes suitable wetland habitats and the grasslands and blue oak savannah south of the Consumes River in the following watersheds: South of Cosumnes River-Badger Creek, North Fork Badger Creek, Middle Laguna, Upper Laguna, Willow Creek, Town of Wilton–Cosumnes River, Arkansas Creek–Cosumnes River, Liberty Cemetery–Dry Creek, Lower Laguna, Loch Lane–Dry Creek, Grizzley South–Cosumnes River and Hadselville Creek. CTS have not been recorded north of the Cosumnes River in the Planning Area. No occurrences have been documented in this latter area despite extensive surveys in very large areas with presumably suitable habitat (e.g., Mather, Sacramento Valley Conservancy Vernal Pool Prairie Preserve, Sunrise Douglas Area, Kiefer landfill, and East of Grant Line Road (CDFG 2010).

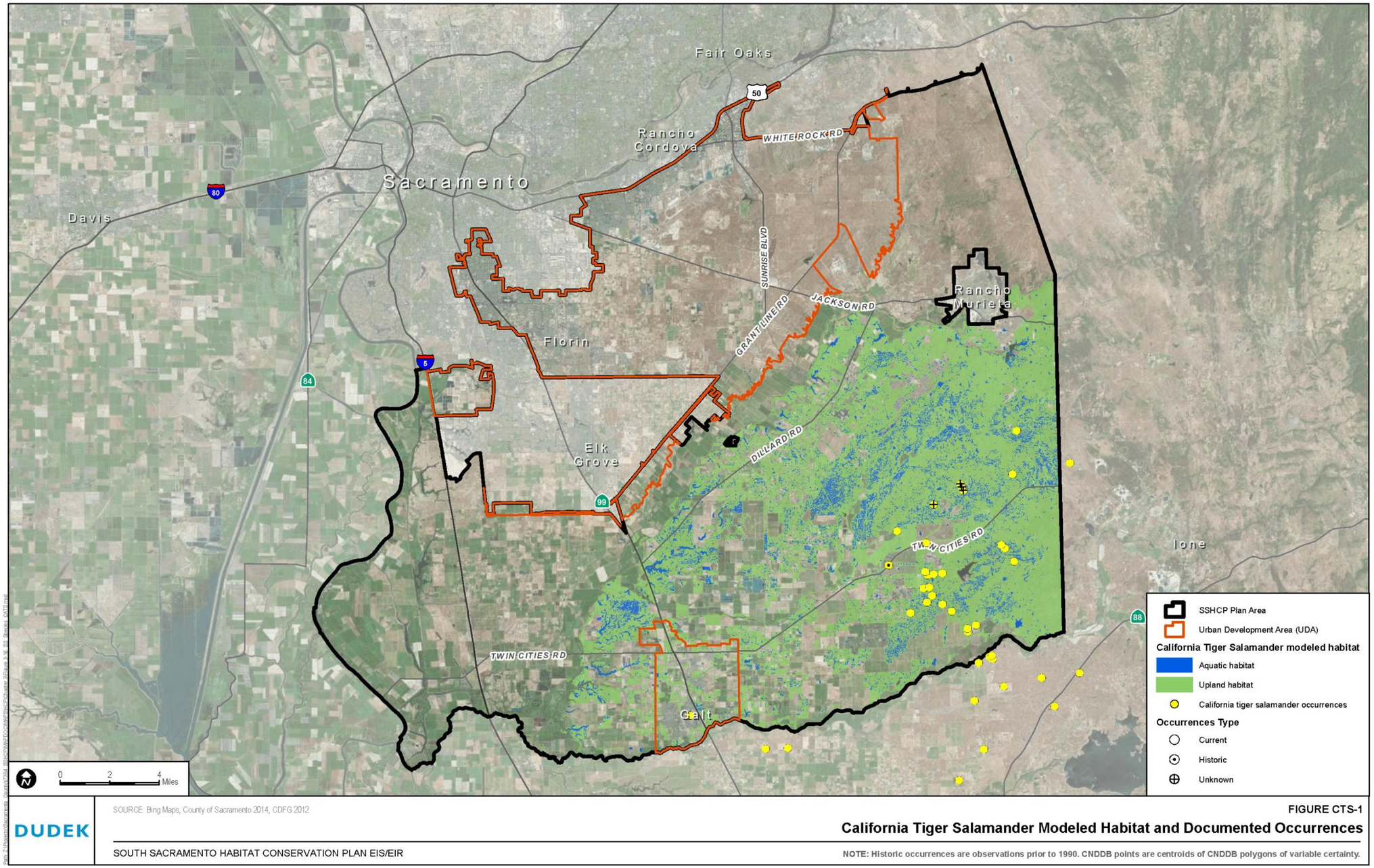
CTS Population Level and Trends

Population trends for CTS are difficult to assess due to limited data for the species. Data for the species is lacking for several reasons: 1) the species is difficult to detect; 2) CTS spend much of their life underground (Storer 1925; Feaver 1971; Shaffer et al. 1993); and 3) all individuals do not migrate to breeding pools each year (Trenham et al. 2000). Consequently, population estimates for the species are not possible and the USFWS primarily relies on measures of habitat availability as well as current and future habitat status as an indication of the status of the species.

The life history and ecology of CTS make it likely that it has a metapopulation structure (Hanski and Gilpin 1991). A metapopulation is a set of local populations or breeding sites within an area, where typically migration from one local population or breeding site to other areas containing suitable habitat is possible, but not routine. Movement between areas containing suitable habitat (i.e., dispersal) is restricted due to inhospitable conditions around and between areas of suitable habitat. Because many of the areas of suitable CTS habitat may be small, and support small numbers of CTS, local extinction of these small units may be common. A metapopulation's persistence depends on the combined dynamics of these local extinctions and the subsequent recolonization of these areas through dispersal (Hanski and Gilpin 1991, 1997; McCullough 1996; Hanski 1999).

Habitat loss has reduced the size and connectivity of patches of suitable and occupied CTS habitat (USFWS 2003, 2004b). Reduction in the extent and amount of suitable water bodies, grasslands, and other suitable upland habitats likely has eliminated connectivity among most of the known breeding sites, making recolonization of some sites more difficult following local extinction (USFWS 2003, 2004b). Furthermore, the reduction of habitat below a certain size threshold has the effect of reducing the quality of the remaining habitat by reducing the size of habitat boundaries, and making effects of other factors such as amount of food, availability of rodent burrows, pesticide use, mortality from vehicles, and predators more pronounced given the smaller area now exposed to such impacts (Semlitsch and Brodie 1998). Currently, there is not enough data to determine potential impact thresholds regarding CTS, whereby any further reduction in habitat quality or quantity would decrease survivorship or persistence (USFWS 2003, 2004a). Area of suitable habitat is likely dependent upon factors such as land-use adjacent to habitat boundaries (i.e., residential, industrial, community park), number of coterminous roads and number of vehicular trips on those roads, amount of pesticide use within the breeding pool watershed, or whether domestic animals or people have access to the site during periods when CTS are on the move and vulnerable. According to the USFWS (2003, 2004a), there is a size threshold for habitat below which the combination of various impacts will result in the loss of more CTS than the fragmented populations can produce and local extinction will occur.

Figure CTS-1 California Tiger Salamander Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012

FIGURE CTS-1

California Tiger Salamander Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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CTS Threats to the Species

Although certain factors are known to contribute to CTS decline range-wide, exactly how and to what extent they affect the decline are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantified than factors that indirectly affect an area or population. Therefore, to improve conservation planning efforts for CTS in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats. Without a better understanding of how covered activities affect California Tiger Salamander and other target species, the potential for success in conserving the species is reduced. The following is a summary of factors known or suspected to negatively affect CTS.

CTS Habitat Loss and Alteration

Destruction or modification of CTS habitat is caused by conversion of rangeland to a variety of urban and agricultural land uses. The USFWS (2004b) defines urban impacts as non-agricultural development activities such as building and maintenance of housing, commercial, and industrial developments; construction and widening of roads and highways; golf course construction and maintenance; landfill operation and expansion; operation of gravel mines and quarries; dam building and inundation of habitat by reservoirs; and other infrastructure activities that support urban areas. Agricultural impacts include the conversion of native habitat by disking and deep-ripping; and cultivation, planting, irrigation, and maintenance of row crops, orchards, and vineyards. These impacts threaten suitable breeding and upland habitat for CTS.

CTS Loss of Upland Habitat

Research suggests that even CTS using breeding ponds that are protected from development may not persist as viable populations if upland habitat is unavailable or reduced in the area, or if breeding ponds become fragmented and isolated from other breeding ponds (Marsh and Trenham 2001; Trenham and Shaffer 2005). Earthmoving operations and cultivation in upland habitat can directly or indirectly kill or injure CTS in burrows or on the surface by crushing or trapping them. Such activities render all affected areas unsuitable for CTS breeding, feeding, and sheltering. Earth disturbing practices can also expose CTS to adverse environmental conditions (increased predation, high temperatures, low humidity), destroy food sources, and alter surface hydrology (potentially affecting breeding ponds). Disking, deep-ripping, or grading of upland habitat also destroys California ground squirrel burrows and crevices utilized by CTS, making suitable subterranean refugia unavailable and likely reducing long-term adult survival of CTS (Loredo et al. 1996). Stebbins (2003) maintains that extensive control of California ground squirrels and Botta's pocket gophers is considered a serious threat to the species.

CTS Loss of Wetland Habitat

Filling, disking, or excavating wetland habitat can directly kill or injure CTS larvae, eggs, or breeding adults, and prevent future use of the wetland for reproduction. Additionally, surviving adults may be unable to locate alternative breeding sites in subsequent years if habitat is present, but has become highly fragmented by roads, housing, agriculture, and other non-habitat elements. Changes in vernal pool or pond inundation duration and depth caused by urban and agricultural land use (e.g., digging of drainage/irrigation ditches, construction of permanent ponds or reservoirs, deepening or terming of seasonal wetlands, and redirection of runoff from developments) can reduce reproductive success for CTS by: 1) prematurely drying wetlands and desiccating larvae; 2) extending the inundation period and facilitating invasion of non-native predators; 3) creating conditions that are more conducive for hybridization with non-native Tiger Salamanders; and 4) increasing vulnerability to disease by increasing isolation and fragmentation (USFWS 2004a).

CTS Rangewide Habitat Trends

Although the CTS still occurs throughout the majority of its historic range, the overall area of the species' natural habitat has been substantially reduced and the species has become increasingly rare (Shaffer et al. 1993; Barry and Shaffer 1994; Fisher and Shaffer 1996). Some researchers estimate that as much as 75 percent of CTS historic habitat has been lost (Shaffer et al. 1993). Historically, approximately 3.7 million hectares (9.1 million acres) of valley and coastal grasslands existed within the range of the Central Valley CTS population (Central CTS) (Kuchler 1988). An additional 2.6 million hectares (6.5 million acres) of blue oak/foothill pine, valley oak, or mixed hardwoods (Kuchler 1988) also existed, of which some portion was likely used by the species; however, urbanization and intensive agriculture have eliminated virtually all valley grassland and oak savanna habitat from the Central Valley floor. Loss of grasslands has exceeded the loss of all other habitats in California (Ewing et al. 1988) and it has been estimated that less than 10 percent of California's Central Valley grasslands remain (USFWS 2003). Consequently, valley grasslands and the Central CTS are now distributed primarily in a ring around the Central Valley (Heady 1977; Holland 1978).

The relative loss of habitat has also been significant with respect to vernal pool grasslands, the historic breeding habitat of the CTS (Trenham et al. 2000). Approximately 1.68 million hectares (4.15 million acres) of grasslands in 20 Central Valley counties are estimated to have supported vernal pools at the time of European settlement (Holland 1978, 1998; Holland and Jain 1988; CDFG 2010) although there is no historical data to substantiate this estimate. Most of this area, except the northern Sacramento Valley, was within the CTS assumed historic range (Shaffer et al. 1993). The remaining vernal pool complexes in California are now fragmented and significantly reduced in area (USFWS 2004b). Where vernal pools exist, the habitat is often

disturbed and degraded and the natural regime has been affected by drainage modification, off-road vehicle use, gravel mining, non-native plant invasion, road construction, and urban development (Jones and Stokes Associates 1987; USFWS 2004b; Keeler-Wolf et al. 1998). Vernal pools in California are now recognized as threatened resources, and many of the species that inhabit them are listed as threatened or endangered species (Jones and Stokes Associates 1987; Wright 1991; USFWS 2004b). Estimates of vernal pool habitat loss through the 1980s were at two to three percent annually and this rate is compounded continually (Holland 1988). During the 1980s and 1990s, vernal pool grasslands continued to be lost at an estimated rate of 1.5 percent per year (Holland 1998). As of 1997, 377,165 hectares (931,991 acres) of vernal pool grasslands remained in the Central Valley, representing a loss of approximately 78 percent (Holland 1998). Along the southeastern edge of the Central Valley, from San Joaquin to Fresno counties, at least 25 percent of the 259–hectare (640–acre) sections that had contained vernal pools in 1970 (Holland 1978) were wholly converted to agriculture or urban uses by 1994 (Seymour and Westphal 1994). This conversion estimate is probably conservative because it does not include partially converted sections where vernal pool habitat may also have been lost (Seymour and Westphal 1994). Holland (1998) estimated that at a continued 1.5 percent annual loss of vernal pools in California, 50 percent of the vernal pool habitat present in 1997 would be lost by 2043 (46 years), representing a cumulative loss of 88 percent of vernal pool grasslands.

As part of an evaluation of CTS status throughout its range, Shaffer et al. (1993) detected CTS in only 36 of 86 localities (42 percent) that had been previously recorded, and ponds currently occupied by CTS were significantly higher in elevation than those that were unoccupied or had been previously occupied; although it should be noted that these decreases may also be the result of low sampling frequency. Some researchers (Shaffer et al. 1993; Seymour and Westphal 1994; Fisher and Shaffer 1996; Davidson et al. 2002) believe these and other data suggest that many of the low-elevation breeding sites on the valley floor have been eliminated in recent years, restricting habitat used by this species to higher elevations on the margin of its ecological requirements. These higher elevation breeding sites are likely human-created stock ponds or bermed ponds that have benefited the species by offsetting the loss of CTS natural, historic vernal pool breeding habitat; however, these created breeding ponds have a shorter life span than natural vernal pools if not maintained. Additionally, some of these created breeding ponds can place CTS at risk of predation by holding water for a greater period than vernal pools.

Using information from 632 CTS records identified in the CNDDB, of which 589 records were considered extant by the CDFW, as well as 79 CTS breeding sites from Carnegie Off-Road Vehicular Park and the Los Vaqueros watershed, the USFWS (2004b) analyzed threats to the Central CTS throughout the remaining portions of its range in 20 counties. Their results suggested that there were approximately 378,882 hectares (936,204 acres) of Central CTS upland and aquatic habitat remaining in 2003 (USFWS 2004b). Of the 378,882 hectares (936,204 acres) of Central CTS habitat,

28,526 hectares (70,489 acres, 8 percent) fell within areas delineated by general plans or other planned development (high-density residential, medium-density residential, industrial, and commercial development) (USFWS 2004b). Because they are within areas that were to be developed, the USFWS considered these areas to be threatened by development. These development projects may destroy and fragment upland or aquatic breeding habitat and reduce the likelihood of long-term persistence and viability at the affected localities.

The USFWS determined that an additional 24,240 hectares (59,897 acres, 6 percent) of the estimated 378,882 hectares (936,204 acres) of Central CTS habitat is threatened by low-density residential development (2- to 20-acre parcels). Furthermore, 45,880 hectares (113,371 acres, 12 percent) of CTS habitat is threatened by very-low-density residential development (20- to 160-acre parcels) (USFWS 2004b). The land use data the USFWS used to evaluate the threat of low-density and very-low-density development is based on a minimum delineation of these areas in 2000 (USFWS 2004b). These areas will likely be further developed resulting in a greater number of houses per area in the future, and in some cases, low-density areas are regions that will become incorporated into high-density urban areas (USFWS 2004b).

Low-density residential development is a greater threat to the Central CTS than very-low-density residential development due to the greater number of houses per acre. These low-density housing developments may result in the extirpation of CTS at some locations due to the direct effects of construction that destroy breeding sites or indirect effects that alter hydrology and increase sedimentation. Structures, roads, and highways fragment habitat and prevent CTS from reaching their breeding sites by eliminating or disrupting their upland habitat or migratory corridors (Marsh and Trenham 2001). Reduced availability of upland habitat decreases the long-term population viability of CTS breeding sites (Trenham and Shaffer 2005). In the eastern United States, 25 percent of the upland habitat within 300 meters (984 feet) of a spotted salamander (*A. maculatum*) vernal pool breeding site was destroyed, resulting in a 53 percent decline in the abundance of the species at the site (Calhoun and Klemens 2002).

Low-density housing would also further fragment CTS habitats within the Sierra Nevada and Coast Range foothill counties, which are among the fastest growing counties in California (CGCDD 2003). These areas provide the last strongholds of remaining CTS (USFWS 2004b). CTS are known to have a high rate of interpond dispersal between breeding ponds, but only when the ponds are relatively close together (i.e., less than 670 meters [2,200 feet]) (Trenham et al. 2001). Therefore, the loss of breeding localities, or their isolation due to habitat fragmentation, may result in the extirpation of other breeding locations (Marsh and Trenham 2001). Furthermore, decreased landscape connectivity and increased habitat fragmentation has had negative effects on other amphibian assemblages including the eastern tiger salamander (*A. tigrinum*) (Lehtinen et al. 1999). Increased numbers of residents living in low-density residential developments and rural houses may also result in increased introduction of non-native

predators, increased applications of pesticides or agricultural contaminants, and rodent control that may reduce the long-term viability of CTS inhabiting these areas. The CTS may also be threatened by the construction of new roads or increased mortality due to increased vehicle traffic (USFWS 2004b).

Estimates of the location and amount of habitat threatened by conversion and fragmentation from urban uses described above does not consider all of the projected human population growth, urbanization, and subsequent habitat loss that will occur in the counties inhabited by the Central CTS because most city and county general plans have variable planning horizons that do not extend beyond 20 years (USFWS 2004b). California developers and builders constructed 2.8 million new housing units between 1980 and 1997, and an additional 220,000 units will be required each year for the next 20 years with the human population of the State almost doubling in less than 40 years (CGCDD 2003). New housing is currently being constructed in low-density developments on the edge of urban areas or beyond such areas (CGCDD 2003). Most of the future growth of California will be outside of the current metropolitan areas (San Francisco, Los Angeles, and San Diego), occurring in the Sacramento, San Joaquin, and Imperial valleys (CGCDD 2003). Two of these valleys are inhabited by CTS.

Rangeland areas contain vernal pool grassland are being lost as a result of rural residential development (CGCDD 2003). Privately owned rangeland in California decreased by 252,524 hectares (624,000 acres) from 1982 to 1997, an average loss of 16,997 hectares (42,000 acres) per year (USFWS 2004a), and from 1998 to 2000, the State lost an additional 21,555 hectares (53,263 acres) of rangeland (CGCDD 2003). The decline in farm rancher income, the aging of ranchers, tax implications of intergenerational transfers of ranches, and the difficulty of beginning a ranching operation (e.g., in terms of cost and knowledge of ranching) are all reasons California is experiencing the loss of rangeland (CGCDD 2003).

Projecting the future loss of Central CTS habitat from conversion of rangeland to intensive agriculture is difficult because conversion to this land use is largely unregulated by cities and counties. Conversion to intensive agriculture largely depends upon the individual landowner and is based on numerous factors that are difficult to predict, such as economic considerations, markets, and water availability. The loss of rangelands and vernal pool grasslands has been well documented in counties within the range of the Central CTS and annual rates of loss have been estimated (CDC 1994, 1998, 2000; Holland 1978, 1998, 2003; Jones and Stokes Associates 1987; Keeler-Wolf et al. 1998; CDFG 2003; CDWR 1998). The cumulative loss of vernal pool grassland was estimated at 78 percent by the late 1990s, and annual rates of loss have been between 1 and 3 percent during the 1980s and 1990s. Some of the loss of Central CTS habitat has resulted from conversion to intensive agriculture, and some is attributable to urbanization and other non-agricultural activities. The USFWS (2004b) believes that the continued loss of Central CTS habitat due to intensive agriculture represents an important threat to the species.

The USFWS anticipates that this conversion of land use will continue to adversely affect CTS if human population growth continues to increase as projected (75 percent increase from 2000 to 2040) in the range of the Central CTS (CDF 1998). If these projections are correct, this population growth will continue to spur the conversion of irrigated agriculture conversion to urban use, and the subsequent displacement of intensive agriculture on to rangeland in the foothill areas of the Central Coast or east side of the San Joaquin Valley (CDWR 1998; CDC 2002). However, the rate of displacement and subsequent conversion to intensive agriculture is expected to continue at lower rates than in the past as areas with suitable soils and water availability necessary for intensive agriculture become increasingly scarce. Additionally, there can be a financial incentive for landowners to convert existing rangeland and grasslands areas to irrigated crops, as rangeland is generally valued much less per acre than irrigated agricultural (ASFMRA 2003). Conversion of Central CTS habitat to intensive agriculture, in addition to the loss of habitat to rural residential housing, further fragments CTS habitat. Fragmentation of habitat may not only be directly impacting breeding sites, but may also be creating barriers to interpond dispersal and seasonal movements between breeding sites and upland refugia (Marsh and Trenham 2001; Trenham and Shaffer 2005; Calhoun and Klemens 2002).

CTS Urban and Population Growth

As the human population of the State of California continues to increase, there is a concomitant increase in urban and suburban development. According to the 2000 census, the number of people in California has increased by 13.8 percent since 1990 (CDF 2002). The average growth in human population within the counties in the range of the Central CTS during this period has been 19.5 percent (CDF 1998). Counties in the East Bay Area region and State Highway 99 corridor in the San Joaquin Valley are also undergoing increases in urbanization related to population growth (CDF 1998, 2002). From 1995 to 2020, the human population in the Central Valley, Bay Area, and Central Coast counties is projected to grow by 49 percent (from 12.8 million to 19.1 million people) (CDWR 1998). According to the California Department of Finance (CDF), the human population in the counties inhabited by the Central CTS is expected to grow by 75 percent from 2000 to 2040 (from 11.2 million to 19.6 million people) (CDF 1998). Therefore, impacts to the CTS due to conversion of its habitat resulting from urban development are expected to continue (USFWS 2004b).

CTS Disease, Parasitism and Non-Native Species

The specific effects of disease on the CTS are not known and there is presently no information indicating disease is prevalent in existing populations in California (USFWS 2004a). Chytrid Fungus infections (chytridiomycosis) have been detected specifically in Central CTS and pathogens (fungi, bacteria, and viruses) have been known to adversely affect other amphibians including other tiger salamander species (USFWS 2004b). Ranaviruses are another potential

threat to CTS because they have been found to adversely affect other amphibians including other Tiger Salamander species, and it is carried by non-native species that occur within the range of CTS, including bullfrogs and non-native tiger salamander species. Nowhere are pathogens indicated as an imminent threat.

Bullfrogs prey on CTS (Anderson 1968; Lawler et al. 1999), which has resulted in an overall pattern of the decline in areas where bullfrogs and other exotic species are present (Fisher and Shaffer 1996). The bullfrog, native to North America east of the Great Plains, was introduced into California in the late1800s and early-1900s, and has rapidly spread throughout the State (Storer 1925; Hayes and Jennings 1986). Morey and Guinn (1992) documented a shift in amphibian community composition at a vernal pool complex, with CTS becoming proportionally less abundant as bullfrogs increased in number. Bullfrogs are unable to establish permanent breeding populations in unaltered vernal pools and seasonal ponds because they require more than one year to complete their aquatic larval stage. Dispersing immature bullfrogs take up residence in such water bodies during the winter and spring where they prey on native amphibians, including larval CTS (Laabs et al. 2001; Morey and Guinn 1992; Seymour and Westphal 1994).

Bullfrogs are known to travel at least 2.6 kilometers (1.6 miles) between ponds (Bury and Whelan 1984), and have the potential to naturally colonize new areas where they do not currently exist, including areas where Central CTS occur. In one study of the eastern San Joaquin Valley, 22 of 23 ponds (96 percent) with CTS were within the bullfrogs' potential dispersal range (Seymour and Westphal 1994). In addition, because bullfrogs are still sought within California for sport and as food, and may be taken without limit under a fishing license (USFWS 2004b), the threat of transport for intentional establishment in new habitat already occupied by CTS is significant.

Western mosquitofish (*Gambusia affinis*), first introduced in California in 1922, are native to central North America (watersheds tributary to the Gulf of Mexico) and have been introduced throughout the world for mosquito control. The species occurs throughout California wherever the water does not get too cold for extended periods and they are still widely planted throughout the State (Boyce 1994; Moyle 2002) by about 50 local mosquito abatement districts. Mosquitofish are ubiquitous because of their tolerance of poor water quality and wide temperature ranges (Boyce 1994). Larval CTS may be especially vulnerable to mosquitofish predation due to their fluttering external gills, which may attract these visual predators (Graf and Allen-Diaz 1993). Loredo-Prendeville et al. (1994) found no CTS inhabiting ponds containing mosquitofish. Leyse and Lawler et al. (2000) found that the survival of CTS in experimental ponds stocked with mosquitofish, at densities similar to those found in many stock ponds, was significantly reduced. Larvae that survived in ponds with mosquitofish were smaller, took longer to reach metamorphosis, and had injuries such as shortened tails. However, a recent experiment that replicated conditions in vernal pool environments and permanent ponds

determined that, at low densities, mosquitofish did not have a significant effect on larval CTS growth and survival, but that growth and size at metamorphosis was significantly reduced at high fish densities (USFWS 2004b).

Other non-native fish have either been directly implicated in predation of CTS or appear to have the potential to prey upon them (Fisher and Shaffer 1996; Shaffer et al. 1993). For example, introductions of sunfish species (e.g., largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), catfish (*Ictalurus* spp.), and fathead minnows (*Pimephales promelas*) are believed to have eliminated CTS from several breeding sites in Santa Barbara County (USFWS 2000). In eastern Merced County, CTS were absent in stock ponds where non-native fish were present, whereas stock ponds absent of non-native fish had CTS present (Laabs et al. 2001). Non-native sunfish, catfish, and bullheads (*Ameiurus* spp.) have been, and still are, widely planted in ponds in California to provide for sportfishing. By 1984, the California fish fauna included about 50 such transplanted and exotic species, mostly of eastern North American origin (Hayes and Jennings 1986). The alien species have been introduced for a variety of reasons including ornamental, sport, bait, insect control and food uses. Thus, the USFWS considers introductions of such nonnative fish species into Central CTS breeding habitat a threat to the persistence of the species in these locations (USFWS 2004a).

CTS Other Natural or Manmade Factors Affecting California Tiger Salamander Continued Existence

Several other factors may threaten CTS including exposure to various contaminants, rodent population control efforts, chemical mosquito control, direct mortality while crossing roads, hybridization with non-native tiger salamanders, and certain practices associated with livestock grazing.

Contaminants

Little research has been done on the effects of contaminants to the CTS, especially with respect to agricultural pesticides. Most toxicological studies to date have been conducted on other amphibian species, specifically anuran species (frogs and toads). Although not specifically on CTS, these latter studies provide insight to the potential risks of contaminants to the CTS. Like most amphibians, CTS inhabit both aquatic and terrestrial habitats during different stages of their life cycle and may be exposed to a variety of pesticides and other chemicals throughout their range. Due to their permeable skin, amphibians may be particularly vulnerable to environmental stressors such as pesticides (Blaustein and Wake 1990). It is important to note that toxicants do not have to be present at lethal levels to be harmful. Toxicants at sub-lethal levels may still cause adverse effects such as developmental abnormalities in larvae and behavioral anomalies in adults (Hall and Henry 1992; Blaustein and Johnson 2003). Sources of

chemical pollution which may adversely affect CTS include pesticides used in agricultural, landscaping, roadside maintenance, and rodent and vector control activities, as well as hydrocarbons and other pollutants that enter stormwater runoff from residential areas and industrial facilities (USFWS 2004a).

Rodent Control

As CTS spend the majority of their lives aestivating underground, typically in ground squirrel, pocket gopher, and other burrowing mammal burrows (Loredo et al. 1996; Trenham 1998a), widespread burrowing mammal control likely poses a significant threat to CTS. Beginning in the early 1900's (Marsh 1987), burrowing mammal control methods have included trapping, shooting, fumigation of burrows, use of toxic (e.g., anticoagulant) baits, and deep ripping of burrow areas (USFWS 2004a). Burrowing mammal control programs are widely conducted (frequently via bait stations placed at specific sites) on and around various commercial agricultural operations, including grazing/range lands, various row crop areas, and vineyards (Thompson *in litt*. 1998). In addition, flood control agencies and levee districts, routinely conduct extensive California Ground Squirrel control programs around levees, canals, and other facilities under their management (USFWS 2004b). Pocket gopher control is common around golf courses, residential homes, and gardens. Two of the most commonly used rodenticides, chlorophacinone and diphacinone, are anticoagulants that cause animals to bleed to death. These chemicals can be absorbed through the skin and are considered toxic to fish and wildlife (USFWS 2004a). These latter two chemicals, along with strychnine, are used to control rodents (Thompson *in litt.* 1998). Although the effects of these poisons on CTS have not been assessed, any use in close proximity to occupied Central CTS habitat may have various direct and indirect toxic effects. Gases, including aluminum phosphide, carbon monoxide, and methyl bromide, are used in rodent fumigation operations and are introduced into burrows by either using cartridges or by pumping. When such fumigants are used, most or all animals inhabiting the fumigated burrow are non-selectively killed (Salmon and Schmidt 1984).

In addition to possible direct adverse effects of rodent control chemicals and gasses, California ground squirrel and Botta's pocket gopher control operations may also indirectly affect CTS by reducing the number of upland burrows available to them (Loredo-Prendeville et al. 1994). Because the burrow density required by CTS is unknown, the impacts of less than total burrow loss are also unknown. It is currently thought that active California Ground Squirrel colonies are probably needed to sustain CTS because inactive burrow systems become progressively unsuitable over time (USFWS 2004a). For example, Loredo et al. (1996) found that burrow systems usually collapsed within 18 months following cessation of California ground squirrel use and that CTS did not utilize collapsed burrows.

Mosquito Control

In addition to the use of western mosquitofish, a common chemical method of mosquito control in California involves the use of methoprene, an insect hormone mimic that increases the level of juvenile hormone in insect larvae and disrupts the molting process. Lawrenz (1984, 1985) found that methoprene (Altosoid SR–10) retarded the development of selected crustacea that had the same molting hormones (i.e., juvenile hormone) as insects, and anticipated that the same hormone may control metamorphosis in other arthropods. Because the success of many aquatic vertebrates relies on an abundance of invertebrates in temporary wetlands, any delay in insect growth could reduce the numbers and density of available prey (Lawrenz 1984, 1985). Therefore, the use of methoprene could have an indirect adverse effect on CTS by reducing the availability of prey.

Road-Crossing Mortality

Although no systematic studies of road mortality of the CTS have been conducted, traffic related mortality on CTS is well documented (Hansen and Tremper 1993; USFWS 2004a). For example, during one 15-day period in 2001 at a Sonoma County location, 26 road-killed CTS were found (USFWS 2004a). Loss of CTS to vehicular-caused mortality in the vicinity of breeding sites can range from 25 to 72 percent of the observed CTS crossing roads (Twitty 1941; Launer and Fee 1996). Additionally, mortality is likely exacerbated by associated roadway curbs and berms as low as 9 to 12 centimeters (3 to 5 inches) that allow CTS access to roadways, but prevent their exit (Launer and Fee 1996; S. Sweet *in litt.* 1998).

Vehicular usage on California roads is increasing proportional to human population growth and urban expansion. During November 2002, California's estimated total vehicular travel on State highway system roads alone was 23 billion kilometers (14.27 billion miles) (Caltrans 2003). From 1972 to 2001, the State highway system total vehicular usage rose steadily from 108.6 billion to 270 billion kilometers (67.1 to 167.8 billion miles) annually. For the California counties in which the Central CTS may occur, State highway system total annual vehicular usage in 1999, 2000, and 2001 was 86.0, 90.0, and 92.1 billion kilometers (53.3, 55.9, and 57.2 billion miles) respectively. Moreover, in those areas of the State where the Central CTS occurs, road densities from past urbanization are already high. Overall, these areas have 5,860.2 kilometers (3,641.5 miles) of roads (and rail tracks) of all types. The range of current road (and rail) density is from 1.01 kilometer per 100 hectares (0.25 mile per 100 acres) in the southern San Joaquin Valley, to 1.64 kilometers per 100 hectares (0.41 mile per 100 acres) in the Bay Area counties. The USFWS (2004a) believes that these high road-use and road-density values and subsequent associated road-kill mortality are a threat to the species, a threat that will continue growing in concert with the State's rapid growth of human population and urbanization.

Hybridization

Hybridization has been defined by Rhymer and Simberloff (1996) as ‘‘interbreeding of individuals from what are believed to be genetically distinct populations, regardless of taxonomic status.’’ Hybridization between species may lead to introgression, which occurs when hybrid individuals repeatedly backcross to one or both parental types so that genetic material is transferred between the two species. Natural hybridization can be an important component of evolutionary processes; however, hybridization and introgression can be cause for concern, particularly if they are the result of human activities such as the introduction of non-native taxa. In the extreme, hybridization between native and non-native taxa can lead to loss of the native taxon through ‘‘genetic assimilation’’ (Rhymer and Simberloff 1996; Allendorf et al. 2001). Hybridization has been implicated in the extinction of populations and species of many animal and plant taxa (Rhymer and Simberloff 1996; Allendorf et al. 2001), including Tecopa pupfish (*Cyprinodon nevadensis calidae*), Amistad gambusia (*Gambusia amistadensis*), and longjaw cisco (*Coregonus alpenae*) (Rhymer and Simberloff 1996).

Of particular concern is the threat of genetic contamination and assimilation of CTS by non--native barred tiger salamanders (*A. mavortium*), which were introduced into central California as bass bait in the mid-1900s (Riley et al. 2003). Riley et al. (2003) studied hybridization between these two species relative to habitat-types commonly used by the species and identified diagnostic genetic markers from mtDNA and nuclear DNA. They found clear evidence that the two species are interbreeding in the wild and producing viable and fertile hybrid offspring. Furthermore, they determined that the extent of genetic mixing depends on the breeding habitat, with non-hybrid CTS more likely to occur in natural habitats than in created or disturbed wetlands. Vernal pools contained significantly fewer larvae with hybrid genotypes and significantly more non-hybrid parental genotypes than expected. Fitzpatrick and Shaffer (2004) further analyzed the frequencies of hybrid genotypes in breeding habitats, focusing on natural vernal pools, ephemeral man-made cattle pools and perennial man-made ponds. They found that perennial ponds contained a high percentage of non-native alleles (alternative forms of a gene). They suggested that this may be because *A. mavortium* has 1) a more flexible breeding phenology than CTS and can therefore take advantage of perennial ponds by breeding earlier in the fall, and 2) exhibits facultative paedomorphosis (i.e., retention of larval characteristics as an adult). These two characteristics of *A. mavortium* may increase the relative ability of non-native alleles to persist in perennial ponds. Riley et al. (2003) and Fitzpatrick and Shaffer (2004) show that the extent of hybridization between *A. mavortium* and CTS may depend on the breeding habitat used (i.e., created and highly modified habitats may facilitate hybridization) and that, in at least some circumstances (e.g., where there are perennial ponds), non-native genes may be more likely to persist than native genes.

CTS hybridization has been found to varying degrees in the Central Coast, Bay Area, and Central Valley portions of the CTS range (Shaffer and Trenham 2002; H.B. Shaffer *in litt.* 2003; USFWS 2004a). Of particular concern is the widespread hybridization within the Central Coast population where introduced genes have been found from southern Santa Clara County throughout most of Monterey County down to Fort Hunter Liggett on the San Luis Obispo County line, and east across all of San Benito County (H.B. Shaffer *in litt.* 2003). Within this region, virtually all Monterey County populations of the CTS have been compromised by non-native genes, and every population of the CTS at Fort Hunter Liggett is either introduced or a hybrid mixture (H.B. Shaffer *in litt.* 2003).

Using Geographic Information System (GIS), the USFWS estimated the number of Central CTS records (presumably CTS without non-native genes present) that were threatened by hybridization (USFWS 2004b). A CTS record was considered threatened by hybridization if the record was within 2.1 kilometers (1.3 miles) of a hybridized or non-native tiger salamander observation. Dr. H. Bradley Shaffer of University of California at Davis provided locations of hybridized or non-native tiger salamander locations. Other records also were considered threatened if they were part of a larger polygon that consisted of multiple records located within 2.1 kilometers (1.3 miles) of a hybridized or non-native Tiger Salamander observation. The USFWS's assumptions were that if a non-native or hybridized tiger salamander was within 2.1 kilometers (1.3 miles) (based on the maximum observed migration distance of a tiger salamander, Sweet *in litt.* 1998) of a CTS record, then the non-native or hybridized tiger salamander would be able to migrate to the native CTS breeding site and breed with the individuals at that location. Additionally, if the non-native or hybrid was located within 2.1 kilometers (1.3 miles) of a polygon consisting of multiple records, then there would be sufficient intervening breeding habitat located within the polygon to allow for the nonnative or hybrid tiger salamanders to migrate to and breed with the CTS records within the polygon (USFWS 2004b).

Using this analysis, the USFWS determined that 48 records (22 percent) in the Bay Area region, 56 records (78 percent) in the Central Coast region, and 27 records (8 percent) in the Central Valley region were threatened by hybridization because of their close proximity to non-native and hybridized tiger salamanders (USFWS 2004b). Non-native tiger salamanders are not known to occur within the range of the CTS in Sonoma County. In Santa Barbara County, nonnative tiger salamanders are known from the Lompoc Federal Penitentiary. The closest known CTS breeding pond is approximately 12.9 kilometers (8 miles) from the Penitentiary.

Livestock Grazing

Rangeland, suitably managed for livestock (cattle, sheep, and horses), is generally thought to be compatible in many cases with CTS habitat requirements (Shaffer et al. 1993; Loredo et al.

1996; USFWS 2004a). By maintaining shorter vegetation, grazing may make areas more suitable for California Ground Squirrels whose burrows are essential to CTS survival. The long-term effects of ranching on the species is thought to have been either neutral or beneficial where burrowing rodents were not completely eradicated, because the CTS would have likely been extirpated from many areas if stock ponds had not been built and maintained for livestock production (USFWS 2004b).

CTS Data Gaps and Conservation Implications

In recent years, the ecology, status, and management of CTS have received increased attention; however, there are several sources of uncertainty regarding CTS and its requirements in the Planning Area. The primary data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

CTS Population and Habitat Distribution within the Planning Area

CTS occur in suitable habitat within the Planning Area; however, the species' overall distribution, abundance, and population structure are incompletely known. Land cover-types used by CTS, such as vernal impoundment, vernal pool, and seasonal impoundment, and adjacent uplands (blue oak woodland, blue oak savanna, and valley grassland), occur throughout Sacramento County. Nonetheless, almost all records of CTS are from the southeastern portion of the area.

Though comprehensive surveys for CTS have been conducted in much of the Planning Area, the population size and distribution of the species throughout the Planning Area are still incompletely known. In addition, though the distribution of different habitat-types is mapped and quantifiable, the quality of habitat (particularly as it relates to certain essential habitat components) for CTS within many areas is unknown. These information gaps limit our ability to identify the best lands available for preserving CTS habitat and accurately estimate the impacts resulting from covered activities.

Until this data gap is remedied, the conservation value for CTS will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, have multiple breeding sites that may function as a metapopulation, or are adjacent to these areas.

CTS Determining Threat Severity

Certain factors are known to contribute to CTS decline rangewide; however, exactly how and to what extent these factors contribute are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population (e.g., habitat fragmentation, changes in hydroperiod

of potential breeding sites, etc.). Therefore, to improve conservation planning efforts for CTS in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats.

Effectiveness of Habitat Enhancement and Restoration Techniques in Creating Suitable Habitat for California Tiger Salamander

Achieving the conservation goals and objectives for CTS will require successful enhancement and restoration of suitable habitat. The function of habitat (e.g., connectivity, hydroperiod, biodiversity) is an important factor for suitability for CTS. Whether created, restored or enhanced habitats can retain the functional attributes suitable for CTS is unknown.

If habitat creation, restoration and enhancement techniques cannot eventually result in habitats with functional characteristics suitable for CTS, then those lands would not support sustainable populations.

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WESTERN SPADEFOOT (WST)

Western Spadefoot (WST)

(Spea hammondii)

Status USFWS: None

Status CDFW: Species of Special Concern

WST Listing Status

The western spadefoot (*Spea hammondii*) was a Category 2 candidate for listing in 1994 (USFWS 1994). This species currently has no federal listing status. The western spadefoot was designated a species of special concern by the State of California in 1994 (Jennings and Hayes 1994; CDFG 1998).

WST Life History and Ecology

WST Species Description and Life History

Taxonomy

Spadefoots are members of the Family Pelobatidae. Two closely related genera of spadefoots have been recognized within this Family: *Scaphiopus* and *Spea* (Cannatella 1985; Weins and Titus 1991). Western spadefoots are officially recognized within the genus *Spea* (Weins and Titus 1991) although many literature sources reference *Scaphiopus* as the genus. Species relationships within *Spea* have been difficult to define due to morphological homogeneity among species. At least four species currently are recognized (Weins and Titus 1991). Named by

Baird in 1859, *Spea hammondii* was believed to have a broad geographic range from California to western Texas and Oklahoma with a distributional gap in the Mojave Desert of California (Storer 1925; Stebbins 1966). Brown (1976) identified morphological, vocalization, and reproductive differences between eastern (Arizona eastward) and western (California) populations, justifying species recognition for each. The California populations retained the name *Spea hammondii* while the eastern populations were designated as *Spea multiplicata*. This distinction was further supported by electrophoretic analyses conducted by Sattler (1980) and by allozymic and morphological analyses conducted by Weins and Titus (1991). Genetic variation across the range of *Spea hammondii* has not been studied to date.

Species Description

Western spadefoots are dusky green or gray above and often have four irregular light-colored stripes on their back, with the central pair of stripes sometimes distinguished by a dark, hourglass-shaped area. The skin tubercles (small, rounded protuberances) are sometimes tipped with orange or are reddish in color, particularly among young individuals (Storer 1925; Stebbins 1985). The iris of the eye is usually a pale gold. The abdomen is whitish without any markings. Spadefoots have a wedge-shaped, glossy black "spade" on each hind foot. The call of the western spadefoot is hoarse and snore-like, and lasts between 0.5 and 1.0 second (Stebbins 1985). Snout-vent length ranges in size from 3.7 to 6.2 centimeters (1.5 to 2.5 inches) (Stebbins 1985).

Spadefoots are distinguished from the true toads (genus *Bufo*) by their cat-like eyes (their pupils are vertically elliptical in bright light, but are round at night), the single black sharp-edged "spade" on each hind foot, teeth in the upper jaw, and rather smooth skin (Stebbins 1985). The parotid glands (large swellings on the side of the head and behind the eye) are absent or indistinct on spadefoots. Adult males may have a dusky throat and dark nuptial pads on the innermost front toes (i.e., thumb). Western spadefoots and southern spadefoots (*Spea multiplicata*) lack a cranial boss (a ridge between the eyes). This trait distinguishes these species from the Plains spadefoot (*S. bombifrons)* and Great Basin spadefoot (*S. intermontanus*), which each have a cranial boss. Compared to western spadefoots, southern spadefoots have a more elongate spade, are brownish above, and have a copper-colored iris.

The eggs of western spadefoots are pigmented and are found in irregular cylindrical clusters of about 10 to 42 eggs attached to plant stems and other submerged objects in temporary pools (Stebbins 1985). Spadefoot larvae (tadpoles) can reach seven centimeters (2.5 inches) in length. They have oral papillae (small nipple-like projections that encircle the mouth), and their eyes are set close together at the top of the head. Their body is broadest just behind the eyes (Storer 1925).

Western spadefoot larvae are similar in appearance to other spadefoot larvae. The larvae have oral papillae, and their eyes are set close together and situated well inside the outline of the head

as viewed from above. Western spadefoot larvae resemble those of the Plains spadefoot in that their body is broadest just behind the eyes and they are light to medium gray or brown above. In addition, western spadefoot larvae have an upper mandible that is beaked and a lower mandible that is notched. These larvae grow to around seven centimeters (2.8 inches) (Storer 1925).

Reproduction

Western spadefoots breed from January to May in temporary pools and drainages that form following winter or spring rains. Water temperatures in these pools must be between nine (9) degrees Celsius (48 degrees Fahrenheit) and 30 degrees Celsius (86 degrees Fahrenheit) for western spadefoots to reproduce (Brown 1966, 1967). Oviposition (egg-laying) does not occur until water temperatures reach the required minimum of nine (9) degrees Celsius (48 degrees Fahrenheit) (Jennings and Hayes 1994). Depending on the water temperature and annual rainfall, oviposition may occur between late February and late May (Storer 1925; Burgess 1950; Feaver 1971; Stebbins 1985). During breeding, highly vocal aggregations of more than 1,000 individuals may form (Jennings and Hayes 1994). Breeding calls are audible at great distances and are thought to bring individuals together at suitable breeding sites (Stebbins 1985). Females deposit their eggs in numerous small irregularly cylindrical clusters of 10 to 42 eggs (average is 24) (Storer 1925), and may lay more than 500 eggs in one season (Stebbins 1951). Eggs are deposited on plant stems or pieces of detritus in temporary rain pools, or sometimes pools in ephemeral stream courses (Storer 1925; Stebbins 1985).

Eggs hatch in 0.6 to sic (6) days depending on water temperature (Brown 1967). At relatively high water temperatures (e.g., 21 degrees Celsius [70 degrees Fahrenheit]), Storer (1925) noted that approximately half of the Western spadefoot eggs failed to develop, possibly due to a fungus that thrives in warmer water and invades the eggs. Larval development can be completed in 3 to 11 weeks (Burgess 1950; Feaver 1971) depending on food resources and water temperature, but must be completed before pools dry. In eight vernal pools examined by Morey (1998), the average duration to complete larval development (hatching to metamorphosis) was 58 days (range 30 to 79 days). Further, pools that persisted for longer periods permitted longer larval development resulting in larger juveniles with greater fat reserves at metamorphosis. Morey (1998) concluded that longer periods of larval development are associated with larger body size at metamorphosis, which is correlated to greater fitness and survivorship (Pfennig 1992).

Annual reproductive success probably varies with precipitation levels with success being lower in drier years (Fisher and Shaffer 1996). Recently metamorphosed juveniles emerge from water and seek refuge in the immediate vicinity of natal ponds where they spend several hours to several days near ponds before dispersing. Weintraub (1979) reported that toadlets of Plains spadefoot seek refuge in drying mud cracks, under boards, and under other surface objects

including decomposing cow manure. Age of sexual maturity in western spadefoot is unknown, but considering the relatively long period of subterranean dormancy (eight to nine months), individuals may require at least two years to mature (Jennings and Hayes 1994).

Demography

Virtually no data are available on demographic values such as long-term population dynamics, survival rates, reproductive success, and dispersal rates for western spadefoot. However, it is assumed that protecting connectivity corridors between metapopulations is essential for conservation of the species. Morey and Guinn (1992) reported that western spadefoot abundance appeared to remain stable from 1982 to 1986 at a vernal pool complex in Stanislaus County, California. Based on systematic collections of road-killed western spadefoots, proportions of adults and juveniles were 70 percent and 30 percent, respectively, and the proportions of adult males and females were about equal (USFWS 2005).

In a study of amphibian reproduction in 30 vernal pools in Madera County, Feaver (1971) reported a mortality rate of 81 percent for larval spadefoots, 10 percent of which he attributed to predation from California tiger salamander (*Ambystoma californiense*) larvae, while the remainder was due to desiccation from pools drying before metamorphosis was complete. In some years, all reproductive potential is lost when pools dry before any spadefoot larvae are able to metamorphose (Baldwin 1988; Morey 1998). Morey (1998) reported that Western spadefoot larvae that occurred in pools lasting less than five weeks experienced nearly 100 percent mortality. Denver et al. (1998) reported that the Western spadefoot showed the ability to "accelerate metamorphosis in response to water volume reduction" triggered by the reduced opportunity or inability to feed in combination with reduced water volume.

Diet and Foraging

Adult western spadefoots forage on a variety of insects, worms, and other invertebrates. Morey and Guinn (1992) examined the stomach contents of 14 Western spadefoots and found 11 different food items including grasshoppers (Order Orthoptera: Family Gryllacrididae), true bugs (Order Hemiptera), moths (Order Lepidoptera: Family Noctuidae and unidentified moths), ground beetles (Order Coleoptera: Family Carabidae), predaceous diving beetles (Order Coleoptera: Family Dytiscidae), ladybird beetles (Order Coleoptera: Family Coccinellidae), click beetles (Order Coleoptera: Family Elateridae), flies (Order Diptera: Family Heleomyzidae), ants (Order Hymenoptera: Family Formicidae), and earthworms (Order Haplotaxida). Adult spadefoots can consume 11 percent of their body mass during a single outing, and Dimmit and Ruibal (1980) speculated that adult southern spadefoots may be able to acquire sufficient energy for their long dormancy period (eight to nine months) in only a few weeks. The specific food habits of western spadefoot larvae are unknown; however, the larvae of southern

spadefoot and Plains spadefoot consume planktonic organisms and algae, and also will scavenge dead organisms, including other spadefoot larvae (Bragg 1964). In addition, larvae of Plains spadefoots reportedly will prey on fairy shrimp (e.g., *Branchinecta* spp.) (Bragg 1962).

WST Habitat Requirements and Ecology

Western spadefoots primarily occur in lowland habitats generally below 900 meters (3,000 feet) within or adjacent to washes, floodplains of rivers, alluvial fans, playas, and alkali flats. They also occur in the foothills and mountains (Stebbins 1985) up to 1,363 meters (4,500 feet) (Morey 1988). Associated vegetative communities include valley-foothill grassland, open chaparral, pine-oak woodland and lower montane conifer and mixed conifer forest within open areas comprised of short grasses and sandy or gravelly soil. Western spadefoots have two distinct habitat requirements including quiet streams (Stebbins 2003) or seasonal pools for breeding and uplands for foraging and dry-season aestivation. Western spadefoot eggs and larvae have been observed in a variety of permanent and temporary wetlands including rivers, creeks, pools in intermittent streams, vernal pools, and temporary rain pools (CDFG 2010). They have also been found in altered wetlands including vernal pools that have been disturbed by activities such as earthmoving, disking, intensive livestock use, and off-road vehicle use, and man-made wetlands such as created ponds, livestock ponds, sedimentation and flood control ponds, irrigation and roadside ditches, roadside puddles, tire ruts, and borrow pits (Fisher and Shaffer 1996; CDFG 2010). Although western spadefoots have been observed inhabiting and breeding in wetlands altered or created by humans, survival and reproductive success in these pools have not been compared to unaltered natural pools and research suggests that vernal pools and other temporary wetlands may be optimal for breeding due to the absence or reduced abundance of both native and nonnative predators, many of which require more permanent wetlands.

Often undervalued in conservation planning, terrestrial habitats surrounding aquatic breeding sites are critical to the survival of many semiaquatic species that depend on mesic ecotones to complete their life cycles (Semlitsch and Bodie 2003). Several studies have shown the close dependence of semiaquatic species, such as reptiles and amphibians, on terrestrial habitats for critical life history functions. During periods of drought, aquatic habitats may not be available to semiaquatic species for extended periods of their lives. In such cases, terrestrial habitats act as population reservoirs or sources for adults until breeding and reproduction can again occur (Semlitsch and Bodie 2003). In addition, adult frogs, salamanders and turtles are generally philopatric to individual wetlands and migrate annually between aquatic and terrestrial habitats to forage, reproduce and overwinter or aestivate (Burk and Gibbons 1995; Semlitsch 1998). The amount of terrestrial habitats used during migrations to and from wetlands and for foraging defines the terrestrial core habitat of a population. This aggregation of adults constitutes a local population centered on a single wetland or wetland complex (Semlitsch and Bodie 2003). Local

populations are connected by dispersal and are part of a larger metapopulation, which extends across the landscape (Pulliam 1988; Marsh and Trenham 2001).

Annual natal migrations centered on a single wetland or wetland complex are biologically different than dispersal to new breeding sites. It is generally thought that dispersal among populations is achieved primarily by juveniles for amphibians (Gill 1978; Breden 1987; Berven and Grudzien 1990) or by males for turtles (Morreale *et a*l. 1984). Dispersal by juvenile amphibians tends to be unidirectional and longer in distance than the annual migratory movements of breeding adults (Breden 1987; Seburn et al. 1997). Thus, habitats adjacent to wetlands can serve as stopping points and travel corridors for dispersal to other nearby wetlands (Semlitsch and Bodie 2003). In any given western spadefoot population, we expect that some subpopulations will disappear, but the habitat they occupied will eventually be recolonized if it remains suitable.

Little is currently known regarding western spadefoot dispersal distances and overland movement patterns from aquatic breeding sites to upland aestivation sites. Semlitsch and Bodie (2003) summarized data from the literature on the use of terrestrial habitats by 19 frog and 13 salamander species representing 1363 individuals that are otherwise typically associated with wetlands. In general, plethodontid stream salamanders (e.g., *Desmognathus fuscus*, *Eurycea bislineata*, *Eurycea longicauda*), although migratory at some stage of their life cycle, remain close to the edges of ponds and streams and seldom move more than 20-30 m from aquatic habitats. Alternatively, some species of frogs, toads and newts are highly mobile and move 1,000 to 1,600 meters (e.g., *Bufo bufo*, *Rana catesbbeiana*, *Notophthalmus viridescens*). The majority of the remaining species occur at intermediate distances, where they emigrate to find suitable terrestrial habitat. The overall core terrestrial habitat ranged from 159 to 290 meters (522 to 951 feet) from the edge of aquatic breeding sites.

Behavior

Western spadefoots are almost completely terrestrial and enter water only to breed (Dimmitt and Ruibal 1980); however, typical of amphibians, Western spadefoots require a certain level of moisture to avoid desiccation, which can be a challenge in the arid habitats occupied by the species. Consequently, spadefoots have adapted behaviorally and physiologically to better facilitate moisture retention.

During dry periods for example, spadefoots construct and occupy burrows that may be up to 0.9 meters (3 feet) in depth (Ruibal et al. 1969) where they may remain for 9 to 10 months aestivating. Like all amphibians, Western spadefoots have very permeable skin, which allows them to absorb moisture from the surrounding soil. Ruibal et al. (1969) found that spadefoots may select soils that are relatively sandy and friable when constructing burrows as these

attributes facilitate both digging and water absorption. Research also suggests that spadefoots may retain urea to increase the osmotic pressure within their bodies preventing water loss to, and facilitating water absorption from, surrounding soil with relatively high moisture tensions (Ruibal et al. 1969; Shoemaker et al. 1969).

Spadefoots emerge from burrows to forage and breed following rains in the winter and spring; however, the factors that stimulate emergence are not well understood. In Arizona, spadefoots emerged after as little as 0.25 centimeters (0.1 inch) of precipitation, which barely wet the soil surface and obviously did not soak down to burrows (Ruibal et al. 1969). Sound or vibration from rain striking the ground appears to be the primary emergence cue used by spadefoots, and even the vibrations of a motor can cause them to emerge (Dimmitt and Ruibal 1980). Spadefoots may move closer to the surface prior to precipitation and may even emerge to forage on nights with adequate humidity. Most surface activity is nocturnal. Morey and Guinn (1992) report that surface activity is related to both moisture and cooler temperatures that occur following storms. Surface activity has been observed in all months from October to May (Morey 1988; Morey and Guinn 1992). Above-ground activity is primarily nocturnal, presumably to reduce water loss. Even when exposed to artificial light, spadefoots will immediately move away or begin burrowing underground (Storer 1925; Ruibal et al. 1969). During the day, spadefoots dig and occupy relatively shallow burrows two to five centimeters (0.5 to 2 inches) in depth (Ruibal et al. 1969), and may even use small mammal burrows. In addition to breeding during periods of above-ground activity, spadefoots must acquire sufficient energy resources prior to reentering dormancy (Seymour 1973).

Interspecific Interactions

The role of predation on the population dynamics of western spadefoots is unclear. The extended dormancy period of adult and juvenile spadefoots reduces their exposure to predators. Also, toxic secretions from dermal glands provide a significant deterrent to predators. Predators pose a much greater threat to larval western spadefoots than to adults. Spadefoot larvae are preyed upon by a variety of native predators including wading birds, garter snakes (*Thamnophis* spp.), and Raccoons (*Procyon lotor*) (Childs 1953; Feaver 1971). Feaver (1971) found Western spadefoot larvae were preyed upon by California tiger salamander larvae when the two species co-existed in the same pools and the California tiger salamander larvae matured first; however, if western spadefoot and California tiger salamander larvae are the same size, no predation may occur (Anderson 1968).

Nonnative predators introduced within the range of western spadefoots include crayfish (*Procambarus clarkii*), various fishes, and bullfrogs (*Rana catesbeiana*) (Hayes and Warner 1985; Hayes and Jennings 1986; Morey and Guinn 1992; Jennings and Hayes 1994; Fisher and Shaffer 1996). Nonnative fish, many of which are predatory, negatively affect native amphibians by

preying upon eggs and larvae (Jennings 1988). In some locations, mosquitofish (*Gambusia affinis*), purposely introduced to control mosquitoes, also prey on Western spadefoot eggs and larvae (Grubb 1972; Jennings and Hayes 1994; Fisher and Shaffer 1996). Introduced bullfrogs have been implicated in the declines of native amphibians (Moyle 1973; Hayes and Jennings 1986), but may not be significant predators of adult western spadefoots, although western spadefoots have been found in the stomachs of bullfrogs on at least two occasions (Hayes and Warner 1985; Morey and Guinn 1992). Bullfrogs may present more of a threat to larval western spadefoots than adults. During dispersal between permanent water sources, juvenile bullfrogs will use temporary water sources (e.g., vernal pools) as resting and feeding areas, increasing the potential for predation on spadefoot larvae (Morey and Guinn 1992).

Although, bullfrogs are of concern regarding the conservation of western spadefoots, some significant ecological differences exist that may minimize interactions between the species. For example, spatial segregation may exist due to bullfrogs occurring less frequently in the temporary wetlands (e.g., vernal pools) used by western spadefoots. Also, western spadefoots increase activity in response to moisture and low temperatures following storms whereas bullfrogs increase activity in response to warmer temperatures prior to storms (Morey and Guinn 1992). Thus, some temporal segregation may occur as well; however, some studies indicate that declining population trends may be associated with introduced predators including bullfrogs (USFWS 2005). At a site in Stanislaus County, California, western spadefoot abundance remained stable during 1982 to 1986 despite dramatic increases in bullfrog abundance during this same period (Morey and Guinn 1992).

Western spadefoots have been recorded in 11 of the 17 vernal pool regions described by Keeler-Wolf et al. (1998). The species has been documented to co-occur with several other rare species, some of which are federally protected. Among the 406 locations for western spadefoots in the CNDDB (CDFG 2010), the following special status animals have been documented to co-occur: California tiger salamander, California red-legged frog (*Rana draytonii*), vernal pool tadpole shrimp (*Lepidurus packardi*), vernal pool fairy shrimp (*Branchinecta lynchi*), and California fairy shrimp (*Linderiella occidentalis*). Rare plants have also been observed in association with western spadefoot and include San Joaquin Valley Orcutt grass (*Orcuttia inaequalis*), hairy Orcutt grass (*O. pilosa*), fleshy owl's clover (*Castilleja campestris* ssp. *succulenta*), Colusa grass (*Neostapfia colusana*), and Hoover's spurge (*Chamaesyce hooveri*). In addition, both adult and larval western spadefoots consume food items that also are used by other co-occurring amphibians including pacific tree frog (*Hyla regilla*), California tiger salamander, and western toad (*Bufo boreas*) (Morey and Guinn 1992). Thus, some degree of resource competition may unnecessarily occur, depending upon the abundance of food resources.

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for western spadefoot are identified in Table G-3.15-1 and have been derived from input from local species experts.

Table G-3.15-1. Habitat Elements for Western Spadefoot

Essential Activities	Land Cover Types	Habitat Elements
Breeding and larval development	Vernal impoundment, vernal pool, vernal swale, seasonal wetlands, seasonal impoundment, swale, open water, and streams/creeks.	Temporary pools, drainages, and quiet streams that form following winter or spring rains. Water temperatures in these pools must be between 9 degrees Celsius (48 degrees Fahrenheit) and 30 degrees Celsius (86 degrees Fahrenheit) for western spadefoots to reproduce.
Foraging, dispersal, migration, and summer inactivity	Blue oak savanna, blue oak woodland, and valley grassland.	Require uplands to create burrows and some degree of moisture. In particularly dry areas spadefoots may select soils that are relatively sandy and friable.

WST Species Distribution and Population Trends

WST Central California Distribution

The western spadefoot is nearly endemic to California, and historically ranged from Redding in Shasta County southward to Mesa de San Carlos in northwestern Baja California, Mexico (Stebbins 1985) occurring throughout the Central Valley, Coast Ranges and coastal lowlands (Jennings and Hayes 1994). However, in recent decades the western spadefoot has been extirpated throughout most of the lowlands of southern California (Stebbins 1985) and from many historic locations within the Central Valley (Jennings and Hayes 1994; Fisher and Shaffer 1996). According to Fisher and Shaffer (1996), the western spadefoot has suffered a severe decline with virtually complete extirpation from the Sacramento Valley, a reduced density of populations in the eastern San Joaquin Valley and modest declines in the Coast Ranges. The average elevation of sites where the species still occurs is significantly higher than the average elevation for historical sites suggesting that declines have been more pronounced in lowlands (USFWS 2005).

WST Distribution within Planning Area

Figure WST-1 shows 31 occurrence records of WST within and adjacent to the Planning Area. Fourteen occurrences of WST are within the Urban Development Area (UDA). Sixteen occurances are located outside of the UDA, east of Interstate 5 and north of the Cosumnes River. One occurance record is location south of the Cosumnes River.

WST Population Levels and Trend

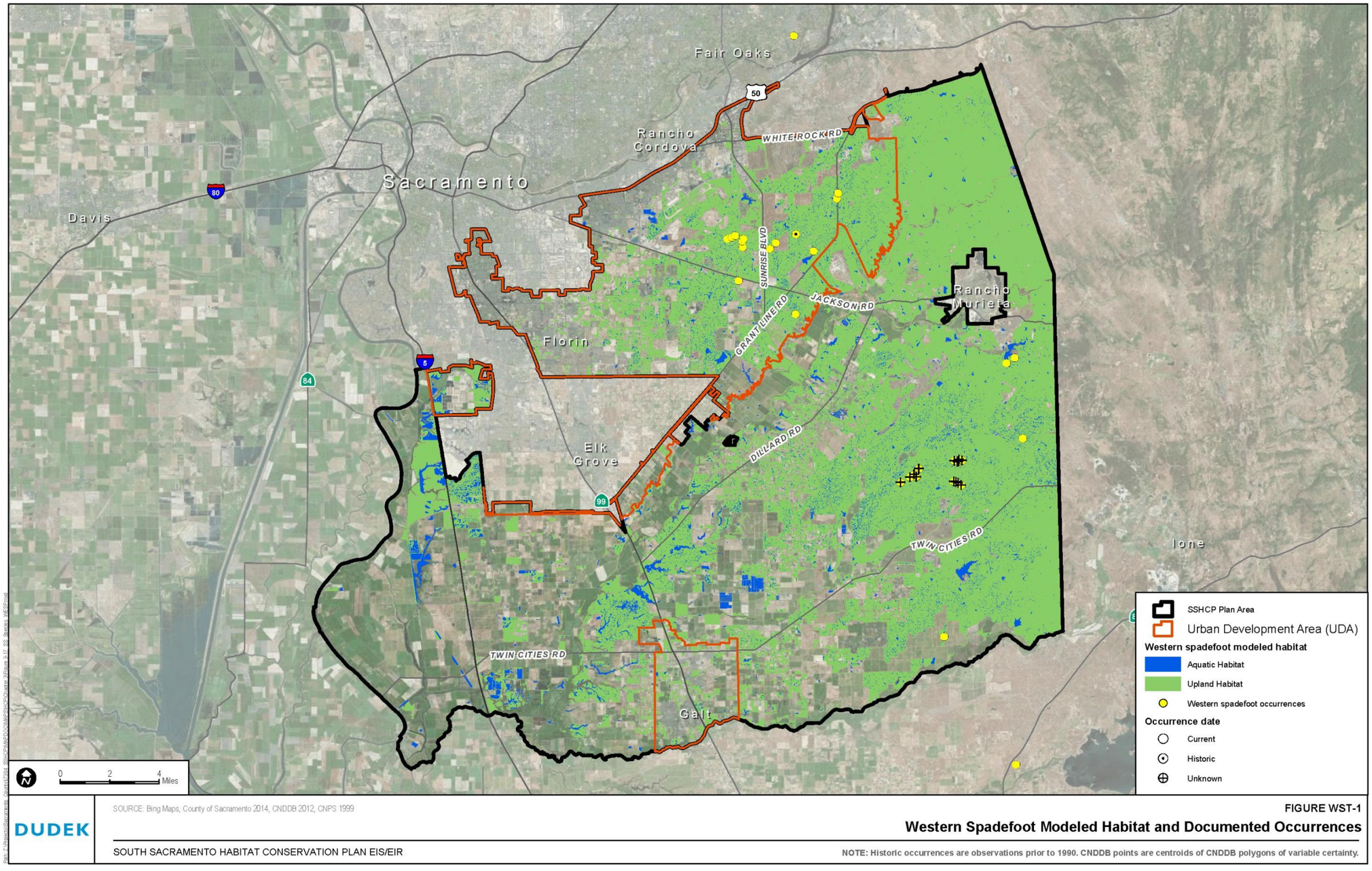
Three relatively recent sources of data have presented information regarding the current status and distribution of the western spadefoot. Jennings and Hayes (1994) examined 832 museum and sighting records from 346 locations and concluded that western spadefoots still occurred in 18 California counties, but had been extirpated from six counties. Fisher and Shaffer (1996) conducted field surveys of 315 sites in the Sacramento Valley, San Joaquin Valley, and Coast Ranges from 1990 to 1992 that confirmed the presence of western spadefoots in 13 counties. The CNDDB (CDFG 2010) lists 406 records of western spadefoots from 26 counties. These records range from 1978 to 2006 and do not represent a systematic survey. Additionally, the status of most of the sites where western spadefoots were observed is unknown and many sites may no longer exist due to subsequent development. Some of the records were submitted by biological consultants who conducted surveys on sites that were about to be developed (USFWS 2005).

WST Threats to the Species

Although certain factors are known to contribute to western spadefoot decline rangewide, exactly how and to what extent they affect the decline are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population. Therefore, to improve conservation planning efforts for western spadefoot in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats. Without a better understanding of how covered activities affect western spadefoot and other target species, the potential for success in conserving the species is reduced. The following is a summary of known and suspected threats to western spadefoot in the Planning Area.

Habitat loss and fragmentation are currently the most significant threats to the survival and recovery of western spadefoot (USFWS 2005). Although determining the degree of severity among contributing factors is difficult without additional information, habitat loss generally is a result of urbanization and agricultural conversion, but can also occur in the form of habitat alteration and degradation resulting from the following: changes to natural hydrology; introduction of invasive species; incompatible grazing regimes, including insufficient grazing for prolonged periods; infrastructure projects (e.g., roads, water storage and conveyance, utilities); recreational activities (e.g., off-highway vehicles and hiking); erosion; contamination; and poor rangeland management and/or lack of monitoring. Habitat fragmentation generally is a result of activities associated with habitat loss (e.g., roads and other infrastructure projects that contribute to the isolation and fragmentation of suitable habitats).

Figure WST-1 Western Spadefoot Modeled Habitat and Documented Occurrences



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Most western spadefoot habitat is not protected and those areas that are protected are relatively small and therefore highly subject to external threats. It is likely that western spadefoots suffered dramatic reductions in the mid to late 1900's when urban and agricultural development were rapidly destroying natural habitats in the Central Valley and southern California (Jennings and Hayes 1994). Jennings and Hayes (1994) estimated that over 80 percent of the habitat once known to be occupied by the western spadefoot in southern California (from the Santa Clara River Valley in Los Angeles and Ventura Counties southward) has been developed or converted to uses that are incompatible with successful reproduction and recruitment of the species. In northern and central California, loss of habitat has been less severe, but nevertheless significant. It is estimated that over 30 percent of the habitat once occupied by western spadefoots has been developed or converted (Jennings and Hayes 1994). Regions that have been severely affected include the lower two-thirds of the Salinas River system, and much of the areas east of Sacramento, Fresno, and Bakersfield. In addition, many of the suitable seasonal wetlands and vernal habitats concentrated on valley terraces above the Central Valley floor, have begun disappearing or been fragmented (Jennings and Hayes 1994).

California has both the highest absolute and relative human population growth in the United States. California's population is predicted to grow by almost 18 million by the year 2025, an increase of over 50 percent, the highest of any state in the nation (US Census Bureau 1996). Approximately 73 percent of the land within the Central Valley is privately owned, and in areas containing vernal pool habitats, only six percent of the land area is in public ownership (USFWS 2005). According to the 1997 National Resources Inventory (USDA 2000), California ranked sixth in the nation in amount of non-federal land developed between 1992 and 1997, at over 221,200 hectares (546,700 acres). If current population trends continue, seasonal wetland habitats in California, especially those on private land, will be increasingly threatened and possibly extirpated.

In more recent years, vernal pool habitats have been lost primarily as a result of widespread urbanization. Between 1994 and 2003, the Sacramento Field Office of the USFWS conducted section seven consultations on impacts to almost 20,250 hectares (50,000 acres) of vernal pool habitats across California (USFWS 2005). Over half of this loss of habitat, 10,125 hectares (25,000 acres), was the result of residential, commercial, and industrial development projects. The construction of infrastructure associated with urbanization including the construction of highways, wastewater treatment plants, sewer lines, water supply projects, and other utility projects has also contributed greatly to the loss and fragmentation of vernal pools and seasonal wetlands in California (USFWS 2005).

In addition to urbanization, conversion of California's Central Valley to intensive agricultural uses continues to contribute to the decline of vernal pool habitat. From 1992 to 1998, 50,825 hectares (125,591 acres) of grazing land were converted to other agricultural uses in the Central

Valley of California. It is likely that much of this land supported vernal pools. Holland (1998) estimated that more than 12,950 hectares (32,000 acres) of vernal pool habitats were lost in the San Joaquin Valley vernal pool region from the late 1980's through 1997, mostly as a result of agricultural conversion. Since 1994, the Sacramento USFWS office has reviewed projects converting more than 6,070 hectares (15,000 acres) of vernal pool habitats to intensive agricultural uses via section 7 of the Endangered Species Act (USFWS 2005).

WST Altered Hydrology

In addition to direct habitat loss, changes to vernal pool hydrology may also adversely affect spadefoot populations. For example, physical barriers, such as roads and canals can dam or block hydrologically linked systems and alter wetland hydrology both upstream and downstream of the barrier by truncating connectivity and flow. Wetland hydrology also may be altered by changes to patterns of surface and subsurface flow, depending on topography, precipitation, and soil types (Hanes et al. 1990; Hanes and Stromberg 1998). In addition, increased runoff and nuisance flows associated with urban development and impervious surfaces can result in altered hydrology of seasonal wetlands on and off-site. For example, stormwater drains, or the coverage of land surfaces with concrete, asphalt, or irrigated lawns, can alter the duration, volume discharge and frequency of surface flows through increased flooding and runoff (USFWS 2005).

As the timing, frequency, and duration of vernal pool inundation are critical to the survival of vernal pool species including the western spadefoot, alterations to hydrology can be particularly harmful due to premature pool dry-down before the life cycle of the species is completed, preventing reproduction and disrupting gene flow. Similarly, flowing water that removes plants and animals, including cysts, eggs or seeds, from the pool complexes can also prevent successful reproduction and disrupt gene flow. Water flow into vernal pools during the summer can significantly alter vernal pool species composition (Clark et al. 1998). In addition, longer periods of inundation and/or changes in water depth can effectively change seasonal wetland functions (e.g., change from vernal pool to perennial/permanent wetlands), which could potentially provide suitable habitat for introduced bullfrogs and fish.

Excluding livestock and/or changing the grazing intensity and/or season of use can also alter vernal pool hydrology. Historically, native herbivores helped maintain appropriate inundation periods of seasonal wetlands by limiting vegetation accumulation and by sustaining soil conditions that create favorable vernal pool habitat (Barry 1995). The removal of cattle grazing from historically grazed grasslands has been found to dramatically decrease the inundation period of vernal pools (Marty 2004). In a study conducted in pools inhabited by spadefoots, Marty (2004) found that the removal of grazing led to a reduction in pool inundation below the period of time necessary for successfully metamorphose by western spadefoot. Standing dry or dead

vegetation may reduce overland flows during precipitation events via interception and direct evaporation. In addition, changes in vernal pool hydrology resulting from livestock exclusion are interrelated with the invasion of nonnative annual species (USFWS 2005). Bauder (1987) found a direct correlation between nonnative vegetation and length of inundation in vernal pools.

In some areas, the alteration of hydrology, often in combination with specific land use practices, has caused downcutting of sloughs and swales, thus threatening the stability and functions of adjacent vernal pools. Any ground-disturbing activities, such as plowing, trenching, grading, deep-ripping, scraping, off-road vehicles, inappropriate levels of livestock grazing, or other activities, adjacent to or within the watersheds of vernal pools can result in siltation when pools fill during the following wet season. Siltation is particularly likely in areas where high, disturbed slopes rise above the level of the vernal pools. Poorly designed trail and road systems near vernal pools may also cause erosion and result in siltation of vernal pools. Larval western spadefoots may suffocate in pools with high levels of siltation and turbidity and siltation may also result in the burial and/or asphyxiation of eggs. Runoff from irrigated agricultural lands can also alter the hydrology of adjacent vernal pools and also can contribute to erosion, siltation, and contaminant loads (USFWS 2005).

WST Contaminants

Amphibians typically have complex life cycles and thus more opportunities for and routes of exposure than other vertebrates. The western spadefoot is exposed to a variety of toxins throughout its range, but the sensitivity of this species to pesticides, heavy metals, air pollutants, and other contaminants is largely unknown. Each year, millions of kilograms (millions of pounds) of fertilizer, insecticides, herbicides, and fungicides are used on crops, forests, rights of way, and landscape plants in California. Some of these chemicals are extremely toxic to aquatic organisms such as amphibians and their prey. Industrial facilities and motor vehicles also release contaminants that may harm the western spadefoot. Contaminants from road materials, leaks, and spills also could adversely affect western spadefoots by contaminating the water in wetlands.

WST Human Waste, Recreational Use, and Vandalism

As vernal pool habitats become increasingly rare and urban development expands, threats from disposal of waste, off-road vehicle use, and vandalism increase. People often dump unwanted items such as trash, tires, and appliances in vernal pool areas. Not only can these items release toxic substances into the environment and contaminate water and soil (Ripley et al. 2004), but they can directly affect species by crushing them and restricting photosynthesis in plants by shielding the sun. Waste material also may disrupt the natural hydrologic flow.

Certain recreational activities threaten vernal pool ecosystems and western spadefoots may be adversely affected by off-road vehicle use, hiking, and bicycling. When off-road vehicles and bicycles cut through vernal pool complexes, they may impair hydrological functions by displacing soil and causing erosion or truncating swale connectivity, thus resulting in hydrological changes. Similarly, some off-road enthusiasts (e.g., bicyclists may create dirt jump ramps, which also could result in the aforementioned effects. Western spadefoots may be crushed and killed as a result of careless site users. Trampling also may reduce the reproductive output of western spadefoots using the area.

WST Inappropriate Livestock Grazing

Considering the historic grazing of native ungulates and other herbivores in vernal pool ecosystems, properly managed livestock grazing can play a significant role as a process surrogate in the protection and enhancement of vernal pool ecosystems. Livestock grazing has three primary effects on vernal pools: consumption of vegetation, trampling, and nutrient input from urine and feces (Vollmar 2002). However, inappropriate levels of grazing, from overgrazing, undergrazing, or inappropriately timed grazing, can result in significant adverse effects to vernal pool ecosystems on which western spadefoots depend.

Although experts maintain that the relationship between grazing livestock and vernal pool habitat condition is difficult to quantify, the prevailing belief is that livestock grazing can play an important role as a management tool in vernal pool habitat (USFWS 2005). The perceived need for some amount of ecosystem disturbance should not be interpreted as an invitation to indiscriminately graze vernal pool landscapes. Because vernal pool species exhibit a variety of life history strategies, grazing regimes must take these needs into consideration.

WST Random, Naturally Occurring Events

Western spadefoots occurring in small habitat patches are vulnerable to random environmental fluctuations or variation (stochasticity) due to annual weather patterns and availability of food and other environmental factors. As with most vernal pool species, western spadefoot populations are unevenly distributed within fragmented vernal habitats and are predominantly isolated from other. As a result, these populations are more vulnerable to stochastic extinction and genetic problems, particularly in the expression of deleterious genes (known as inbreeding depression). Individuals and populations possessing deleterious genetic material are less likely able to withstand environmental change and survivorship is decreased.

WST Disease

Chytrid fungus (*Batrachochytrium dendrobatidis*) is known to contribute to amphibian declines, and could be spread via infected organisms or contaminated equipment (USFWS 2005).

Diseases and parasitic threats may range from benign to fatal. The vectors and biochemical pathways associated with spread and infection should be considered in order to adequately minimize the threats posed by diseases and pathogens.

WST Non-Native Species

Another reason for the population decline of the western spadefoot is the introduction of nonnative predators, specifically bullfrogs, crayfishes and fishes (e.g., mosquitofish) (Hayes and Warner 1985; Hayes and Jennings 1986; Fisher and Shaffer 1996). All of these species were introduced into California in the late 1800's and early 1900's, and through range expansions, additional introductions, and transplants, these exotics have become established throughout most of California (USFWS 2005). Fisher and Shaffer (1996) reported an inverse relationship between the presence of western spadefoots and nonnative predators. Additionally, nonnative predators may have displaced western spadefoots at lower elevations, resulting in the species being found primarily at higher elevation sites where these predators apparently are less abundant (Fisher and Shaffer 1996). Fisher and Shaffer (1996) assessed native amphibian populations in the Coast Ranges, Sierra Nevada foothills, and Central Valley. They predicted that widespread declines of western spadefoots would occur if nonnative species continued to spread into low-elevation Coast Range habitats. In the San Joaquin Valley they found that relatively few nonnative predators were present, but native amphibians still had declined significantly. The San Joaquin Valley was the most intensively farmed and most modified of the three regions examined. It has been subject to extensive habitat loss, degradation, and fragmentation (USFWS 1998). Adverse impacts from these activities as well as isolation from other western spadefoot populations may have caused the observed declines. In addition, disking the soil as a part of row-cropping and other forms of intensive agriculture are likely to cause mortality of western spadefoots in their underground burrows.

WST Roads

Roads represent an additional threat to the western spadefoot. Road construction can result in direct mortality of the western spadefoot and can cause direct loss and fragmentation of habitat. Roads can also cause indirect loss of habitat by facilitating additional road construction and urban development (a major cause of habitat loss for the western spadefoot) (USFWS 2005). Mortality of western spadefoots from motor vehicle strikes has been observed by multiple researchers (Morey and Guinn 1992; CDFG 2010), and appears to be both widespread and frequent. For instance, Jennings (1998) reported road mortality at all seven sites that he surveyed in Kings and Alameda Counties. The impact of motor vehicle-caused mortality on populations of western spadefoots is unknown. Roads can also be a barrier to movements and effectively isolate populations. In Germany, roads are significant barriers to gene flow among common frog (*Rana temporaria*) populations and has resulted in genetic differentiation (Reh and Seitz 1990).

Similarly, Kuhn (1987, in Reh and Seitz 1990) determined that approximately 24 to 40 cars per hour on a given road resulted in mortality of 50 percent of common toads (*Bufo bufo*) as individuals attempted to migrate across the road. Heine (1987, *in* Reh and Seitz 1990) identified that 26 cars per hour effectively reduced toad survival at road crossings to zero.

WSt Noise and Vibration

Activities that produce low frequency noise and vibration, such as grading for development and seismic exploration for natural gas in or near habitat for western spadefoots, may be detrimental to the species. Dimmitt and Ruibal (1980) determined that southern spadefoots were extremely sensitive to such stimuli and would break dormancy and emerge from their burrows in response to these disturbances. Disturbances that cause spadefoots to emerge at inappropriate times could result in detrimental effects such as mortality or reduced fitness.

WST Data Gaps and Conservation Implications

In recent years, the ecology, status, and management of the western spadefoot have received increased attention. There are several sources of uncertainty regarding western spadefoot and its requirements in the Planning Area. The primary data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

WST Population and Habitat Distribution within the Planning Area

Western spadefoots occur in suitable habitat within the Planning Area. The species' overall distribution, abundance, and population structure are incompletely known. Habitat-types used by western spadefoot, such as drainages, vernal pools, other seasonal wetlands, some perennial wetlands, and adjacent uplands, occur throughout Sacramento County.

No comprehensive surveys for western spadefoot have been conducted in the Planning Area. Therefore, the population size and distribution of the species throughout the Planning Area are still incompletely known. In addition, though the distribution of suitable habitat-types is mapped and quantifiable, the quality of habitat (particularly as it relates to certain essential habitat components) for California tiger salamander within many areas is unknown. These information gaps limit our ability to identify the best lands available for preserving western spadefoot habitat and accurately estimate the impacts resulting from covered activities.

Until this data gap is remedied, the conservation value for western spadefoot will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, have multiple breeding sites that may function as a metapopulation, or are adjacent to these areas.

WSt Determining Threat Severity

Certain factors are known to contribute to western spadefoot decline rangewide. Exactly how and to what extent these factors contribute are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population (e.g., habitat fragmentation, changes in hydroperiod of potential breeding sites, etc.). Therefore, to improve conservation planning efforts for western spadefoot in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats.

WST Effectiveness of Habitat Enhancement and Restoration Techniques in Creating Suitable Habitat for Western Spadefoot

Achieving the conservation goals and objectives for western spadefoot will require successful enhancement and restoration of suitable habitat. The function of habitat (e.g., connectivity, hydroperiod, biodiversity) is an important factor for suitability for western spadefoot. Whether created, restored or enhanced habitats can retain the functional attributes suitable for western spadefoot is unknown.

If habitat creation, restoration and enhancement techniques cannot eventually result in habitats with functional characteristics suitable for western spadefoot, then those lands would not support sustainable populations.

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WESTERN POND TURTLE (WPT)

Western Pond Turtle (WPT)

(Actinemys marmorata)

Status USFWS: None

Status CDFW: Species of Concern

WPT Listing Status

The western pond turtle (*Actinemys marmorata*), including the northwestern sub-species (*A. m. marmorata*) and the southwestern sub-species (*A. m. pallida*), is a California species of concern.

WPT Life History and Ecology

WPT Species Description and Life History

Taxonomy

The phylogenetic relationships of the western pond turtle are in a state of flux. Recent evidence suggests that the species is distinct from the other three species of the former group *Clemmys and Emys* in eastern North America (Bickham et al. 1996; Feldman and Parham 2001; Holman and Fritz 2001). Feldman and Parham (2002) and Parham and Feldman (2002) presented evidence that the western pond turtle should be placed in the genus *Emys*, along with the European pond turtle (*Emys orbicularis*) and Blanding's turtle (*Emys* [=*Emydoidea*] *blandingii*), and this view has been adopted by others (Spinks et al. 2003; Spinks and Shaffer 2005). In contrast, Holman and Fritz (2001) and Stephens and Wiens (2003) believed that the western pond turtle is not closely related to any extant species and should be placed in its own genus, *Actinemys*. The Turtle Taxonomy Working Group (2007) recorded it as "*Emys* or *Actinemys marmorata* Baird and Girard 1852 [formerly in *Clemmys*]." The genus *Actinemys* is used in both of the most recent standardized names of North American herpetofauna (Collins and Taggart 2002; Iverson et al. 2008) and globally (Fritz and Havas 2007).

The first specimens of *A. marmorata* were collected in 1841 in the vicinity of Puget Sound, Washington and described by Baird and Girard (1852) as *Emys marmorata*. Seeliger (1945) described two subspecies: northern pacific pond turtle (*Clemmys* [=*Actinemys*] *marmorata marmorata*) and southern pacific pond turtle (*Clemmys* [=*Actinemys*] *m. pallida*). A broad range

of intergradations occurs from the American River south through the San Joaquin Valley (Seeliger 1945; Stebbins 2003).

Recently, Spinks and Shaffer (2005) reported genetic differences indicating four un-named clades within *A. marmorata*, with the following distributions: 1) from the Transverse Mountains of southern California south into Baja California Norte; 2) San Joaquin Valley and adjacent foothills; 3) Ventura and Santa Barbara counties in central coastal California; and 4) all of the remaining populations. These data suggest considerable genetic fragmentation within the species, especially in the southern half of the range. The new groups do not follow the pattern of the earlier described subspecies (i.e., *A. m. marmorata* and *A. m. pallida*).

Species Description

The western pond turtle is the only native box turtle widely distributed in the western United States (Stebbins 1985). The painted turtle (*Chrysemys picta*), which is found primarily in the Midwestern United States, ranges into the Pacific Northwest. The painted turtle can be distinguished from the western pond turtle by the presence of yellow lines on the head and limbs, and red markings on the shell (Stebbins 1985). The pond slider or red-eared slider (*Trachemys scripta elegans*), has been introduced in the west. The pond slider can be distinguished from the western pond turtle by the presence of lengthwise wrinkles and streaks on the shell, absence of spotting on the head and neck, and a broad red, yellow, or orange stripe or blotch behind the eye (Stebbins 1985).

The western pond turtle is a small (9 to 19 centimeters, 3.5 to 7.5 inches) aquatic turtle characterized by an olive, dark brown, or black shell with a spotted head and neck (Stebbins 1985) and is often observed basking on logs, rocks, or floating on the surface of calm water bodies. The northwestern subspecies is defined on the basis of mottled head and neck coloration and a relatively high frequency of inguinal shields. The southern subspecies is defined on the basis of light head and neck coloration with more prominent markings in these areas, and a reduced frequency of occurrence of large inguinal shields.

Reproduction

The age of first reproduction is typically seven to nine years of age for the southern western pond turtle and 10 to 14 years of age for the northern western pond turtle (Holland 1991a). Most females lay eggs in alternate years; however, Hays *et a*l. (1999) reported that females nested every year. Gist and Jones (1989) suggest that sperm storage within the female may occur. This may allow adults to mate in the fall, when environmental conditions are highly suitable, while fertilization occurs during the next year. Clutch size ranges from one to 13 eggs, with larger females generally laying larger clutches (Holland 1985a, 1991a; Storer 1930; Ernst et

al. 1994). From May through August females make many extended movements into upland habitat where they dig shallow nests (Rathburn et al. 1992; Reese and Welsh 1997). Nest locations range from 12 to 402 m (39 to 1,319 ft) from aquatic habitat (Storer 1930; Holland 1991b; Rathbun et al. 1992) and are typically located in open areas dominated by grasses and forbs. Soils are dry and generally well drained with significant clay/silt content and low slope. Nests on sloping terrain often have a southern or southwestern exposure. Females excavate their nests in the ground, deposit the eggs, and cover the nest by scraping soil and vegetation over the eggs. Females tend to be very wary during overland nesting movements and may abandon nesting attempts if disturbed (Holland 1991a; Rathbun et al. 1992). Some level of nest site philopatry has been reported in the western pond turtle (Holland 1994). This suggests a great need for the protection of upland habitats that may be used by nesting turtles.

Incubation requires from 96 to 104 days in the wild (Holland 1991a). In captivity, Feldman (1982) noted an incubation period of 73 to 80 days. Normal hatching success is approximately 70 percent (Feldman 1982; Holland 1994). In southern California, juveniles may emerge from the nest in early fall; however, most hatchlings overwinter in the nest and move to water in during March to April (Holland 1994; Reese and Welsh 1997). Feldman (1982) suggested that the eggs of the western pond turtle must normally be laid in soils that are relatively dry. He noted that eggs placed in a wet environment exploded when internal pressure exceeded the limits of the eggs. He further noted that hatchlings did not leave the eggs when temperatures exceeded 27 degrees Celsius, “but once moved to a cooler environment, they broke free from the eggs within two to three hours.” This response, he concluded, may reduce the potential for dehydration when hatchlings leave the nest to seek aquatic habitat.

Diet and Foraging

Western pond turtles are opportunistic predators and occasionally scavengers (Bury 1986; Ashton et al. 1998). The majority of their diet consists of crustaceans, arthropods (i.e., insect larvae and crayfish), but western pond turtles also feed opportunistically on carrion. Western pond turtles will eat plant matter and have been observed foraging on submergent vegetation mats, as well as willow, alder, and other plant types (Bury 1986; Holland 1994). Herbivory in adults may provide an important source of nutrients and some proteins when animal food is unavailable. Adults, particularly females, consume a greater percentage of plant material than do juveniles (Bury 1986). Young turtles feed on mosquito larvae and other aquatic invertebrates, and nekton (Holland 1994). Western pond turtles commonly forage from early morning to early evening. It has been reported that the western pond turtle must swallow its food underwater (Holland 1994).

Dispersal and Migration

In the majority of its range, western pond turtles are active from approximately March through October with the peak of activity in May and June (USFWS 1999). Western pond turtles are generally inactive during the winter months (December to February) within most of their range; however, western pond turtles in southern California are active throughout the year. During this time, turtles either bury into the bottom mud of ponds, creeks, or other watercourses, or they move upland, well away from water, to find suitable habitat to wait out periods of unsuitable weather (Holland 1994; Reese and Welsh 1997). During the winter months, some western pond turtles may become active for short periods (Holland 1994). After their winter inactive period, western pond turtles have been reported to congregate in vernal pools before returning to riverine systems. This may allow them to utilize a warm water habitat while high seasonal water flows in rivers still exist (Ashton et al. 1998). In the fall and spring, hatchling turtles may move as far as 400 m from their nest locations to aquatic sites nearby (Holland 1994).

During their active season, western pond turtles engage in movements along the watercourses in which they live seeking suitable foraging and basking habitat (USFWS 1999). Active season home ranges are typically represented by several hundred meters of the same creek bank (Holland 1994), as they rarely move between drainages (Holland 1991a). Bury (1972a) found active season home ranges of western pond turtles to average one hectare (2.5 acre) for males, 0.3 hectare (0.7 acre) for females, and 0.4 hectare (one acre) for juveniles. Within the northern California stream system studied by Bury (1972a), males moved greater distances than females or juveniles. More extensive movement occurs seasonally when females move upland to find suitable nesting locations. When studying the terrestrial movements of western pond turtle within the Trinity River system of northern California, Reese (1996) found a mean terrestrial migration distance from aquatic sites of 118 meters (range = 39-423 meters).

Western pond turtles exhibit a high degree of site fidelity in both aquatic and terrestrial environments (Ashton et al. 1998; Holland 1994). Western pond turtles trapped and moved at the Los Vaqueros watershed for example, moved 3.2 to 6.4 kilometers (2 to 4 miles) to return to the original trapping site (USFWS 1999). Other long-distance movements may occur in response to drying of local water bodies, or other unknown factors (Ashton et al. 1998). This species is capable of moving distances of 1.6 to 12.8 kilometers (1 to 8 miles) over upland habitat to find water (Ernst et al. 1994; Holland 1994).

Survivorship

Survivorship in western pond turtles is apparently dependent on age and sex (USFWS 1999). Hatchlings and first-year juveniles average only eight to 12 percent survivorship and this rate may not increase significantly until turtles are 4–5 years old (USFWS 1999). Once the turtles

reach adulthood, survivorship increases dramatically, with an average adult turnover rate of only three to five percent (Holland *in* Hays et al. 1999). On average, adult males have a higher probability of surviving than adult females, with skewed sex ratios observed as high as 4:1 (Holland 1991a). The most plausible explanation for these observed sex ratios is that females suffer higher rates of predation during overland nesting attempts (Holland 1991a). The maximum-recorded age for western pond turtle is 39 to 40 years, but the expected longevity for this species is likely 50 to 70 years (Ashton et al. 1998; USFWS 1999).

The western pond turtle is preyed upon by a wide variety of native and introduced predators including large and small mammals, raptors, herons, corvids, snakes, frogs, and fish. Of the native predators, the raccoon (*Procyon lotor*) is a ubiquitous and effective predator, taking animals of all sizes, including eggs and hatchlings. The spotted skunk (*Spilogale putorius*) is also a suspected predator of nests. In Oregon, over 90 percent of the 100 nests examined in 1991-1992 were destroyed by predators, most likely raccoons or skunks (Holland 1992). Raccoon populations, in particular, respond favorably to urban environments, where human refuse may support larger populations than normal. Larger populations of raccoons and other predators combined with reduced nesting habitat for western pond turtles adjacent to aquatic habitat results in concentrations of nests, which are more easily detected by predators. Other native predators observed to have locally significant effects on western pond turtles are the black bear (*Ursus americanus*), river otter (*Lutra canadensis*), and mink (*Mustela vison*) (Holland 1991a). Two introduced predators of particular concern are the bullfrog (*Rana catesbeiana*) and the largemouth bass (*Micropterus salmoides*). Both species have been observed feeding on juvenile western pond turtles (Moyle 1973; Holland 1991a).

WPT Habitat Requirements and Ecology

Western pond turtles inhabit a variety of aquatic habitats from sea level to elevations of 1,980 meters (6,500 feet). They are found in fresh to brackish aquatic habitats including marshes, rivers, ponds and streams. Western pond turtles also may occur in man-made habitats, such as irrigation ditches, reservoirs, and sewage and millponds. Western pond turtles have been found in waters with temperatures as low as one degree Celsius (34 degrees Fahrenheit), and rarely in water with temperatures exceeding 39 to 40 degrees Celsius (102 to 104 degrees Fahrenheit) (Boyer 1965; Holland 1994; Jennings and Hayes 1994), but seem to become more active in water that consistently reaches 15 degrees Celsius (60 degrees Fahrenheit) (Jennings and Hayes 1994). Preferred aquatic habitat is characterized by slow moving or quiet water, emergent aquatic vegetation, deep pools with undercut banks for refugia, partially submerged rocks and logs, open mud banks and matted floating vegetation for thermoregulatory basking. Western pond turtles use aquatic habitats primarily for foraging, thermoregulation, and avoidance of predators (Boyer 1965; Holland 1994, Reese and Welsh 1998a). Basking is done intermittently throughout the day and is primarily conducted to maintain a body temperature of 24 to 32

degrees Celsius (75 to 90 degrees Fahrenheit) (Boyer 1965; Bury 1986). Hatchling and young turtles (one year) require shallow water areas (less than 30 centimeters [11.8 inches] deep) dominated primarily by emergent aquatic reeds (*Juncus* spp.) and sedges (*Carex* spp.) (Holland 1991a) and have been observed to avoid areas of open water lacking these species (Boyer 1965; Holland 1994; Hays et al. 1999; Reese and Welsh 1998a). Highly fluctuating flow rates associated with aquatic habitats may diminish habitat quality for western pond turtles (Reese and Welsh 1998b). Conversely, western pond turtles may leave aquatic habitat as pools dry. Holland (1994) reported overland movements of five kilometers (3.1 miles) possibly resulting in turtles seeking more appropriate aquatic habitat.

Western pond turtles "hibernate" in both aquatic and terrestrial habitats. Aquatic refugia consist of rocks, logs, mud, and undercut areas along banks while terrestrial hibernacula consist of burrows in leaf litter, heavy brush, or soil (Holland 1994). In woodland and sage scrub habitats along coastal streams in central California, most western pond turtles leave the drying creeks in late summer and return after winter floods. These turtles spend an average of 111 days in upland refugia that are an average of 50 meters (164 feet) from the creeks (Rathbun et al. 1992). Upland nesting sites must be dry and often have a high clay or silt component. Typically, western pond turtles dig nests in open sunny areas that are on slopes no steeper than 25 degrees.

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for western pond turtle are identified in Table G-3.16-1 and have been derived from input from local species experts.

Table G-3.16-1. Habitat Elements for Western Pond Turtle

Essential Activities	Land Cover Types	Habitat Elements
Foraging, breeding and dispersal	Vernal impoundment, vernal pool, vernal swale, seasonal wetlands, seasonal impoundment, swale, freshwater marsh, open water, and streams/creeks.	Fresh to brackish aquatic habitats characterized by slow moving or quiet water, emergent aquatic vegetation, deep pools with undercut banks for refugia, partially submerged rocks and logs, open mud banks and matted floating vegetation for thermoregulatory basking. Highly fluctuating flow rates associated with aquatic habitats may diminish habitat quality.
Nesting and aestivation	Blue oak savanna, blue oak woodland, mine tailing riparian woodland, valley oak riparian woodland, mixed riparian scrub, and valley grassland.	Aquatic aestivation sites consist of rocks, logs, mud, and undercut areas along banks while terrestrial hibernacula consist of burrows in leaf litter, heavy brush, or soil. Upland nesting sites must be dry and often have a high clay or silt component.

WPT Species Distribution and Population Trends

WPT Range-wide Distribution

The northern western pond turtle historically and currently ranges from Puget Sound, Washington, south through Oregon, generally west of the Sierra-Cascade crest, to the American River drainage in central California. The southwestern subspecies ranges from the vicinity of Monterey Bay, California, south through the Coast Ranges to Baja California, Mexico. The area of the Central Valley of California between the American River drainage and the Transverse Ranges is considered to be a zone of introgression between the two subspecies (Seeliger 1945). Historically, the western pond turtle inhabited the vast permanent and seasonal wetlands on the Central Valley, with the Tulare Lake Basin being a stronghold for the species. Today, the western pond turtle remains in 90 percent of its historic range, but at greatly reduced numbers (Holland 1991a). Records of the species from Grant County, Oregon, and British Columbia, Canada, are believed to represent introduced animals (Nussbaum et al. 1983; Storer 1937). Outlying populations of the species occur in Nevada primarily in the Carson River drainage. Whether or not these populations are native or represent introduced animals is debated by the experts (Holland 1991a).

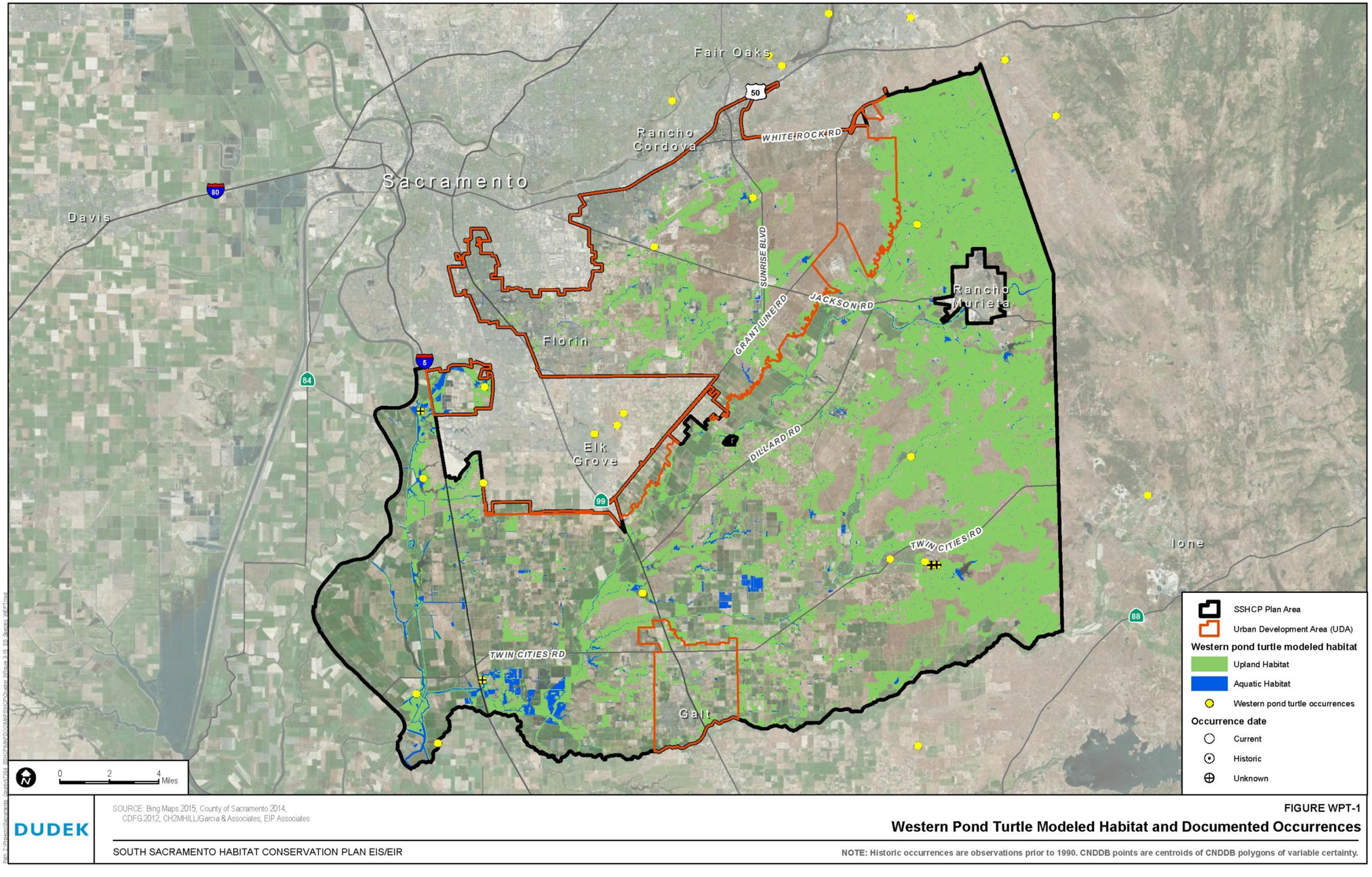
WPT Central Valley Distribution

Historically in the Central Valley, western pond turtles inhabited the permanent and seasonal wetlands of the area, with the Tulare Lake Basin as a major population center (Hays et al. 1999; USFWS 1999). Today, western pond turtles occur in 90 percent of their historic range in the Central Valley, but in greatly reduced numbers (Jennings and Hayes 1994).

WPT Distribution within the Planning Area

The Planning Area falls within the introgression zone for the two subspecies of western pond turtle. Currently there are no records for the southern western pond turtle in the Planning Area. There are 25 known occurrences of western pond turtle in Sacramento County (CDFG 2010). Among these 25 locations, seven are known to occur in the Urban Development Area (UDA) Figure WPT-1. The range of western pond turtle within the Planning Area is therefore considered to be the entire Planning Area.

Figure WPT-1 Western Pond Turtle Modeled Habitat and Documented Occurrences



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WPT Population Level and Trends

Western pond turtle were once abundant in California, Oregon, and locally in Washington, but are declining in numbers throughout their range, particularly in Washington, northern Oregon, southern California and Baja California (Lovich 1998; Hays et al. 1999). Although the western pond turtle still exists in about 90 percent of its original range, this species has been completely or ecologically extirpated from a number of areas including the Puget Sound area of Washington, Willamette River drainage in Oregon, Klamath River drainage of Oregon and California, San Francisco metropolitan area, southern San Joaquin Valley, Los Angeles and San Diego metropolitan areas, and Nevada (Holland 1991a). A variety of factors, including habitat loss and modification, commercial exploitation, disease, introduced predators and competitors, and other natural and man-made factors working together have resulted in a significant decline in western pond turtle populations throughout 75 to 80 percent of its range (Holland 1991a; Jennings and Hayes 1994; Hays et al. 1999; USFWS 1999).

The population status and trends of western pond turtle in the EIS/EIR Study Area is unknown. The western pond turtle is believed to have been abundant in the area when it supported extensive wetlands (Hays et al. 1999), but conversion of former wetlands to agricultural lands and urban development has likely resulted in local declines of these populations (Jennings and Hayes 1994).

WPT Threats to the Species

Although certain factors are known to contribute to western pond turtle decline rangewide, exactly how and to what extent they affect the decline are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population. Therefore, to improve conservation planning efforts for western pond turtle in the Planning area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats. Without a better understanding of how covered activities affect western pond turtle and other target species, the potential for success in conserving the species is reduced. The following is a summary of factors known or suspected to negatively affect western pond turtle.

WPT Habitat Loss and Alteration

Habitat loss and alteration are most responsible for the historic decline of western pond turtles throughout its range (USFWS 1999). In California, over 90 percent of historic wetlands have been diked, drained, and filled primarily for agricultural development and urban development (Frayer et al. 1989). Urbanization has significantly altered or eliminated western pond turtle habitat, with significant impacts occurring in southern California. Local extirpation of the

southwestern subspecies in the Los Angeles Basin has occurred primarily through the channelization and cementing of numerous tributaries comprising the watershed (Brattstrom and Messer 1988; Holland 1991a).

Water diversions for agriculture and urban uses have also negatively affected western pond turtle populations. For example, agricultural, aquatic habitats, such as rice lands, are used to convey and store agricultural water and are consequently subject to changes in the timing and amount of water flow. Many rivers, particularly in more arid regions such as the San Joaquin Valley, have had significant portions of their flows diverted for agriculture resulting in very low flows or no flows for several miles of stream during summer months. In addition, numerous wetlands are channelized and periodically cleaned of aquatic vegetation, rendering them less suitable for western pond turtles. Furthermore, where western pond turtles persist adjacent to agricultural lands, upland nesting opportunities may be limited or nonexistent due to the practice of farming up to the edge of aquatic habitats. Such actions typically result in the elimination of western pond turtles from affected waters and isolation of turtle populations located in other portions of the drainage (Holland 1991a). Because western pond turtles are long-lived, populations may persist in these isolated wetlands long after recruitment of young has ceased (Jennings and Hayes 1994; USFWS 1999) resulting in very small and heavily adult biased populations (Holland 1991a).

Changes in the nature and timing of water releases from reservoirs adversely affects downstream habitat by eliminating or altering basking sites, upland refugia, foraging areas, and particularly, hatchling microhabitat (Reese and Welsh 1998b; Hays et al. 1999). High releases of water in the Trinity River in late May to early June in 1991, for example, scoured out several miles of hatchling turtle habitat (Holland 1991a) and a similar incident occurred in Piru Creek in southern California (Holland 1991a). Reservoirs also are typically stocked with exotic species of fish, which may expand into previously isolated turtle habitat. Reservoirs, in general, provide poor habitat for turtles because of the lack of emergent aquatic vegetation, basking sites, high recreational use, and presence of exotic species. Only small groups of adults are typically seen using reservoir habitats (Holland 1991a).

Another significant source of habitat alteration throughout the range of the western pond turtle is livestock grazing. Livestock have been documented as a major cause of excessive habitat disturbance in riparian areas (Behnke and Raleigh 1978; Kauffman and Krueger 1984). Cattle have a disproportionately greater adverse affect on riparian and other wetland habitats because they tend to concentrate in these areas, particularly during the dry season (Marlow and Pogacnik 1985). Cattle trample and eat emergent vegetation (Platts 1981) that serves as foraging habitat for turtles of all sizes and as critical microhabitat for hatchlings and first-year animals. Stream banks also are trampled by cattle often resulting in the collapse of undercut banks (Platts 1981; Kauffman et al. 1983) that provided refugia for turtles. Cattle grazing results

in increased erosion in streams (Winegar 1977), which in turn fills in deep pools, increases stream velocity, and adversely affects aquatic invertebrates (Behnke and Raleigh 1978; Platts 1981). Cattle may also crush turtles (Holland 1991a).

In-stream and streamside mining operations for sand and gravel also unfavorably alter western pond turtle habitat. These operations may directly eliminate or modify aquatic habitats and adjacent riparian habitat, alter the pattern of water flow, increase siltation, which fills in pools and alters the prey base, and disrupt normal behavior patterns or force displacement (Holland 1991a). In addition, removal of basking sites (e.g., logs, snags, and rocks) for aesthetic reasons or to facilitate recreational pursuits has a negative effect on western pond turtles. Loss of basking sites changes thermoregulatory behavior of turtles and reduces available foraging and refuge sites. According to Holland (1992), this activity is a primary factor in the observed decline of western pond turtles in several lakes in Oregon.

Construction of roadways and railways adjacent to western pond turtle habitat may adversely affect western pond turtles in several ways. First, roads often present a partial or complete barrier to turtles traveling overland to nesting or over wintering sites. Western pond turtles have been observed crushed on roadways in California, Oregon and Washington, with the majority of these being gravid (with developing young or eggs) or postpartum females (Holland 1985a, 1992). In addition to hampering access to nesting areas, roadbeds reduce the area of potential nesting. Roads constructed on south-facing slopes adjacent to the Umpqua River in Oregon likely eliminated both existing and potential nesting habitat (Holland 1992). Train tracks may have similar adverse affects on western pond turtles. At two locations in Oregon, western pond turtles were found dead between railroad tracks. In both cases, the railroad tracks paralleled the north side of the watercourse and were located between the watercourse and potential nesting habitat (Holland 1992). Holland (1992) hypothesized that the turtles became trapped between the railroad tracks when unable to find a way to exit under the rail.

WPT Over Utilization for Commercial, Recreational, Scientific, or Educational Purposes

Records of harvesting western pond turtles for food date back to the commercial harvest of this species for the San Francisco market (Lockington 1879). At the time, commercial harvest had already depleted populations of the western pond turtle in the San Francisco area, resulting in commercial operations focusing on populations in the San Joaquin Valley, particularly Tulare Lake (Elliot 1883; Brown 1940). Over 18,000 western pond turtles were offered for sale in San Francisco markets, presumably in one year in the 1890s (Smith 1895). This practice continued at least through the 1920s (Storer 1930).

Collection of western pond turtles for food still exists today with numbers from 20 to over 100 taken in a single outing (Holland 1991a). In addition, a commercial pet market exists for the species despite state prohibitions. Holland (1991a) noted western pond turtles for sale by a Florida dealer in 1991 and in some California pet stores through at least 1985. Bury (1982) noted removal of over 500 turtles from one lake in southern California for the pet trade.

Incidental collection of the species by fisherman may be a significant mortality factor in some areas. Approximately 3.6 percent of turtles captures by Holland (1991a) at an Oregon site had ingested fishhooks. At a California site, about six percent of captured turtles showed evidence of trauma related to removal of hooks, had hooks in place, or were found dead with hooks embedded in the esophagus or stomach (Holland 1991a). A turtle captured by Holland (1991a) in Oregon before and after ingestion of a fishhook had lost a significant amount of weight, suggesting that hooked turtles may eventually starve to death. Hooked turtles are often killed by fishermen, who mistakenly presume that western pond turtles are competitors for fish or consume ducklings (Holland 1991a). Similarly, indiscriminate shooting of western pond turtles can be a significant mortality factor, particularly in areas adjacent to urban development. In southern California for example, a substantial proportion of a western pond turtle population under study was shot by two individuals carrying rifles (Holland 1991a). In Washington, shooting of turtles for sport was reported in the early 1970's (Milner 1986).

WPT Disease, Parasitism and Non-Native Species

The only documented instance of disease outbreak in the western pond turtle occurred in an isolated Klickitat County population in southern Washington in 1990 (Holland 1991b). A significant portion of the population displayed symptoms of upper respiratory disease syndrome, a disease previously observed in desert tortoises (*Gopherus agassizi*). A minimum of 42 to 47 percent of the population died from the disease despite extensive efforts to treat diseased animals in captivity (Holland 1991b). The agent and mechanism responsible for the epidemic are unknown. Given the highly contagious nature of this disease and the high observed rates of mortality, the potential exists for significant population declines should this disease appear in contiguous western pond turtle populations. Evidence of this or a similar disease was found in a turtle from the Willamette River drainage in Oregon (Holland 1991a). Parasites that affect the western pond turtle include trematodes, helminthes, nematodes, lungworms, and leeches (Holland 1994).

Two introduced predators, the bullfrog and largemouth bass have been observed feeding on juvenile western pond turtles (Holland 1991a). Both species were introduced into the western United States in the latter part of the 19th century, and through range expansions, reintroductions, and transplants these species have become established across most of the western United States (Moyle 1973). Bullfrogs forage primarily in shallow water, the

microhabitat favored by hatchling and juvenile western pond turtles. Examination of a number of sites in Washington, Oregon, and California by Holland (1991a) indicates a negative correlation between the abundance of bullfrogs and the abundance of small western pond turtles. Their impact on populations of native species is thought to be significant due to the high reproductive potential of the bullfrog (i.e., egg masses may have 20,000 individuals eggs). Although many authors have reported bullfrogs feeding on native reptiles and amphibians, the extent to which bullfrogs can modify or contribute to the decline of their prey populations has been the source of much speculation (Morey and Guinn 1992). High concentrations of bullfrogs within structurally simple habitats (e.g., vernal pools and heavily grazed ponds) may have a significant impact on local populations. Interestingly, recent investigations suggest that Bullfrogs may not contribute to changes in the community composition and structure of native amphibians, particularly in complex habitat types (e.g., heavily vegetated stream courses) (Morey and Guinn 1992). The vulnerability of hatchling turtles remains very high when bullfrogs are sympatric with the western pond turtle. The impact of bullfrogs on the recruitment of western pond turtles is poorly understood and may not be evident until many years have past. This may result in significant gaps in recruitment or the absence of entire cohorts.

Another factor that may adversely affect western pond turtle populations is the introduction of non-native competitors. Numerous species of nonnative aquatic turtles have been observed within the range of the western pond turtle (Jennings 1987). These species include the painted turtle, red-eared slider, common snapping turtle (*Chelydra serpentina*), spiny soft-shelled turtle (*Apalone spinifera*), alligator snapping turtle (*Macroclemys temmincki*), stinkpot (*Sternotherus odoratus*), diamondback terrapin (*Malaclemys terrapin*), and Mississippi map turtle (*Graptemys kohni*). Most of these turtles represent animals imported for the pet or food trade that have been released or escaped captivity. In addition to competition for food, exotic turtles also may carry new pathogens for which western pond turtles exhibit no immunity.

Additional non-native competitors of particular concern are carp (*Cyprinus carpio* and *Carassius auratus*), aunfish (*Lepomis* spp. and *Pomoxis* spp.), and crayfish (*Cambarus*, *Procambarus*, and *Pacifasticus*). Carp alter aquatic habitats by consuming emergent and floating vegetation. Their activities also produce turbid water conditions. These alterations of the aquatic habitat may have a significant impact on hatchling turtle habitat, may reduce the availability of invertebrate prey, and decrease turtle foraging success as turtles rely primarily on vision to capture prey (Holland 1991a). Sunfish, which are capable of reaching large population sizes in aquatic habitats may modify or compete for the available invertebrate prey base (Holland 1991a). Although direct scientific data are unavailable to support this hypothesis, Holland (1991a) noted that several sites lacking native or nonnative fishes support the largest known western pond turtle populations. Crayfish, which also may prey on young western pond turtles, may compete with western pond turtles for both the invertebrate prey base and carrion (Holland 1991a).

WPT Other Natural or Manmade Factors Affecting Its Continued Existence

Off-road vehicle activity poses a threat to western pond turtles both directly and indirectly. Direct impacts include crushing of individual turtles or nests and access to remote populations of the turtle for collection or shooting. Off-road vehicle activity indirectly impacts western pond turtles by interfering with normal foraging and basking activities, and by altering or restricting overland or instream movements of turtles. Long-term impacts of off-road vehicle activity include increased soil erosion, soil compaction, vegetation removal, siltation of the watercourse, and alteration or loss of refugia. According to Holland (1991a), western pond turtle populations located in off-road vehicle areas in California tend to be small and disjunct, and occur in very limited habitats. Poor habitat quality combined with a very low probability of maintenance or reestablishment by immigration, renders these populations highly susceptible to extirpation.

Boat traffic also may adversely affect western pond turtles. Observations on the Rogue River in Oregon by Holland (1992) indicate that high levels of boat traffic may detrimentally alter basking and other behavior patterns. In addition, turtles that become acclimated to boat or vehicle traffic are potentially more susceptible to shooting. Holland (1991b) found that flight distances were significantly less in turtle populations acclimated to low or moderate levels of vehicle traffic than for populations in isolated areas. Boat propellers may also injure or kill western pond turtles (Holland 1992).

The exact role that contaminants play in western pond turtle mortality is unknown. Only one documented instance of contaminant-related mortality of western pond turtles was reported by Bury (1972b). Turtle mortality resulted from a spill of diesel fuel. In Oregon, pollution of several tributaries to the Willamette River (i.e., the Tualatin and Clackamas Rivers) in the late 1950's and 1960's may be related to the disappearance of western pond turtles from these rivers (Holland 1991a). The long life span and food habits of the western pond turtle could render this species prone to bioaccumulation of contaminants, such as heavy metals; however, no data are available to support this hypothesis (Holland 1991a).

The most significant natural factor affecting western pond turtle populations is drought. The six-year drought in California (1987 to 1992) had a major effect on western pond turtle populations, particularly in central and southern California within the range of the southern western pond turtle. Surveys of eight sites conducted by Holland (1991a) from 1987 to 1991 in central and southern California indicated that turtle populations had declined from 65 to 100 percent as a result of drought. One population in the Pajaro-Salinas River drainage of central coastal California, which contained the highest recorded density of turtles, suffered an 85 percent population decline (Holland 1991a). Drying of the habitat resulted in 1) concentrating large numbers of turtles in the few remaining pools, 2) major increases in the distance between pools, 3) exhaustion of the prey base, 4) increased exposure to predators, and 5) a general

increase in stress suffered by the turtle population (Holland 1991a). Observations of additional sites by Holland (1991a) within the range of the southern western pond turtle indicated that drought related declines in populations of this subspecies were widespread. Where non-native predators and competitors were present, the adverse affects of drought were probably magnified (Holland 1991a).

Fire, which is often associated with drought and the over accumulation of combustible plant material, adversely affects western pond turtles in several ways. Unseasonal fires may kill overwintering turtles or hatchlings in the nest. Sweet (*in* Holland 1991a) reported that the Sespe Creek fire in fall 1991 probably killed any adult or hatchling turtles overwintering in the uplands. Excessive siltation of streams following fires may alter the prey base and eliminate refugial habitat, generally decreasing the suitability of the stream for turtles (Holland 1991a).

WPT Data Gaps and Conservation Implications

The ecology, status, and management of western pond turtle s have received increased attention in recent years. There are several sources of uncertainty regarding western pond turtle and its requirements in the Planning Area. The primary data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

WPT Population and Habitat Distribution within the Planning Area

Western Pond Turtles occur in suitable habitat within the Planning area; however, their overall distribution, abundance, and population structure are not well known. Habitat-types used by western pond turtles, such as suitable riverine and lacustrine habitats and adjacent uplands, occur throughout much of the Central Valley and are well represented in Sacramento County and the Planning area.

Because comprehensive surveys for western pond turtle in the Planning Area have not been conducted and the existing occurrence data are based primarily on incidental observations (e.g., CNDDB, anecdotal records), the population size and distribution of the species throughout the Planning Area are not known. In addition, though the distribution of different land cover-types is mapped and quantifiable, the quality of habitat for western pond turtle s within most of these areas is unknown. These information gaps limit our ability to identify the best lands available for preserving western pond turtle habitat and accurately estimate the impacts resulting from covered activities.

Until this data gap is remedied, the conservation value for western pond turtle will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, or are adjacent to these areas.

WPT Determining Threat Severity

Although certain factors are known to contribute to western pond turtle decline rangewide, exactly how and to what extent these factors contribute are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population. Therefore, to improve conservation planning efforts for western pond turtle in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats.

WPT Effectiveness of Habitat Enhancement and Restoration Techniques in Creating Suitable Habitat for Western Pond Turtle

Achieving the conservation goals and objectives for western pond turtle will require successful enhancement and restoration of suitable habitat. The function of habitat (e.g., connectivity, hydroperiod, biodiversity) is an important factor for suitability of western pond turtle. Whether restored or enhanced habitats can retain the structural attributes suitable for western pond turtle is unknown.

If habitat restoration and enhancement techniques cannot eventually create habitats with functional characteristics suitable for western pond turtle, then those lands would not support sustainable populations.

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GIANT GARTER SNAKE (GGS)

Giant Garter Snake (GGS)

(Thamnophis gigas)

Status USFWS: Threatened

Status CDFW: Threatened

GGS Listing Status

The giant garter snake (*Thamnophis gigas*) was listed as threatened by the State of California in 1971 and the United States Fish and Wildlife Service (USFWS) in 1993 under the California and Federal Endangered Species Acts respectively (USFWS 1993).

GGS Life History and Ecology

GGS Species Description and Life History

Species Description

The giant garter snake is one of the world's largest garter snakes, reaching a total length of up to 162 centimeters (64 inches). Females are slightly longer and proportionately heavier (typically 500 to 700 grams [1.0 to 1.4 pounds]) than males. The maximum number of dorsal scale rows is 23 or 21; supralabials (scales on upper lip) number eight with the 6th shorter than the 7th; subcaudals (scales on the underside of the tail, counted beginning with the first scale behind the vent) number 73 to 81 inches males and 65 to 73 inches females; and the lateral stripe, when present, is confined to dorsal scale rows two and three (Van Denburgh and Slevin 1918; Fitch 1940; Stebbins 1985; Rossman and Stewart 1987; Rossman et al. 1996).

Dorsal background color varies from brown to olive with a cream, yellow, or orange dorsal stripe and two light colored lateral stripes. Some individuals have a checkered pattern of black spots between the dorsal and lateral stripes. Background coloration, prominence of the checkered pattern, and the three yellow stripes are individually and geographically variable (R. Hansen 1980). Individuals in the northern Sacramento Valley for example, tend to be darker with more pronounced mid-dorsal and lateral stripes (California Department of Fish and Game [CDFG] 1992). The ventral coloration is variable from cream to orange to olive-brown to pale blue with or without ventral markings (R. Hansen 1980; CDFG 1992). Supralabial scales are dull brown and usually lack distinct wedge markings (R. Hansen 1980; CDFG 1992). As giant garter snake nears ecdysis (skin shedding), all pattern characteristics and colors may be obscured.

The giant garter snake can be distinguished from the common garter snake (*T. sirtalis*) and western terrestrial garter snake (*T. elegans*) by its color pattern, scale numbers, and head shape. The giant garter snake lacks the red lateral markings of the common garter snake. The Western terrestrial garter snake has well defined stripes and a black to dark gray ground color. The giant garter snake has a maximum of 23 or 21 scale rows and eight supralabials while the common garter snake has a maximum of 19 scale rows and seven supralabials, and the western terrestrial garter snake has a maximum of 19 or 21 scale rows and eight supralabials. In addition, the giant garter snake's seventh supralabial scale is wider than the sixth (R. Hansen 1980; Stebbins 1985; Rossman et al. 1996). The giant garter snake has an elongated head with a pointed muzzle (Stebbins 1985; Rossman et al. 1996) where the relative width of the muzzle of the giant garter snake averages 75.6 percent in males and 65.1 percent in females (calculated as InR/NR, where InR is the width of contact between the internasal and rostral scales, and NR is the width of contact between the nasal and rostral scales) (Rossman et al. 1996). The common garter snake and western terrestrial garter snake have broad muzzles with the relative muzzle width of the

western terrestrial garter snake averaging 99 to 112 percent, and the relative muzzle width of the common garter snake averaging 127.6 percent (Rossman et al. 1996).

Subspecies have not been described for the giant garter snake, but there appears to be some morphological variation, principally with aspects of dorsal coloration and pattern, that conforms to geographic units (i.e., northern and southern groupings) (Boundy 1990). To date, there have been no range-wide studies of genetic variation in the giant garter snake. The only contemporary genetic studies on the giant garter snake have incorporated allozyme variation (Lawson and Dessauer 1979) or mtDNA sequencing (de Queiroz and Lawson 1994) in phylogenetic studies of the Sierra Nevada garter snake complex.

Reproduction

The giant garter snake breeding season begins soon after emergence from over-wintering sites and extends from March into May (USFWS 1999). Females brood young internally, and typically give birth to live young from late July through early September (Hansen and Hansen 1990). Brood size is variable, ranging from 10 to 46 young, with a mean of 23 (Hansen and Hansen 1990). At birth, young have an average snout-vent length of approximately 20.6 centimeters (8.1 inches) and weight of three to five grams (0.1 to 0.2 ounces). Following birth, young immediately scatter into dense cover and absorb their yolk sacs, after which they begin feeding on their own. Although growth rates are variable, young typically more than double in size by one year of age (G. Hansen pers. comm.). Sexual maturity averages three years in males and five years for females (USFWS 1999).

During 1989 and 1990, sex ratio data were collected from giant garter snakes captured by hand in the Natomas Basin population near Sacramento County (Hansen and Brode 1993). In a sample of 191 individuals, the ratio of females to males was approximately 1.5:1 (Hansen and Brode 1993). During 1996, sex ratio data were collected for three other populations (Wylie et al. 1997). The ratio of females to males was approximately 1:1 at both Badger Creek Marsh in Sacramento County and Gilsizer Slough in Sutter County. In contrast, the sex ratio was roughly 2:1 at Colusa National Wildlife Refuge in Colusa County.

Diet and Foraging

Giant garter snakes feed primarily on aquatic prey such as fish and amphibians. Brode (1988) and G. Hansen (1988) suggest that the giant garter snake specializes in ambushing small fish underwater, and Rossman et al. (1996) suggest the giant garter snake occupies a niche similar to some eastern water snakes (*Nerodia* spp.). They appear to take advantage of pools which trap and concentrate prey items. R. Hansen (1980) and Hansen and Brode (1993) observed giant garter snakes feeding on mosquitofish (*Gambusia affinis*) confined to small pools of

water. The predominant food items of giant garter snakes are now introduced species such as carp (*Cyprinus carpio*), mosquitofish, other small fish, and bullfrogs (*Rana catesbeiana*) (Fitch 1941; Fox 1951; R. Hansen 1980; Brode 1988; Hansen and Brode 1993; Rossman et al. 1996; USFWS 1993). Native species preyed upon by giant garter snakes include the Sacramento blackfish (*Orthodox microlepidotus*) and Pacific treefrog (*Hyla regilla*). Cunningham (1959) reported a record of a giant garter snake from Buena Vista Lake, Kern County, swallowing a live Sacramento blackfish, which it had just dragged onto the bank. Historically, giant garter snake food also may have included the extinct thick-tailed chub (*Gila crassicauda*) and the federally threatened California red-legged frog (*Rana draytonii*), which has been extirpated from the Central Valley floor (R. Hansen 1980; Rossman et al. 1996).

Dispersal and Migration

Giant garter snakes begin emerging from winter retreats around April 1st. By April 15th, most giant garter snakes are active and beginning to search for food. By May 1st, all giant garter snakes have usually emerged and are actively foraging. Around October 1st, giant garter snakes begin seeking winter retreats. Foraging and other activities are sporadic at this time and dependent upon weather conditions. By November 1st, most snakes are in winter retreats and will remain there until spring (Brode 1990; Hansen and Brode 1993).

Seasonal activity may begin earlier than April 1st (as early as March 1st) in some years. Hansen and Brode (1993) concluded that they may emerge from winter retreats during any month of the year based on captures of giant garter snakes in the Natomas Basin in March and multiple observations of injured snakes. In 1996, captures of giant garter snakes began in March at Gilsizer Slough and at Colusa National Wildlife Refuge (Wylie et al. 1997). Late March was reported as the earliest time of regular seasonal activity at the Mendota Wildlife Area (R. Hansen 1980). Giant garter snake activity peaks during April and May; therefore, they may become less detectable in mid- to late summer (Hansen and Brode 1993). Hansen and Brode (1993) found that the sudden decrease in observations of giant garter snakes along canals in June and July corresponded with the sudden appearance of giant garter snakes within maturing rice fields. Captures at Gilsizer Slough and Colusa National Wildlife Refuge became infrequent after June of 1996 (Wylie et al. 1997). At Badger Creek Marsh, captures in 1996 became infrequent after mid-July, and in August of 1996, giant garter snakes at Badger Creek Marsh used burrows as much as 50 meters (164 feet) away from the marsh edge to escape extreme heat (Wylie et al. 1997).

Giant garter snakes are generally inactive during the winter months although some individuals may bask or move short distances on warmer days. For example, juveniles were occasionally observed at the Mendota Wildlife Area during the winter months when the air temperature was only 15 degrees Celsius (59 degrees Fahrenheit) (R. Hansen 1980). In the Sacramento

Valley, 50 percent of the radio-telemetered snakes were observed, at some time, basking or moving short distances during the winter months (Wylie et al. 1997).

Fitch (1940) considered the giant garter snake as a "strictly diurnal snake"; however, observations by R. Hansen (1980) suggest that giant garter snakes are flexible in terms of their activity. Giant garter snakes were observed feeding at night on mosquitofish in small pools of water, and giant garter snakes at the Mendota Wildlife Area exhibited diurnal activity during the spring (March to June), and nocturnal activity during the hot summer months (R. Hansen 1980). Cunningham (1959) observed giant garter snakes feeding at night in September, 2.5 hours after dark at Buena Vista Lake. Hansen and Brode (1993) also observed giant garter snakes after sunset during hot weather. G. Hansen reported observing giant garter snakes active at night at the Mendota Wildlife Area, Gray Lodge Wildlife Area, and within the Natomas Basin during cool spring nights as well as during hot weather (USFWS 1993). The daily activity of giant garter snakes as described by Hansen and Brode (1993) follows a general pattern: 1) emergence from burrows after sunrise; 2) increasing body temperature to activity temperatures by basking, particularly during cool weather or on cold mornings; and 3) foraging or courting activity for the remainder of the day.

During radio-telemetry studies conducted by the USFWS, giant garter snakes typically moved little from day to day; however, total activity varied widely among individuals (USFWS 1993). At the Colusa National Wildlife Refuge, snakes moved up to eight kilometers (five miles) in two days in response to dewatering of habitat during refuge maintenance of water control structures (Wylie et al. 1997). Giant garter snakes usually remain in close proximity to wetland habitats, but can be found as far away as 250 meters (820 feet) from their edge (G. Hansen 1988; Wylie et al. 1997). Hansen and Brode (1993) also documented giant garter snakes moving at least 400 meters (0.25 miles) between small lateral ditches and larger canals within the Natomas Basin. Some marked and recaptured giant garter snakes moved distances greater than 800 meters (0.5 miles) in as little as a day. The average distance between upland, over wintering sites and aquatic breeding sites is thought to be approximately 150 meters, ranging from 50 to 400 meters (G. Wylie and S. Barry pers. comm. 2005)

Derived from telemetry data, the USFWS estimated the home range sizes of giant garter snakes at three study sites (Table G-3.17-1). The mean home range estimate for individual snakes was 19.0 hectares (47 acres) (range 0.8 hectares [2 acres] to 259.5 hectares [641 acres], N=27) at Gilsizer Slough; 53.2 hectares (131 acres) (range 1.3 to 1,130 hectares [3.2 to 2,792 acres], N=29) at the Colusa National Wildlife Refuge; and 9.2 hectares (23 acres) (range 4.2 to 82.0 hectares [10.3 to 203 acres], N=8) at Badger Creek (USFWS 1993).

Table G-3.17-1. Population Estimates and Home Range Size Estimates for Three Populations of Giant Garter Snakes

Site (surface area in hectares/acres)	Year	Population Estimate(95% C.I.)*	Median Home Range in hectares/acres(range in hectares)**
Gilsizer Slough (1,430/3,500)	1995	206 (136-349)	19.0/47 (0.8-259.5) N =27
	1996	170 (128-248)	
Colusa NWR (4,500/11,120)	1996	132 (80-254)	53.2/131 (1.3 - 1,130) N =29
	1997	119 (72-239)	
Badger Creek (235/580)	1996	191 (69-674)	9.2/23 (4.2 - 82.0) N =8

* Population estimates for giant garter snakes from the mark-recapture model with time-specific changes in probability of capture, which results in a conservative estimate. Estimates are derived from two-week time intervals. ** Home range estimates (ha/ac) for individual giant garter snakes derived from telemetry using the adaptive kernal method. "N" is the number of snakes in the sample. "C.I." is the Confidence Interval.

Ecological Relationships

A number of native mammals and birds are known or likely predators of giant garter snake including raccoons (*Procyon lotor*), striped skunks (*Mephitis mephitis*), opossums *(Didelphis virginiana*), foxes (*Vulpes vulpes*, *Urocyon cinereoargenteus*), hawks (*Bute*o spp.), northern harriers *(Circus cyaneus*), egrets (*Ardea alba*, *Egretta thula*), bitterns (*Botaurus lentiginosus*), and great blue herons (*Ardea herodias*). Many areas supporting garter snakes have been documented to have abundant predators (R. Hansen 1980; Hansen and Brode 1993; Wylie et al. 1997). G. Hansen (1986) observed that nearly all giant garter snakes captured and examined possessed scars or recent injuries, presumably acquired during attacks by predators. R. Hansen (1980) concluded that the abundance and diversity of predators suggested that predation pressure might be severe; however, predation does not seem to be a limiting factor in areas that provide abundant cover, high concentrations of prey items, and connectivity to a permanent water source (Wylie et al. 1997).

The giant garter snake may coexist with two other species of garter snakes. The Valley garter snake (*T. sirtalis fitchi*) was found to coexist with giant garter snakes in all areas that currently support them (R. Hansen 1980; G. Hansen 1986). The western terrestrial garter snake was observed at locations in the Elk Grove and Galt areas of Sacramento County, and Badger Creek Marsh supports all three species of garter snakes (G. Hansen 1986). Differences in foraging behavior may allow these species to co-exist. The Valley garter snake forages among vegetation bordering the water, while the giant garter snake captures its food in the water (R. Hansen 1980). Giant garter snakes may also successfully compete with the Valley garter snake by specializing on small fish as prey (Brode 1988).

GGS Habitat Requirements and Ecology

Endemic to valley floor wetlands in California's Central Valley, the giant garter snake inhabits marshes, sloughs, low gradient streams, and other waterways and agricultural wetlands such as irrigation and drainage canals and rice fields. Giant garter snakes feed on small fishes, tadpoles, and frogs (Fitch 1941; G. Hansen 1980; G. Hansen 1988). Suitable habitat consists of (1) adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover, (2) emergent, herbaceous wetland vegetation, such as *Scirpus* and *Typha* spp. for escape cover and foraging habitat during the active season, (3) grassy banks and openings in waterside vegetation for basking, and (4) higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter (G. Hansen 1988). Giant garter snakes are absent from larger rivers and other water bodies that support introduced populations of large, predatory fish, and from wetlands with sand, gravel, or rock substrates (Hansen 1980; Rossman and Stewart 1987; Brode 1988; G. Hansen 1988). Riparian woodlands do not typically provide suitable habitat because of excessive shade, lack of basking sites, and absence of prey populations (R. Hansen 1980).

The ideal concept of a marsh managed for giant garter snake includes shallow and deep water with variations in topography, including some higher ground resembling ditch banks, or "islands" similar to a rice check. Rice fields contain warm, shallow water with emergent vegetation (i.e., rice plants), which is present during the giant garter snake's active season (spring through early fall). During the late summer when rice fields contain large numbers of mosquitofish and Pacific tree frogs, rice fields may provide important nursery areas for newborn giant garter snakes (Brode and Hansen 1992; Hansen and Brode 1993). In addition, this habitat-type and its associated water conveyance system, if managed properly, provides hydrological connectivity, protection from predators, relatively warm water to aid metabolism, gestation, and digestion, and a reliable source of food (USFWS 1993).

Today, giant garter snakes appear to be most numerous in rice growing regions. The diverse habitat elements of rice lands, rice fields, tail-water marshes, ditch and drain components of water conveyance systems, delivery canals, and associated levees, all contribute structure and complexity to this man-made ecosystem. Giant garter snakes can apparently survive in this created ecosystem because the spring and summer flooding and fall dry-down of rice culture roughly coincides with the biological needs of the species (USFWS 1999). Giant garter snakes utilize rice lands extensively and depend on them for habitat (Fuller pers. comm. 2005). Giant garter snake seasonal activity associated with rice cultivation occurs as follows:

- **Spring:** Rice is planted and the fields are flooded with several inches of water. Rice fields that contain prey species such as small fish or frogs attract giant garter snakes.

- **Summer:** While the rice grows, giant garter snake continue to use rice fields as long as prey species are present in sufficient densities.
- **Late Summer/Fall:** Rice fields are drained and rice is harvested. Giant garter snakes move off the fields into adjacent habitats and the females, who have just delivered young, intensively forage to regain their body weight before winter. The dry-down of rice fields during this time is thought to be important because prey species which have been proliferating, become concentrated in the remaining pockets of standing water where snakes can gorge prior to the period of winter inactivity.
- **Winter:** giant garter snakes are predominantly dormant in the winter and rice fields are fallow.

In addition to grassy banks, giant garter snakes will bask in bulrush, cattails, shrubs overhanging the water, patches of waterweed (*Ludwigia peploides*) and other floating vegetation. In the San Joaquin Valley, giant garter snakes also bask in openings within saltbush (*Atriplex* spp.) (Van Denburgh and Slevin 1918; Brode 1988). Riparian vegetation such as saltbush and willows (*Salix* spp.) provide cover from predation. Giant garter snakes also bask in openings in vegetation created by rip-rap placed around water control structures. Giant garter snakes use small mammal burrows and other soil crevices above prevailing flood elevations during the winter (i.e., November to mid-March), typically with sunny exposures along south- and west-facing slopes (USFWS 1999). During the active season, small mammal burrows, crayfish burrows, and soil crevices provide retreats from extreme heat (Hansen and Brode 1993). In one study, wintering site location varied from canal banks and marsh areas to riprap along a railroad grade near the marsh (Wylie et al. 1997). Wintering locations of radio-telemetered snakes tended to be in the vicinity of spring capture sites. In addition, during the active season, giant garter snakes use burrows as far as 50 meters (164 feet) away from the marsh edge, whereas, overwintering snakes use burrows as far as 250 meters (820 feet) from the edge of marsh habitat (Wylie et al. 1997).

Brode and Hansen (1992) and Hansen and Brode (1993), reported that giant garter snakes begin utilizing rice fields as early as June. In agricultural areas where rice fields and agricultural waterways are available, radio-telemetered giant garter snakes were located in rice fields 19 to 20 percent of the time, in marsh habitat 20 to 23 percent, and in canal and agricultural waterway habitats 50 to 56 percent of the time (Wylie et al. 1997). Between 48 and 55 percent of these latter snakes used rice fields at some time. Where marsh habitat and adjacent uplands were the only habitat available, giant garter snakes used the marsh edge most of the time (Wylie et al. 1997).

Habitat Elements

Habitat elements are those basic aspects of the environment which are needed for survival and propagation of the species. The habitat elements for giant garter snake are identified in Table G-

3.17-2 and have been derived from the USFWS's list of habitat components in the Draft Recovery Planning for the giant garter snake (USFWS 1999) as well as input from local species experts.

Table G-3.17-2. Habitat Elements for Giant Garter Snake

Essential Activities	Land Cover Types	Habitat Elements
Foraging, breeding and dispersal	Seasonal impoundments, freshwater marsh, open water, and streams/creeks.	Adequate water during the snake's active season (early-spring through mid-fall) to provide food and cover; emergent, herbaceous wetland vegetation for escape cover, dispersal, and foraging habitat during the active season; and grassy banks and openings in waterside vegetation for basking.
Winter and summer inactivity	Mine tailing riparian woodland, valley oak riparian woodland, mixed riparian scrub, cropland, seasonal wetlands, seasonal impoundment, and freshwater marsh.	Uplands for cover and refuge during high summer temperatures. Higher elevation uplands for cover and refuge from flood waters during winter dormancy.

GGS Species Distribution and Population Trends

GGS Range-wide Distribution

Giant garter snakes are endemic to the valley floors of the Sacramento and San Joaquin Valleys of California (Fitch 1940; Hansen and Brode 1980; R. Hansen 1980; Rossman and Stewart 1987). Although the boundaries of its original distribution are uncertain, records coincide with the historical distribution of the large flood basins, fresh water marshes, and tributary streams of the Central Valley of California (Hansen and Brode 1980). Fitch (1940) described the historical range of giant garter snakes as extending from the vicinity of Sacramento and Contra Costa Counties southward to Buena Vista Lake, near Bakersfield in Kern County. Fox (1951) indicated that intergrades between giant garter snakes and another closely related species (then called *T. elegans aquaticus*) occurred from Butte County near Gridley south to Sacramento. Hansen and Brode (1980) suggested that the intergrades described by Fox (1951) were actually giant garter snakes and described the range of the giant garter snake as extending from Burrel in Fresno County, north to Gridley. Rossman and Stewart (1987) examined additional specimens and concluded that the range of the giant garter snake extended to about 32 kilometers (20 miles) north of Gridley.

The giant garter snake probably occurred historically from Butte County in the north, southward to Buena Vista Lake in Kern County. Giant garter snakes have probably always been absent from the northern portion of the San Joaquin Valley, where the floodplain of the San Joaquin River is restricted to a relatively narrow trough by alluvium from tributary rivers and streams. This 100-kilometer (62 -mile) gap in its distribution separates populations in Merced County from those along the eastern fringes in the Sacramento/San Joaquin River Delta (Delta)

in San Joaquin County (Hansen and Brode 1980). Because extensive marshes once occurred throughout the Delta, it is possible that giant garter snakes historically occupied this area (G. Hansen 1986, 1988). The foothills of the Coast Ranges and Sierra Nevada Mountains probably define the eastern and western boundaries of their range. Rossman et al. (1996) described the elevational distribution as ranging from sea level to 122 meters (400 feet) above mean sea level; whereas locality records in the southern Sacramento Valley occurred between three and 12 meters (10 and 40 feet) in elevation (G. Hansen 1986).

R. Hansen (1980) investigated the gap between the distribution of the giant garter snake and Sierra garter snake on the eastern side of San Joaquin Valley and determined that extensive riparian forests along river corridors historically limited the ranges of the two garter snake species. The river corridors lacked rocks or exposed vegetation (e.g., bulrushes, cattails) and areas on shore that might serve as basking sites. Prey items may also have been less abundant in these riparian corridors than in sloughs and marshes of the Central Valley floor (R. Hansen 1980).

GGS Sacramento County Distribution

There are 56 documented occurrences of giant garter snake in Sacramento County in the California Natural Diversity Data Base (CNDDB) (CDFG 2010). Thirty-nine (70 percent) of these occurrences are located in northern Sacramento County (i.e., north of Interstate 80)and constitute the southern portion of the American Basin population, the largest extant population of the giant garter snake (USFWS 1999). Reconnaissance-level surveys of this area conducted by the USFWS prior to 1991 indicated that approximately 570 hectares (1,408 acres) of giant garter snake habitat existed in the form of man-made irrigation channels and drainage ditches, and an undetermined number of acres of suitable habitat within approximately 5,260 hectares (13,000 acres) of adjoining rice fields; however, much of this habitat is now gone. The remaining 17 CNDDB occurrences in Sacramento County (i.e., south of Interstate 80) are in the following general locations: just north of the Antioch Bridge, Horseshoe Bend, Stone Lake, Laguna Creek, Morrison Creek, Snodgrass Slough, Willow Creek, Badger Creek, Hadselville Creek, and Elk Grove Creek. In addition, an unknown number of giant garter snakes are believed to occur along portions of Elder Creek (USFWS 1999) as well as hydrologically connected irrigation canals and tail waters in agricultural areas. Together, these occurrences suggest that Sacramento County supports a substantial proportion of the current rangewide distribution of giant garter snake.

GGS Distribution within Planning Area

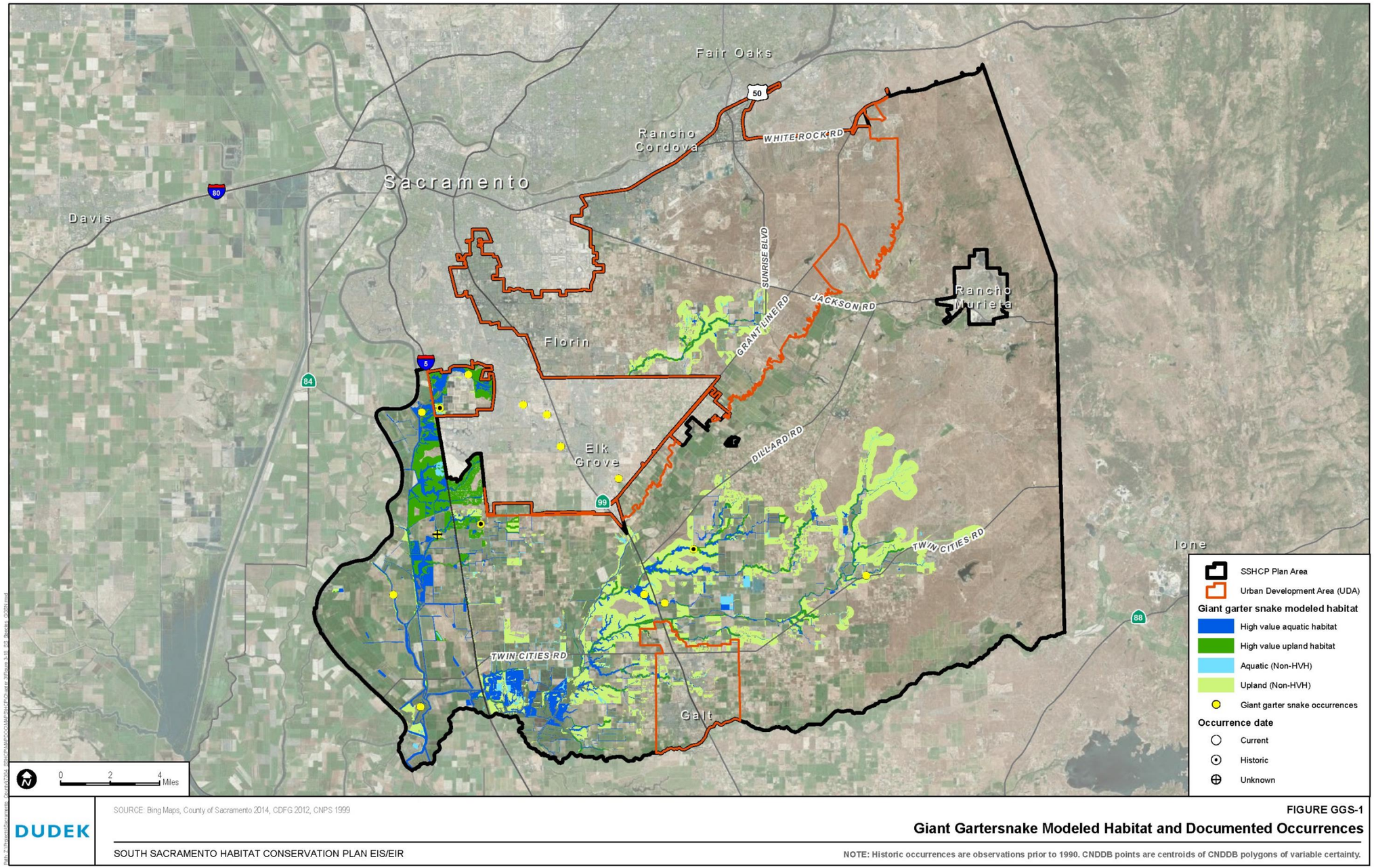
There are 15 documented occurrences of giant garter snake within the Planning Area including six within the Urban Development Area (UDA) and nine outside of the UDA (CDFG 2010) (Figure GGS-1). The giant garter snake occurrence records within the Planning Area are concentrated within the southern and southwestern portions of the Planning Area. There are no occurrence

records east of Clay Station Road in the southern portion of the Planning Area or east of Bradshaw Road in the City of Elk Grove (CDFG 2010). The occurrence record located in the southern part of the City of Elk Grove east of Waterman Road approximately one mile north of Grant Line Road is assumed to be recorded in error. Eric Hansen (pers. comm., January 12, 2006) considers this occurrence questionable given the general lack of habitat components for the species at and near this location, the lack of other documented occurrences from the vicinity, and no supporting documentation for the occurrence (e.g., specimen or photograph). The documented occurrence records seem to indicate that the range of the species is west of State Highway 99 and south of the Cosumnes River; however, according to the Draft Recovery Planning for the giant garter snake, the distribution of giant garter snake is defined by the Delta Recovery Area from the Draft Giant Garter Snake Recovery Planning (USFWS 1999). The Planning Area modeled habitat was then extended to include streams and creeks that have been visually determined to have a perennial water source and are hydrologically connected to current or past occurrence record, according to the CNDDB database (CDFG 2010).

GGS Population Levels and Trends

Agricultural and flood control activities have extirpated the giant garter snake from the southern one third of its range in the former wetlands associated with the historic Buena Vista, Tulare, and Kern lakebeds (Hansen and Brode 1980; R. Hansen 1980; CDFG 1992; G. Hansen 1986, 1988). As recently as the 1970's, the range of the giant garter snake extended from near Burrel (Hansen and Brode 1980) northward to the vicinity of Chico (Rossman and Stewart 1987). CDFW studies (G. Hansen 1988) indicate that giant garter snake populations are distributed in portions of the rice production zones of Sacramento, Sutter, Butte, Colusa, and Glenn Counties; along the western border of the Yolo Bypass in Yolo and Solano Counties; west to the vicinity of Woodland in Yolo County and the vicinity of Liberty Farms in Solano County; and along the eastern fringes of the Sacramento/San Joaquin River Delta from the Laguna Creek/Elk Grove region of central Sacramento County southward to the Stockton area of San Joaquin County. Giant garter snakes also occur in the central San Joaquin Valley in rice production zones in Fresno and Merced Counties, and at Mendota Wildlife Area in Fresno County (G. Hansen 1996; USFWS 1993). In September 1998, a giant garter snake was positively identified in the western Sacramento/San Joaquin Delta in the vicinity of Decker and Sherman Islands, in Sacramento County (USFWS 1999). The last record of a giant garter snake this far west in the Delta region was a specimen collected in the 1930's to 1940's. It is not known if this snake represents a resident population in the western Delta or was washed into the Delta during high water flows in the winter of 1997-1998 (USFWS 1999).

Figure GGS-1 Giant Gartersnake Modeled Habitat and Documented Occurrences



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The San Joaquin Valley populations of giant garter snakes have apparently suffered severe declines and possible extirpations over the last three decades. Prior to 1980, several areas within the San Joaquin Valley supported populations of giant garter snakes. Until recently, there were no post-1980 sightings from Stockton southward despite several survey efforts (G. Hansen 1988). Surveys of historic localities conducted during 1986 did not detect any giant garter snakes (G. Hansen 1988). However, during the 1995 surveys of historic locality records and adjacent waterways, one road-killed giant garter snake was found, and three presumed giant garter snakes were observed, but not captured. These two sightings occurred at the Mendota Wildlife Area, and two occurred several miles south of the city of Los Banos. These data indicated that giant garter snakes are still extant in two localities within the San Joaquin Valley, but are in extremely low to undetectable numbers. giant garter snakes also were observed in the Caldoni Marsh/White Slough Wildlife Area in San Joaquin County during 1995 surveys (G. Hansen 1996).

In 1994, the Biological Resources Division of the US Geological Survey (BRD) (formerly the National Biological Survey) began a study of the life history and habitat requirements of the giant garter snake in response to an interagency submittal for consideration as a National Biological Survey Ecosystem Initiative. Since April of 1995, the BRD has further documented occurrences of giant garter snakes within some of the populations identified in the final rule to list this species (USFWS 1993). The BRD has studied populations of giant garter snakes at the Sacramento and Colusa National Wildlife Refuges within the Colusa Basin; at Gilsizer Slough within the Sutter Basin; and at the Badger Creek area of the approximately 46,000-acre Cosumnes River Preserve, within the Badger Creek/Willow Creek area (Wylie et al. 1997). These populations, along with the American Basin population of giant garter snakes, represent the largest extant populations. During 1997, the BRD also surveyed at Stone Lakes National Wildlife Refuge, where four locality records from 1992 and earlier occur on or within close proximity to the Refuge (CDFG 2010). Although suitable habitat is present at Stone Lakes National Wildlife Refuge, the BRD did not find giant garter snakes during their trapping efforts (USFWS 1999). Surveys over the last two decades have located the giant garter snake as far north as the Butte Basin in the Sacramento Valley.

Currently, the USFWS recognizes 13 separate populations of giant garter snakes, with each population representing a cluster of discrete locality records within contiguous habitat (USFWS 1993). The 13 extant populations largely coincide with historical riverine flood basins and tributary streams throughout the Central Valley (G. Hansen 1980, Brode and Hansen 1992) and include: (1) Butte Basin, (2) Colusa Basin, (3) Sutter Basin, (4) American Basin, (5) Yolo Basin/Willow Slough, (6) Yolo Basin/Liberty Farms, (7) Sacramento Basin, (8) Badger Creek/Willow Creek, (9) Caldoni Marsh, (10) East Stockton -- Diverting Canal and Duck Creek, (11) North and South Grasslands, (12) Mendota, and (13) Burrel/Lanare. These populations are distributed discontinuously in small isolated patches and are vulnerable to extirpation by

random, naturally occurring environmental events, population dynamics and genetic processes. All 13 populations are isolated from each other without protected dispersal corridors. These populations span the Central Valley from just southwest of Fresno (i.e., Burrel/Lanare) north to Butte Creek. The 11 counties where the giant garter snake is still presumed to occur are: Butte, Colusa, Glenn, Fresno, Merced, Sacramento, San Joaquin, Solano, Stanislaus, Sutter, and Yolo.

The current distribution and abundance of the giant garter snake is much reduced from former times (USFWS 1999). Agricultural and flood control activities have extirpated the giant garter snake from the southern one third of its range in former wetlands which were associated with the historic Buena Vista, Tulare, and Kern lakebeds (Brode and Hansen 1992; CDFG 1992; G. Hansen 1986; Hansen and Brode 1980; R. Hansen 1980). These lakebeds once supported vast expanses of ideal giant garter snake habitat, consisting of Cattail and Bulrush-dominated marshes. South of Fresno, virtually no suitable freshwater habitat remains (Hansen and Brode 1980). Vast expanses of Bulrush and Cattail floodplain habitat also typified much of the Sacramento Valley historically (Hinds 1952). Prior to reclamation activities beginning in the mid- to late 1800's, about 60% of the Sacramento Valley was subject to seasonal flooding in broad, shallow flood basins that provided expansive areas of giant garter snake habitat (Hinds 1952). However, these valley floor wetlands have since been subjected to the cumulative effects of upstream watershed modifications, water storage and diversion projects, as well as urban and agricultural development resulting in their almost complete elimination; however, a relatively small percentage of semi-natural and created wetlands remain, which currently provides suitable habitat for giant garter snake (USFWS 1999). Regardless of the extent of wetlands currently remaining, field studies (Hansen 1986; Hansen 1988) indicate that the species is absent from most areas with seemingly suitable habitat.

GGS Threats to the Species

Although certain factors are known to contribute to giant garter snake decline range wide, exactly how and to what extent they affect the decline are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population. Therefore, to improve conservation planning efforts for giant garter snake in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats. Without a better understanding of how covered activities affect giant garter snake and other target species, the potential for success in conserving the species is reduced. The following is a summary of factors known or suspected to negatively affect giant garter snake.

GGS Habitat Loss and Alteration

Habitat loss and alteration throughout the range of the giant garter snake has resulted in fragmented and isolated habitat remnants supporting small, scattered populations of giant garter snake. Principles of population genetics stipulate that small populations confined to limited habitat areas are more vulnerable to extirpation from stochastic (random) environmental, genetic and demographic events than larger, less fragmented populations (Schonewald-Cox et al. 1983). When an existing, local population becomes extinct, there is virtually no chance of recolonization by other populations unless adequate dispersal corridors are protected and maintained into perpetuity. In addition, the breeding of closely related individuals can cause genetic problems in small populations, particularly the expression of deleterious genes (known as inbreeding depression).

A number of land use practices and other human activities currently threaten the survival of the giant garter snake throughout its remaining range. Although some giant garter snake populations have persisted at low population levels in created wetlands associated with agricultural and flood control activities, many of these altered wetlands are now threatened with urban development. Several cities within the current range of the giant garter snake are expanding rapidly within or near the historic range of the giant garter snake and include, but are not limited to, Chico (Butte Basin population), Yuba City (Sutter Basin population), Sacramento (American and Sacramento Basin populations), Galt (Badger/Willow Creek population), Stockton (East Stockton population), and Gustine and Los Banos (North and South Grasslands population). In addition, the North Delta Water Management project proposed by the California Department of Water Resources would facilitate urban development and adversely affect the Sacramento Basin population; the American River Watershed Investigation or local equivalent by the Corps would facilitate urban growth that may adversely affect the American Basin population; and the Sacramento River Flood Control Project, Phase II Marysville/Yuba City Area, and Yuba River Basin project would facilitate urban growth in the vicinity of the Sutter Basin population.

Certain agricultural practices can also destroy habitat that supports the giant garter snake. For example, intensive vegetation control activities along canal banks can fragment and isolate available habitat. In addition, G. Hansen (1982, 1986), and G. Hansen and J. Brode (USFWS 1993) observed livestock grazing threats to four populations of the species. Studies on other garter snake species have established a negative cause and effect relationship between livestock grazing and snake population demographics (Szaro et al. 1985). The giant garter snake requires dense vegetative cover in proximity to waterside foraging and basking habitats in which to seek refuge from predators and other forms of disturbance. Livestock grazing along the edges of water sources degrades habitat quality by reducing vegetative cover. Overall, grazing has eliminated or reduced the quality of available habitat at four known locations (USFWS 1993).

Northern Sacramento County

Habitat supporting the giant garter snake in the American Basin is threatened by a number of activities including urbanization. In addition, the United States Corps of Engineers and/or local project sponsors are proposing flood protection for this approximately 22,260-hectare (55,000-acre) agricultural area. The USFWS (USFWS 1991) anticipates that the provision of flood control would result in the conversion of most or all of this area to urban land uses within the next 50 years. Other projects in the American Basin include the North Natomas Community Drainage System and associated urban development. These projects, which are proposed by the City of Sacramento, would affect about 42 kilometers (26 miles) of giant garter snake habitat along existing canals and ditchesas well as additional rice field habitat (Brode and Hansen 1992). In addition, the Sacramento Metropolitan Airport is proposing about 765 hectares (1,890 acres) of development on agricultural and vacant lands that could result in major adverse impacts to the species, including the loss of about 14.5 kilometers (9.0 miles) of canal habitat and 607 hectares (1,500 acres) of rice fields, as well as the disruption of movement corridors (Brode and Hansen 1992). Roadway improvements or construction projects, or the planned extension of the Sacramento Regional Transit system in this area, would likely result in elevated mortality from increased traffic on local roads and highways (Brode and Hansen 1992).

Planning Area

Habitat supporting the giant garter snake in the Planning Area is threatened by a number of activities including urbanization. Development within the Urban Development Area (UDA) may adversely affect the species if present. For example, the City of Elk Grove contains natural and man-altered wetland features that may support giant garter snake. These features include areas within the Stone Lakes National Wildlife Refuge, Cosumnes River, Sacramento River and associated tributaries (e.g., Deer Creek, Morrison Creek, and Laguna Creek), and vegetative communities consisting of valley oak woodland, annual grassland, valley foothill riparian, and agricultural lands. Some of the irrigation ditches and open water habitats in the UDA support suitable habitats for this species.

GGS Over Utilization for Commercial, Recreational, Scientific, or Educational Purposes

Although giant garter snakes do not seem to be of great interest to reptile collectors, the species has been found for sale in pet shops (USFWS 1993); however, collection for commercial purposes does not appear to threaten the giant garter snake.

Collection and harassment associated with recreational activities apparently cause a substantial impact in certain areas (USFWS 1993). Recreationists can disturb basking snakes, interfering

with thermoregulatory behavior. Fishing pressure at the Mendota population during the 1970's and 1980's resulted in numerous observed instances of road kills and other possible killing and injuring of giant garter snakes (USFWS 1993). In the American Basin, collection of crayfish for human consumption also results in harassment of giant garter snakes and disturbance and harassment associated with fishing pressure also is implicated in the demise of the giant garter snake population at Burrell (USFWS 1993).

GGS Disease and Predation

Little information on diseases that affect the giant garter snake is available. The CDFW ceased mark and recapture studies on the giant garter snake in the American Basin after observing that marked snakes were slow to heal and often became infected (USFWS 1993).

Unidentified parasitic worms have been found in giant garter snakes from the American Basin population (USFWS 1993). Infected snakes exhibited reduced appetites and growth rates compared to uninfected snakes and all infected snakes eventually died after lingering malaise, although some reached 12 to 14 months of age. Upon death, uniformly sized five- to eight-centimeter worms emerged from noticeable lumps at locations along the ventral or dorsal skin surfaces. The degree of threat posed by these worms to the American Basin population or the species throughout its range is not known.

Predation levels on the giant garter snakes have increased due to a number of factors. A number of native mammals and birds are known or likely predators of giant garter snakes, including raccoons, skunks, opossums, foxes, hawks, egrets, and herons. The abundance and diversity of predators and a paucity of escape cover in remaining giant garter snake habitat suggest that predation pressure on this species probably is severe (Hansen 1980). The high fecundity (Hansen and Hansen 1990) and extremely wary behavior (Hansen 1980 and references cited therein) of the species provide additional evidence that the species has developed physiological and behavioral adaptations to help withstand predatory pressure. Hansen (1986) observed that nearly all captured and examined giant garter snakes possessed scars or recent injuries (presumably acquired during attacks by predators).

Domestic cats prey upon the giant garter snake. G. Hansen (pers. comm. 1993) has observed numerous snake kills by domestic cats in one of his longtime study areas about 3.2 kilometers (2 miles) from the closest urban development in the City of Davis, Yolo County.

Few, if any, native fish species pose a predatory threat to the giant garter snake. However, introduced large mouth bass and catfish are voracious, opportunistic predators of many species of invertebrates, fish, reptiles, amphibians, birds, and small mammals, and have become established in virtually all permanent and semi-permanent waters throughout the Central Valley (USFWS 1993).

These introduced predatory fishes have been responsible for eliminating many species of native fishes and aquatic vertebrates in the western United States (Minkley 1973; Moyle 1976).

Bass in the 0.4 to 1.4 kilogram size class can take 30 to 38-centimeter snakes and would prey upon giant garter snakes (USFWS 1993). The instinctive response of giant garter snakes to dive under water upon disturbance (Fitch 1941) would be maladaptive where nonnative predatory fish have become established. Parmley and Mulford (1985) reported an instance of a Largemouth Bass eating a water snake. Introduced predatory fish may explain the absence of garter snakes from large bodies of water (Brode 1988). Brode (1988) believed that the giant garter snake was absent from large bodies of water due to the presence of introduced predatory fishes.

Introduction of the bullfrog to virtually all areas inhabited by the giant garter snake further increases the threat of predation facing the species. The spread of Bullfrogs has contributed to the demise of numerous species of native amphibians and reptiles (Schwalbe and Rosen 1989; Holland 1991). Bury and Whelan (1984) cited 14 cases of bullfrogs eating snakes. These studies documented (1) bullfrog ingestion of garter snakes up to 80 centimeters (31.5 inches) in length, (2) depletion of the <80-centimeter length (snout-vent) age class, and (3) disappearance and resurgence of garter snake populations coincident with the introduction and decline of bullfrog populations. Schwalbe and Rosen (1989) concluded that bullfrogs have a high potential for eliminating garter snake populations. Treanor (1993) found that unidentified garter snakes *(Thamnophis* spp.*)* comprised 6.0 and 6.4 percent volume of bullfrog stomach contents in the months of July and August at Gray Lodge Waterfowl Management Area, a known giant garter snake location.

GGS Other Natural or Manmade Factors Affecting Giant Garter Snake Continued Existence

In rice production areas of the American Basin, the largest remaining population of giant garter snakes inhabits water management facilities adjoining rice fields (in rare instances the snake occurs along other agricultural waterways) (USFWS 1993). The seasonal flooding and draining of rice ponds may provide an adequate forage base and may prevent establishment of populations of large predatory fish (Brode and Hansen 1992).

However, Pacific Environmental Consultants (1992) cites sources that document 250,000-acre swings in rice production over a three-year time span suggesting that these situations do not represent stable conditions for associated giant garter snake populations. Rice production varies depending upon market conditions (e.g., Department of Agriculture price support programs), and water availability for agriculture (e.g., State Water Resources Control Board Draft Interim Water Rights Decision, D—1630) protects estuarine fisheries values by reducing winter and spring exports from the Delta, which could result in reduced acreage of rice production.

Furthermore, intensive control of vegetation along water delivery and drainage facilities eliminates remaining habitat and prevents reestablishment of former habitat (Hansen 1988; Brode and Hansen 1992; USFWS 1993). For example, more intensive maintenance practices have eliminated habitat along water canals in the American Basin along State Route 70/99 (USFWS 1993). Such activities can kill or injure snakes, remove critical escape cover, eliminate prey populations, and destroy small mammal burrows and other soil fissures needed as winter retreat habitat. G. Hansen observed the complete elimination of suitable habitat from maintenance practices along both sides of canals where giant garter snakes were found the previous season (USFWS 1993).

The giant garter snake is vulnerable to changes in water management because it depends on the availability of wetlands. In response to Statewide water shortages associated with drought, water management agencies, including the California Department of Water Resources and US Bureau of Reclamation, announce reductions in delivery of water to certain agricultural regions. In addition, the Department of Water Resources has begun acting as a broker to facilitate transfer of water from users with discretionary supplies to those with critical needs. Water districts from around the State are offering to purchase water from water districts in rice production regions of the Sacramento Valley (USFWS 1993).

Contaminants, such as fertilizers and pesticides, could adversely affect giant garter snake populations by degrading water quality and reducing prey populations. Selenium contamination of agricultural drain water appears to pose a severe threat to any giant garter snake population that still may inhabit the Grasslands region of western Merced County in the San Joaquin Valley (USFWS 1999). High levels of selenium contamination have been documented in biota from at least six major canals and watercourses in the Merced Grasslands (Saiki et al. 1991, 1992a) that have historic giant garter snake records. The bioaccumulative food chain threat of selenium contamination to fish, frogs, and fish-eating birds in the region has been well documented (Ohlendorf et al. 1986, 1988; Saiki and Lowe 1987; Saiki and May 1988; Hothem and Ohlendorf 1989; Saiki et al. 1991, 1992b, 1993). Contaminant studies on aquatic organisms and their habitats in the grasslands and neighboring areas documented elevated levels of waterborne selenium in many representative water bodies in this region that exceeded known toxicity thresholds for giant garter snake prey species (San Joaquin Valley Drainage Program 1990; Central Valley Regional Water Quality Control Board 1992; Hermanutz 1992; Hermanutz et al. 1992; Nakamoto and Hassler 1992). Elevated salinity of waters in the grasslands due to a sodium sulfate-based salt have also been documented at deleterious levels in resident fishes and amphibians (Ohlendorf et al. 1986, 1988; Saiki et al. 1992a), the major food source of giant garter snakes.

According to the USFWS (1993), most or all giant garter snake populations are vulnerable to adverse effects from flooding, and a 100-year flood event has the potential of extirpating all remaining populations of giant garter snake. Many areas, such as in the rice production districts

of the Sacramento Valley, flood more frequently, even during winters with normal levels of rainfall. In Glenn and Colusa Counties, Willow Creek, Walker Creek, French Creek, Wilson Creek, Logan Creek, Hunter Creek, Lurline Creek, and the Colusa Drain all flood to heights exceeding the levee tops (USFWS 1993). In eastern Sutter County, many creeks convey water to heights one to two feet above levee tops (USFWS 1993). These flooding events may account, at least in part, for the apparent absence of the giant garter snake in many rice production districts.

Giant garter snakes retreat to habitats at higher elevations during the winter dormancy period. Commercial development, agricultural conversion, and levee channel construction and maintenance along the edges of wetlands have eliminated much of the retreat habitat, forcing giant garter snakes to overwinter in flood-prone (streamside) levee slopes.

GGS Data Gaps and Conservation Implications

The ecology, status, and management of giant garter snake have received increased attention in recent years; however, there are several sources of uncertainty regarding giant garter snake and its requirements in the Planning Area. The primary data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

GGS Population and Habitat Distribution within the Planning Area

Giant garter snakes occur in suitable habitat within the Planning Area; however, their overall distribution, abundance, and population structure are not well known. Land cover-types used by giant garter snakes, such as suitable seasonal impoundments, freshwater marsh, open water, streams and creeks as well as adjacent uplands, occur throughout much of the Central Valley and are well represented in Sacramento County and the Planning Area.

Because comprehensive surveys for giant garter snake in the Planning Area have not been conducted and the existing occurrence data are based primarily on incidental observations (e.g., CNDDB, anecdotal records), the population size and distribution of the species throughout the Planning Area are not known. In addition, though the distribution of different habitat-types is mapped and quantifiable, the quality of habitat (particularly as it relates to essential habitat components) for giant garter snakes within most of these areas is unknown. These information gaps limit the ability to identify the best lands available for preserving giant garter snake habitat and accurately estimate the impacts resulting from covered activities.

Until this data gap is remedied, the conservation value for giant garter snake will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, or are adjacent to these areas.

Determining Threat Severity

Although certain factors are known to contribute to giant garter snake decline rangewide, exactly how and to what extent these factors contribute are largely unknown. Activities that directly remove or replace suitable habitat with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population (e.g., stormwater flooding of occupied winter retreats). Therefore, to improve conservation planning efforts for giant garter snake in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats.

Effectiveness of Habitat Enhancement and Restoration Techniques in Creating Suitable Habitat for Giant Garter Snake

Achieving the conservation goals and objectives for giant garter snake will require successful enhancement and restoration of suitable habitat. The function of habitat (e.g., connectivity, hydroperiod, biodiversity) is an important factor for suitability of giant garter snake. Whether restored or enhanced habitats can retain the structural attributes suitable for giant garter snake is unknown.

If habitat restoration and enhancement techniques cannot eventually create habitats with functional characteristics suitable for giant garter snake, then those lands would not support sustainable populations.

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COOPER'S HAWK (COHA)

Cooper's Hawk (COHA)

(Accipiter cooperii)

Status USFWS: None

Status CDFW: Bird Species of Special Concern

COHA Listing Status

Cooper's hawk (*Accipiter cooperii*) is legally protected under the federal Migratory Bird Treaty Act (16 U.S.C. 703-712) and California Fish and Game Code (Sections 3503.5 and 3800). This species is considered a "Watch List" species by the California Department of Fish and Wildlife (CDFW).

COHA Life History and Ecology

COHA Species Description and Life History

Physical Description

Cooper's hawk is a medium-sized (e.g., crow-sized) woodland hawk with short, rounded wings and a long tail. Adult birds have yellow legs and orange-red eyes. The back and upper wing coverts are blue-gray, and the breast and underparts are finely barred with rufous or rust coloration. Young and juvenile birds are brown on the back and white on the breast with fine brownish streaks. Female Cooper's hawks are approximately one-third larger than males, and western birds are smaller than eastern birds. Adult mass of western females averages 16.7 and 15.5 ounces (473 and 439 grams) during the breeding season and migration, respectively. Adult mass of western males averages around 9.9 ounces (280 grams) during breeding and migration. Length estimates for western Cooper's hawks have not been summarized; however, eastern females average 17.7 inches (45 centimeters) in length, while males average 15.4 inches (39 centimeters). (Rosenfield and Bielefeldt 1993).

Field identification of Cooper's hawk can be difficult where the species co-occurs with similar species. This species is frequently confused with the smaller sharp-shinned hawk (*A. striatus*) and larger northern goshawk (*A. gentilis*).

Taxonomy

Cooper's hawk is one of three North American hawks in the genus *Accipiter*. The other two species are the larger northern goshawk and smaller sharp-shinned hawk. Two subspecies of *A. cooperii*, the western *A. c. mexicanus* and eastern *A. c. cooperii*, are no longer recognized (Rosenfield and Bielefeldt 1993).

Reproduction

The breeding season for Cooper's hawk is generally March to July, however breeding is sometimes initiated earlier. Cooper's hawks typically begin breeding after two years of age, although breeding by first-year males (Rosenfield and Wilde 1982) and females (Meng 1951; Hennessy 1978; Reynolds and Wight 1978; Moore and Henny 1984; Asay 1987) have been documented. Cooper's hawks are monogamous and generally breed once per year; however, renesting can occur if a clutch is lost early in the incubation period (Rosenfield and Bielefeldt 1993). Pairs generally return to the same territory each year, but typically build a new (alternate) nest in the vicinity of the existing nest (Reynolds and Wight 1978). In California, the rate of nest area reoccupancy has been found to be 80 percent, and half of nesting attempts occurred in rebuilt nests (Asay 1987). In Southeast Arizona, Boal and Mannan (1999) observed

color-banded pairs of Cooper's hawks on their territories during the non-breeding seasons, suggesting that some pairs maintain their pair bonds year-round.

Throughout its range, Cooper's hawk nests in evergreen and deciduous tree species. In California, 75 of 77 (97 percent) Cooper's hawk nests studied by Asay (1987) in three low-elevation study areas (Sacramento, Stockton, and southern California) were in live oaks (*Quercus wislizenii* or *Q. agrifolia*). The other two nests were in a blue oak (*Q. douglasii*) and California sycamore (*Platanus racemosa*). Most of these nests occurred in groves of six or more trees; however, two were in solitary trees 30 to 40 meters from the nearest tree.

Cooper's hawk nests are stick platforms with a cup lined with bark, placed in a crotch or lateral limb against the trunk of a tree. On average, nests are constructed 26 to 49 feet (8 to 15 meters) high, in trees 8.3 to 20 inches (21 to 52 centimeters) diameter-at-breast-height (dbh), and in stands with 64 to 95 percent canopy closure and 600 to 2,863 trees per acre (243 to 1,159 trees per hectare) (Rosenfield and Bielefeldt 1993).

Once the nest is built, Cooper's hawks engage in a month-long prelaying and copulatory period (Rosenfield et al. 1991). During this period, the male leaves the nest area to forage for himself and the female, but spends most of his time near the nest. The male provides nearly all the female's food during the pre-laying and nesting periods (Rosenfield and Bielefeldt 1993). In California, Cooper's hawks typically lay eggs in April and May. Clutch sizes range from one to seven eggs, but clutch sizes of three to five eggs are typical. Immature breeders tend to lay approximately five to 10 days later than adults. Incubation lasts approximately 34 to 36 days, and young remain in the nest an additional 30 to 34 days. Young may remain together in the vicinity of the nest for up to five to six weeks or more prior to dispersal (Rosenfield and Bielefeldt 1993). Boal and Spaulding (2000) recently observed a nesting attempt that involved nest helping by a third Cooper's hawk. Both the parental male and a subadult male delivered food to the nesting female, and all three individuals defended the nest.

Survival and Longevity

The maximum reported age of a Cooper's hawk is 12 years, while nine years is the maximum age known for a breeding bird. First year and adult annual survivorship has been estimated at 22 to 28 percent and 63 to 66 percent for first year and adult birds, respectively, using life table methods (Rosenfield and Bielefeldt 1993). Mannan et al. (2004) estimated a survival rate of 67 percent for radio-tagged fledgling Cooper's hawks, through 180 days of age, in an urban setting in Tuscon, Arizona.

Dispersal Patterns

The small amount of information on Cooper's hawk natal dispersal is based on band return data and a few localized studies. In Wisconsin, the average distance between the natal site and subsequent breeding site was 7.5 miles (12.0 kilometers) for six males, and 8.9 miles (14.4 kilometers) for a female (Rosenfield and Bielefeldt 1993). A female Cooper's hawk was also documented dispersing 49 miles (79 kilometers) between the natal and subsequent breeding site (Rosenfield and Bielefeldt 1993). Mannan et al. (2004) studied dispersal of 40 radio-tagged fledgling Cooper's hawks in urban Tuscon, Arizona. Dispersal patterns were characterized by relatively sedentary behavior in the natal area, followed by long movements after 11 to 13 weeks of age, then settlement and sedentary behavior in the fall/winter home range. The average distance between natal sites and winter home ranges was 6.8 and 3.7 miles (10.9 and 6.0 kilometers) for females and males, respectively.

There is little empirical information about adult dispersal; however, the available information suggests that adult Cooper's hawks exhibit strong fidelity to nesting areas (Rosenfield and Bielefeldt 1993), and pairs often reuse the same nest sites over consecutive years (Call 1978).

Diet and Foraging

Cooper's hawks primarily eat medium-sized birds and mammals; and birds comprise most of the diet (Peterson and Murphy 1992; Rosenfield and Bielefeldt 1993). Important avian prey includes mourning dove (*Zenaida macroura*), American robin (*Turdus migratorius*), northern flicker (*Colaptes auratus*), jays (*Cyanocitta* spp*., Aphelocoma* spp.), and European starling (*Sturnus vulgaris*). Other documented avian prey includes ring-necked pheasant (*Phasianus colchicus*), American crow (*Corvus brachyrhynchos*), rock pigeon (*Columba livia*), house sparrow (*Passer domesticus*), and dark-eyed junco (*Junco hyemalis*). Mammalian prey includes chipmunks (*Tamius* spp*., Eutamius* spp.), hares (*Lepus* spp.), deer mouse (*Peromyscus*), tree squirrels (*Sciurus* spp*., Tamiasciurus*), ground squirrels (*Ammospermophilus* spp*., Spermophilus* spp.). Cooper's hawks also eat reptiles, mammals, insects, and fish.

In an urban environment, Roth and Lima (2003) found that mourning dove, European starling, and rock pigeon comprised 91 percent of the diet of eight Cooper's hawks. In this study, small birds such as house sparrow were abundant, but rarely attacked. Mammals were not taken.

Cooper's hawks are considered aggressive ambush predators, using concealment to catch prey. Surprise attacks are often initiated at close range from behind an obstruction (Roth and Lima 2003). They often use a series of brief perch and scan episodes to locate and capture prey. In open habitats, Cooper's hawks occasionally hunt from the air, scanning the ground and stooping on prey (Rosenfield and Bielefeldt 1993).

Movement and Migration Patterns

Cooper's hawks breeding in the northern portions of the species' range are more migratory than those at more southern latitudes (Palmer 1988; Rosenfield and Bielefeldt 1993). Most Cooper's hawks breeding in California are permanent, non-migratory residents; however, Cooper's hawks breeding in montane habitats may exhibit seasonal movements, moving to snow-free lower elevations during winter (Zeiner et al. 1990).

Territoriality/Home Range

Cooper's hawk home ranges have been estimated at 988 to 4,446 acres (400 to 1,800 hectares) in New York, Michigan, Oregon, New Mexico, and Wisconsin. Home range size varies through the nesting cycle, and small portions of the home range may be used disproportionately (Rosenfield and Bielefeldt 1993). In urban Tuscon, Arizona, home range size for nine subadult Cooper's hawks during their first fall/winter averaged 1,905 acres (771 hectares) (Mannan et al. 2004). In a study of nesting Cooper's hawks in the Sacramento area, the average distance between adjacent nests was 0.99 mile (1.6 kilometers) (Asay 1987).

In Tuscon, Mannan and Boal (2000) studied the movements of adult male Cooper's hawks in adjacent home ranges during the breeding season. Home range sizes for nine individuals ranged between 32.9 and 322.7 acres (13.3 and 130.6 hectares) and averaged 161.9 acres (65.5 hectares), while only one pair of home ranges overlapped. These home range sizes were considerably smaller than those reported elsewhere. Home range size apparently decreased with the number of years a Cooper's hawk maintained its breeding territory. The authors suggested that these relatively small home ranges may be a function of abundant prey availability, and Cooper's hawks in their study area may not require long foraging distances to meet their energetic requirements. In a study by Estes and Mannan (2003), the proportion of land use types within home ranges varied considerably among territories, and Cooper's hawks did not appear to select their home ranges based on the land use categories recognized by the authors. Also, patterns of habitat use suggested that male Cooper's hawks foraged primarily in areas surrounding their nests.

COHA Habitat Requirements and Ecology

Throughout its range, the Cooper's hawk nests in a wide variety of woodland and forest habitats, including oak woodland, riparian woodland, coniferous, deciduous, and mixed forest, woodlots, and suburban and urban areas. In much of California's lowland valley and foothill landscapes, including those within the Planning Area, this species appears strongly associated with live oak woodland (Asay 1987). At higher elevations in California (e.g., the Sierra Nevada), Cooper's hawks nest in conifer forest (Asay 1987; Zeiner et al. 1990; Henderson pers. obs.).

On average, Cooper's hawk nests are constructed 26 to 49 feet (8 to 15 meters) high, in trees 8.3 to 20 inches (21 to 52 centimeters) diameter-at-breast-height (dbh), and in stands with 64 to 95 percent canopy closure and 600 to 2,863 trees per acre (243 to 1,159 trees per hectare) (Rosenfield and Bielefeldt 1993). Dense canopy closure is a consistent feature of most nest sites, and the tallest tree in the stand is often selected for nesting (Kennedy 1988). Kennedy (1988) suggested that suitability of Cooper's hawk nest sites may be a function of four primary factors: 1) proximity to foraging habitat with dense prey populations; 2) availability of prey during the fledgling period; 3) historic nest success at a site; and 4) the overall vegetation structure of the site.

In a study of 77 Cooper's hawk nests in California, Asay (1987) found that nearly all nests (i.e., 75) were in live oak trees. The other two nests were in a blue oak and California sycamore; and these trees were in stands of live oak. This study focused on three study areas at relatively low elevation including the Sacramento study area (Sacramento, Placer, and El Dorado counties at 98 to 656 feet [30 to 200 meters] elevation), the Stockton study area in the foothills east of Stockton (Calaveras county at 394 to 1,378 feet [120 to 420 meters] elevation), and the southern California study area in the hills east and north of San Diego (Riverside and San Diego Counties at 345 to 3,593 feet [105 to 1,095 meters] elevation). The Sacramento study area, which included 27 nest sites, was dominated by gray pine (*Pinus sabiniana*), Fremont cottonwood (*Populus fremontii*), valley oak (*Quercus lobata*), blue oak, and interior live oak (*Q. wislizenii*). In the vicinity of Folsom Lake, habitat consisted of relatively continuous and dense stands of interior live oak, gray pine, and shrubs. Occupied areas south of Folsom Lake consisted of more patchy stands of interior live oak mixed with valley oak, blue oak, and gray pine in a matrix of rolling grasslands. Although not specified in Asay's study, riparian woodlands also provide important habitat for Cooper's hawks in Sacramento County.

Other key findings of Asay's (1987) study of Cooper's hawk nesting habitat in lowland California were: 1) most nests occurred in groves of six or more trees; 2) stand structure was characterized by the canopies of multiple trees growing together; 3) the understory of these stands was relatively sparse, comprised of larger branches, few small branches and leaves, and sparse ground cover that included short grass and/or poison oak; 4) most nest trees (79 percent) were in flat or bottomland areas, although 21 percent occurred on steep hillsides; 5) nests were typically constructed in one of the most mature trees in the stand, in or just below the canopy; and 6) the heights of 48 nests ranged 18.7 to 46 feet (5.7 to 14 meters) and averaged 33 feet (10.1 meters) above ground.

In typical conifer forest habitats, Cooper's hawks inhabit medium to older aged forests with moderate tree densities, high canopy closure, and high canopy height (Reynolds et al. 1982; Moore and Henny 1983). Forest edge habitats are generally included within the home range (Rosenfield and Bielefeldt 1993). In Oregon, Cooper's hawks nested in stands of intermediate

ages (30 to 70 years old) and densities (2,240 trees per acre [907 trees per hectare]). Comparatively, northern goshawks nested in older and more open stands, and sharp-shinned hawks nested in the youngest and densest stands (Reynolds 1983; Moore and Henny 1983).

Cooper's hawks also breed in urban and suburban areas. Several urban populations of Cooper's hawks have been well documented (Beebe 1974; Stahlecker and Beach 1979; Murphy et al. 1988; Rosenfield et al. 1991; Mannan et al 2004). Cooper's hawks appear tolerant of habitat fragmentation and human disturbance near the nest (Beebe 1974; Murphy et al. 1988; Palmer 1988; Rosenfield et al. 1992). Urban nest sites have included isolated trees within 492 feet (150 meters) of commercial and recreational activities, and 66 to 98 feet (20 to 30 meters) of residential houses (Stahlecker and Beach 1979; Rosenfield and Bielefeldt 1993). In urban Tuscon, first-year Cooper's hawks used a variety of habitats before settling on winter home ranges, but occurred most frequently (35 percent of locations) in riparian areas (Mannan et al. 2004). Adult Cooper's hawks in Tuscon nested more frequently in eucalyptus (*Eucalyptus* spp., 70.8 percent), Aleppo pine (*Pinus halepensis*, 25 percent), and cottonwood (4.2 percent) trees than expected based on their availability (Boal and Mannan 1998). Most nest trees were in the yards of single-family residences (48.3 percent) and high-use recreational areas (28.3 percent). Human disturbance levels did not appear to affect nest site selection. Compared to random sites, nest sites were characterized by groves of greater canopy closure and more trees greater than 32.8 feet (10 meters) tall. Furthermore, nest trees were taller and larger (Boal and Mannan 1998).

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Cooper's hawk are identified in Table G-3.18-1 and have been derived from input from local species experts.

Table G-3.18-1. Habitat Elements for Cooper's Hawk

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak woodland, blue oak savanna, mine tailing riparian woodlands, valley oak riparian woodlands, mixed riparian woodland, mixed riparian scrub, and orchards.	Structurally diverse woodland habitats that provide suitable prey abundance and diversity (i.e., medium-sized birds) and large numbers of sites within which to perch, scan, and launch attacks on potential prey.
Nesting	Blue oak woodland, mine tailing riparian woodlands, valley oak riparian woodlands, mixed riparian woodland, and mixed riparian scrub.	Groves of trees; stand structure with the canopies of multiple trees growing together; sparse understory; and mature trees that allow for placement of nests 18 to 46 feet above ground.

COHA Species Distribution and Population Trends

COHA Species Distribution

Cooper's hawk is the most widely distributed North American Accipiter south of Canada (American Ornithologists' Union 1957; Asay 1987). Populations of Cooper's hawk occur throughout most of the United States as well as southern Canada and northern Mexico. Northern populations are migratory or partially migratory (Palmer 1988; Rosenfield and Bielefeldt 1993), while some southwestern populations migrate as well (Millsap 1981; Kelly and Kennedy 1993). Most Cooper's hawks winter in the coterminous United States, most of Mexico, and south to Costa Rica and possibly Panama (Ridgely and Gwynne 1989; Rosenfield and Bielefeldt 1993).

COHA Central Valley Distribution

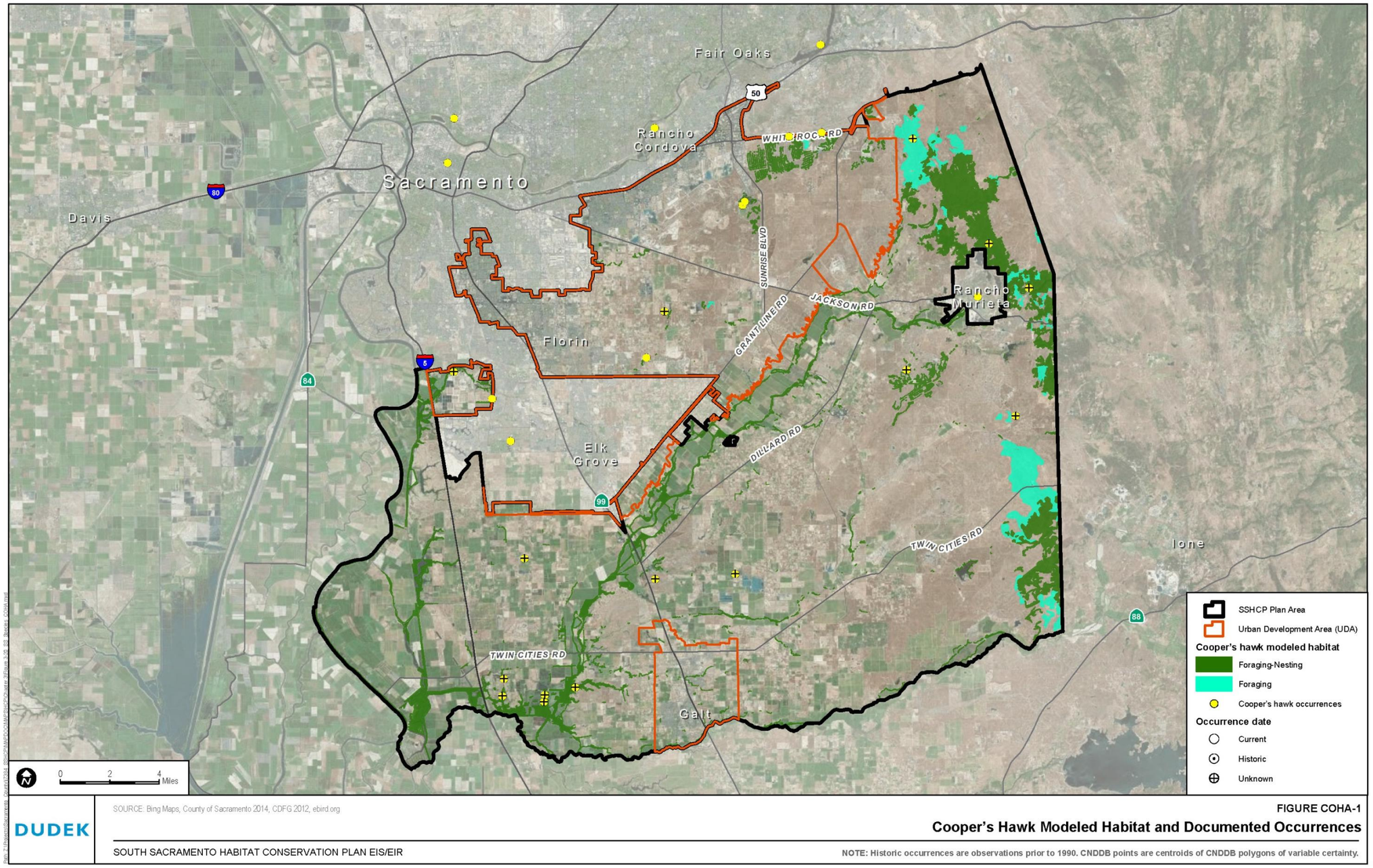
Cooper's hawk is a breeding resident throughout most of California, including the Central Valley, in a variety of woodland habitats. Based on its close association with live oak woodlands (Asay 1987), its Central Valley breeding distribution is probably concentrated in the foothill woodlands along the upper margins of the Central Valley.

COHA Distribution Within the Planning Area

Cooper's hawks occur in suitable habitat within the Planning Area; however, their overall distribution, abundance, and population structure are not well known. Land-cover types used by Cooper's hawks, such as oak and riparian woodland, occur throughout much of the Central Valley and are well-represented in Sacramento County and the Planning Area, particularly in the eastern portion of the Planning Area and outside the Urban Development Area (UDA). At most sites within these land-cover types, the presence of Cooper's hawk is not known, and it is assumed that most of this habitat is not occupied.

Asay (1987) studied breeding habitat characteristics and productivity of Cooper's hawks at 27 nest sites in Sacramento, El Dorado, and Placer Counties collectively; however, the number and locations of sites specifically in Sacramento County were not reported. In the Planning Area, the CNDDB reports three occurrences inside the UDA and no occurrences outside the UDA (CDFG 2010). There are four CNDDB occurrence records of Cooper's hawk in Sacramento County outside, but near the Planning Area (CDFG 2010). Figure COHA-1 shows the known occurrences of Cooper's Hawk within and adjacent to the Planning Area (CDFG 2010; Henderson unpublished; Asay 1987).

Figure COHA-1 Cooper's Hawk Modeled Habitat and Documented Occurrences



DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, ebird.org

FIGURE COHA-1

Cooper's Hawk Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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The occurrence data from the CNDDB does not allow for an estimate of the distribution or population size of Cooper's hawk in the Planning Area because they are based on a very small number of surveys in a limited area. Local ornithologists C. Conard and J. Trochet provided additional occurrence and habitat distribution information, which is summarized below.

- At the Cosumnes River Preserve, at least three Cooper's hawk nests have been documented in the Lower Preserve over the last 10 years. All of these nests failed before fledging, presumably due to predation by great horned owls (*Bubo virginianus*). Also, an adult Cooper's hawk carrying a towhee was recently observed at the Tall Forest (Trochet pers. comm.). This adult could have been delivering food to a nest.
- In 2003, nesting was documented east of Highway 99 at Bond Drive (Trochet pers. comm.).
- First-year Cooper's hawks are regularly observed at the Bufferlands (Conard pers. comm.).
- Cooper's hawks have historically nested in McKinley Park (Trochet pers. comm.).
- Nesting has not been documented at Howard Ranch (Trochet pers. comm.).
- Habitat identified as suitable for nesting Cooper's hawks in the Planning Area includes dense stands of interior live oak near Scott Road (Conard pers. comm.). Also, riparian woodland along Deer Creek downstream of its crossing with Scott Road, which includes cottonwood trees, has a high potential to support breeding Cooper's hawks (Trochet pers. comm.).

Because comprehensive surveys or monitoring efforts for Cooper's hawk in the Planning Area have not been conducted, and because the known occurrences are based mostly on incidental observations or limited surveys (e.g., CNDDB, anecdotal records, surveys conducted over a limited area), the population size and extent of suitable nesting habitat for this species in the Planning Area are not well known.

COHA Population Levels and Trend

Overall, Cooper's hawk has been considered common in the western portion of its range (Reynolds 1989), and western populations have been considered relatively stable (Snyder et al. 1973; Jones 1979). Grinnell and Miller (1944) once considered Cooper's hawk a common breeder throughout its range in California. Although population declines in the west are less well documented than in the east, Remsen (1978) reported that breeding populations of Cooper's hawk had declined throughout California over the two or three decades prior to 1978. At that time, breeding populations had been extirpated from some areas (e.g., the Colorado River), and severe declines were reported for the Sacramento Valley (Gaines 1974), Santa Cruz and Santa Clara Counties (Chandik and Baldridge 1969), Santa Barbara area, northern San Diego County, and Yosemite National Park (Gaines 1977, Remsen 1978). Also, analysis of Breeding

Bird Survey (BBS) data for the 20-year period (1983 to 2003) suggests that Cooper's hawk populations in California may have declined (P = 0.11) during that period (Sauer et al. 2004).

COHA Threats to the Species

The primary threat to Cooper's hawk, particularly in California, is probably habitat loss and degradation as a result of urbanization and development. Direct or indirect human disturbance of nesting activities, particularly in suburban areas, may also threaten populations (Thelander 1973; Olendorff and Kochert 1977; Remsen 1978; Bosakowski et al. 1993; Boal and Mannan 1998).

Declines in eastern Cooper's hawk populations attributed to pesticide contamination have been documented (Henny and Wight 1972; Snyder et al. 1973; Bednarz et al. 1990). In San Diego, one Cooper's hawk in 1968 was found to be highly contaminated with DDT (dichlorodiphenyltrichloroethane) (Risebrough et al. 1968); however, pesticide contamination of Cooper's hawks in California has not been reported elsewhere (Remsen 1978).

Shooting and trapping were important factors in historical population declines, but are no longer considered a threat (Rosenfield and Bielefeldt 1993). Timber harvest is considered a potential threat, but the impacts of logging on this species are poorly understood (Reynolds 1983; Rosenfield and Bielefeldt 1993). The availability of breeding habitat is apparently not a limiting factor for Cooper's hawk populations, at least in some areas, including suburban areas (Rosenfield and Bielefeldt 1993). More than 100 nest sites for this species have been found during on-going surveys by the Golden Gate Raptor Observatory (GGRO) in the larger East Bay Area (i.e., urban areas from El Cerrito south to Alameda) since 2002 (Fish 2008).

Trichonmoniasis, a digestive tract disease in raptors that originates from infected avian prey (particularly doves), has been reported to be common and an important source of mortality in nestling and fledgling Cooper's hawks in some urban populations (Boal et al. 1998; Boal and Mannan 1999; Rosenfield et al. 2002; Estes and Mannan 2003). However, the prevalence of infection appears to vary widely across the Cooper's hawk's breeding range (Rosenfield et al. 2002). Also, West Nile virus has been isolated from brain tissue of a Cooper's hawk in Connecticut (Wakem et al. 1999).

COHA Data Gaps and Conservation Implications

The ecology, status, and management of Cooper's hawks have received considerable attention in recent years. However, there are several sources of uncertainty regarding Cooper's hawks and their requirements in the Planning Area. The primary data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

COHA Population and Habitat Distribution within the Planning Area

Cooper's hawks occur in suitable habitat within the Planning Area; however, their overall distribution, abundance, and population structure are not well known. Land-cover types used by Cooper's hawks, such as oak and riparian woodland, occur throughout much of the Central Valley and are well-represented in Sacramento County and the Planning Area, particularly in the eastern portion of the Planning Area and outside the UDA. However, at most sites within these land-cover types, the presence of Cooper's hawk is not known, and it is assumed that most of this habitat is not occupied.

Because comprehensive surveys for Cooper's hawk in the Planning Area have not been conducted and because the existing occurrence data are based primarily on incidental observations (e.g., CNDDB, anecdotal records), the population size and nesting locations of this species throughout the Planning Area are not known. Also, although the distribution of oak and riparian woodlands is mapped and quantifiable, the quality of habitat for Cooper's hawks within most of these areas is unknown. A few areas identified as suitable for nesting Cooper's hawks in the Planning Area include dense stands of interior live oak near Scott Road (Conard pers. comm.). Also, riparian woodland along Deer Creek downstream of its crossing with Scott Road has a high potential to support breeding Cooper's hawks (Trochet pers. comm.).

These information gaps limit our ability to identify the best lands available for preserving Cooper's hawk habitat and accurately estimate the impacts resulting from covered activities. Until this data gap is remedied, the conservation value of woodland and riparian woodland land-cover types for Cooper's hawk will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, or are adjacent to these areas (e.g., near the Cosumnes River Preserve).

COHA Effectiveness of Woodland Enhancement and Restoration Techniques in Creating Suitable Habitat Structure for Cooper's Hawk

Achieving the conservation goals and objectives for Cooper's hawk will require successful enhancement and restoration of oak and riparian woodlands. The structure of woodlands (e.g., dense canopy closure) is an important factor for suitability of Cooper's hawk. Whether restored or enhanced woodlands can retain the structural attributes suitable for Cooper's hawk is unknown. If woodland restoration and enhancement techniques cannot eventually create woodland habitats with structural characteristics suitable for Cooper's hawk, then those lands would not support breeding pairs.

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TRICOLORED BLACKBIRD (TRIC)

Tricolored Blackbird (TRIC)

(Agelaius tricolor)

Status USFWS: Bird of Conservation Concern

Status CDFW: Candidate for Listing as Endangered

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TRIC Listing Status

The tricolored blackbird (*Agelaius tricolor*) is legally protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-7012) and California Fish and Game Code (Section 3503.5 and 3800).

The species is a candidate for listing as endangered by the California Department of Fish and Wildlife (CDFW). The tricolored blackbird was formerly a candidate (category 2) for federal listing as either Threatened or Endangered by the U.S. Fish and Wildlife Service (USFWS) (59 Federal Register [219]: 58990), and was also informally identified as a Species of Concern (USFWS 1995). More recently, the USFWS (2002) designated the tricolored blackbird as a Bird of Conservation Concern (BCC). The Bureau of Land Management (BLM) also designates it as a Sensitive Species (BLM 1999).

TRIC Life History and Ecology

TRIC Species Description and Life History

Physical Description

The tricolored blackbird is a medium-sized, sexually dimorphic blackbird. Adults range from 18 to 24 centimeters (7 to 9.5 inches) in length (from beak to tail) and weight between 40 to 70 grams (1.4 to 2.5 ounces), depending on the sex and season (Beedy and Hamilton 1999). Adult males are entirely black, glossed bluish (in full sunlight), with bright red lesser wing-coverts forming conspicuous reddish patches on wing shoulders (epaulets). The median-coverts are buffy white (August through February) to pure white (February through July) (Mailliard 1910; DeHaven 1975). Adult females are mostly black, with distinct grayish streaks; relatively whitish chins and throats, rarely with faint pinkish or peach wash; and small but distinct reddish shoulder patches (DeHaven 1975). Juveniles of both sexes (April through August) are similar to adult females but are much paler gray and buff (Pyle 1997).

TRIC Demography

Reproduction

During the breeding season, tricolored blackbirds typically nest in dense colonies (some estimated as having 200,000+ nests), with males defending small territories and mating with one to four females (Beedy and Hamilton 1999). They are also considered itinerant breeders, sometimes nesting more than once at different locations during the breeding season. Studies by Neff (1937) reported that nesting colonies are often located in seasonal wetlands with tules (*Scirpus* spp.) and cattails (*Typha* spp.) present. More recent studies indicate that nesting colonies are also regularly found in Himalayan blackberries (*Rubus discolor*) (Cook 1999) and grain fields (DeHaven 2000).

Female tricolored blackbirds breed in their first year, but most males apparently defer breeding until they are at least two years old (Payne 1969). Nest construction, done exclusively by females, is usually highly synchronous and may be initiated as soon as the day of arrival at the

breeding colony (Neff 1937). Additional birds may be recruited to the colony site and initiate nesting later. These birds may nest in a continuing concentric wave at the margin of the colony (Orians 1961). As colonization of a breeding site proceeds, the area occupied by nests expands (Tyler 1907), engulfing any previously established breeding red-winged blackbird (*Agelaius phoeniceus*) nest sites (Orians 1961).

Tricolored blackbird nests are bound to upright plant stems from a few inches up to about six feet (1.8 meters) above water or ground (Harrison 1978). Nests in the canopies of willows (*Salix* spp.) and ashes (*Fraxinus* spp.), however, may be more than 12 feet (3.6 meters) high (Hamilton pers. comm.). Tricolored blackbird nests are rarely built on the ground (Neff 1937). Deep cup nests are constructed with outer layers of long leavers (e.g., cattail thatch, annual grasses, or forbs) woven tightly around supporting stems. The inner layers are coiled stems of grasses lined with soft plant down, mud, or algal fibers. Nest building takes about four days (Payne 1969).

Egg laying can begin as early as the second day after nest initiation, but ordinarily starts about four days after the arrival of birds at breeding sites (Payne 1969). One egg per day is laid, and clutch size is typically three to four eggs (Payne 1969, Hamilton et al. 1995). Emlen (1941) and Orians (1961) estimated the tricolored blackbirds incubation period at 11 or 12 days, while Payne (1969) estimated this interval at 11 to 14 days. Incubation begins before clutches are completed, and eggs in individual nests hatch asynchronously (Hamilton pers. comm.).

Tricolored blackbird clutches take about nine days from hatching until the oldest nestling is willing to jump from the nest when disturbed. Young require about 15 days from this pre-fledging date until they are independent of their parents. Thus, one successful nesting effort for a reproductive pair takes about 45 days (Hamilton et al. 1995). The persistence of a successful colony takes additional time, depending on the presence of females recruited into the colony after the initial establishment.

A successful tricolored blackbird colony, including some asynchronous nests, takes about 50 days from nest initiation to fledging. Because most first nesting efforts are made before April 25, most nesting attempts observed between April 25 and May 20 are probably second or third attempts by birds that lost earlier nests. A pair beginning nesting after April 25 and before May 20 would not have had sufficient time (i.e., about 45 days) to complete a prior, successful nest (Beedy and Hamilton 1997).

Tricolored blackbird activity during the early stages of colony settlement may give the erroneous impression of high local nesting densities because typically more birds are present at some colonies initially than will actually remain to nest (Hamilton et al. 1995). Flight activity over colonies during the settlement phase is mainly by males that have not established nesting territories. Males gaining breeding territories may remain below the canopy of nesting

substrates and, therefore, out of view. The mean number of females per male is estimated to be two (Orians 1961; Payne 1969), but some colonies may have nearly as many males as females (Hamilton pers. comm.). A count of active tricolored blackbird nests per unit area is a better indication of local abundance than numbers of singing males (Neff 1937).

Females on nests are quiet during incubation, and active colonies may appear to be largely deserted. The more synchronous colonies are particularly inconspicuous at this stage and can be easily overlooked. Close approach by an observer, however, usually causes females to leave their nests and fly away (Hamilton pers. comm.).

Banding studies, summarized by Neff (1942) and DeHaven and Neff (1973), indicated life span may extend to at least 13 years (Kennard 1975; Beedy and Hamilton 1999). No annual survivorship studies have been conducted and available banding data is inadequate to determine annual survivorship (Beedy and Hamilton 1999).

Dyer et al. (1977 *in* DeHaven 2000) reported red-winged blackbird's (*Agelaius phoeniceus*), the tricolored blackbird's closest relative, annual survival between 42 to 62 percent and an average life expectancy of 2.14 years.

Dispersal Patterns

A crèche of tricolored blackbirds is a group of fledglings that have left the nest and assembled either at the colony site or at locations between colonies and favorable foraging areas (Payne 1969). These fledglings are conspicuous, both because they are vociferous and because adults are feeding them as rapidly as possible (Hamilton pers. comm.). DeHaven et al. (1975) banded 33,058 nestlings and only 39 percent of band recoveries were re-located within 16 kilometers (10 miles) of natal colonies.

Diet and Foraging

Tricolored blackbirds primarily forage by gleaning food parts from the ground and secondarily by gleaning food parts from foliage (Ehrlich et al. 1988). Food items are diverse and change seasonally. During the nesting season, foods delivered by adults to nestlings include beetles and weevils, grasshoppers, caddisfly larvae, and moth and butterfly larvae (Orians 1961; Crase and DeHaven 1977; Skorupa et al. 1980), and, especially in current rice-growing areas, dragonfly larvae (Hamilton pers. comm.). In contrast, breeding season foraging studies in Merced County showed that animal matter makes up about 91 percent of the food volume of nestlings and fledglings, 56 percent of the food volume of adult females, and 28 percent of that of adult males (Skorupa et al. 1980). Studies conducted since the 1980's have documented tricolored blackbirds feeding on dairy cow silage that is stored in large open piles on the ground (Cook

pers. comm.). Also, the importance of grasshoppers as a dietary item has been highlighted during the breeding season (Cook pers. comm.; DeHaven 2000).

Adults may continue to consume plant foods through the nesting cycle, but also forage on insects and other animal foods. Immediately before and during nesting, adults are often attracted to dairies, where the birds take high-energy items from livestock feed rations. Adults with access to livestock feed, such as cracked corn, begin providing it to nestlings when they are about 10 days old (Hamilton et al. 1995).

More that 88 percent of all winter food in the Sacramento Valley is plant material, primarily seeds or rice and other grains, but also weed seeds (Crase and DeHaven 1978). In winter, tricolored blackbirds often associate with other blackbirds, but flocks as large as 15,000 individuals (almost all tricolored blackbirds) may aggregate at one location and disperse to foraging sites. Some winter foraging flocks are almost exclusively composed of one sex (Hamilton pers. comm.), which may imply an as-yet unidentified gender difference in foraging preferences.

Movement and Migration Patterns

In late March and early April, tricolored blackbirds vacate wintering areas in the Sacramento-San Joaquin River Delta and along coastal central California and arrive at breeding locations in Sacramento County and throughout the San Joaquin Valley (DeHaven et al. 1975). A substantial, but as yet unmeasured, number of tricolored blackbirds also winter in the northern San Joaquin Valley (Hamilton pers. comm.).

During the breeding season, tricolored blackbirds often exhibit itinerant breeding and move to new breeding locations following previous nesting attempts elsewhere (Hamilton 1998). Most probably move from the San Joaquin Valley and Sacramento County to the northern Sacramento Valley for second or third nesting attempts. While this trend was noted in all three years of an intensive study, colonies may form at any time during the breeding season (April through July) throughout the known breeding distribution of this species (Hamilton et al. 1995; Hamilton 2000).

Long-term banding studies by DeHaven et al. (1975) demonstrated a major postbreeding season movement into the Sacramento Valley from other breeding locales. Large postbreeding roosts continue to develop in this area from late summer (August) into fall (Hamilton pers. comm.).

The timing of major movements to wintering areas is unknown. Large foraging flocks can be seen in pasturelands north of Rio Vista, Solano County, by late October (Beedy pers. obs.), and Hamilton (pers. comm.) has seen large flocks in the Sacramento and San Joaquin River Delta by late November. During winter, tricolored blackbirds can be found in large flocks by themselves,

or with other blackbird species including red-winged blackbirds and Brewer's blackbirds (*Euphagus cyanocephalus*) (Beedy and Hamilton 1999).

Ecological Relationships

Several wildlife species are known to raid tricolored blackbird nests. In addition, great-tailed grackles (*Quisalus mexicanus*), a southern species expanding its range northward, have been reported nesting near and exhibiting aggression toward tricolored blackbird breeding colonies (Hamilton pers. comm. *in* Beedy and Hamilton 1999). Roosting European starlings (*Sturnus vulgaris*) are associated with desertion of tricolored blackbird colonies (Payne 1969 *in* Beedy and Hamilton 1999).

TRIC Habitat Requirements and Ecology

Tricolored blackbirds are closely related to red-winged blackbirds, but the two species differ substantially in their breeding ecology. Red-winged blackbird pairs defend individual territories, while tricolored blackbirds are among the most colonial of North American passerines (Bent 1958; Orians 1961, 1980; Orians and Collier 1963; Payne 1969; Beedy and Hamilton 1999). As many as 20,000 or 30,000 tricolored blackbird nests have been recorded in cattail marshes of 9 acres (four hectares) or less (Neff 1937; DeHaven et al. 1975), and individual nests may be built less than 1.5 feet (0.50 meters) from each other (Neff 1937). The tricolored blackbirds highly synchronized and colonial breeding system have adapted to exploit a rapidly changing environment where the locations of secure nesting habitat and rich insect food supplies were ephemeral and likely to change each year (Orians 1961; Orians and Collier 1963; Collier 1968; Payne 1969).

Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: a protected nesting substrate that is either flooded, thorny, spiny, or "visually" but not actually spiny; a suitable foraging space providing adequate insect prey within a few miles of the nesting colony; and open accessible water (Hamilton et al. 1995; Beedy and Hamilton 1997, 1999). DeHaven (2000), however, questioned whether the lack of water constitutes a significant limitation on breeding substrate utilization.

Almost 93 percent of the 252 tricolored blackbird breeding colonies reported by Neff (1937) were in freshwater marshes dominated by tules and cattails. The remaining colonies in Neff's study were in willows, blackberries (*Rubus* spp.), thistles (*Cirsium* and *Centaurea* spp.), or nettles (*Urtica* spp.). In contrast, only 53 percent of the colonies reported during the 1970s were in cattails and tules (DeHaven et al. 1975).

An increasing percentage of tricolored blackbird colonies in the 1980s and 1990s were reported in Himalayan blackberries (Beedy et al. 1991; Cook 1996, 1999), and some of the largest recent colonies are in grain fields (Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000).

Other substrates where they have been observed nesting include giant European reed (*Arundo donax*), safflower (*Carthamus tinctorius*) (DeHaven et al. 1975), tamarisk (*Tamarix* spp.), elderberry (*Sambucus* spp.), poison-oak (*Toxicodendron diversilobum*), and riparian scrublands and forests (e.g., *Salix, Populus,* and *Fraxinus* spp.) (American Birds file data).

Tricolored blackbird foraging habitats in all seasons include annual grasslands, wet and dry vernal pools and other seasonal wetlands, agricultural fields (such as large tracts of alfalfa and pastures with continuous haying schedules, and recently tilled fields), cattle feedlots, and dairies. They also forage occasionally in mixed riparian scrub habitats along marsh borders. Weed-free row crops and intensively managed vineyards and other orchards do not serve as regular foraging sites (Beedy and Hamilton 1997, 1999; DeHaven 2000).

Grassland and vernal pool complexes characterize the landscape in much of the tricolored blackbirds breeding range and preferred foraging habitat in southern Sacramento County (Cook 1999). Ungrazed grasslands containing tall grasses (greater than 15 centimeters [six inches] tall) and vernal pools were considered preferred over dry, grazed grasslands containing short grasses (Cook 1999). Foraging birds often congregate at the margins of wet vernal pools and in their interiors once they dry (Cook 1999). Most tricolored blackbirds forage within five kilometers (three miles) of their colony sites (Orians 1961), but commute distances of up to 13 kilometers (eight miles) have been reported (Hamilton pers. comm.). Short-distance foraging (i.e., in sight of the colony) for nestling provisioning also is common. Both sexes are known to provision nestlings (Beedy and Hamilton 1999).

Proximity to suitable foraging habitat appears to be extremely important for the establishment of colony sites, because tricolored blackbirds always forage, at least initially, in the field containing the colony site (Cook 1999). Usually only a minor fraction of the area within the commuting ranges of a colony, however, provides suitable foraging habitat (Beedy and Hamilton 1999; Cook 1999). For example, within a five-kilometer (three-mile) radius there may be low-quality foraging habitats such as cultivated row crops, orchards, and vineyards, along with high-quality foraging areas like irrigated pastures, lightly grazed rangelands, vernal pools, and recently hayed alfalfa fields (Cook 1999).

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for tricolored blackbird are identified in Table G-3.1911 and have been derived from input from local species experts.

Table G-3.19.1. Habitat Elements for Tricolored Blackbirds

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak savanna, blue oak woodland, mine tailing riparian woodland, valley oak riparian woodland, cropland, vineyards, orchards, irrigated pasture grassland, valley grassland, seasonal wetlands, freshwater marsh, and open water.	Foraging space providing adequate insect prey within a few miles of the nesting colony; and open accessible water.
Nesting	Mine tailing riparian woodland, valley oak riparian woodland, mixed riparian scrub, cropland, seasonal wetlands, seasonal impoundment, and freshwater marsh.	A protected nesting substrate, including flooded, thorny, spiny, or "visually" spiny vegetation.

TRIC Species Distribution and Population Trends

TRIC Species Distribution

Surveys indicate that the Tricolored Blackbirds overall range is little changed since the 1930s (Neff 1937; DeHaven et al. 1975; Beedy et al. 1991; Hamilton 1998). Tricolored blackbirds are largely endemic to California, and more than 99 percent of the global population occurs in the state. In any give year, more than 75 percent of the breeding population occurs in the Central Valley (Hamilton 2000). Small breeding populations also exist at scattered sites in Oregon, Washington, Nevada, and western coastal Baja California (Beedy and Hamilton 1999).

TRIC Central Valley Distribution

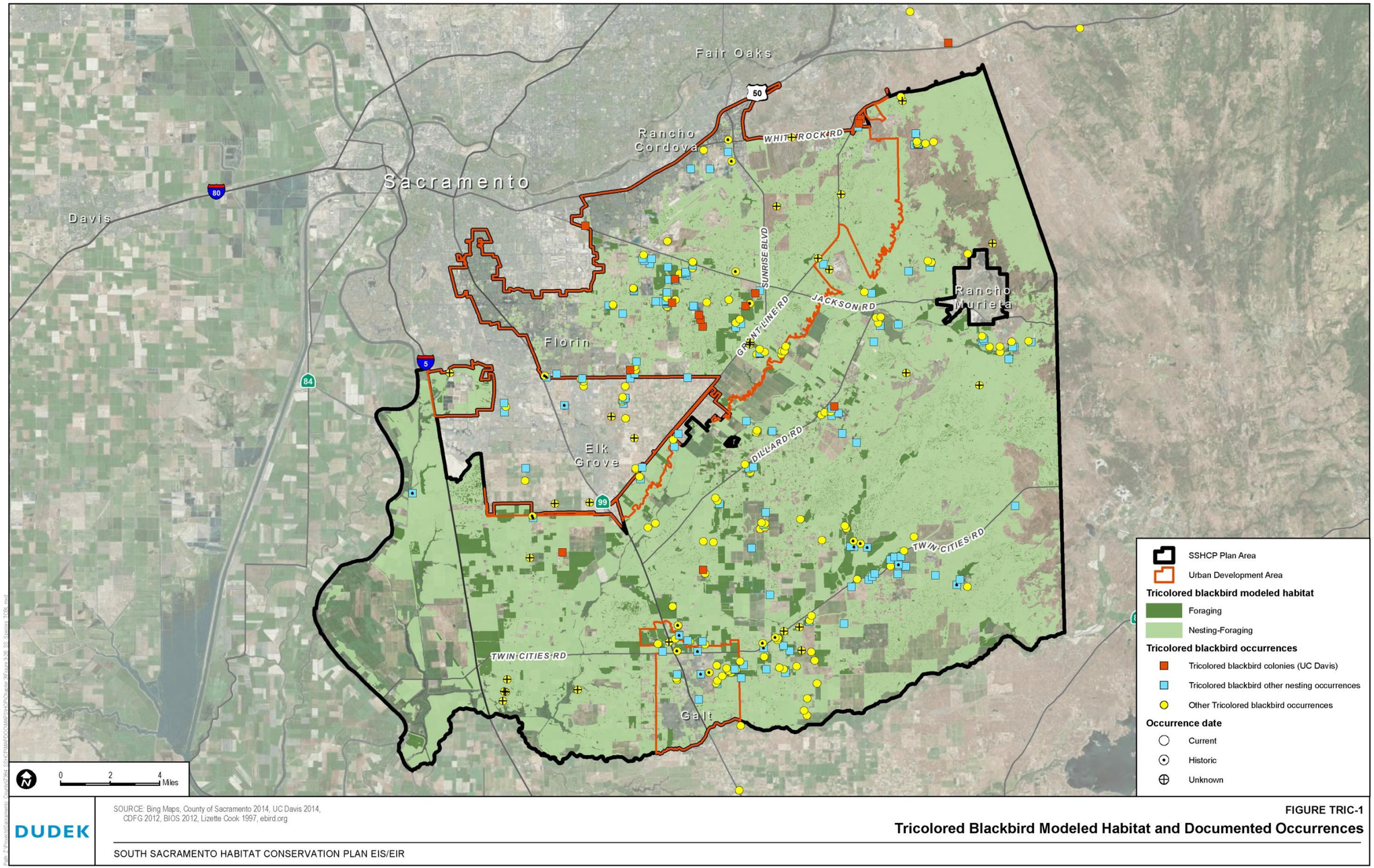
Tricolored blackbird breeding colonies have been observed in all Central Valley counties (Beedy and Hamilton 1997, 1999; Hamilton 2000). DeHaven et al. (1975) found that tricolored blackbirds were unlikely to nest at the sites where they hatched or where they had nested the year before (N=298 recoveries from 45,660 banded birds). Other studies have demonstrated that breeding colonies often exhibit site fidelity and traditionally use many of the same areas year after year if they continue to provide essential resources, including secure nesting substrates, water, and suitable foraging habitats (Beedy et al. 1991; Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000). Therefore, there may be regional differences in the degree of site fidelity. As discussed earlier, the distribution of tricolored blackbirds in the Central Valley varies according to relatively predictable, seasonal movements.

TRIC Distribution within Planning Area

Observations and field studies of tricolored blackbirds have been ongoing in southern Sacramento County since 1991 (Cook 1999). Colonies occurred primarily in the approximately 1,036 square kilometers (400 square miles) region bordered by U.S. Highway 50 to the north, U.S.

Highway 99 to the west, and the county line to the south and east. A total of 46 active tricolored blackbird colony sites had been documented in the Planning Area from surveys conducted until 1999 (Cook 1999). Of the 46 nest sites reported by Cook (1999), 37 colonies were found in Himalayan blackberries surrounded by mostly fallow, annual grasslands. The remaining eight colonies were in cattail marshes or willows. Between 1992 and 1994, an average of 22 active tricolored blackbird colonies were found in the Planning Area. That number declined in 1997, 1998, and 1999 when the counts were 12, 11, and 9, respectively. Six formerly active colony sites have been lost (i.e. nesting habitat), including one of the largest colonies (Bozich Ranch) observed since 1992 (Cook 1999). Figure TRIC-1 provides the distribution of known tricolored blackbird occurrences within and adjacent to the Planning Area. The modeled habitat of the species in the Planning Area is discussed in Section G-4 of this Appendix.

Figure TRIC-1 Tricolored Blackbird Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, UC Davis 2014, CDFG 2012, BIOS 2012, Lizette Cook 1997, ebird.org

DUDEK

FIGURE TRIC-1
Tricolored Blackbird Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

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TRIC Population Levels and Trend

Historical Populations

Published and unpublished accounts of historical tricolored blackbird breeding observations were summarized by Dawson (1923), Neff (1937), Grinnell and Miller (1944), and Beedy et al. (1991). Hamilton et al. (1995) also provided an update of historical tricolored blackbird observations. The first systematic, rangewide surveys of their population status and distribution were conducted by Neff (1937, 1942). He observed as many as 736,500 adults per year (1934) in just eight Central Valley counties. During a five-year interval, he found tricolored blackbirds in 26 California counties. The largest numbers of breeding tricolored blackbirds were in the Central Valley (Neff 1937).

Neff (1937) summarized his observations of 252 California colonies. These surveys were conducted after most Central Valley wetlands were lost (Frayer et al. 1989). Neff (1937) found many large colonies, including one in Glenn County containing more than 200,000 nests (about 300,000 adults) covering almost 24 hectares (60 acres), and several others in Sacramento and Butte Counties that contained more than 100,000 nests (about 150,000 adults). Most large tricolored blackbird colonies observed by Neff (1937) were associated with freshwater emergent wetlands in rice growing areas of California.

Orians (1961) and Payne (1969) made detailed accounts of the ecology and breeding biology of tricolored blackbirds. These workers observed colonies of up to 100,000 nests in Colusa, Yolo, and Yuba Counties, but did not attempt to survey the entire range of the species. DeHaven et al. (1975) conducted population surveys and banding studies of tricolored blackbirds in the Central Valley from 1969 through 1972. They concluded that the tricolored blackbirds geographic range and major breeding areas were unchanged in the 35 years since Neff's (1937) study. They observed an average of about 133,000 individuals per year and estimated that the overall population size had declined by more than 50 percent since the 1930s. It is possible, however, that DeHaven et al. (1975) underestimated the tricolored blackbird total population size because they did not survey large portions of the southern San Joaquin Valley (Beedy and Hamilton 1999). Table G-3.19-2 shows the tricolored blackbird colonies in Sacramento County from 1991 to 1999 (Cook 1999).

Table G-3.19-2. Tricolored Blackbird Colonies in Sacramento County from 1991 through 1999[1]

No.	Name	Habitat	1991	1992	1993	1994a	1994b	1997	1998	1999
1	Rancho Seco	HB	K's	20000	5000	20000	7000	4000	N	2400
2	Latrobe	HB	K's	4000	N	4000		N	Y	3500
3	Folsom	HB	K's	3000	3500	6000	5000	N	N	&
4	Calvine	HB	H's	250	1000	250		X	Y	X
5	Calvine @ Hwy 99	HB	H's	X	X	X	X	X	X	X
6	Slough-house [1]	HB	2000	N	N	N	N	N	?	N
7	Slough-house [2]	HB	1600	N	N	N	N	N	?	N
8	Clay @ Dillard	HB	400	Y	N		400	N	?	N
9	Marengo [1]	HB	600	X	X	X	X	X	X	X
10	Borden & West	HB	Y	?	?	600	?	?	?	?
11	Alabama	Cattail	?	5000	N	N	N	N	N	N
12	Alabama [2]	HB	?	5000	?	?	?	110	?	N
13	Campbell	HB	?	5000	7000	4000		N	N	N
14	Cherokee	HB	?	1500	15000	N	N	15000	1500	N
15	Cherokee [2]	HB	?	500	N	N	N	N	N	N
16	Moore	Cattail	Y*	3000	7500	?	?	?	?	?
17	Green Rd	Cattail	?	3000	N	N	N	N	N	?
18	Colony Rd	HB	Y	3000	550	400	400	X	X	X
19	Knox	HB	?	4000	2400	15000		1000	3500	4500
20	Sheldon	HB	?	500	Y*	500		N	N	&
21	Van Vleck [1]	Cattail	?	1950	3000	4000		?	?	?
22	Van Vleck [2]	Willows	?	500	?	?	?	?	?	?
23	Van Vleck [3]	Willows	?	1500	?	?	?	?	?	?
24	Elder Ck	HB	?	5000	30	7000		N	N	52
25	Bozich Ranch	HB	Y*	20000	N	N	N	N	N	X
26	Bradshaw	HB	?	350	350	350		N	Y	N
27	Grant Line @ Mosher	HB	?	1500	?	?	?	?	Y	N
28	Hwy99 @ Twin Cities	HB	?	100	?	?	?	?	?	?
29	Walmort	HB	?	Y						
30	Alta Mesa	HB	?	?	3500	3000		N	?	Y
31	Brad/Elder	HB	?	?	3500	4500		N	N	N
32	Horse	HB	Y*	Y*	2000	N	N	N	?	#
33	Davis Rd	HB	?	?	1600	1000		500	900	1200
34	Bull	HB	?	?	320	N	N	N	X	X
35	Ivie	HB	?	?	260	N	N	N	N	N
36	Betts Ranch	HB	?	?	7500	?	?	?	?	?
37	Koessler	HB	?	?	?	4000		3000	?	20
38	Scott Marsh	Cattail	?	?	500	5000	5750	300	Y	3000
39	Eagles Nest	HB	?	?	?	1000		250	Y	Y
40	Grant Line @ Bradshaw	HB	?	?	Y	6750	2500	?	?	N
41	Slough-house [3]	HB	N	N	N		40	30	?	N

Table G-3.19-2. Tricolored Blackbird Colonies in Sacramento County from 1991 through 1999[1]

No.	Name	Habitat	1991	1992	1993	1994a	1994b	1997	1998	1999
42	Excelsior-Jackson Hwy	HB	?	N	N	15		N	?	N
43	Mather	HB	?	?	?	9000		200	?	?
44	Dillard-Cosumnes	unknown	?	?	?	?	?	Y	Y	?
45	Marengo Marsh	Cattails	N	N	?	?	?	3000	4000	N
46	Tavenor & Apricot	HB	?	?	?	?	?	3000	?	
Total number of colonies			**13**	**24**	**21**	**22**		**12**	**9**	
Total number of birds				**86142**	**64510****	**96365**	**21090**	**32387**	**NA**	**16671**

[1] Data from Cook (1999)
Y = Nesting occurred, but colony size estimate not available
Y* = Observation reported by landowner
N = The site was visited, but no colony was observed
X = No breeding due to nesting habitat loss
? = Breeding unverified. The site may or may not have been used that year.
= Birds observed, but the site was not used for breeding
& = Settlement attempted, but was unsuccessful
** = Probably an underestimate. An intensive survey
K's = Thousands; H's= Hundreds
HB = Himalayan blackberry
Notes: This table includes only observed colonies. Because not all colonies may have been observed, the total population sizes may have been larger. In 1991, the colony size estimating skills were under development. Therefore, relatively reliable estimates are not available. In 1993, the total estimated number of breeding birds is probably less than the actual number because survey efforts were focused on obtaining data about reproductive success at a sample of colonies, such that survey effort was not comparable to other years. The 1994a and 1994b surveys represent an early and later (second) breeding attempt following the first. The total estimate for the number of breeding tricolored blackbirds in Sacramento County in 1994 would therefore be the combined total, or, 111,855. In 1998, survey effort was not comparable to other years. The total number for the year is, therefore, an underestimate.

Recent Populations

The USFWS, CDFW, and California Audubon cosponsored intensive, volunteer tricolored blackbird surveys (Volunteer Surveys) in suitable habitats throughout California in 1994, 1997, 1999, and 2000 (Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000). Results of late April surveys for Sacramento County, Sacramento Valley, and the statewide totals for these four years are presented in Table G-3.19-3. In 2001, Point Reyes Bird Observatory (PRBO) coordinated the Volunteer Surveys with the help of Bill Hamilton and developed a web based data sheet and submittal process for volunteers. A statewide estimate of 142,045 adults was reported, but PRBO believed data from priority sites was not submitted (PRBO 2002). Therefore, some researchers do not consider the 2001 effort comparable to previous years such as those in 1994, 1997, 1999, and 2000 (Cook pers. comm.)

Local, regional, and statewide tricolored blackbird populations have experienced major declines since 1994. These declines are especially alarming because approximately 99 percent of the global population of this species occurs in California (Beedy and Hamilton 1999).

Table G-3.19-3. Total Adult Tricolored Blackbirds (breeding and nonbreeding) in Statewide Surveys[1]

Region	1994	1997	1999	2000	% Decline (1994-2000)
Sacramento County	94,028	31,508	12,859	16,383	-82.6%
Sacramento Valley	98,362	37,426	24,748	30,979	-68.7%
Statewide Total	**369,359**	**237,928**	**104,786**	**162,508**	**-56%**

[1] Data from Hamilton (2000)

The Volunteer Survey results (summarized by Hamilton et al. 1995; Beedy and Hamilton 1997; Hamilton 2000) have identified several important distribution and population trends for tricolored blackbirds that should be emphasized: 1) local, regional, and statewide populations and distributions vary from year to year; 2) 60 percent of all Tricolored Blackbirds located in all years were found in the ten largest colonies; 3) 70 percent of all tricolored blackbird nests and 86 percent of all foraging by nesting birds were on private agricultural lands; 4) in some portions of their range, tricolored blackbirds have definitely declined or been eliminated, including local extirpation in most of Yolo County and portions of southern Sacramento County.

A decline in the number of breeding tricolored blackbirds in Sacramento County has mirrored the species' overall population decline since 1994. In the four years when accurate population censuses were made, Sacramento County supported 50 to 95 percent of the Sacramento Valley breeding population, and between 10 and 25 percent of the statewide population. In each census year since 1992, one or more of the state's 10 largest colonies has been in southern Sacramento County, and this area has consistently supported some of the largest and most successful colonies observed anywhere in the species' range (Cook 1996, 1999; Beedy and Hamilton 1997).

Declines in the tricolored blackbird population is northern Sacramento County corresponded with a reduction in the percentage of the statewide population nesting in Himalayan blackberries, which averaged from 22 to 34 percent in 1992 and 1994, but declined to about 12 percent and 17 percent in 1997 and 1999, respectively (Cook 1999). Most Himalayan blackberry nesting colonies in the Planning Area are situated in areas where the extent of suitable foraging and nesting habitat has been substantially reduced since 1992 because of extensive conversion of grasslands and vernal pools to vineyards. Declines in the number of breeding tricolored blackbirds in southern Sacramento County is probably related to this documented habitat loss (Cook 1999).

Reproductive success of tricolored blackbird colonies in southern Sacramento County has consistently been the highest of any region in the state since studies began in 1992 (Cook 1999). On average, the reproductive success of colonies in Himalayan blackberries was substantially higher than in other habitats, such as cattails, which approached zero in most years. The high reproductive success of tricolored blackbirds in Himalayan blackberry habitats was attributed to a marked reduction in predation rates compared to marsh habitats (Cook 1999).

TRIC Threats to the Species

TRIC Habitat Loss and Alteration

At one time virtually all alluvial soils in the Central Valley supported riparian woodlands, marshlands, or perennial grasslands, but these lands were converted to agricultural and urbanization uses (Frayer et al. 1989). Many formerly agricultural areas within the historical range of the tricolored blackbird are now being urbanized. Tricolored blackbirds in Sacramento County forage in the extensive, lightly to moderately grazed annual grasslands associated with ranches and rural subdivisions (Cook pers. comm.). These land uses currently provide suitable habitat for tricolored blackbirds, habitat that will be largely eliminated if current development patterns and land use conversions continue.

In some places, most historical tricolored blackbird breeding and foraging habitats have been eliminated, and there is little or no breeding effort where once there were large colonies (Orians 1961; Beedy et al. 1991). Elsewhere, tricolored blackbirds have shifted from cattails as a primary nesting substrate (Neff 1937) to Himalayan blackberries (DeHaven 1975) and more recently to cereal crops and barley silage (Hamilton et al. 1995). Nests and nest contents in cereal crops and silage are often destroyed by agricultural operations (Hamilton et al. 1995). Harvesting silage and plowing weedy fields are currently the most common reasons tricolored blackbird colonies are destroyed on agricultural lands.

Agricultural cropping patterns have also affected tricolored blackbird habitat. DeHaven (2000) quantified changes in California cropping patterns and found that tricolored blackbird “friendly” habitats such as rangelands, grassland, and pastures have decreased. These habitats are often replaced by other crops that do not provide habitat (e.g., fruit and nuts, vegetables and melons, cotton, tomatoes, beans, potatoes, sugar beets, and vineyards). Clearly, irrigated and non-irrigated pastures (alfalfa, various hay crops, etc.) and grasslands of various kinds, dry seasonally wet areas, dairies, livestock feedlots, and harvested grain fields continue to be important crops and areas to tricolored blackbirds during breeding and non-breeding periods (DeHaven 2000).

In addition to the increase in tricolored blackbird non-habitat crops, changes in management of habitat friendly crops such as rice and hay have affected foraging. Tricolored blackbirds were observed in huge flocks during the fall and winter months in the 1970s in rice fields after they were harvested and burned (DeHaven 2000). Recent crop harvesting and management changes (i.e., flooding during fall) preclude significant foraging by tricolored blackbirds (DeHaven 2000). More intensive pest control management practices in hay and pastures is hypothesized to substantially reduce insect-foraging opportunities, although no confirming studies have been conducted (DeHaven 2000).

In recent years and possibly also in the past, more than half of all observed nesting efforts by tricolored blackbirds occurred in a few, large colonies (Hamilton et al. 1995; Beedy and Hamilton 1997). Concentration of a high proportion of the known population in a few breeding colonies increases their risk of major reproductive failures, especially if they are situated in vulnerable habitats such as active agricultural fields.

Predation

Predation is at present a major cause of complete nesting failure at some tricolored blackbird colonies (Hamilton et al. 1995; Beedy and Hayworth 1992). Historical accounts documented the destruction of nesting colonies by a diversity of predators, including wolves (*Canis lupus*) and gray foxes (*Urocyon cinereoargenteus*) (Hermann 1853), skunks (*Mephitis* sp.) and opossums (*Didelphis virginiana*) (Evermann 1919), Swainson's hawks (*Buteo swainsoni*) (Mailliard 1914), Cooper's hawks (*Accipiter cooperii*), burrowing owls (*Athene cunicularia*), American crows (*Corvus brachyrhynchos*), raccoons (*Procyon lotor*), and mink (*Mustela vison*) (Neff 1937).

More recently, Payne (1969) reported predation of tricolored blackbird nests by feral domestic cats (*Felis catus*), northern harriers (*Circus cyaneus*), barn owls (*Tyto alba*), short-eared owls (*Asio flammeus*), and yellow-billed magpies (*Pica nuttallii*). Merlins (*Falco columbarius*) may associate with flocks of wintering tricolored blackbirds and have been observed preying on adults (Manolis pers. comm.).

At some colonies, especially those in permanent freshwater marshes, black-crowned night herons (*Nycticorax nycticorax*) devastate nesting efforts and eliminate all or most nests (Hamilton et al. 1995). At foothill locations and in the southern San Joaquin Valley, common ravens (*Corvus corax*) may assemble and destroy all or almost all nests within colonies. In the Central Valley, coyotes (*Canis latrans*) are a major predator of tricolored blackbird colonies, especially in silage field colonies, and cattail colonies when water is withdrawn (Hamilton pers. comm.).

Poisoning, Hunting, Contaminants, and Pollution

Tricolored blackbirds were commercially hunted in the early 1900's (DeHaven 2000) and were regularly shot during hazing programs in an effort to limit crop damage in rice. Neff (1937) reported that greater than 300,000 tricolored blackbirds and red-winged blackbirds were killed and marketed during one five-year period in the 1930's. As agriculture expanded, the use of poisons was adopted to also control blackbirds from rice crop depredations (DeHaven 2000).

McCabe (1932) described the strychnine poisoning of 30,000 breeding tricolored blackbirds as part of an agricultural experiment. Poisoning to regulate numbers of blackbirds preying on crops in California, especially rice, was considered a major source of adult mortality by Neff (1942). This practice continued until the 1960s, and thousands of tricolored blackbirds and

other blackbirds were exterminated to control damage to rice crops in the Central Valley. However, improved harvesting methods, earlier ripening rice varieties, and fewer blackbirds have resulted in few recent reports of blackbird crop depredation, and no control programs are currently operating (Gorenzel pers comm.).

During 1986, Beedy and Hayworth (1992) observed a complete nesting failure of a large (about 47,000 breeding adults) tricolored blackbird colony at Kesterson Reservoir, Merced County. External examinations of dead nestlings collected from roads surrounding the reservoir revealed that two of the 10 specimens had club feet (Grau pers. comm. *in* Beedy and Hayworth 1992). Similar deformities were found for shorebirds and other water birds that were also collected at Kesterson Reservoir (Ohlendorf et al. 1986). Pathological examinations of the tricolored blackbird nestlings revealed some evidence of heart muscle degeneration. Selenium toxicosis was suspected as the cause of the deaths (Beedy pers. comm.).

Hamilton (pers. comm.) observed a colony sprayed by mosquito abatement operators in Kern County. All sprayed eggs failed to hatch. Hosea (1986) attributed the loss of at least two tricolored blackbird colonies to aerial herbicide applications.

Human Disturbance

Tricolored blackbirds are sensitive to human disturbance at active nesting colonies. Entry into colonies may be required for scientific study and management purposes; however, to avoid unnecessary disturbance of the nesting birds, colonies should not be entered by casual observers (Beedy and Hamilton 1999).

TRIC Data Gaps and Conservation Implications

Several researchers have documented the life history, habitat requirements, species distribution, population trends, and threats to the species throughout California and the Planning Area. This information is critical for the development of the tricolored blackbird Conservation Strategy. Equally important is the acknowledgment of information considered to be data gaps, along with their implications for conservation. These topics are discussed below.

TRIC Wintering Habitat

Most of the tricolored blackbird population within the EIS/EIR Study Area is assumed to winter along the Delta and central coast area; however, it is unclear if important wintering habitat is necessary within the Planning Area. Wintering habitat requirements, if not met, can potentially aid to the further decline of the species rangewide and in the Planning Area.

TRIC Locations of Important yet Unknown Tricolored Blackbird Colonies

Undescribed tricolored blackbird breeding colonies may be located within portions of the Planning Area that have not been surveyed. In the Planning Area, discovery of new populations of tricolored blackbirds may occur anywhere that vernal pool/grassland complexes, emergent marshes, natural drainages, created irrigation/drainage conveyances, reservoirs and lake margins and stockponds, and silage fields are present.

Tricolored blackbirds do not currently occupy habitat that appears suitable (Cook pers. comm.). Although specific habitat elements are present (i.e., Himalayan blackberry), and general habitats such as irrigated pasture and rangelands occur nearby, no active colonies have been identified. Decisions regarding which areas to include as tricolored blackbird preserves would benefit from discovering if there are any relationships between amount of suitable habitat and food abundance to support specific population sizes of nesting tricolored blackbirds.

No studies have been conducted that can make predictions regarding the potential size of a tricolored blackbird colony based on the quality of nearby foraging habitat or other operating factors (e.g., predation). Tricolored blackbird colony sizes vary tremendously (e.g., 50 to 20,000 individuals) within the Planning Area, and no data is available to conclude why some colonies are larger than others.

TRIC Predators and Nest Destruction

Several predators have been documented to cause complete reproductive failure of large tricolored blackbird colonies; however, determination of “safe” distances between tricolored blackbird colonies and the most devastating of these predators (e.g., black-crowned night-heron colonies) may provide effective protection during nesting.

Knowledge of these “safe” distances, if any, would help in the establishment of the proper location for preserves. Furthermore, predator populations such as black-crowned night herons may have to be discouraged from nesting or roosting near historical or current locations supporting tricolored blackbird colonies.

TRIC Pesticide and Herbicide Application

The use of pesticides and herbicides in agricultural areas and their impacts on prey items for tricolored blackbirds is unknown. There is no information on whether tricolored blackbirds could benefit from changes in pesticide or herbicide applications that are still consistent with effective management of agricultural crops.

Unknown Factors Affecting Breeding Site Fidelity

Tricolored blackbird colonies are generally thought of as nomadic colonial nesters. This nomadic behavior is hypothesized to have evolved due their dependence upon highly productive, but unpredictable food resources that are necessary during the nestling and fledgling stages of the breeding season. However, recent data suggests an increase in nest site fidelity even at sites that experience complete reproductive failure, suggesting suitable nesting habitat may be limited.

Managing for tricolored blackbirds by establishing preserves may be the desired strategy to ensure populations are maintained and enhanced; however, if tricolored blackbirds leave previously successful breeding sites (i.e., preserves) for unknown reasons, conservation of the species may be difficult.

TRIC Effects of Global Climate Change

The scientific community commonly accepts as valid the phenomenon of increasingly rapid global climate change. Specific climatic models for California predict an average increase in temperature over the coming decades, with concomitant unpredictability in annual rainfall patterns. There is uncertainty regarding the exact nature and extent of these changes, as well as the consequences these changes pose to conservation biology.

It is likely that given the expected global climate trends, a response of some kind could be expected for tricolored blackbird populations within the study period of this EIS/EIR, or at some time beyond.

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WESTERN BURROWING OWL (BUOW)

Western Burrowing Owl (BUOW)

(Athene cunicularia hypugaea)

Status USFWS: Bird of Conservation Concern

Status CDFW: Species of Special Concern

BUOW Listing Status

Western burrowing owl (*Athene cunicularia hypugaea*) is legally protected under the federal Migratory Bird Treaty Act (16 U.S.C. 703-712) and California Fish and Game Code (Sections 3503.5 and 3800). This species is designated as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW) (Shuford and Gardali 2008); Bird of Conservation Concern (BCC) by the U.S. Fish and Wildlife Service (USFWS) (USFWS 2002); and Sensitive Species by the U.S. Bureau of Land Management (BLM).

BUOW Life History and Ecology

BUOW Species Description and Life History

Physical Description

Western burrowing owl is a small, round-headed, ground-dwelling owl that inhabits open habitats such as grasslands, deserts, steppes, and agricultural lands. Burrowing owls are unique in physical appearance and behavior among other owls due to their ground-dwelling and non-arboreal natural history. Individuals have long legs relative to their body size, a stubby tail, bright yellow eyes (irises) and white eyebrows, an oval facial ruff, and no ear tufts. Their long legs allow the species to scan over short- or sparsely-vegetated landscapes for predators and prey from the ground, and pursue insect prey on foot. The head, back, and upper wings of adults are brown with thick white or buffy-white spots; while the underparts are generally buffy-white in color with brown barring along both sides. Adults range from approximately 7.5 to 9.8 inches (19 to 25 centimeters) in total length (from bill to tail) and weigh approximately 5.3 ounces (150 grams). Adult burrowing owls have a wingspan of approximately 20 to 24 inches (50.8 to 61.0 centimeters). Their wings are rounded and long relative to body size. Burrowing owls exhibit sexual size and color dimorphism as females are larger and darker than males (Haug et al. 1993.); however, it is often difficult to distinguish between males and females in the field.

Taxonomy

Burrowing owl was originally classified as *Strix cunicularia* in 1782. Through several taxonomic and name revisions, it has been moved between the genera *Speotyto* and *Athene* (Haug et al. 1993; Clark 1997). The species was classified as *Athene* by the American Ornithologists' Union (AOU) in 1983 (AOU 1983), reclassified as *Speotyto* in 1991 based on genetic data (AOU 1991), and moved back to *Athene* in 1997 (AOU 1997).

As many as 21 subspecies of *A. cunicularia* have been recognized; however, Konig et al. (1999) recognizes only 13 subspecies. Two subspecies occur in North America: Florida burrowing owl (*A. c. floridana*) occurs in Florida and the Bahama Islands, while western burrowing owl (*A. c. hypugaea*) occurs in North America west of the Great Plains and south to Panama (Haug et al. 1993). The remaining subspecies, with the exception of two island forms (i.e., *A. c. rostrata* [Clarion Island off the west coast of Mexico] and *A. c. troglodytes* [Hispaniola]) are all found in South America.

Reproduction

During the breeding season, burrowing owls build nests in excavated burrows, underground tunnels, or burrow facsimiles. They typically adopt burrows or tunnels excavated by fossorial mammals or reptiles, including ground squirrels, prairie dogs, badgers, skunks, armadillos,

marmots, foxes, coyotes, and tortoises (Karalus and Eckert 1987). In California's Central Valley, California ground squirrel (*Spermophilus beecheyi*) populations are particularly important to the breeding ecology and conservation of burrowing owls, by creating and maintaining availability of burrowing owl nesting and satellite burrows. Where the number and availability of suitable natural burrows are limited (e.g., where burrows have been destroyed or ground squirrels eradicated), burrowing owls will occupy drainage culverts, cavities under piles of rubble, discarded pipe, and other tunnel-like structures.

Nesting burrowing owls often occur in loose colonies, depending on local population density and site conditions. Breeding adults can exhibit strong nest site fidelity and often return to the same or nearby burrows each year. This life history trait can make burrowing owl populations particularly sensitive to loss of occupied nesting habitat and permanent displacement of owls from nest sites; and it is important that conservation planning efforts for western burrowing owl emphasize *in situ* protection of occupied nesting habitat. During the nesting period, adults and juveniles typically utilize several satellite burrows around the main or nest burrow. During nest site selection, the adult pair will often prepare or "renovate" several neighboring burrows by scraping out dirt with their bills, feet, and wings. One of those burrows is eventually selected as the nest burrow. Adults frequently line the nest burrow with cattle or horse manure, other organic material such as vegetation or feathers, or debris (CBD et al. 2003).

Like other owls, burrowing owls usually breed once per year in an extended reproductive period; however, renesting and production of a second brood within a nesting season, after the first brood successfully fledged, was recently documented in California (Gervais and Rosenberg 1999). Most adults are monogamous, although polygamy and extra-pair fertilizations occasionally occur (Johnson 1997b). Localized high densities of burrowing owls, along with the mobility of their young, facilitate extra-pair copulations, brood amalgamation and mixing, and joint-nesting (and possibly intraspecific brood parasitism). In one study of burrowing owls near Sacramento, at least 37 percent of adults exhibited parental behavior toward offspring that were not their own (i.e., alloparenting). They were similarly non-discriminating in their choice of mates, breeding randomly with respect to the local group of adults (Johnson 1997b).

Both sexes reach sexual maturity at one year of age. The burrowing owl nesting season (including courtship, breeding, and fledging stages) is generally February through August. Most Burrowing owls in California begin pair formation and courtship in February or early March; however in the Imperial Valley, pair formation is initiated as early as mid-January (Coulombe 1971). Courtship and pair formation begins when the male conducts courtship displays and vocalizations. Males produce a "who-who" call to attract females while standing near a potential nest burrow. After a female is attracted to the site, courtship behaviors include a combination of vocalizations and posturing by both sexes, typically within 49 feet (15 meters) of

the burrow. Nest site selection begins once the pair has formed. Males collect and deliver the majority of nesting material (Anderson et al. 2001).

Burrowing owl pairs breed from March through May, although the peak breeding period is April through May. During March through May, eggs are laid at least one day apart and are incubated by both adults for about three to four weeks. Females can lay up to 12 eggs; however, the average clutch size is seven eggs (Haug et al. 1993). The female incubates the eggs for 28 to 30 days. The male forages and delivers food to the female and guards the burrow entrance during the day. Young owlets are brooded in the nest chamber for another two to three weeks, at the end of which time they may be seen at the burrow entrance in their natal-down plumage. Nestlings emerge asynchronously and tentatively. They gradually become bolder, eventually spending more time outside near the burrow entrance. During this period, nestlings can range widely on foot, even before they can fly. The adults guard their brood tenaciously, attacking intruders if provoked. Older nestlings or fledglings may move to nearby satellite burrows as the natal burrow becomes crowded. Fledging occurs six to eight weeks after emergence. Fledglings typically remain near the burrow and accompany the adults in foraging flights at dusk (Rosenberg et al. 1998).

Reproductive success is probably the most important demographic parameter in ensuring population viability for most species with short life spans and low survival rates (Emlen and Pilkitch 1989; CBD et al. 2003); and it is probably the most important demographic parameter for burrowing owl populations (Gervais and Rosenberg 1999); however, accurately estimating reproductive rates for burrowing owls is difficult (Gorman et al. 2003). Up to ten young per pair can be fledged in especially productive years (Gervais and Rosenberg 1999). In recent years, the number of young fledged in central California has ranged between three and six, and was typically four or five (DeSante et al. 1997). In the Sacramento area, the mean per capita rate of reproduction of burrowing owls has been estimated at zero to 4.5 offspring per individual (Johnson 1997c). Anecdotal information suggests that burrowing owl fledging success in the early 1900's was six to eight young per nest (Dawson 1923). The possible decline in fledging success in the Central Valley since the early 1900's corresponds with documented population declines of other avian predators occurring in Central Valley grassland habitats (e.g., loggerhead shrike [*Lanius ludovicianus*], American kestrel [*Falco sparverius*]) (DeSante et al. 1997). Rosenberg and Haley (2004) reported that average fledging success in the Imperial Valley was 2.5 young per nest.

Survival and Longevity

Extensive data on burrowing owl longevity are not available. The maximum life span documented for a banded burrowing owl is approximately 8.5 years (Rosenberg et al. 1998). Burrowing owl adult and juvenile survival rates vary considerably among studies. The range of reported between-year return rates is 30–83 percent (Thomsen 1971; Haug et al. 1993; Clayton

and Schmutz 1997; CBD et al. 2003). Depending on assumptions about emigration and immigration, the probability that juvenile burrowing owls will survive to one year of age (the age of first breeding) has been estimated between 0.23 and 0.93, while annual adult survivorship has been estimated between 0.42 and 0.93 (Johnson 1997c).

Dispersal Patterns

Nest site fidelity is common in resident burrowing owl populations. Breeding adults often return to the same or nearby burrows each year (Botelho and Arrowood 1998). Also, second-year birds will often attempt to nest near (less thean 0.2 mile [300 meters]) their natal sites (Rosenberg et al. 1998). Burrowing owls in migratory populations often renest in or near the same burrow, particularly if breeding was successful there the previous year (Belthoff and King 1997).

As of 1993, the USFWS Bird Banding Lab (BBL) documented 44 records of burrowing owls band returns in California. Nearly all of these records were from the same area in which the birds were originally banded or adjacent areas. Only two records were from owls that moved substantial distances (one between Orange County and Mexico, another between Orange County and Nevada) (Barclay pers. comm., cited in CBD et al. 2003). In two burrowing owl demography studies conducted in the San Francisco Bay Area, owls moved an average distance of 0.5 to 0.9 miles (0.8 to 1.4 kilometers) (n=276 owls) between breeding seasons. Of this sample population, 27 percent remained at the same nest site; 14 percent dispersed less than 265 feet (80.8 meters) away; 34 percent dispersed 0.05 to 0.5 mile (80 to 804.7 meters); eight percent dispersed 0.5 to 1.0 mile (804.7 meters to 1.6 kilometers); 14 percent dispersed 1.0 to 5.0 mile (1.6 to 8.0 kilometers); and two percent moved 5.0 to 10 miles (8.0 to 16.1 kilometers) (Chromczak unpublished data, cited in CBD et al. 2003). Adults that experience failed nesting attempts have been documented to move miles (up to tens of kilometers) away prior to subsequent renesting attempts, sometimes within the same season (Gervais pers. comm., cited in CBD et al. 2003).

Diet and Foraging

Burrowing owls primarily eat small rodents and large arthropods (Coulombe 1971; Green and Anthony 1989; Silva et al. 1995; Gervais et al. 2003). Important rodent prey items include mice, voles, rats, kangaroo rats, and young ground squirrels. Arthropod prey includes grasshoppers, beetles, crickets, dragonflies, other insects, and crayfish. Burrowing owls are considered opportunistic predators (Thomsen 1971; Zarn 1974; York et al. 2002) and will also prey on small birds, reptiles, amphibians, and other small live prey. Burrowing owls have been documented preying on several bird species including killdeer (*Charadrius vociferus*), western meadowlark (*Sturnella neglecta*), horned lark (*Eremophila alpestris*), Wilson's warbler (*Wilsonia pusilla*), American avocet (*Recurvirostra americana*), red-winged blackbird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), mourning dove (*Zenaida macroura*), and black-

headed grosbeak (*Pheucticus melanocephalus*) (see CBD et al. 2003). They have also been documented preying on burrowing owl chicks (Botelho 1996; Rosenberg et al. 1988); spadefoots (*Spea* spp.) (Sperry 1941; Bond 1942); snakes, centipedes, and scorpions (Stoner 1933; Neff 1941); and bats, including hoary bat (*Lasiurus cinereus*) (Thomsen 1971) and Mexican free-tailed bat (*Tadarida brasiliensis*) (Gobalet 1999).

Burrowing owls often hunt from a perch. Foraging behavior is variable but generally consists of hunting while hovering or hover-gliding and returning to the perch. Burrowing owls also chase their prey on foot while walking, running, or hopping. Hunting behavior apparently depends on vegetation type and structure, time of day, and the type of prey pursued (Thompson and Anderson 1988; Haug et al. 1993).

Burrowing owls are primarily crepuscular (i.e., dawn and dusk) foragers, but will hunt at any time (Grant 1965; Marti 1974; Rosenberg et al. 1988). Nesting burrowing owls are also central-place foragers (Gervais et al. 2003; Rosenberg and McKelvey 1999), foraging from and returning to the same location. Some owls may forage up to one mile from their burrow (Johnson pers. comm.) and nocturnal foraging can occur up to several miles away from the burrow. During the breeding season, adult male burrowing owls have been documented foraging over a range of 0.8 to 1.2 square miles (2 to 3 square kilometers) (Haug and Oliphant 1987) and primarily within 0.4 mile (600 meters) of the nest burrow (Gervais et al. 2003; Rosenberg and Haley 2004).

Burrowing owls tend to concentrate their hunting in natural grasslands, agricultural lands, uncultivated fields, ungrazed areas, and open ruderal areas such as roadsides that support abundant small mammal and arthropod populations (Haug and Oliphant 1990; Gervais et al. 2003). In urban areas, burrowing owls are often attracted to street lights, where insect prey congregates. In a recent study conducted in California's San Joaquin Valley, burrowing owls did not appear to differentiate between grassland and cropland in their foraging habitat selection (Gervais et al. 2003).

Movement and Migration Patterns

The tendency of burrowing owl populations to migrate annually varies over the species range. Populations are resident in locations where food availability is stable and available throughout the year. Burrowing owl populations in the northern part of the species' range are migratory, leaving their breeding grounds in the fall and returning to the same or nearby areas (often the same burrow) in the spring. However, most California populations are resident (i.e., non-migratory) (Thomsen 1971; Haug et al. 1993) or wander during winter months (Coulombe 1971; Martin 1973; Botelho 1996), especially in central and southern California (CBD et al. 2003). The winter burrowing owl population in California is large relative to other regions throughout the species' range. It is thought that some owls migrating from northern areas (e.g., Canada, Washington, Oregon, and

Idaho) winter in California and augment resident populations (Coulombe 1971). Non-migratory seasonal movements in burrowing owl populations can also occur. For example, after the young fledge, family groups will sometimes move among burrows in the fall and juveniles may adopt their own nearby burrow. During winter, pairs will examine and select new burrows as territorial boundaries are relaxed and pair formation proceeds (Thomsen 1971).

During the breeding season, adult burrowing owls remain close to or inside their nest burrows throughout most of the day. They have been documented spending most of their time within 162 to 325 feet (49.4 to 99.1 meters) of their nest or satellite burrows during daylight hours (Haug and Oliphant 1990). Individuals often begin perching outside in the afternoon and foraging at dusk. Nesting adults return to the burrow at night (Thomsen 1971).

Territoriality/Home Range

Home range sizes of western burrowing owls vary greatly among individuals (Gervais et al. 2003). During the breeding season, adult male burrowing owls have been documented foraging over a range of 0.8 to 1.2 square miles (2 to 3 square kilometers) (Haug and Oliphant 1987), and primarily within 0.4 mile (600 meters) of the nest burrow (Gervais et al. 2003; Rosenberg and Haley 2004). Although burrowing owls aggressively defend a small territory around their burrows against predators and other owls (CBD et al. 2003), the home ranges of adjacent males may overlap considerably (Haug and Oliphant 1987). Inter-nest distances, which can indicate the limit of an owl's territory, have been found to average between 198 to 695 feet (60.4 to 211.8 meters) (Thomsen 1971; Haug and Oliphant 1990).

Gervais et al. (2003) studied space use and habitat selection of a burrowing owl population in a San Joaquin Valley agricultural landscape (near Fresno, California). Out of several biophysical variables analyzed, including cover-type (e.g., grass, crop) and distance to road edges and irrigation ditches, distance-from-nest was the best predictor of foraging habitat use. In their study, approximately 80 percent of foraging observations occurred within 0.37 mile (600 meters) of the nest burrow, independent of cover-type availability or other factors measured. These results are different than those reported by Haug and Oliphant (1990), who found that burrowing owls used grass-forb habitats more frequently than croplands or grazed pasture. Also, Gervais et al. (2003) reported that variation in burrowing owl home range size was not explained by several variables including cover-type composition, number of neighboring nests, reproductive output, and the proportion of rodents in the diet.

Ecological Relationships

In California's Central Valley, perhaps the most important ecological relationship for the burrowing owl is its commensalism with California Ground Squirrels. Because burrowing owls

generally need fossorial animals to dig their burrows, burrowing owl population dynamics in the Central Valley are closely linked with California Ground Squirrel populations. California Ground Squirrels create and maintain burrowing owl nest and satellite burrows. Furthermore, burrowing owl habitat quality is considered proportional to the condition and viability of California Ground Squirrel populations. In addition to creating burrows, colonial rodents such as California Ground Squirrels can maintain burrowing owl nest burrows between breeding seasons, and vigilant ground squirrels incidentally alert burrowing owls to predation threats by alarm-calling (Trulio 1994).

Predator-prey relationships are important for burrowing owls, particularly because burrowing owls are both a predator and prey species. Predation on burrowing owls generally occurs in two forms: predation of nests and/or incubating adults in the nest chamber, and predation of juvenile or adult birds outside the nest chamber. Nest predators are typically species that are capable of accessing the nest chamber and include foxes (*Vulpes* spp.), badgers (*Taxidea taxus*), skunks (*Mephitis* spp.), raccoons (*Procyon lotor*), and rattlesnakes (*Crotalus viridis*) (Coulombe 1971; Kemper 1996). Predators of burrowing owls above ground include prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), northern harrier (*Circus cyaneus*), golden eagle (*Aquila chrysaetos*), foxes, coyote (*Canis latrans*), and domestic dogs (*C. familiaris*) and cats (*Felis catus*).

BUOW Habitat Requirements and Ecology

Historically, burrowing owls in California were most abundant in broad, interior, lowland valley bottoms and flat coastal lowlands (Grinnell and Miller 1944). According to DeSante and Ruhlen (1995), 92 percent of breeding burrowing owls in California occurred in these lowland settings, usually below approximately 200–984 feet (60–300 meters) in elevation. In these landscapes, burrowing owls occurred primarily in open prairie and shrub-steppe habitats (Coulombe 1971; Butts 1973). Most of the burrowing owl's original prairie habitat in California has been removed and other open habitats in lowland landscapes are experiencing the most intensive urban development pressures in the state (CBD et al. 2003).

Throughout their life cycle, burrowing owls require habitat with three basic attributes: open, well-drained terrain outside areas at risk of flooding; short, sparse vegetation; and underground burrows or burrow facsimiles. Burrowing owls inhabit grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, and urban vacant lots, as well as the undeveloped margins of airports, golf courses, roads, and railroad beds. Burrowing owls typically occur in habitats with less than 30 percent tree or shrub cover (DeSante et al. 1996). In California, the four cover types most frequently occupied by burrowing owls are: grasslands adjacent to intensive agriculture; intensive agriculture where owls nest along irrigation banks; large, unfragmented grasslands;

and small grassland and ruderal patches surrounded by and adjacent to urban development (Rosenberg and DeSante 1997; Rosenberg and Haley 2004). The proximity of nest sites to suitable foraging habitat is especially important, as burrowing owls tend to forage near their burrows (Gervais et al. 2003).

The most important habitat consideration for burrowing owls is the availability of underground burrows throughout their life cycle. While burrowing owls nest and roost in these burrows, they do not typically create them. Throughout their range, they use burrows excavated by fossorial mammals or reptiles, including ground squirrels, prairie dogs, badgers, skunks, armadillos, marmots, foxes, coyotes, and tortoises (Karalus and Eckert 1987). Where the number and availability of natural burrows are limited (e.g., where burrows have been destroyed or ground squirrels eradicated), owls may occupy other natural and unnatural sites such as rock outcrops (Gleason and Johnson 1985; Rich 1986), concrete and asphalt (Trulio 1994), cavities under piles of rubble, drainage culverts, discarded pipe and other tunnel-like structures, and human-made artificial burrows (Collins and Landry 1977).

In the Sacramento region, including the Planning Area, burrowing owls most commonly live in natural tunnels created by California ground squirrels. Accordingly, the quality of burrowing owl habitat in the Planning Area is closely and positively related to the occurrence and population viability of California ground squirrels in an area. DeSante et al. (1996, 2003) found that the best predictor of burrowing owl reoccupancy of nest sites in California was ground squirrel presence. Burrowing owls and ground squirrels can co-inhabit the same burrow system (Johnson pers. comm.), but the frequency with which this occurs has not been measured, and underground interactions have not been studied.

Vegetation height and structure, and the availability of roost sites, particularly affect burrowing owl habitat quality, especially because this species is a small ground-dweller (Zarn 1974; Green and Anthony 1989; Trulio 1994). Burrowing owls select sites that support short vegetation, even bare soil, presumably because they can easily see over it and maneuver through it; however, they will tolerate tall vegetation if it is sparse. Owls will perch on raised burrow mounds or other relief, such as rocks, tall plants, fence posts, and debris piles to attain good visibility. During the breeding season, they may also need enough permanent cover and taller vegetation within their foraging range to provide them with sufficient prey, such as small mammals (Wellicome 1994). In Santa Clara County, vegetation cover and average vegetation height at occupied burrow habitat were 44 to 57 percent and six inches (15.2 centimeters), respectively (Trulio 1994). burrowing owls in Oklahoma occured where vegetation was four inches (10.2 centimeters) or less in height (Butts 1973). Green and Anthony (1989) reported that 28 percent vegetation cover was optimal in the Columbia Basin, and that burrowing owls used areas with high proportions of bare ground. Some land management practices that manipulate vegetation while avoiding burrow damage or disturbance, including moderate

grazing or vegetation removal, can enhance or maintain suitable vegetation in burrow habitat (Coulombe 1971; Green and Anthony 1989; Trulio 1994; Jones pers. comm.).

Burrowing owls sometimes occur in small habitat fragments, including grassland or ruderal patches surrounded by urban development (Rosenberg and DeSante 1997; DeSante et al. 2004). In general, burrowing owl colonies often occur in habitat edges and/or disturbed sites characterized by natural or anthropogenic soil disturbance (including soil piles and bare ground) and topographic breaks (Gifford pers. comm.). Their proximate association with these areas may be independent of certain landscape variables such as habitat patch size; therefore, these settings appear to simply provide burrowing owls with some of their required habitat elements, including suitable digging sites for California ground squirrels, short and sparse vegetation, and good visibility. However, the spatial requirements of burrowing owls, and how long-term population viability varies with landscape-level parameters, are not well understood. CDFW's burrowing owl mitigation guidelines (CBOC 1993) imply that breeding pairs or resident individuals of burrowing owls may require a minimum of 6.5 acres (2.6 hectares) of contiguous foraging habitat to persist (based on a 300-foot [91.4-meter] radius around an occupied burrow). For example, the guidelines for avoiding project impacts on pairs or individuals requires preserving a minimum of 6.5 acres of foraging habitat contiguous with occupied burrow sites for each pair of breeding owls or single unpaired resident bird. Guidelines for mitigating the loss of foraging and burrowing habitat on a project site requires protection of at least 6.5 acres of foraging habitat per pair or unpaired resident bird. Whether these guidelines have an empirical ecological or demographic basis is not clear.

Burrowing owl pairs have been observed in isolated habitat patches as small as one acre (0.4 hectare). However, an area this size does not support the foraging requirements of most burrowing owls, and individuals occurring at sites this small must forage offsite. Reproductive success and long-term persistence in small and isolated habitats are unknown. Although the relationship between habitat area and population viability of this species is not well documented, small and isolated habitat patches are not likely to sustain high reproductive success or long-term persistence.

In urban settings, burrowing owls occurring in isolated habitats may experience frequent disturbances from adjacent land uses (e.g., habitat degradation, predation) and barriers to foraging areas. For example, the availability of rodent prey may be limited in isolated habitats, and ground squirrels may abandon or be eradicated from small parcels of habitat in urban settings. Also, small and isolated occurrences are more likely to experience random local extirpation as a result of natural disturbances (e.g., Goodman 1987) and recolonization of small or isolated habitat patches is less likely than recolonization of large habitat areas. Burrowing owls can tolerate considerable levels of non-threatening human activity and noise in locations

that sustain their other habitat requirements (e.g., suitable nesting and foraging habitat, and roosting sites) (CBD et al. 2003).

What constitutes an isolated habitat patch for burrowing owl and the minimum size of a viable patch of habitat (i.e., habitat capable of sustaining a population over a long time) are not well documented. These parameters are likely affected by habitat quality, juxtaposition of the site relative to other suitable habitat, surrounding land uses, and prey availability. Burrowing owls have been observed in small lots nearly surrounded by development. Furthermore, burrowing owls will fly through urban areas to forage in nearby areas; however, the type and minimum extent of development that constitutes a barrier to movement between occupied patches and nearby foraging areas is not known. Although small and isolated patches of habitat can support owls, these sites may be unlikely to attract new pairs.

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for burrowing owl are identified in Table G-3.20-1 and have been derived from input from local species experts.

Table G-3.20-1. Habitat Elements for Burrowing Owl

Essential Activities	Land Cover Types	Habitat Elements
Foraging, breeding and dispersal	Blue oak savanna, cropland, irrigated pasture grassland, and valley grassland.	Open, well-drained terrain outside areas at risk of flooding; short, sparse vegetation; and underground burrows or burrow facsimiles. Requirement for burrows is facilitated by healthy populations of California ground squirrel.

BUOW Species Distribution and Population Trends

BUOW Species Distribution

Western burrowing owl occurs throughout western North America west of the Mississippi River, and south through Mexico to Panama (Haug et al. 1993). In California, western burrowing owl is a year-round resident. Historically, burrowing owl was widespread and occurred in suitable habitats throughout the state (Grinnell and Miller 1944), but its range has contracted significantly, particularly in coastal grasslands. Its present range includes lowlands from north-central California west of the Sierra Nevada and south to Mexico, desert regions of southwestern California, and scattered locations in the Great Basin (DeSante et al. 1996). Burrowing owls are absent from coastal areas north of Sonoma County. They are also absent

from montane regions such as the Sierra Nevada and the ranges between Santa Barbara and San Bernardino Counties.

BUOW Central Valley Distribution

There are historical records of burrowing owl occurrence from nearly every county in the Central Valley (DeSante et al. 1996). DeSante et al. (1996) described the western burrowing owl's Central Valley range in terms of its county distribution within three geographic zones: Northern Central Valley, Middle Central Valley, and Southern Central Valley. Approximately half of all breeding groups known to occur in the Central Valley during the 1980's disappeared by the early 1990s (DeSante and Ruhlen 1995).

BUOW Distribution within the Planning Area

The Planning Area occurs within the Middle Central Valley portion of the burrowing owl's range. DeSante et al. (1996) estimated that the Central Valley supports 14 percent of the total California burrowing owl population (and some of the highest population densities, along with Imperial Valley); and 11 percent of the total population occurs in the Middle and Northern Central Valley, and southern San Francisco Bay Area combined. The Planning Area lies within the core of this region. This area is particularly important to the current and future western burrowing owl population in California for several reasons: 1) it is located within a complex that supports some of the highest burrowing owl population densities in the state; 2) it historically supported some large burrowing owl populations (see below); 3) breeding populations still remain within this area, and there are opportunities to enhance existing populations; 4) large areas of suitable habitat remain in the area; and 5) the greater region is threatened by intensive development and urbanization pressure.

Western burrowing owls occur in suitable habitat within the Planning Area; however, their overall distribution, abundance, and population structure are not well known. Land-cover types used by burrowing owls, such as grasslands, vernal pool grasslands, fallow agricultural fields, and open oak savannah occur throughout most of the Central Valley and are well-represented in Sacramento County and the Planning Area, particularly outside the Urban Development Area (UDA); however, at most sites within these land-cover types, the presence of burrowing owls is not known, and it is assumed that most of this habitat is not occupied

Since the 1950's, large colonies of burrowing owls have been recorded in the Planning Area at Executive Airport, Sacramento Army Depot, Cosumnes River College, and Mather Air Force Base (DeSante et al. 1996; CDFG 2010; Johnson pers. comm.) (see Figure BUOW-1). Large colonies have also been documented in Sacramento County outside the Planning Area at the California State University Campus. Effects from surrounding development and habitat degradation have

reduced burrowing owl numbers in these areas. Some populations remain in increasingly isolated tracts of urban open space south of the American River and in the North Natomas area, in Sacramento County but outside the Planning Area.

Although burrowing owl populations have declined or disappeared from much of their historical habitat, outlying areas of the County still provide suitable habitat for the species. Burrowing owls are known to occupy patches of habitat that extend from the Sacramento Regional County Sanitation District (SRCSD) Bufferlands (Jones pers. comm.) to The Nature Conservancy's Cosumnes River Preserve (Reiner pers. comm.), as well as habitat in the rolling grasslands in eastern Sacramento County. The Meadowview and Pocket areas within the City of Sacramento (outside the Planning Area) support disjunct, isolated populations north to Florin Road (Roscoe pers. comm.). No comprehensive data exist on the distribution or abundance of these owls or on their demographic relationship to the burrowing owls within the city limits of Sacramento. It seems likely, however, that extant habitat south and east of the city boundary has served for some time as a "refuge" for burrowing owls being displaced from the Sacramento Metropolitan Area by urbanization.

Because comprehensive surveys or monitoring efforts for western burrowing owl in the Planning Area have not been conducted, and because the existing data of known occurrences are based mostly on incidental observations or limited surveys (e.g., CNDDB, anecdotal records, surveys conducted over a limited area), the population size and nesting distribution of this species in the Planning Area are not known. There are 36 previously recorded occurrences scattered throughout the Planning Area, 17 of which are within the UDA (CDFG 2010). The species is believed to occur throughout the Planning Area in areas of modeled habitat, which is discussed in Section G-4 of this Appendix.

BUOW Population Levels and Trend

The burrowing owl is experiencing precipitous population declines throughout North America. In Canada, its numbers are rapidly declining, and in 1995 the Committee on the Status of Endangered Wildlife in Canada listed it as an endangered species. In Mexico, it is officially considered a threatened species. The burrowing owl is also declining throughout most of the western United States, and has disappeared from much of its historical range in California. Nearly 60 percent of California burrowing owl colonies that existed in the 1980's had disappeared by the early 1990s (DeSante and Ruhlen 1995; DeSante et al. 1997). In the San Francisco Bay Area and the central portion of the Central Valley (from Yolo and Sacramento Counties to Merced County), the burrowing owl population has declined by at least 65 percent since 1986 (DeSante pers. comm.).

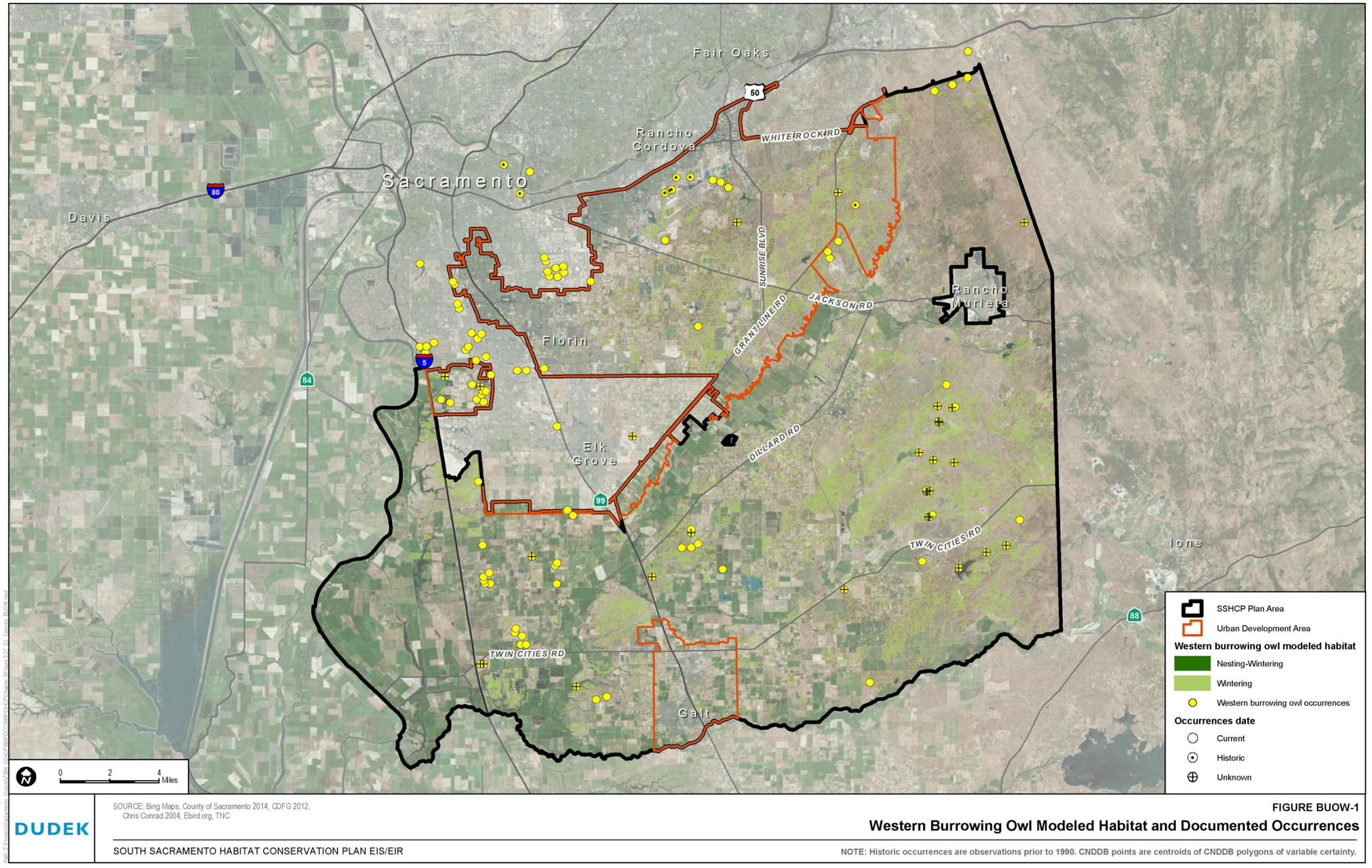
Burrowing owls remain throughout nearly all of their Central Valley range. Approximately half of all breeding groups known to occur in the Central Valley during the 1980s disappeared by the early 1990s (DeSante and Ruhlen 1995). Due to severe losses of habitat suitable for burrowing owls in the Planning Area over the past several decades, as a result of development and certain agricultural conversions, it is assumed that western burrowing owl populations in the Planning Area have declined substantially over recent decades.

BUOW Threats to the Species

Western burrowing owl is threatened over most of its range by several factors. The Center for Biological Diversity et al. (2003) provides a thorough description of threat factors, including documentation by specific studies in several cases. The following section summarizes threats to western burrowing owl populations. Immediate threats to western burrowing owl include the conversion of grassland habitat to urban and agricultural uses, and the loss of suitable agricultural lands to development. Approximately 91 percent of burrowing owls in California occur on private land. Statewide, over 86 percent of grasslands are in private ownership (Bates 2006). Equally important is the loss of fossorial rodent populations such as prairie dogs and ground squirrels across much of the owl's historical habitat. Eradication programs have decimated populations of these rodents and have in turn disrupted the commensal ecological relationship the owls have with these species. Another cause of population declines is thought to be pesticide use (especially organophosphates in southern Canada); however, the available evidence does not clearly indicate that other contaminants are reducing populations (Gervais et al. 1997). Habitat fragmentation (Remsen 1978) probably increases foraging distances, making hunting less efficient, and potentially reducing reproductive success. Furthermore, fragmentation may reduce the chances that a male owl will attract a mate and successfully reproduce.

Studies of island biogeography suggest that small, isolated populations can suffer from genetically induced problems that may jeopardize the long-term survival of a species (Goodman 1987; Hanski and Gilpin 1997), and recent studies of burrowing owls suggest that such genetically induced problems may threaten the species. One study suggests that small owl populations many be genetically isolated from other populations (Johnson 1992). Another study found a population of owls near Sacramento to be inbred due to small population size rather than non-random mating (Johnson 1997a).

Figure BUOW-1 Western Burrowing Owl Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, Chris Conrad 2004, Ebird.org, TNC

DUDEK

FIGURE BUOW-1

Western Burrowing Owl Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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Other documented threats to western burrowing owl throughout the species' range include predation, mortality due to collisions with vehicles and wind turbines, and relocation of burrowing owls away from occupied habitat for development (CBD et al. 2003). Attempts to exterminate rodents by the use of poisons may also kill burrowing owls (Rosenberg et al. 1998).

Western burrowing owls in south Sacramento County are specifically threatened by habitat loss and fragmentation as a result of conversion of habitat to urban uses and agriculture, particularly the conversion of grasslands to vineyards. Also, the loss of suitable agricultural land to development has reduced the extent of suitable habitat. It is assumed that control of ground squirrels has reduced the extent and quality of burrowing owl habitat by reducing the number of suitable nesting burrows. It is possible that the use of rodenticides and insecticides have reduced prey populations, resulting in lowered survivorship and reproductive success.

BUOW Data Gaps and Conservation Implications

The ecology, status, and management of western burrowing owl have received considerable attention in recent years; however, there are several sources of uncertainty regarding burrowing owl and its requirements in the Planning Area. These data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

Population and Habitat Distribution within the Planning Area

Because comprehensive surveys for western burrowing owl in the Planning Area have not been conducted and the existing occurrence data are based primarily on incidental observations (e.g., CNDDB, anecdotal records), the population size and nesting locations of this species throughout the Planning Area are not known. In addition, though the distribution of grassland, agricultural, and ruderal land-cover types is mapped and quantifiable, the quality of habitat for burrowing owls within most of these areas is unknown.

These information gaps limit our ability to identify the best lands available for preserving burrowing owl habitat, and accurately estimate the impacts resulting from covered activities. Until these data gaps are remedied, the conservation value for burrowing owl will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, or are adjacent to these areas.

Landscape-level Habitat and Preserve Design Requirements for Viable Populations

The minimum habitat size and connectivity requirements for the western burrowing owl are not well documented. This causes uncertainty in determining what preserve design will be effective in meeting the conservation goals for burrowing owls.

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FERRUGINOUS HAWK (FEHA)

Ferruginous Hawk (FEHA)

(Buteo regalis)

Status USFWS: Bird of Conservation Concern

Status CDFW: None

FEHA Listing Status

Ferruginous hawk (*Buteo regalis*) is legally protected under the federal Migratory Bird Treaty Act (16 U.S.C. 703-712) and California Fish and Game Code (Sections 3503.5 and 3800). It is considered a Bird of Conservation Concern (BCC) by the U.S. Fish and Wildlife Service (USFWS).

FEHA Life History and Ecology

FEHA Species Description and Life History

Physical Description

Ferruginous hawk is a large broad-winged hawk that occurs in two morphs (light and dark) with no intermediate morph. The dark morph is less frequent. Adult light morphs are rust colored on the back and shoulders, with a pale head, and white tail with pale rust washings. When observed in flight from below, the species appears mostly white, with a rufous "V" patch that is formed from the leg feathers. Observed from above, a white crescent-shaped patch is distinctive in the outer primaries. Dark morphs have a deep brown-colored head and body, upper-and lower-wing surfaces, and tail coverts. The back and breast are a dark rufous color. The tail, primaries, and secondaries are white or pale (Bechard and Schmutz 1995; Sibley 2000; Udvardy 1998). Adults are not sexually dimorphic in plumage, but females tend to show more pigmentation on the legs and belly (Bechard and Schmutz 1995).

Juvenile light morphs are generally similar to adults; however, the darker colored feathers are more brown than rufous. When observed from below in flight, juvenile feathers are more white or pale as compared to adults. They also lack the rufous "V" shape that is formed from the leg feathers on adults. Like light morphs, juvenile dark morphs are similar to adults, but have

feathers that are more brown than rufous. In both morphs, juvenile iris color is pale, while adult iris color is reddish-brown (Sibley 2000).

Reproduction

Ferruginous hawks do not regularly breed in California, with the most recent breeding being recorded in 1989 in northeastern California (Harlow and Bloom 1989). Since the species is not a regular breeder in California and has not been recorded breeding in the Central Valley, reproduction will not be discussed in detail in this account.

Ferruginous hawks are apparently monogamous, and pairs initiate nesting mid-March to mid-April depending on location (Bechard and Schmutz 1995). Clutch size in this species is larger than in most raptors, generally ranging from two to four eggs, but occasionally ranging up eight eggs in years of high prey abundance (Smith and Murphy 1978). Both sexes participate in nest building. Nests are most often located in trees and shrubs, followed by cliffs, utility structures, and ground outcrops (Olendorff 1993). Incubation is estimated to range between 32 and 33 days (Palmer 1988), while young leave the nest between 38 and 50 days after hatching (Powers 1981 *in* Bechard and Schmutz 1995).

Suitable nesting sites have declined in some portions of the breeding range given that isolated trees are uncommon, many have fallen, and little new regeneration is occurring. Furthermore, ferruginous hawks may experience reduced reproductive success due to harassment by later arriving Swainson's hawks and competition for nest sites (Leslie 1992). Establishment of artificial nesting platforms in regions with limited available nest sites has proven successful in addressing this issue (Bechard and Schmutz 1995).

Longevity, Survival, and Mortality

Maximum potential longevity is believed to be 20 years of age (Lloyd 1937; Houston 1984 in Bechard and Schmutz 1995). The oldest known age of a wild ferruginous hawk is 17 years 11 months. Banding data from Schmutz and Fyge (1987) was used to estimate first year mortality at 65 percent, while reoccupancy of nest data from Woffinden and Murphy (1989) has been used to estimate annual adult mortality at 25 percent.

Ferruginous hawks fall prey to birds and mammals. Great horned owls (*Bubo virginianus*) take nestlings, common ravens (*Corvus corax*) and American crows (*Corvus brachyrhynchos*) prey on eggs and nestlings, and ground predators such as coyotes (*Canis latrans*), American badgers (*Taxidea taxus*), and foxes (*Vulpes* spp.) may be a serious threat to ground-nesting pairs and young after fledging (Bechard and Schmutz 1995).

Other sources of mortality include illegal shooting, presumed collisions with automobiles, and high-tension wire collisions or electrocution (Gossett 1993). Olendorff (1973) also reported that eggs and young are killed when blown or pushed from nests.

Dispersal Patterns

Band return data for juvenile ferruginous hawks from the first 90 days after banding found that 48 individuals moved less than 15.5 miles from their natal site, while 33 individuals dispersed as far as 1,056 miles (Gossett 1993 in Bechard and Schmutz 1995). No other dispersal information is available for the ferruginous hawk.

Diet and Foraging

Prey selection by ferruginous hawks is determined primarily by availability (Steenhof and Kochert 1985 *in* Bechard and Schmutz 1995). Some individuals have even been reported to forage on prairie dogs (*Cynomys* spp.) immediately after the prey was shot by squirrel hunters (Chesser 1979).

Ferruginous hawks opportunistically forage at times during the day when their main prey items are available. Four types of prey pursuit have been described and include: 1) still hunting from perches with flights of less than 100 meters to capture prey; 2) short-distance strikes originating from the ground; 3) aerial hunting; and 4) hovering. No communal feeding has been reported, though 10 to 20 ferruginous hawks have been observed standing or perching in the same general area (Bechard and Schmutz 1995).

Mammals are the most common food items with rabbits and hares (*Syvillagus* and *Lepus* spp.), ground squirrels (*Spermophilus* spp.), and prairie dogs *Cynomys* spp.) comprising most of the food consumed by adults and juveniles throughout the year. Bechard and Schmutz (1995) summarized ferruginous hawk prey reported from several studies throughout the species' range by percent occurrence and percent biomass. Mammals were most frequently preyed upon (83 percent) and constituted 95 percent of the food biomass, while birds were the second prey group most frequently eaten (13 percent), but only constituted 3.8 percent of the food biomass. Amphibians, reptiles, and insects were also consumed, but were found to be much less frequent and comprised less than one percent of the food biomass. No food habit studies of wintering ferruginous hawks in California have been conducted.

Movement and Migration Patterns

The ferruginous hawk is a migratory species in the northern part of its breeding range, but little is known regarding migration for southern nesting individuals. Fall migration of juveniles begins in early August, while most ferruginous hawks migrate in September and October. Adults begin

migration later in August and peak migration occurs in late October and early November. Migration of both juveniles and adults is completed by the end of November (Bechard and Schmutz 1995).

Spring migration is different in that hatch-year birds migrate later than adults. As with most bird species, the migration period of ferruginous hawks is shorter during spring. Adults migrate between mid-February and early April, with peak activity occurring during the month of March. First year birds start spring migration in early April, peak between mid-April and mid-May, and finish with the latest migrating individuals leaving in early June.

Most individuals that winter in California are believed to have originated in the states west of the continental divide. Gossett (1993) used band recovery data to calculate that 4.1 percent of eastern nesting birds were recovered west of the continental divide, while 27.5 percent of western birds were recovered east of the divide. In California, Garrison (1990) reported that 66 percent of band recoveries were from breeding populations west of the Rocky Mountains, while the remaining recoveries were from the north and east. Fidelity to wintering areas by migratory individuals is unknown (Bechard and Schmutz 1995).

Territoriality/Home Range

Bechard and Schmutz (1995) suggest that the ferruginous hawk may defend winter territories. Winter densities in Utah have been reported at one individual per 3.60 square miles (Smith and Murphy 1978), while Plumpton and Andersen (1997) found a mean daily minimum convex polygon home range size of 1.36 square miles. Data on nesting territory size has been reported by several researchers and may also be useful as an estimate for winter habitat requirements (Hunting 2001). Breeding home ranges have been reported between 2.28 and 2.93 square miles per pair (Smith and Murphy 1978; Bechard and Schmutz 1995).

Ecological Relationships

Ferruginous hawks depend on a small number of prey species for their main food items. Consequently, population cycles and abundance of these species are highly correlated with the number of breeding pairs, eggs laid, and young fledged (Thurow et al. 1980; White and Thurow 1985; Woffinden and Murphy 1989; Steenhof and Kochert 1985; Schmutz and Hungle 1989 *in* Bechard and Schmutz 1995).

FEHA Habitat Requirements and Ecology

The ferruginous hawk is considered an “open country” species that inhabits the grasslands, shrub steppes, and deserts of western North America. Since the species does not regularly nest in California, only the habitat requirements and ecology of wintering ferruginous hawks will be described herein. During the winter, ferruginous hawks use grasslands and arid areas,

particularly where pocket gophers, ground squirrels, rabbits, or prairie dogs are abundant. Ferruginous hawks also winter near cultivated fields that support populations of pocket gophers (Bechard and Schmutz 1995), and are known to use urban open space grasslands as long as prey is available (Berry et al. 1998).

Few field studies of the ferruginous hawk have been conducted in wintering areas, and none are known for the Central Valley of California. Therefore, descriptions of the species' winter habitat requirements in California are based mostly on the personal observations of birders. Manolis (pers. comm.) has observed ferruginous hawks in open grassland habitats and non-vineyard agricultural areas in the Planning Area. Characteristics of these grasslands and agricultural lands are that they support abundant prey and include friable soils (for digging and burrowing), moderate to dense vegetative cover (particularly grasses), and some topographic variation (West pers. comm.).

Ferruginous hawks wintering in Utah have been found in higher numbers in irrigated pastures and dry croplands (Brouse 1999). The spatial requirements of ferruginous hawks during winter have not been widely reported (Bechard and Schmutz) and what constitutes the minimum size of suitable winter foraging habitat is unknown for most areas. In Colorado, Plumpton and Andersen (1997) found a mean daily minimum convex polygon home range size of 1.36 square miles. The minimum patch size for ferruginous hawks is likely affected primarily by prey availability, but also by the juxtaposition of the site relative to other suitable habitat, and by surrounding land uses. Ferruginous hawks generally roost individually, but sometimes roost communally in groups of up to 24 birds (Olendorff 1993).

FEHA Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for ferruginous hawk are identified in Table G-3.21-1 and have been derived from input from local species experts. This species does not nest within the Planning Area and therefore habitat elements for nesting is not included.

Table G-3.21-1. Habitat Elements for Ferruginous Hawk

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak savanna, cropland, irrigated pasture grassland, and valley grassland.	Abundant rodent populations.

FEHA Species Distribution and Population Trends

FEHA Species Distribution

Ferruginous hawks nest in western North America, from southern Saskatchewan and Alberta south to central New Mexico and Arizona, east to the Great Plains, and west to central Nevada and Oregon. Nesting occurs in 17 states and three provinces in western North America (Bechard and Schmutz 1995).

The winter distribution includes the southwestern United States and northern Central America. In California, ferruginous hawks occur commonly in each of the eight geographic regions used in analysis of the National Audubon Society's Christmas Bird Count (CBC) data (Garrison 1990). In each region, ferruginous hawks were reported to occur in over 22 percent (range 22 to 56percent) of CBC's between 1950 through 1988. When CBC data was standardized by search effort, Ferruginous hawks were most commonly observed in the North Interior, followed by the South Interior, Central Coast, and South Coast. Fewer individuals were found in the North and South Sierras, North Coast, and Central Valley.

Analysis of more recent CBC data found more ferruginous hawks in the Sierra Nevada, Cascades, and Inner Coast Range physiographic regions than other regions. Regions reporting moderate numbers of ferruginous hawks included the South Coast, Central Coast, and Central Valley. Those regions reporting the fewest ferruginous hawks included the Mojave and Colorado Deserts, North Coast, and High Desert (Hunting 2001).

FEHA Central Valley Distribution

Ferruginous hawks were detected regularly on more than 97 percent of the CBCs in the Central Valley between 1980 and 1997 (Hunting 2001); however, no additional data analysis on these records has been reported.

FEHA Distribution within the Planning Area

Observations of ferruginous hawk in the Planning Area are primarily opportunistic sightings of individuals by birders or observations during CBCs. Most observations of ferruginous hawks have been reported from open grassland habitats in the eastern portion of the Planning Area from Interstate 50 south to Howard Ranch (Manolis pers. comm.). Winter observations have also been recorded from non-vineyard agricultural habitats in the south and southwestern portions of the Planning Area. There are three previously recorded occurrences of ferruginous hawk reported to the CNDDB within Sacramento County, all of which are within the UDA (CDFG 2010). Figure FEHA-1 shows the occurrences within the Planning Area according to CNDDB (CDFG 2010) and other sources (ebird.org 2005-2010).

FEHA Population Levels and Trend

The ferruginous hawk range-wide population was estimated at between 5,842 and 11,330 individuals between 1990 and 1995 (Olendorff 1993). In the grasslands of the Great Plains, Schmutz et al. (1992) estimated 14,000 individuals; however, no range-wide breeding population or California wintering population estimates have been conducted to date (Bechard and Schmutz 1995, Garrison 1990).

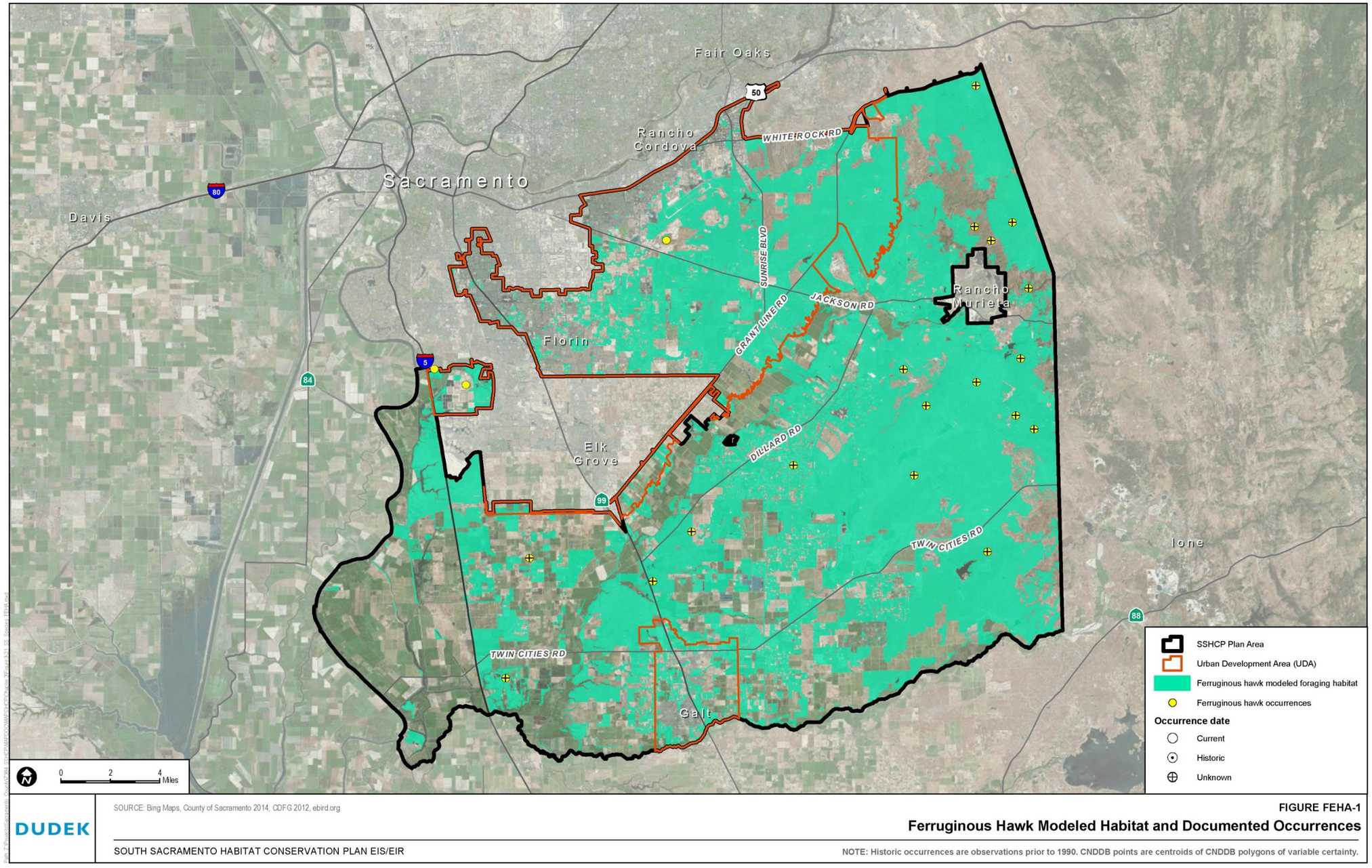
Garrison (1990) analyzed CBC data and found the species winters throughout the state. Analysis was grouped in eight regions and two time periods (Table G-3.22-2). The greatest number of ferruginous hawks occurred in the North Interior, Central Coast, South Coast, and South Interior regions.

Table G-3.22-2. Measures of Abundance for Wintering Ferruginous Hawks in California based on Christmas Bird Count Data Between 1949-1988 (Garrison 1990)

Region	N (#)	% of CBCs with Ferruginous hawks	Avg. No. Ferruginous hawks/CBC	Avg. No. Ferruginous hawks/100 party mi.
North Coast	17	32.5	0.64	.20
North Interior	6	56.8	2.51	1.07
North Sierra	4	28.6	0.50	0.16
Central Valley	21	36.5	0.94	0.33
Central Coast	19	34.4	1.40	0.65
South Sierra	7	22.4	0.31	0.28
South Interior	14	35.0	2.25	0.78
South Coast	23	37.0	1.63	0.63

Regional populations have been documented as both increasing and decreasing; however, the North American population is generally considered to be declining (Bechard and Schmutz 1995). In California, Garrison (1990) and Hunting (2003) used CBC data to investigate trends and found increases in wintering ferruginous hawks. Although many comparisons between time periods (1949-1969 compared with 1970-1988) within regions lacked adequate sample sizes, ferruginous hawks were significantly more frequent and more individuals were observed per CBC in the Central Coast and South Coast regions. No significant differences were found in the North Coast and Central Valley regions, although the Central Valley showed increases in the percentage of ferruginous hawks/CBC and more individuals/CBC. Garrison provided several reasons why the recorded increases in wintering birds may be artificial, and could not unequivocally conclude these increases were “real.”

Figure FEHA-1 Ferruginous Hawk Modeled Habitat and Documented Occurrences



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More recent analysis of CBC data by Hunting (2001) also reported increases in wintering ferruginous hawks (Table G-3.22-3). Both mean ferruginous hawk detections per count circle and mean number of count circles detecting ferruginous hawks increased in six of seven physiographic regions with a decrease noted only in the South Coast region. Some increases, however, were attributed to an increase in the absolute number of count circles (Hunting 2001).

Table G-3.22-3. Mean Ferruginous hawk Observations (Circles Detecting Ferruginous hawks) for Each of Seven California Physiographic Regions[1]

Physiographic Region	Mean Count Circle Observations (Circles) 1980-89	Mean Count Circle Observations (Circles) 1990-97	Numeric (percent) Change
North Coast	2.43 (4.8)	2.76 (7.5)	0.33 (12.1)
Sierra Nevada, Cascades and Inner Coast Range	3.53 (2.2)	8.14 (3.8)	4.61 (56.7)
Great Central Valley	2.73 (11.6)	4.43 (14.7)	1.7 (38.5)
Central Coast	2.70 (20.4)	4.63 (27.0)	1.93 (41.7)
South Coast	5.06 (13.6)	4.77 (15.8)	-0.29 (-6.1)
Mojave and Colorado Deserts	3.17 (4.2)	3.83 (4.7)	0.66 (17.4)
High Desert, Mono and Inyo Counties	0.33 (0.2)	1.30 (0.8)	0.97 (77.5)
Mean Observations[2]	3.27 (+-0.96)	5.22 (+-2.88)	

1 Table copied from Hunting 2001

2 Due to small sample size, values for High Desert, Mono and Inyo Counties omitted from calculation

FEHA Threats to the Species

Threats to ferruginous hawks occur in their breeding and wintering areas; however, since this species does not regularly nest in California, only threats in their wintering areas will be discussed in this account. Also, some historical threats such as egg collection, which occurred from 1900 to 1930 (Bechard and Schmutz 1995), no longer occur and are not considered a key factor in population declines (Bechard and Houston 1984; Bechard and Schmutz 1995). The use of organochlorine pesticides between the 1940's and 1960's also caused severe reductions in raptor populations from secondary poisoning. These pesticides have been banned in the United States since the 1970's, although they are still used in Central and South America (Sibley 2000).

FEHA Habitat Loss and Alteration

Foraging habitat (i.e., grasslands) for ferruginous hawks has been lost to urbanization or converted to agricultural crops that do not support prey species or are not used for foraging. Conversion of grassland habitats to urban and agricultural uses proportionately exceeds the conversion of any other habitat type in California (Ewing et al. 1988; Moore et al. 1990 *in* Hunting 2001). DeHaven (2000) quantified changes in California cropping patterns and found that ferruginous hawk "friendly" habitats such as rangelands, grassland, and pastures have

decreased. These habitats have been replaced by a variety of other crops (e.g., fruit and nuts, cotton, and vineyards) that are not used by ferruginous hawks, or by crops (e.g., vegetables and melons, tomatoes, beans, potatoes, sugar beets) that are suspected as having lower quality foraging value. Unlike other wintering raptors in California, ferruginous hawks do not use agriculture areas as frequently. Instead, they are more frequently found using natural habitat types such as grasslands and vernal pool/grassland complexes for foraging.

FEHA Shooting

Historically, raptors were illegally shot for sport like many other bird species (Bendire 1892; Cameron 1914; Salt 1939 *in* Bechard and Schmutz 1995). Shootings are still reported (Howard 1975; Harmata 1981), but decreases in the rate of band recoveries since the mid-1940's suggest a decrease in the numbers shot (Houston and Bechard 1984). Bechard and Schmutz (1995), however, suggest that shootings may still be a problem on the wintering grounds (Harmata 1981; Gilmer et al. 1985).

FEHA Pesticides

The control of ground squirrel and prairie dog populations with pesticides (i.e., strychnine) may affect ferruginous hawks (Hunting 2001). Eradication programs have decimated populations of these rodents. In addition, secondary poisoning has been documented for several raptors species; however, no studies have been found that document secondary poisoning of ferruginous hawks, and Bechard and Schmutz (1995) suggest pesticides pose little threat to the species.

FEHA Data Gaps and Conservation Implications

The ecology, status, and management of ferruginous hawks have received attention in recent years. However, there are several sources of uncertainty regarding ferruginous hawk and its requirements in the Planning Area. These data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

FEHA Population and Habitat Distribution within the Planning Area

Ferruginous hawks occur in suitable habitat within the Planning Area; however, their overall abundance and population structure are not well known. Land-cover types used by ferruginous hawks, such as grasslands, occur throughout much of the Central Valley and are well-represented in Sacramento County and the Planning Area; however, at most sites with these land-cover types, the status of ferruginous hawk is not known.

Because comprehensive surveys for ferruginous hawk in the Planning Area have not been conducted and because the existing occurrence data are based primarily on incidental observations (e.g.,

anecdotal records), the population size and important wintering areas of this species throughout the Planning Area are not known. Although the distribution of grasslands is mapped and quantifiable, the quality of habitat for ferruginous hawks within most of these areas is unknown.

These information gaps limit our ability to identify the best lands available for preserving ferruginous hawk habitat and accurately estimate the impacts resulting from covered activities.

Until this data gap is remedied, the conservation value of grassland and agricultural land-cover types for ferruginous hawk will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, or are adjacent to these areas.

FEHA Landscape-level Habitat and Preserve Design Requirements for Viable Populations

The minimum habitat size and connectivity requirements for ferruginous hawk are not well documented. This causes uncertainty in determining whether the preserve design will be effective in meeting the conservation goals for ferruginous hawk.

FEHA Effectiveness of Mammalian Prey Population Enhancement Measures in Improving Foraging Habitat for Ferruginous Hawk

Achieving the conservation goals and objectives for ferruginous hawk may require successful enhancement of mammalian prey populations. Mammalian prey populations, particularly leporids and ground squirrels, should be passively or actively promoted on all lands acquired and managed for ferruginous hawk habitat. However, whether these efforts will succeed at increasing the available prey base and enhancing habitat for ferruginous hawk is unknown.

FEHA Other Data Gaps

Other data gaps that could be important for ferruginous hawk conservation include: 1) responses of ferruginous hawk populations to habitat management and enhancement techniques; 2) prey population dynamics and cycles; and 3) an appropriate livestock grazing and fire regime appropriate for ferruginous hawk habitat management and enhancement.

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SWAINSON'S HAWK (SWHA)

Swainson's Hawk (SWHA)

(Buteo swainsoni)

Status USFWS: Bird of Conservation Concern

Status CDFW: Threatened

SWHA Listing Status

Swainson's hawk (*Buteo swainsoni*) is a migratory bird that is provided protection by the Migratory Bird Treaty Act of 1918. In 1983, the California Fish and Game Commission, acting on the recommendation of the California Department of Fish and Game (CDFG, the title of the agency at the time of the action), listed the Swainson's hawk as a Threatened species, thereby providing protection under the California Endangered Species Act (CESA). The species is considered Bird of Conservation Concern (BCC) by the U.S. Fish and Wildlife Service (USFWS)

SWHA Life History and Ecology

Swainson's hawk is a member of the genus *Buteo*. Other members of this genus that are found on an annual basis in the EIS/EIR Planning Area include two resident species: red-shouldered hawk (*B. lineatus*) and red-tailed hawk (*B. jamaicensis*). Although many red-tailed hawks are resident in the Sacramento Valley, substantial numbers of red-tailed hawks from other portions of western North America migrate to and overwinter in the Planning Area each winter. Two additional *Buteo* spp. also are found in the Planning Area, but are strictly winter visitors and do not nest in the Planning Area: ferruginous hawk (*B. regalis*) and rough-legged hawk (*B. lagopus*). Swainson's hawk is a summer visitor that nests in the Planning Area, but winters in Central and South America. Swainson's hawk is not closely related to the other *Buteo* spp. in the Planning Area. It is thought to be most closely related to Galapagos hawk (*B. galapagos*) and white-tailed hawk (*B. albicaudatus*) (Palmer 1988).

SWHA Species Description and Life History

Adult Description

The Swainson's hawk is a medium-sized *Buteo*, weighing 1.5 to 2.5 pounds. It is less than two feet long and has a wingspan of approximately four feet. In general, it is slightly larger than a

red-shouldered hawk, but it is slightly smaller than the other *Buteos* in the Planning Area. It appears more slender than other *Buteos* due to its relatively long tail and more pointed wings. When perched, the wingtips extend to the tip of the tail. When in flight, the wings are extended in a shallow "U" shape. This slight dihedral silhouette in flight and the more pointed wings are good field marks for distinguishing Swainson's hawks from other flying *Buteos*.

Adult Swainson's hawks, like several other *Buteos*, have different color variations. These color variations are referred to as "morphs" that are generally described as one of the following: light, rufous, intermediate, or dark. These are not discrete color variations, but represent attempts to broadly classify what is a continuum of variation in color. The color variation is readily observed on the underside of the bird and is largely confined to the lower belly, underwing linings and throat. Color on these feathers can range from almost completely white to almost completely black but is usually between these extremes, and is most often represented by brown or rufous speckling, or bars, or washes of color. Clark and Wheeler (1987) noted that dark morphs represent only one to 10 percent of local populations in the Swainson's hawk's entire breeding range, and that the overwhelming majority of individuals are light morphs. However, in the Central Valley roughly 33 percent can be classified as light morph and another 33 percent as dark morph, while the remaining 33 percent are an intermediate morph that has some of the characteristics of dark morphs (Estep 1989; England et al. 1997).

The eye of the adult is dark brown. The hooked, medium-sized beak is dark with a yellow cere (the unfeathered nasal area at the base of the upper mandible). There can be a varying amount of white feathering just above the cere. Otherwise, the feathering on the head is a solid brown to chocolate-gray. This color spreads down the nape and the back to the rump, and extends onto the upperwing coverts (feathers covering the forward part of wing). The chin and throat color is variable. In lighter individuals the chin can have a squared-off white patch. While darker individuals can lack this patch entirely with the chin and throat being completely brown. On other individuals the chin and throat patch can be streaked or otherwise partially present. The breast is always a solid brown bib, with a well-defined horizontal demarcation between breast and belly that is most prominently observable on light morph individuals. Much of the underparts are variable in color. The belly, flanks, axillaries, and underwing coverts can be anything from an immaculate white to rufous or a very dark brown. Throughout most of the species' range, its underparts are usually white, however, in the Central Valley, a multitude of color variations are found. The majority of birds in the Central Valley exhibit characteristics of dark or intermediate morphs.

Swainson's hawks of all color morphs have dark gray remiges (i.e., the large primary and secondary flight-feathers). In all morphs, one can see contrast between the brown coverts and darker flight-feathers of the upperwing. The contrast is most prominently seen on the underside of the wings. When viewed from below, the darker gray trailing edge of the wings

stands out against the lighter underwing coverts. This field mark is widely used to identify the species and, though less pronounced, is even evident on most dark morph Swainson's hawks.

The undertail coverts (feathers between vent and tail on underside) are white, often with some amount of sparse brown barring. This is the case with all color morphs of the species. The tail is a light gray-brown with numerous darker horizontal bands. The sub-terminal band is a bit wider. The prominence of these bands is variable and tends to become fainter toward the base of the tail. The tail can sometimes appear to be slightly reddish when viewed from below (especially when sunlight is shining through it). The legs and feet are yellow or yellow-green while the talons are black.

Sub-Adult Description

Juveniles are similar in size and shape to adults, but have coloration different plumage. The eye is lighter and gray. The head is mainly brown, forehead white and crown streaked. The supercilium (line above eye) is pale, while the cheeks and throat are buffy with dark brown malar streaks (lines at sides of throat). The back and upper wing coverts are brown with buffy edges to the individual feathers. The primary and secondary flight-feathers are dark. The underparts are creamy to buffy, with varying amounts of dark brown spotting. The breast does not have a well-defined bib (unlike in adults) and is buffy with dark brown irregular spots. The tail is usually more distinctly banded with the sub-terminal band not noticeably wider. The cere, legs and feet are yellow, while the talons are black. Individuals that will ultimately attain a dark or light plumage as adults are noticeably more heavily or, conversely, less heavily spotted respectively as juveniles. Second-year plumages are best identified by the juvenal plumage features that are retained: the pale supercilium on a head that usually is otherwise paler than in the adult plumage; the breast is not yet a solid, well-defined bib, but can have irregular dark blotches; and the tail can be less evenly banded.

Sexual Dimorphism

Female Swainson's hawks are, on average, larger than males. Total length of males is 48 to 51 centimeters and mass is 693 to 936 grams, while females are 51 to 56 centimeters long and weigh 937 to 1367 grams (J.K. Schmutz *in* Palmer 1988). In the Central Valley of California, sexual dimorphism is apparent in the color morphs. The female, in virtually every mated pair in the Central Valley is the darker of the pair (Estep 1989; Holt pers. obs.). Females, therefore, tend to account for more of the dark morph individuals, while more of the light morph individuals are male. Clark and Wheeler (1987) notes that "(B)irds of each color morph tend to mate preferentially with their own morph." Sharp (1902) noted that the ample Swainson's hawk population that once existed in southern California was exclusively dark morph. Heerman (*in* Cassin 1856) reports a "new species" of hawk from the Central Valley of California that he

calls the “black hawk” (*Buteo insignatus*). It is evident from his description and an illustration made from specimens that he was referring to female dark morph Swainson’s hawks standing next to fledgling Swainson’s hawks near nests. No description of an adult male Swainson’s hawk is given by Heerman.

Longevity

Data concerning longevity is not abundant. A recovered band from an individual killed in Argentina indicated an age of 19 years six months (Woodbridge *et a*l. 1995b). A female observed at a nesting site in the Butte Valley, California was banded nearby as a nestling 24 years earlier (Bradbury pers. comm. 2004). These individuals likely are representative of the maximum lifespan for the species.

Age at Sexual Maturity

Sexual maturity is perhaps achieved by the third year (Cameron 1913). Instances of breeding at two years have been observed (Woodbridge et al. 1995a). In the Central Valley, individuals in sub-adult plumage have been observed paired with an adult and attempting to breed, but most encounter difficulties, probably due to inexperience, and fail entirely or loose chicks from starvation (n=5, Holt unpubl. notes). Individuals, once mature, are capable of breeding annually throughout the remainder of their life.

Reproductive Strategy

Mated pairs are largely reported to establish nesting territories that are in the same general area from where they were hatched (Woodbridge et al. 1995a; Gilmer and Stewart 1984; Bechard 1980). Pairs are monogamous and can remain together for many years (England et al. 1997). Site tenacity is evident, as the same individuals will return year after year to the same nesting territory (England et al. 1997). Estep (1989) had each of nine color-banded individuals return in successive years (1986-87) to the same nesting territory in the Central Valley. Pair bonding and courtship can take up to several weeks. A pair bond is formed while engaging in: soaring together in the nesting territory, displays of leg-dragging while soaring, undulating swoops, calling to each other, food sharing, copulating and, nest building. Nest building takes one to two weeks and eggs are laid approximately one week after copulation (Fitzner 1980). Clutch size is between one to four eggs. The female does almost all of the incubating of the eggs with the male incubating only briefly to allow the female a respite and an opportunity to stretch her wings. The male provisions the female during incubation and continues provisioning the female and chicks into the nestling and fledgling stages, at which time the female assists with provisioning from areas closer to the nest (Estep 1989; England et al. 1997).

Throughout the North American breeding range, adults arrive on nesting territories in March to May, lay eggs between April and June, and the young fledge between June and August (England et al. 1997). The Central Valley population is disjunct from the remainder of the species breeding range. The Central Valley has a relatively warmer climate than many other parts of the species' breeding range; therefore, the nesting season proceeds a bit earlier than in the more intemperate parts of the range. In the Central Valley, Swainson's hawks arrive at nesting territories from mid-February to the first week in April. Eggs are laid April to mid-May and fledging takes place from mid-June through early August (Swainson's Hawk Technical Advisory Committee 2000; Holt pers. obs.). The latest known nesting dates from the Central Valley population are associated with a nest in Yolo County and another in Sacramento County in 2003. Due to unrelenting inclement weather in April of that year, initial nesting attempts of these pairs were interrupted and secondary nest building and egg-laying took place as late as May 19 to 23 (Holt pers. obs.). Nest-building generally takes one week (Fitzner 1980). Egg-laying involves the laying of a single egg every other day until the clutch is completed (Fitzner 1980). The incubation period is 34 to 35 days (Fitzner 1980). Chicks take two to four days to hatch (Fitzner 1980). Chicks are altricial (helpless) and hatch asynchronously. This allows the first chicks that hatch to get a head start on their younger siblings. The first chick is able to beg for food earlier than the younger chicks and therefore, gains extra strength so that in those years when food resources are short, the available supply will go only to the older chick(s). This strategy ensures the survival of the largest number of offspring that the food resources will allow when the abundance of food for chicks cannot be predicted at the time when eggs are laid. With asynchronous hatching, the smallest chicks will not garner their fair share when times are tough and will only survive in years of abundant resources. Elimination of the smallest chicks usually occurs by starvation as a result of competition with their more developed siblings.

Chicks develop in the nest for 27 to 33 days (Fitzner 1980) before they are able to walk or hop onto nearby limbs (branching). First flight (fledging) takes place between 38 to 46 days (Fitzner 1980). For the first seven to 10 days after first flight the young stay near the nest (Fitzner 1980). The parents continue to feed the young for one month (Fitzner 1980). After that, the fledglings must fend for themselves. They then range widely in search of prey, covering up to one hundred miles in a day and associate in loose groups with other fledglings (Anderson et al. in progress). The pair bond and parental bonds are then relinquished and adults and juveniles migrate separately in autumn (Woodbridge et al. 1995b; Bradbury et al. in prep).

Multi-year studies addressing reproduction have documented the mean number of fledged young per nesting attempt. The high is 1.67 fledglings per attempt (Bednarz 1988), while the low is 1.11 fledglings (England et al. 1995). Eight studies from six states and one province document 2,023 chicks fledged out of 1,444 nesting attempts for an average of 1.40 fledglings per nesting attempt (synthesized from England et al. 1997). It is assumed that a high

percentage of first-year individuals do not survive to breeding age, but data concerning survivorship and recruitment is currently inadequate to address this question.

Seasonal Movements

At the conclusion of nesting when fledglings no longer are dependent upon adults, Swainson's hawks become gregarious and nomadic. Nesting territories and local foraging areas are abandoned and no longer defended. Large flocks of Swainson's hawks join together and range widely in pursuit of prey. They roost communally in trees at night. These flocks are loose associations joined primarily to exploit a common prey source and are not necessarily concerned with pre-migratory staging (Johnson et al. 1987). They remain gregarious and nomadic throughout the entire non-nesting period.

The Swainson's hawk is a neotropical migrant. Migratory movements of the atypical, disjunct Central Valley population are discussed below. The overwhelming majority of the population funnels through the Isthmus of Panama each Boreal autumn/Austral spring and then returns through Panama each Boreal spring/Austral autumn. In migration, they stay over land and do not attempt over-water crossings of extended length. They are reported to roost in trees or on the ground at night in Central America (Smith 1980; Smith et al. 1986).

Migration routes are primarily east of the Rocky Mountains and down the eastern coast of Mexico through Central America and over mountain passes in the Andes in Columbia. The return trip north covers roughly similar routes, only in reverse (Palmer 1988; England et al. 1997). They travel diurnally, seeking thermal updrafts and soaring upward in circles, barely flapping their wings. They then glide for as far as they can go, taking advantage of updrafts with skill while efficiently conserving stored fat reserves (Smith 1980; Smith et al. 1986). They will surf along weather fronts, using the change in air pressure to coast great distances with as little wasted effort as possible. Great masses of Swainson's Hawks have been observed passing over a single spot in Costa Rica or Panama (Smith 1973; Smith 1980). Brown and Amadon (1968) consider the immense migrating flocks of Swainson's hawks to be the most impressive avian gatherings in North America since the demise of the passenger pigeon.

During the Austral summer/Boreal winter, Swainson's hawks remain gregarious and nomadic. They use communal roosts at night (Woodbridge et al. 1995b; Bradbury et al. in prep). They flock together in pursuit of prey, which are almost exclusively insects such as swarms of locusts or dragonflies (Orlog *in* Smith 1980; Jaramillo 1993; Woodbridge et al. 1995b). Seasonal migration can involve many thousands of miles each way. Those that nest furthest north may face the extreme journey of a complete migration of 14,000 miles (Palmer 1988). Six to eight months is spent in migration and wintering, with each leg of migration capable of taking up to two months (Palmer 1988).

SWHA Habitat Requirements and Ecology with Emphasis on the Central Valley of California and Planning Area

Nesting Habitat

Swainson's hawks build their nests with sticks and twigs and some stems from other vegetation. A nest is about two feet in diameter and about one foot deep (England et al. 1997). In the Central Valley of California, there are about 25 different tree species that have been utilized for nesting (Holt pers. obs.; CDFG 2010). The most common nest trees are Fremont's cottonwood (*Populus fremontii*), oaks (*Quercus* spp.), willows (*Salix* spp.), walnuts (*Juglans* spp.), eucalyptus (*Eucalyptus* spp.), pines (*Pinus* spp.), and Deodar cedar (*Cedrus deodara*). They build the nest in the top part of the tree (Bloom 1980). Swolgaard (2004) found nests to be located on average at 79 percent of tree height (n=94). Estep (1989) found average nest height to be 81.8 percent of the average tree height (n=40). In oaks, the nest is often situated in smaller branches toward the top of the tree. In cottonwoods, willows and eucalypts it often is in a crotch of vertical branches. In cottonwoods, nests are also commonly placed atop large mistletoe clumps. Selected conifers are often ones that are very tall, frequently with the tops broken off, being flattened on top or having a large limb projecting from the side (England et al. 1995). In the Central Valley, Estep (1989) documents the mean height of nest trees in his study area at 57.7 feet and the mean height of the nest at 47.2 feet (n=40). In a study done on the Sacramento River (Moreno 1994), the mean tree height was 63.3 feet and the mean height of the nest was 50.6 feet (n=32). In northern San Joaquin County, Swolgaard (2004) found mean tree height to be 62 feet and mean nest height to be 49 feet (n=94). Mature tall trees provide extra safety from dangers below, sturdiness during storm events, and superior vantage points from which to assess potential threats and hunting opportunities.

Most nest trees are associated with riparian systems. Schlorff and Bloom (1984) found 87 percent of all Swainson's hawk's nests in the Central Valley to be associated with riparian systems. Within his study area in parts of Yolo, Sacramento and San Joaquin Counties, Estep (1989) found 78.1 percent of nest trees to be in riparian systems. This, however, is not due to any known affinity for aquatic systems by Swainson's hawks, but may reflect a relationship of superior nesting territories located adjacent to superior foraging habitat. Swainson's hawk's nests are also found well away from waterways in lone trees in fields and pastures, in trees along roadside edges, in small groves, around farm buildings, and in some urban areas.

Nest trees selected in riparian strips or groves are typically among the tallest trees in the stand and they are also situated at an edge of the stand. When in a grove, the nest tree is at the outer edge of the grove (Bloom 1980; Estep 1989). Curiously, in riparian strips a nest tree is typically on the riverside edge much more so than on the landside edge (Wilkinson and Levy 1993; Moreno 1994; Holt pers. obs.). This may be because a particular riverside tree may be taller

than other nearby trees, it may have fewer disturbances at the river's edge, or it could offer the best vantage of the surrounding territory. Nest trees can also be found in close proximity to farm buildings (Bloom 1980; Swolgaard 2004); often in large, well-established, exotic tree species or relict natives. It is likely that a tradeoff exists between the amount of extra disturbance at farm buildings versus the safety of a truly superior nesting tree. Or, it may simply be that a marginally suitable nest tree occurs in an agricultural landscape of cleared open fields that is a vastly superior territory.

Urban Nesting

Nesting in completely urbanized areas is an unusual phenomenon that has recently been discovered in some particular urban settings: 1979 in Davis (P. Bloom pers. comm.) and 1983 in Stockton (D. Yee pers. comm.). England et al. (1995), reported on a five-year study that compared urban-nesting Swainson's Hawks in Davis and Stockton with nearby rural-nesting populations. They found that urban-nesting Swainson's hawks selected nest trees that were among the tallest trees and the trees were either exotic conifers or relict native trees that existed prior to the human constructions. Conifers were particularly selected in urban landscapes: 79 percent in Davis (n=14) and 94 percent in Stockton (n=17). Nests located at the top of 80-foot deodar cedars are common in Stockton (pers. obs.). From this height the hawks have unobstructed views in all directions. England et al. (1995) offered that the preference for conifers is due to their abundance in urban settings, they are the tallest trees, and the dense evergreen foliage and radial branching pattern provide extra screening from activity below.

Urban-nesting always occurs in association with suitable foraging habitat being relatively close to the nest (e.g., Stockton and Davis are surrounded in all directions by high quality foraging habitat in suitable agricultural crops). Comparatively, both Lodi, which is surrounded by vineyards, and Sacramento, with its urban sprawl, lack urban nests (England et al. 1995). At some point the energetic demands on the provisioning male of carrying prey items long distances outweighs the energy value gained. England et al. (1995) calculated that when suitable foraging habitat is beyond five to eight kilometers from suitable urban-nesting habitat, such as in Lodi and Sacramento, urban nesting does not occur. Furthermore, England et al. (1995) reported that the reproductive success of urban-nesting Swainson's hawks was lower than rural-nesting Swainson's hawks during the same period.

Nest Territory Characteristics

Although a nest territory can include only a single tree, it more typically has multiple trees. A lookout-perch that affords a good vantage of potential threats or hunting opportunities in the surrounding area is a necessary component of a nest territory. Such a perch can often be in a tree that is not the nest tree. In alternate years, a nest might be placed in a different tree within a

nesting territory, but the same lookout-perch will be used. Multiyear studies (Wilkinson and Levy 1993; England et al. 1995) and long-term data collections (CDFG 2010) reveal that it is quite common to have alternate nesting sites within the same nest territory. This is necessary when the nest or nest tree from the previous year has been destroyed is appropriated by other raptors, or is found to be newly situated too close to a neighboring raptor's territory or to some other disturbance. The overall size of a nesting territory, as such, can vary substantially from year to year. Over the years, nest territories can dynamically shift, having differing shapes and components. Some nesting territories do remain constant, with the same nest in the same tree for many years, while others are subject to various changes on an annual basis (Holt pers. obs.; Estep pers. comm.).

Estep (1989) found that territories surrounded by preferred foraging habitats were defended more aggressively than territories surrounded by less-favorable foraging habitats. Furthermore, this suggests that a high quality nest territory and its associated foraging habitats and prey base is more important than a particular nest tree.

Nesting Density

Estep (1989) found, in four plots comprising a 374-square-mile study area in the Central Valley, the average distance between nests was 1.14 kilometers. This is the closest average spacing of Swainson's hawk nests recorded (England et al. 1997). It is attributed to riparian nesting habitat being largely contained in thin strips next to treeless agricultural fields of suitable foraging habitat, while in other parts of the breeding range conditions are more savannah-like with trees dotted throughout the foraging habitats.

Competition for Nest Territories

Selection of a poor nest site can be a factor in nesting failure. Competition exists for nest sites. Conflicts with red-tailed hawks and red-shouldered hawks, as well as white-tailed kites (*Elanus leucurus*) erupt into territorial fights over nest sites when Swainson's hawks arrive from spring migration and find a favored nest site occupied by another raptor. The Swainson's hawks begin nesting later in the year when other raptors have already selected nest sites and may be brooding eggs. Nesting raptors are not happy to be dislodged. Territorial fighting can go on for days and can include calling, swooping, stooping with talons outstretched, and even contact with strikes of sharp talons or wheeling in flight with talons interlocked. Swainson's hawks are often forced to accept a second choice in these interactions. They usually have little success evicting red-tailed hawks, but apparently fair better against white-tailed kites. Great-horned owls begin nesting months earlier and do not build their own nest. They appropriate existing raptor nests, including Swainson's hawk's nests that are left over from the previous year. Swainson's hawks have not been observed to succeed in evicting these large, predatory owls.

American crows (*Corvus brachyrhynchos*), yellow-billed magpies (*Pica nuttalli*), American kestrels (*Falco sparverius*), and western kingbirds (*Tyrannus verticalis*) often harass and mob Swainson's hawks at nest sites, but these smaller birds, while undoubtedly are annoying, have not been observed to thwart Swainson's hawks in their nest site selection.

Intra-specific competition between Swainson's hawks for nest territories also occurs, but such disputes have not been reported to rise to the level where breeding success is impacted.

Diet and Foraging

The Swainson's hawk is considered to be largely insectivorous, but breeding pairs are thought to switch to vertebrate prey due to the energetic demands of reproduction (Johnson et al. 1987). Locusts, grasshoppers, dragonflies, crickets, grubs, etc. are the major staple of the Swainson's hawk's diet (Palmer 1988; England et al. 1997). They snatch locusts and dragonflies out of the air with their talons and transfer the prey to their beaks while on the wing (Orlog *in* Smith 1980; Johnson et al. 1987; Jaramillo 1993). They hunt on the ground, sometimes running after grasshoppers and crickets (Bloom 1980; Johnson et al. 1987; Estep 1989). On their wintering grounds, Swainson's hawks are almost exclusively insectivores (Orlog *in* Smith 1980; Jaramillo 1993; Woodbridge et al. 1995b). They are known in Spanish-speaking South America as the locust hawk (aguililla de langosta) or the grasshopper hawk (aguililla de saltamontes). During migration, it is thought that they fast for much of the journey (Smith et al. 1986; Brown and Amadon 1968).

Returning spring migrants in northeastern California were measured to be eight to 14 percent lighter than adults that were weighed in July (Bloom pers. comm.).

During the nesting season dragonflies, grasshoppers, dobsonflies, crickets, etc. continue to be a part of the Swainson's hawk's diet (Grinnell et al. 1930; Bloom 1980; Johnson et al. 1987; Estep 1989). However, insects are not a primary food source for provisioning at the nest. They might be considered as just a "snack" that the male devours for himself (Estep 1989). Insects individually do not have very much caloric bulk. Instead, the male Swainson's hawk provisions its mate and offspring by switching to a variety of larger vertebrate prey. In Alberta and Saskatchewan, ground squirrels are the major prey item (Schmutz et al. 1980; Houston 1990). In Utah they have a preference for whitetail jackrabbits (Smith and Murphy 1973). In New Mexico, they prefer black-tailed jackrabbits (Bednarz 1988). In Arizona, they take a variety of lizards and snakes (Bednarz 1988). In North Dakota, the species takes pocket gophers (Gilmer and Stewart 1984). In Washington, pocket gophers and snakes are the major food items (Fitzner 1980; Bechard 1980). In northeastern California, voles and ground squirrels are a big part of the diet (Woodbridge 1985; Bloom 1980). Bird species are also a large component of their vertebrate diet everywhere (England et al. 1997). Overall, this paints a picture of the Swainson's

hawk as an opportunistic hunter that can handle a variety of vertebrate prey depending upon the prey's availability in a given region.

Hunting techniques include snatching insects out of the air or running insects down on the ground as mentioned above. The Swainson's hawk takes much of its prey while foraging on the wing over open country. This is different from the red-tailed hawk, which hunts from perches with much more frequency, and red-shouldered hawks that hunt from perches almost exclusively. Vertebrate prey is captured usually by descending upon the targeted animal from the air. Besides soaring over open country looking for available prey, Swainson's hawks also commonly will stand on the ground and wait for a burrowing animal such as a gopher to reappear at the surface to pounce upon it (Bechard 1980; Holt pers. obs.). They are everywhere noted (Woodbridge et al. 1995b; England et al. 1997) to use farm machinery as a beater as tractors mowing or plowing in fields displace small rodents, birds or insects making them easy targets as they scurry for cover. Fire and flood-irrigation also provide events when Swainson's hawks take advantage of dislodged prey (Estep 1989). Swainson's hawks appear to look for and to key on these events knowing that they will produce available prey.

SWHA Foraging Habitats

Diet

Reproductive success for the Swainson's hawk in the Planning Area is directly correlated to the adults' ability to capture and deliver sufficient prey to successfully fledge young from the nest. Key components in this success involve prey densities, prey availability, and distance to the nest site. The Swainson's hawk is an opportunistic hunter that can handle a variety of vertebrate prey depending upon the prey's availability in a given area. In the Central Valley a wide variety of prey items are taken including: small mammals, birds, reptiles, and insects; however, the California vole (*Microtus californicus*) is the preferred prey item (Bloom 1980; Estep 1989; Babcock 1995; Swainson's Hawk Technical Advisory Committee 2000; Ron Schlorff pers. comm. 2003; Joe Papp pers. comm. 2004; Holt pers. obs.). Estep (1989) found that California vole was the single most important prey item in his study areas in Yolo, Sacramento and San Joaquin counties. Eight species of mammal, including California vole, Botta's pocket gopher (*Thomomys bottae*), deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), Norway rat (*Rattus norvegicus*), California ground squirrel (*Spermophilus beecheyi*), house mouse (*Mus musculus*), and black-tailed jackrabbit (*Lepus californicus*),were found among prey remains and regurgitated pellets, with the California vole comprising 69.2 percent of all mammalian prey. Birds represented a very significant dietary component as well, with at least 15 different species found (including juvenile ducks and pheasants). Other species taken include Pacific gopher snake (*Pituophis catenifer*), western toad (*Bufo boreas*), crayfish species (*Pacifastacus* spp; *Procambarus* spp.), and numerous insects (mostly grasshoppers and crickets). J. Papp, a nest-tree climber who

bands dozens of Central Valley Swainson's hawk nestlings each year in a long term telemetry study, confirms that the overwhelming majority of prey items in nests are California voles (Papp pers. comm.). While the variety of prey species that can be taken by Swainson's hawks is important to the nesting success of many Swainson's hawks, the consensus of field biologists who have examined prey remains or pellets and observed numerous prey captures and deliveries at nest sites is that the California vole is clearly the favored prey species of Swainson's hawks in the Central Valley (Babcock 1995; Bloom 1980; Bradbury et al. *in prep*.; England et al. 1995; Estep 1989; Schlorf pers. comm.; Swolgaard 2004).

Prey Availability

The availability of prey, rather than prey densities, appears to be the most important factor for foraging success (Estep 1989; England et al. 1997). Swainson's hawks in the Central Valley are very effective at exploiting prey when that prey is made available to them due to the effects of agricultural activities such as harvesting, disking, mowing, flood irrigating, and burning of fields (Palmer 1988; Estep 1989; England et al. 1997). These activities make prey available to predation by dislodging them or reducing their cover. Estep (1989) found that 12 radio-tagged Swainson's hawks spent 52.8 percent of their observed foraging time hunting in response to these activities. He also observed that 73.4 percent of all observed prey captures were made in association with these activities (n=143). Similar observations are noted in several other studies of Central Valley Swainson's hawks (Bloom 1980; Babcock 1995; England et al. 1995; Herzog 1996; Swolgaard 2004). The dense vegetative cover that is in place during the extended growing period of a particular crop provides good rodent habitat, allowing prey populations time to increase their numbers. The rapid removal of that cover then leaves prey species suddenly vulnerable to predation by Swainson's hawks.

Agricultural Foraging Habitats

In four study plots in Sacramento, Yolo and San Joaquin Counties, Estep (1989) analyzed agricultural habitats based on 724 hours of preference data gathered on 12 radio-tagged Swainson's hawks between May 6, 1986 and September 12, 1987. He then ranked Swainson's hawk agricultural foraging habitats in descending order of importance: alfalfa, disked field, fallow, dry-land pasture, beets, tomatoes, irrigated pasture, grains, other row crops, and other. Estep (1989) also extensively trapped for small rodents in these habitats. Swolgaard (2004) did not use radio-tagged individuals, but did record 246 observations of Swainson's hawks foraging in agricultural habitats from April through August of both 2002 and 2003. His findings are generally corroborative of Estep's (alfalfa is high preference, vineyards are low, etc.). A discussion of agricultural foraging habitats ranked by Estep (1989) in descending order of preference is provided below.

Alfalfa is generally associated with the dairy industry. The process of harvesting alfalfa occurs four to seven times a year. The entire field is mowed and the cut hay is left to dry in a row. It is turned over on another day for further drying and on a later day, it is baled and removed. The field is then flood-irrigated and the whole process is repeated. Each of these activities provides a foraging opportunity for Swainson's Hawks. Swolgaard (2004) also rated irrigated hay (alfalfa) as clearly being the first preference. He observed that Swainson's hawk's foraging in alfalfa is correlated to harvest and irrigation, but further noted that there is a preference for alfalfa fields that are not in the first year of production. Alfalfa often stays in place for several years (three to seven years). This allows the population of voles and gophers to increase as the field becomes well established. After the alfalfa crop has run its course for a number of years, grains such as corn, oats, or wheat (crops also important as fodder for dairy cattle) are the most common crops that will be planted in that field for a few years before alfalfa is planted again.

Disked fields are fields in a temporary state of dormancy and are between crops. They constitute a small portion of the total amount of agricultural habitats that may be available at any one time. Because they lack vegetative cover, they also lack significant numbers of small rodents. Estep ranked them highly because it was a daily activity for some Swainson's hawks to spend time running down grasshoppers and crickets in these fields.

Fallow fields make up a rather small amount of total agricultural habitats. Unlike disked fields they have significant weedy vegetation and therefore have significant rodent populations. Swolgaard (2004) observed that 76 percent of foraging observations in this habitat were when machinery was removing vegetation.

Dry pasture is largely comprised of annual grasslands and is grazed primarily by cattle during some part of the year. A large portion of the Swainson's hawk's historical habitat is believed to be similar to this current habitat, although the prey species, their abundance, and availability are likely quite different today as introduced grasses and forbs and introduced grazers now dominate this habitat. Therefore, direct comparisons with historical conditions should be considered with caution. Estep's relatively high ranking of this agricultural habitat was based largely on two radio-tagged hawks that had nests immediately adjacent to this habitat. Therefore, they used dry pasture regularly during foraging. These same individuals were observed to use other habitats opportunistically in response to farming activities. The reverse was not observed. Swainson's hawks with nests not adjacent to dry pasture did not utilize dry pasture for foraging. Swolgaard (2004) observed Swainson's hawks foraging in this habitat, but noted that its frequency of use was lower than expected based on its availability

Sugar beets (which are no longer in production in Sacramento County) and tomatoes have been observed as a foraging habitat, but only for a short time when they are being harvested. Sugar beets were an important foraging habitat for Swainson's hawks because they could be

harvested at different times of the year, resulting in staggered availability throughout the nesting season. Tomatoes, on the other hand, are harvested beginning in late July. The main harvesting period therefore occurs from late summer into autumn. Swainson's hawks are largely finished with nesting as the tomato harvest begins; however, tomato fields are observed to be important foraging habitats for fledglings and pre-migratory adults (Anderson et al. in progress; Holt pers. obs.). First-year mortality in Swainson's hawks is undoubtedly high and migration is a perilous journey. Therefore, tomato fields have important value for Central Valley Swainson's hawks immediately after nesting. Irrigated pasture is occasionally used for foraging. Estep (1989) noted use during periods when the pasture was being irrigated. Swolgaard (2004) observed use when the vegetative cover was at its lowest (grazed).

Grains include wheat, oats and rice. Wheat is a common crop in the Central Valley and Planning Area where it is typically planted in fall and harvested in the spring. Both Estep (1989) and Swolgaard (2004) observed limited foraging in wheat. Furthermore, foraging in this crop occurred primarily during or immediately after harvest. Estep trapped in harvested wheat where he found relatively low numbers of house mouse and deer mouse. Estep observed no foraging in rice fields.

Corn and sunflower are the main component of "other row crops." Estep (1989) considered that the low preference for foraging in these crops is a feature of these crops' attaining a vegetative height that excludes Swainson's hawks. Swolgaard (2004) also observed a low preference for foraging in these habitats. Estep trapped relatively low numbers of deer mouse in cornfields in early summer. However, as in other agricultural habitats, rodent populations build up during the growing season in cornfields. During the beginning of harvest, in September and early October, just prior to southern migration, Swainson's hawks take advantage of the foraging opportunity that corn harvesting offers (Herzog 1996; Holt pers. obs.). Therefore, corn and sunflower crops have some limited value to foraging Swainson's hawks. Also, when taken in combination with other foraging habitats that are rotated on a regular basis (wheat, oats, hay, tomatoes, alfalfa, disced field, etc.), the value of corn and sunflower acquires some added value as a piece in the over-all mosaic of suitable foraging habitats. Lastly, the small population of Swainson's hawks that winter in the Sacramento – San Joaquin Delta forage for small rodents (mainly house mouse) almost exclusively in harvested corn and sunflower fields (Yee pers. comm.; Holt pers. obs.; Herzog 1996).

Other is a category where Estep (1989) groups various infrequently used habitats. Taken collectively these are the lowest ranked habitats and either have very low prey populations or are inaccessible to Swainson's hawks. These habitats include lawn, riparian vegetation, vineyards, orchards, residential areas, oak woodland, asparagus, onions, parks, golf courses, and edge habitats. It should be noted that Estep (1989) trapped a rather high rodent population, primarily house mouse and western harvest mouse, in edge habitats. Swolgaard (2004) grouped edge

habitats differently and included them in a category he termed Ag-urban. His Ag-urban habitats included roadside edges, median strips, weedy lots, railroad right-of-ways, canal levees, and margins along a local airstrip. Swolgaard observed these areas to be used for foraging in disproportion to the small amount of area they covered in his study area. Furthermore, most foraging occurred when these edges were being mowed. Swolgaard noted that Estep had trapped rodents in high densities in edge habitats and cited references documenting voles using road edges as habitat corridors and dispersal routes (Getz *et a*l. 1978; LaPolla and Barrett 1993). Therefore, it may be appropriate to consider edge habitats separately because they may have value as prey refugia and corridors connecting agricultural habitats.

Common agricultural habitats in the Central Valley that are not thought to provide much, if any, foraging opportunities for Swainson's Hawks include safflower, orchards, cotton, vineyards, and rice (Bloom 1980; Estep 1989; England et al. 1995; Babcock 1995).

The purpose of Swolgaard's study (2004) was to determine habitat use by Swainson's hawks in the lower Mokelumne River watershed, an area in northern San Joaquin County adjacent to the Planning Area. The study area supports extensive viticulture. Swolgaard cites vineyard acreage increasing in this study area by 54 percent during the period 1987 to 1997 (DWR 2002). Swolgaard found that foraging by Swainson's hawks does occur in vineyards; however, statistical analysis of habitat selection revealed that foraging in vineyards occurred less than would be expected by random choice. It was evident that Swainson's hawks did not select for vineyards, and that foraging occurred in vineyards perhaps only by members of pairs whose nest trees are in areas that have now become surrounded by vineyards. Foraging was also observed disproportionately at edges of vineyards and along interior road edges of vineyards.

In summary, Swainson's hawks forage successfully in a variety of agricultural habitats. Alfalfa is the crop that provides the highest foraging due to high prey densities and regular harvesting and irrigation that make prey available for capture. However, a variety of suitable agricultural habitats also provide valuable foraging habitats at differing times and for different prey species during the period of time when Swainson's hawks are in the Planning Area. This mosaic of suitable foraging habitats that provides the best opportunity for regular and successful hunting during the nesting season.

Home Range Size

The home range (total area utilized during the nesting period) for Swainson's hawks in the Central Valley is reported as larger than for Swainson's hawks in general (England et al. 1997). Estep (1989) found mean home ranges to be 6,818 acres, while Babcock (1995) plotted 9,978 acres as the mean home range in his study area in eastern Yolo County. These large-sized home ranges are due to the fact that the best agricultural foraging habitats are fragmented. Estep

(1989) and Babcock (1995) both observed Swainson's hawk home ranges to expand to include distant agricultural foraging areas when prey availability was superior at more distant locations. During periods of low prey availability, radio-tagged male Swainson's hawks were recorded to travel as far as 17 miles (Estep 1989) and 18 miles (Babcock 1995) from a nest to exploit more favorable agricultural foraging opportunities. Although at these distances, it was observed that prey items were consumed in the field and not transported back to the nest, likely due to the excessive energy demands required to do so (Estep 1989; Babcock 1995). England et al. (1995) discovered that urban nests, which are in some cases completely surrounded by unsuitable foraging habitat, must have suitable foraging habitat within three to five miles from the nest tree to successfully fledge young (England et al. 1995). Furthermore, urban nest sites typically fledged fewer young than non-urban nest sites.

Nest-site Selection

In the Planning Area nest-site selection is strongly correlated to alfalfa and row and field crop agricultural habitats. Almost all Swainson's hawk nesting sites are located in portions of Sacramento County where irrigated pasture, hay, grain and field crops are being cultivated even though suitable nesting habitat exists elsewhere in the county. For example, there are large cottonwood trees on numerous streams on the eastern side of the Planning Area, there is nesting habitat in the older urbanized areas of the county, and there are unused trees on Delta islands. However, Swainson's hawks are rarely selecting nesting sites in these areas. In each of these situations, the failure to select nesting sites in these areas appears to be related to the lack of nearby suitable foraging habitat throughout the entire nesting season.

Vineyards in the Planning Area are fragmented in distribution and have only recently been converted from other crop types in the last two decades. Viticulture has increased in Sacramento County by 263 percent during the period 1987 to 1997 (DWR 2002). Swolgaard (2004) found that Swainson's hawks do not prefer nest-sites in vineyard habitats; however, the species' avoidance of vineyards is not as strong in some nearby portions of the species' range (e.g., the Lodi area in northern San Joaquin County where vineyards have been a regular part of the landscape for more than 50 years).

Agricultural Foraging Habitat Crop Rotations

Swainson's hawk nest-site selection is strongly correlated to suitable agricultural habitats. The most favored agricultural foraging habitats: alfalfa, row, and field crops are usually planted in cyclical rotations, changing from one field to another in one year to the next, or as with alfalfa, the crop stays in one place for four or five years before it is then removed. For example, a field with hundreds of acres of suitable foraging habitat can be planted with a crop that is largely unsuitable for foraging the next year. Nonetheless, Swainson's hawks often show strong nest-

site fidelity and return to the same nest territory year after year. The landscape that they return to may be different each year due to crop rotations and conversions. Within the several thousand acres typically associated with a home range/nest territory, it is likely that multiple suitable agricultural habitats will be present within any given year and high quality foraging habitat will occur somewhere within the territory at all times during the nesting season due to differences in planting, irrigation, and harvesting schedules (i.e., activities that make prey available in high numbers).

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for Swainson's hawk are identified in Table G-3.22.1 and have been derived from input from local species experts.

Table G-3.22-1. Habitat Elements for Swainson's Hawk

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak savanna, cropland, irrigated pasture grassland, valley grassland.	Valley grassland and open agriculture, especially alfalfa, irrigated pasture, or other field or row crops that support rodent populations and are managed such that the rodents become available through activities such as flood irrigation and harvesting.
Nesting	Blue oak savanna, blue oak woodland, mine tailing riparian woodland, valley oak riparian woodland, and mixed riparian scrub.	Mature trees for nesting (approx. 50 feet) near (less than five miles) foraging habitat. Generally includes isolated trees adjacent to foraging habitat.

SWHA Species Distribution and Population Trends

SWHA Breeding Range

The Swainson's hawk's breeding range is distributed over much of western North America: in the south from Sonora, Chihuahua, Durango, Coahuila, and Nuevo Leon, Mexico north to Alberta, Saskatchewan and Manitoba, Canada; east to Minnesota, Iowa, Kansas, Oklahoma, and Texas,; and west to coastal valleys in Washington and British Colombia. Disjunct populations occur in Missouri, northern British Columbia, and the Central Valley of California, and possibly Yukon and Alaska (Palmer 1988; England et al. 1997; Howell and Webb 1995).

SWHA Boreal Winter/Austral Summer Range

The winter range during the Austral summer in South America is primarily known to be northern Argentina, Paraguay, Uruguay, and southern Brazil (Palmer 1988; England et al. 1997). However, knowledge of South American distribution is incomplete. Human alteration of

habitats (clearing of forests and subsequent increases in cattle pasture and cultivation) throughout South and Central America may provide suitable habitats that may now be utilized in areas not historically known to have Swainson's hawks. Orlog (*in* Smith 1980) and Jaramillo (1993) reported large concentrations of Swainson's hawks in Argentina where flocks were composed almost entirely of juveniles. This suggests that the population is segregated by age class on the wintering grounds and that the juveniles continue to the southern extreme of the winter range (Palmer 1988; Jaramillo 1993). Orlog (*in* Smith 1980) reports that locust swarms are being reduced by pesticides, and that this could be resulting in Swainson's hawks wintering further north.

SWHA Wintering in North America

Some migration dropouts and stragglers have been noted in Boreal winter in southern Florida where it is thought that they are primarily wayward juveniles that cannot manage the over-water crossing further south (Browning 1974). In addition, scattered winter records are noted from Mexico and Central America (Howell and Webb 1995). Observations and telemetry data (Bradbury et al. in prep) have recently documented the presence of a wintering population based primarily in western Mexico, southern Mexico and Central America. Also, a small population, never observed to exceed 30 individuals (Holt pers. obs.), has recently wintered in the Sacramento – San Joaquin River Delta of California (Herzog 1996). While the breeding origins of many Mexican-wintering Swainson's Hawks are now know to be the Central Valley of California, it is also thought that the Mexican wintering population is also comprised of Swainson's Hawks from other parts of the breeding range (Bradbury et al. in prep; Holt pers. obs.).

SWHA Wintering Locations of the Central Valley Breeding Population

The Swainson's hawk population which breeds in the Central Valley of California is now known to have significantly different wintering areas and migration routes than the main population (Bradbury et al. in prep.). In a study that successfully tracked 17 Central Valley-breeding Swainson's hawks with satellite telemetry devices, it was discovered that eight individuals spent the winter in Mexico, one wintered partly in Mexico and partly in Central America, three wintered in Colombia, four wintered in northern Argentina and southern Bolivia, and one wintered in northern Mexico and then returned to the Sacramento–San Joaquin River Delta in the Central Valley in mid-January (Bradbury et al. in prep.). Those birds that did go to northern Argentina/southern Bolivia were still well north of the known wintering areas of the main Swainson's hawk population (Jaramillo 1993; Woodbridge et al. 1997). Wintering in western Mexico (Sinaloa, Nayarit) should be considered to be a recent phenomenon as the areas where foraging now occurs have only been cleared for agricultural production in the past four decades and had previously been extensive thorn forest, a habitat that would not provide any opportunities for Swainson's hawk foraging (Bradbury et al. in prep.). It appears that the habitats in Central America and South America where Central Valley Swainson's hawks have

been discovered to be wintering are likewise landscapes that have been altered by clearing and agricultural cultivation at least within the past century.

SWHA Nesting Distribution in the Central Valley

Swainson's hawk nesting data in California has been compiled by the CDFW since 1979. Data sources used by the CDFW include the following: 1) CNDDB (CDFG 2010), 2) records supplied by Ron Schlorff of the CDFW Non-Game Division, and 3) Swainson's hawk census data obtained by CDFW Region II biologists in 2002 and 2003 (Gifford pers.comm.). Nesting in the Central Valley occurs throughout the valley, extending from Tehama County in the north to Kern County in the south. However, the population is largely concentrated in the middle of the valley in a semi-circle around the Delta, primarily in Yolo, Solano, Sacramento, and San Joaquin counties. Roughly 60 to 65 percent of the statewide population and 70 to 75 percent of the Central Valley population occurs in this latter area. This distribution pattern conforms broadly to the distribution of agricultural habitats in the valley that are suitable for foraging. While alfalfa, irrigated pasture, mixed row, and field crops are found throughout the valley, they are broadly concentrated in those same areas where nesting Swainson's hawks are shown to be concentrated. Vineyards, cotton, orchards and dry native scrub dominate the landscape in the southern end of the valley, while rice and orchards are the dominant crops in the northern end of the valley.

SWHA Nesting Distribution in the Planning Area

In the Planning Area, there are 109 records documented in the CNDDB (CDFG 2010). This number includes some duplicate records of the same nesting territory in different years. There are an additional 49 nest-sites recorded in surveys conducted in 2002 and 2003 by CDFW Region II field biologists. This data has been collected as part of a larger census effort that samples randomly selected blocks throughout the entire Sacramento Valley. This data also includes some duplicates of previously recorded nesting territories. Finally, there is an additional set of seven nest-sites along Dry Creek on the County line that have been culled from Craig Swolgaard's study in 2002-2003. Compiled together, these data points depict the approximate nesting distribution of Swainson's hawk in the Planning Area. Figure SWHA-1 illustrates the distribution of known Swainson's hawk nest sites within and adjacent to the Planning Area as recorded in the CNDDB (CDFG 2010) as well as other sources (ebird.org 2005-2010; Estep 2006, 2007; Gill Ranch Survey 2003).

Swainson's hawk nest territories are aggregated in the south-central part of the county and river bottom lands associated with the Cosumnes River, Deer Creek, and Dry Creek. Swainson's hawks also nest in some urban areas and the dry annual grassland on the east side of the county, albeit in very low numbers.

SWHA Population Levels and Trends

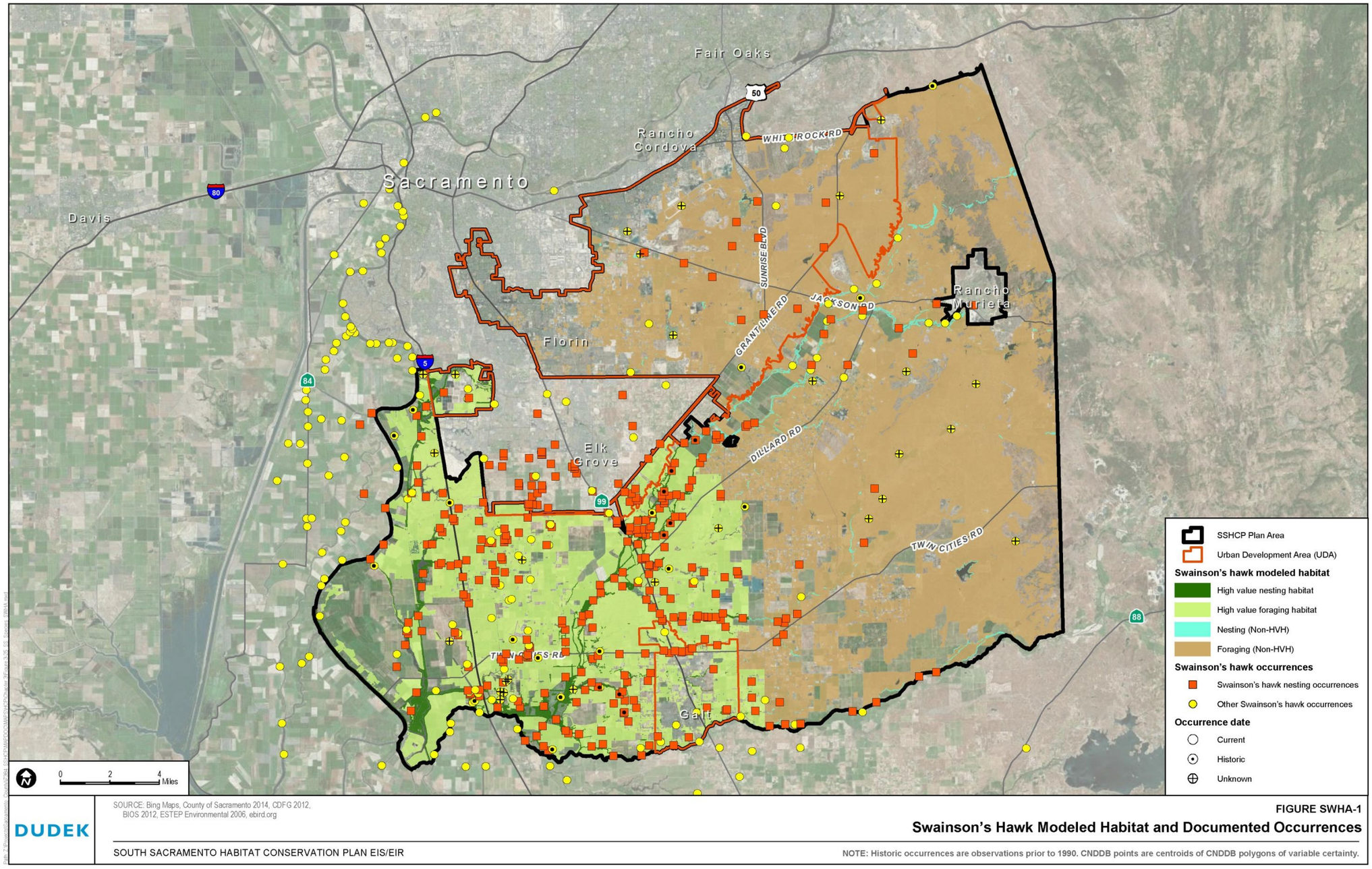
SWHA Range Wide Population Estimate and Trend

Historical population estimates for Swainson's hawk are non-existent. However, comments from several observers mention that the Swainson's hawk was abundant in western North America in the nineteenth century (Palmer 1988; England et al. 1997). By the end of the nineteenth century and well into the twentieth century, observers were noting that Swainson's hawks were becoming less common (Palmer 1988; England et al. 1997). Serious declines in Swainson's hawk numbers continue to be reported in California (Grinnell and Miller 1944; Walton 1978; Bloom 1980), Nevada (Heron and Lucas 1978), southern Saskatchewan (Houston and Bechard 1983), and southeast Oregon (Littlefield et al. 1984).

Recent estimates of the total population of Swainson's hawks are widely disparate and range between 300,000 (Palmer 1988) and 1,000,000 (Clark and Wheeler 2003). England et al. (1997) state that no comprehensive estimate of population has been calculated for the species. Migration period counts over single points in Panama and eastern Mexico in the last 25 years vary from as high as 845,465 to as low as 175,644. Unfortunately, different count methodologies have been employed in different years, resulting in the inability to meaningfully compare the data (England et al. 1997).

In Canada, serious declines in reproductive success have been reported (Houston and Schmutz 1995). It is likely that differing pressures upon local populations in different regions of the species' range result in an uneven trend with regard to the species range wide population status.

Figure SWHA-1 Swainson's Hawk Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, BIOS 2012, ESTEP Environmental 2006, ebird.org

DUDEK

FIGURE SWHA-1

Swainson's Hawk Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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SWHA California and Central Valley Population Estimates and Trend

Grinnell and Miller (1944) provide the following remark in regards to Swainson's hawks in California "Formerly abundant, but now (1943) greatly reduced in numbers and in extent of breeding range, as a result of human influences." Small (1994) states that a "drastic decline for the species in the far west began in the 1930's, accelerated through the 1940's, the 1950's and into the early 1960's. In the 1970's and 1980's, the population remained at a fairly constant but diminished level. Sporadic migratory flocks of 100 to 300 are still occasionally reported, and large summer feeding concentrations of non-breeders (numbering up to 150) have recently been found in the mid-Central Valley. ." Bloom (1980) undertook an analysis of the Swainson's hawk in California. He reviewed historical records and egg collections in order to estimate the historical distribution, and found that the current range had been reduced drastically from its historical extent. Historical records indicate a past existence of breeding populations in appropriate habitat in most of California's bioregions, including the Southern Transverse Ranges, Central Coast Ranges, Central Valley, Great Basin, and Mojave-Colorado Desert. Small populations were documented to have been in Owens Valley, Shasta Valley, and Sonoma County. Unfortunately, historical records typically describe single nest trees and do not support conclusions about the size of local populations.

Bloom (1980) addressed this problem by extrapolating known densities per area of suitable habitat to larger unsurveyed areas. Thereby, he estimated a total statewide historical population to be between 4,284 to 17,136 breeding pairs. Bloom thought that the exact number probably fell somewhere in between those extremes. Bloom (1980) compared the minimum number with his 1979 statewide survey estimate of 375 pairs. Thus, a minimum 91 percent decline was calculated. Bloom (1980) also estimated an historical population in the Central Valley between 1,656 to 6,624 breeding pairs. Thus, using his 1979 population estimate of 280 breeding pairs for the Central Valley, the inferred decline for that region would be a minimum of 83.1 percent.

Hand in hand with the significant reduction in population, an enormous reduction in the former breeding range in California was documented (Bloom 1980). Historical populations have been extirpated from virtually all of Southern California, including: coastal valleys, the Mojave and Colorado Deserts, Transverse Ranges, and Santa Catalina Island. Coastal valleys of Central California (Livermore, Salinas, Sonoma) also no longer have breeding populations of Swainson's hawks. Bloom (1980) states that because of the Central Valley population size and distribution, it probably functions as the nucleus of recruitment into the other areas historically occupied in the state, with the probable exception of the Klamath Basin. Therefore, it is likely that recovery of populations in these areas outside of the Central valley is dependent upon a healthy Central Valley population.

Bloom's Central Valley population estimate of 280 pairs (Bloom 1980) was revised to 430 pairs in 1989 after further survey work (CDFG 1993, 1994). This increase in numbers was attributed to an increase in survey intensity rather than an increase in real numbers. Subsequent survey work in the Central Valley in the 1990's was never coordinated nor completely compiled. Therefore, no new calculation of population estimate was derived. The Swainson's Hawk Technical Advisory Committee (2000) estimates that there are as many as 900 pairs in the Central Valley. This is a reasonable guess; however, it is not possible to arrive at an accurate number without comprehensive surveys Nine hundred pairs are well short of Bloom's estimate of 1,656 to 6,624 historical pairs for the Central Valley. However, the reported increases in numbers could mean that the downward trend may have abated. Swainson's hawks are a relatively long-lived species. Thus, their longevity can have a masking effect on true population trends, particularly when relying on patchy and incomplete data. Therefore, estimates of current population trends are perhaps not prudent without more complete long-term data on population and reproduction.

SWHA Planning Area Population Estimates and Trend

In 1979, Bloom (1980) estimated the then current population between the Cities of Stockton and Sacramento, to be 75 pairs. In 1993, all of Sacramento County had 49 documented active pairs (CDFG Raptor Records Database). The CNDDB has 109 separate nesting records for Swainson's hawk in the Planning Area from the period between 1979 and 2010. This number is a compilation of data from several sources and does not reflect an accurate population estimate for the Planning Area. Earlier CNDDB records from 1979 through 1984 do not usually record a nest-site, but merely are an observation of a Swainson's hawk. Data from CDFW Region II census efforts in 2002 and 2003 accounts for 49 nest-sites, while Swolgaard's study in 2002-2003 of northern San Joaquin County includes seven nest sites along Dry Creek. Both of these efforts involve some duplication of records over the two-year periods. In addition, both studies surveyed only portions of the Planning Area. Therefore, it is not possible to estimate the number of nesting Swainson's hawk pairs is in the Planning Area based on the available data. Therefore, population trends for the area cannot be assessed at this time.

SWHA Threats to the Species

In general, settlement in both North and South America has brought with it a myriad of changes that have consequentially altered the environment that Swainson's hawks live in. To a large extent, vegetative cover types have undergone significant changes: clearing of land, cultivation of agriculture, new grazing regimes (fencing, sheep and cattle). These activities foster changes in plant species diversity and abundance (including invasive exotics) and subsequently affect prey-species composition and availability. Extirpations or extinctions of numerous prey species, such as the Rocky Mountain Locust, or the introduction of exotic prey species, such as house

mouse, undoubtedly has affected Swainson's hawks in ways that will never be entirely known. The rangewide decline in Swainson's hawk numbers is something that was likely the result of a multitude of factors and will never be entirely understood.

Within California, Bloom (1980) documented a dramatic statewide decline in the Swainson's hawk population, and subsequent reduction of the breeding range. The reasons for this decline are again not completely understood. Bloom (1980) discussed habitat destruction, pesticide poisoning, and direct shooting as all contributing to the decline.

SWHA Elimination of Nesting Habitat

Smith (1977) estimated that 98.5 percent of the Central Valley's riparian forest had been eliminated largely by flood control and irrigation projects. Katibah (1981) estimated that 94 percent of riparian forest in the Central Valley had been removed and that the vast majority of the remaining habitat was disturbed, degraded or otherwise impacted by human activities. Schlorff and Bloom (1984) found 87 percent of all Swainson's hawk nests in the Central Valley to be associated with riparian systems. Estep (1989) found 78.1 percent of nest trees to be in riparian systems. With regard to this loss of nesting habitat, Schlorff and Bloom (1984) state that if "species such as the Swainson's hawk are to survive, the trend of destruction must be reversed."

Nest trees that are not in riparian systems such as roadside trees exist only in so far as they are "out of the way." With continued increases in vehicle traffic, roadways everywhere are being widened or otherwise improved. These projects often result in the removal of numerous trees that may be suitable nesting sites for Swainson's hawk. Some relict trees in lone agricultural fields die every year and are never replaced. Lone trees in grazing pastures are also disappearing. They are not being replaced when they die or are cut down. Recruitment of new trees is hampered by continued heavy grazing which removes seedlings. Also, lowered ground water levels, due to over-drafting of underground aquifers, can also hamper recruitment.

SWHA Elimination of Foraging Habitat

Loss of foraging habitat is perhaps the most serious threat to Swainson's hawks. Urbanization has removed large areas of historical habitat. Incompatible foraging crops (cotton, rice, orchards, vineyards, etc.) are dominant in much of the Central Valley. Large areas of former foraging habitat have been completely removed and are now highly urbanized landscapes. This is particularly true in Southern California where entire valleys no longer have any remaining suitable habitat.

Bloom (1980) notes that Swainson's hawks have also disappeared from areas (e.g., Central Coast Ranges) that have not been transformed by excessive urbanization. Therefore, he

concludes that "habitat destruction, although a serious threat to the remaining population, does not appear to be the complete answer."

SWHA Poisoning

Bloom (1980) considered pesticide poisoning to be a threat to Swainson's hawks during migration passages or on their wintering grounds where pesticides use is not as well regulated. The Swainson's hawk's reliance on relatively short-lived terrestrial mammalian prey during the breeding season in North America, could induce a build up of pesticide residues to levels where eggshell thinning could affect reproduction (Henry and Kaiser 1979). Bloom thought that if Swainson's hawks from particular breeding areas all migrated via the same routes and all went to the same wintering areas, then they could all be vulnerable to the same threats during that journey. This could explain why Swainson's hawks are declining or have been extirpated from entire areas of their former breeding range.

Difficulties with insecticide poisoning in Argentina was suspected by Orlog (*in* Littlefield et al*.* 1984). The mass mortality of Swainson's hawks in Argentina resulting from direct organophosphate poisoning was discovered by Woodbridge et al. (1995b). Organophosphate chemicals were apparently being sprayed from tractors coursing across sunflower, corn, and alfalfa fields to control grasshoppers. Swainson's hawks, being attracted to the grasshoppers and field machinery, were found to have been mortally affected after being directly sprayed by the chemical or ingesting heavily contaminated insects. In 1996 approximately 5,000 dead Swainson's hawks were observed in Provincia de La Pampa with an estimated total kill of 16,000 to 20,000 (Goldstein et al. 1996). Additional mortality events of lower magnitude were reported in 1997 and 1998 (Woodbridge 1998; Rich et al. 2004). Education programs and restrictions on use of highly toxic pesticides have since dramatically reduced mortality of wintering Swainson's hawks (Woodbridge 1998).

Existing satellite telemetry data for Central Valley Swainson's hawks (Bradbury et al*.* in prep.) found no individuals wintering in areas where pesticide poisoning has been discovered. Also, band recoveries of deceased Swainson's hawks in Argentina did not include any from individuals banded in the Central Valley. The majority (13 of 17) of Central Valley Swainson's hawks that were tracked by satellite wintered north of the equator where the timing of farming operations (and assumedly pesticide applications) is different than in Argentina. The months when Swainson's hawks from the Central Valley are in Mexico is the winter season, a time when insecticides are generally not being applied (Bradbury pers. comm.; Holt pers. obs.). Therefore, the evidence indicates that Swainson's hawks from the Central Valley are not involved in the poisonings in Argentina. Furthermore, there is no evidence that Swainson's hawks from the Central Valley are involved in similar pesticide poisoning elsewhere.

SWHA Direct Shooting

Shooting of Swainson's hawks is something that has been widely reported in North America (Cameron 1913; Gabrielson and Jewett 1970; Palmer 1988) and in migration (Bloom 1980). Swainson's hawks were thought to be killers of chickens and even lambs and calves. Therefore, Swainson's hawks were routinely shot out of the air and at nest sites. Bloom (1980) points out that in California, in large areas of the Swainson's hawk's former range (Central Coast, Mojave Desert, southern San Joaquin Valley, etc.), red-tailed hawks and red-shouldered hawks continue to exist in fairly large numbers. Both of these species were persecuted as well by the same riflemen, however, both continue to exist in areas where Swainson's hawks no longer are found. Bloom (1980) reasoned that it is likely that shooting on the breeding grounds, therefore, is not the prime reason for the species' extirpation in those areas. Shooting could be a problem on migration routes or at winter roosts. Roost sites and mountain passes in particular are locations where Swainson's hawks are vulnerable to shooters. Information concerning Swainson's hawks in Central and South America is inadequate to assess the magnitude of this problem.

SWHA Threats within the Planning Area

Within the Planning Area, the loss of foraging and nesting habitat are the prime threats to the species. Loss of roadside nest trees and lone trees in agricultural fields and pastures, as mentioned above, should continue to be a challenge. Future flood control projects, spurred by increased human population, will pose threats to riparian nesting habitat. For instance, seven miles of trees along the south bank of the Mokelumne River (on the boundary of the Planning Area) were removed in the mid-1990's for flood control purposes. Mitigation for this long linear reach of nesting habitat, that undoubtedly held several nest trees was all placed in one 20-acre grove – a tree stand that would likely support only one nest territory. Urbanization threatens to remove both nesting habitat and foraging habitat. The Cities of Elk Grove, Galt, and Rancho Cordova, and the County of Sacramento are all expected to continue to grow and affect existing habitat for the species.

Agricultural conversions from one crop to another are not regulated and are difficult to track. Crops, be they compatible foraging habitat for Swainson's hawk or not, are planted on the basis of whether a farmer can profit from the activity. Cropping patterns from 50 years ago were likely different from what they are today. For example, major changes that have greatly affected Swainson's Hawks are the complete loss of sugar beets as a foraging habitat and the recent dramatic increase in vineyards. In Sacramento County, vineyards have increased in acreage by 263 percent in the period 1987 to 1997 (DWR 2002). This trend may have slowed, but there is no certainty in regards to what crops will be profitable to grow in the future.

Another matter of concern is the low reproductive success of Swainson's hawks in the Central Valley compared to other North American regions. Data from England et al. (1995), England et al. (1997), and Swolgaard (2004) compare multi-year studies of reproductive performance from differing regions of the Swainson's hawk's breeding range (Table 2.22-2). An average of 17.34 percent fewer chicks fledged from successful nests in studies that were done in the Central Valley versus the chicks fledged per successful nest in studies done in other areas of the Swainson's hawk's breeding range.

Table G3.22-2. Reproductive Performance of Swainson's Hawks in Various Populations

Location	Years of study	Number of nesting attempts	% successful nesting attempts	# chicks/ successful nest	Source
SE Washington	3	48	81.3%	1.85	Fitzner 1978
NE Colorado	3	119	54.6%	2.18	Olendorff 1973
SE Alberta, Canada	3	153	71.2%	1.98	Schmutz 1987
SE North Mexico	3	36	81.0%	1.94	Bednarz 1988
Saskatchewan, Canada	22	2031		1.91	Houston and Schmutz 1995
NE California	11	454	65.5%	2.24	Woodbridge et al. 1995a
Yolo County, California	5	492	82.1%	1.64	England et al. 1995
San Joaquin County, California	5	60	80.0%	1.73	England et al. 1995
Central Valley, California	2	69	83.5%	1.42	Estep 1989
Central Valley, California	2	31	54.8%	1.50	Holt *in*: Swolgaard 2004

Six studies outside of the Central Valley have a combined average of 1.96 chicks fledged per successful nest. While four combined studies within the Central Valley have an average of 1.62 chicks fledged per successful nest. This data is spread over a 28-year period, collected independently by differing investigators, and is sufficient to illuminate that there is a low rate of chicks fledged per successful nests for Central Valley Swainson's hawks. Nests with four chicks fledged are not unusual outside of the Central Valley (Brown and Amadon 1968; Palmer 1988; England et al. 1997), but in the Central Valley four chicks fledged in a nest is very rare. No such nest has been documented in the Planning Area, but at least one has been observed near Tracy, California in 1999 (Holt pers. obs.).

SWHA Data Gaps and Conservation Implications

A thorough understanding of the demographics of the population within the Planning Area would provide at least two important sources of information that could then be used to develop a more effective conservation strategy for the species: 1) age structure of the population; and 2) reproductive performance. This information would provide an opportunity

to understand whether the species is still in decline in the area or has stabilized, albeit at a low population. The information might also provide insight into how much exchange is occurring with other adjacent populations outside the Planning Area. It could provide information on whether effective recruitment is occurring from the reproductive pairs that occur in the Planning Area (and if not…how that may be related to available habitat).

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NORTHERN HARRIER (NOHA)

Northern Harrier (NOHA)

(Circus cyaneus)

Status USFWS: None

Status CDFW: Species of Special Concern

NOHA Listing Status

Northern harrier (*Circus cyaneus*) is legally protected under the federal Migratory Bird Treaty Act (16 U.S.C. 703-712) and California Fish and Game Code (Sections 3503.5 and 3800). This

species is designated as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW) (Shuford and Gardali 2008).

NOHA Life History and Ecology

NOHA Species Description and Life History

Physical Description

Northern harrier is a long-winged, long-tailed hawk with a distinctive white rump patch in both sexes. Individuals have an "owlish" appearance in the face due to a facial ruff or disk. The male has a pale gray back, head, and breast, with black wing tips. Female and subadult northern harriers are brown on the back and are streaked on the breast. The juvenile coloring has a rusty tone. Northern harrier has a distinct flying style with its wings held in a shallow "V." It is usually observed gliding unsteadily (e.g., tilting) and low over grasslands and marshes (MacWhirter and Bildstein 1996).

Taxonomy

Two subspecies of *C. cyaneus* are recognized: *C. c. hudsonius* and *C. c. cyaneus*. North American birds belong to *C. c. hudsonius*, a large subspecies (Cramp and Simmons 1980), while *C. c. cyaneus* occurs in Eurasia (MacWhirter and Bildstein 1996).

Reproduction

Northern Harriers are primarily monogamous; however, polygyny also occurs. The frequency of polygynous males is positively correlated with local prey abundance (Simmons et al. 1986; Ehrlich et al. 1988). Northern harriers reach sexual maturity at one to two years of age (Martin 1987), and females are more likely to breed during their first year than males; however, first-year males are more likely to breed in years when vole (*Microtus* spp.) abundance is high (Hamerstrom et al. 1985).

The breeding season for Northern harrier is generally late March through mid-September, although breeding is sometimes initiated earlier. Males arrive on the breeding grounds before females, typically in March or April. Pair formation likely occurs on the breeding grounds (Hamerstrom 1986). Courtship usually begins in March or April, followed by nest site selection and construction. Both sexes may select the nest site (Hamerstrom 1986; Simmons et al. 1987), and both sexes engage in nest construction. Adult northern harriers are primarily nomadic and exhibit low fidelity to breeding sites (Hamerstrom 1969; Burke 1979; MacWhirter and Bildstein 1996). When northern harriers do return to general nesting areas over consecutive years, they usually do not return to the same specific nest site (Breckenridge 1935; MacWhirter 1985).

Northern harriers nest on the ground in open, vegetated habitats such as grasslands, wetlands, and agricultural fields. Nests are typically built in dense, tall vegetation in areas that are undisturbed during the nesting period; and nest sites are often in wet areas. Nests are bowls or platforms constructed with vegetation (e.g., grasses, forbs). Northern harriers often construct platforms below the nest using sturdy vegetative material (e.g., cattails), to elevate the nest, particularly in wet areas. Nest construction typically lasts between seven to 14 days. Egg-laying can occur in early April through July, but peaks in late April through early July. The female lays four to nine eggs (five is normal); eggs are laid 2–3 days apart. The female incubates the eggs for 30 to 32 days, while the male delivers food to the female. Hatching usually occurs from April through June, and peaks in May–June. Fledging occurs 30 to 35 days later. Both parents feed the young (Hamerstrom et al. 1985, Ehrlich et al. 1988). Fledged juveniles remain near the nest site and are fed by the parents for approximately 2–4 weeks, when the family group disperses (Bildstein 1992; MacWhirter 1994; MacWhirter and Bildstein 1996). Northern harriers typically produce one brood per season, but will produce a second brood if the first clutch fails during egg-laying or shortly thereafter (Simmons 1984).

Several studies have reported nest success (i.e., percentage of clutches with ≥ 1 young fledged) for northern harrier populations in North America. Nest success ranged from 18 to 79 percent in 12 studies (MacWhirter and Bildstein 1996). Loughman and McLandress (unpubl. data, *cited in* CPIF 2000) estimated nest success for four regions in California between 1987 and 1992. In the Sacramento Valley, San Joaquin Valley, Suisun Marsh, and northeastern California, nest success was 18 percent (n = 20), 28 percent (n = 40), 21 percent (n = 135), and 16 percent (n = 36), respectively.

Survival and Longevity

The maximum reported age of a northern harrier is 16.5 years (Bildstein 1988), while the average age at death among 114 banded birds was 1.4 years (Keran 1981 *cited in* MacWhirter and Bildstein 1996). First-year female and adult survivorship has been estimated at 40 percent and 72.4 percent respectively (Martin 1987). Bildstein (1988) estimated pre-1950s survival rates for first-year and adult harriers at 41 percent and 70 percent respectively.

Dispersal Patterns

There is little empirical information about natal and post-breeding dispersal of northern harriers, and further research on this subject is needed. Juveniles exhibit virtually no fidelity to their natal area, and fledged juveniles do not typically contribute to the breeding population in their natal area (Hamerstrom 1969; MacWhirter and Bildstein 1996). There is no information available on dispersal patterns and distances between natal and subsequent breeding sites. Adult northern harriers are primarily nomadic and exhibit low fidelity to breeding sites. When

northern harriers do return to general nesting areas over consecutive years, they usually do not return to the same specific nest site (Breckenridge 1935; MacWhirter 1985).

Diet and Foraging

Northern harriers primarily eat voles (*Microtus* spp.) and other small mammals; however, they also eat birds, small reptiles, amphibians, and some insects (e.g., grasshoppers, beetles, crickets, and locusts) (MacWhirter and Bildstein 1996). In five studies conducted throughout North America, voles were the primary prey item (MacWhirter and Bildstein 1996). In California, in addition to *Microtus*, other important prey items were leporids (hares and rabbits), quail, finches, and blackbirds (red-winged blackbird and yellow-headed blackbird) (Selleck and Glading 1943).

Northern harriers hunt while flying and "patrolling" low above open ground. Harriers make low, quartering flights three to 30 feet (one to nine meters) above ground. Foraging individuals dive from flight or hover and pounce on prey. Northern Harriers have an "owlish" facial ruff or disk, which aids in the audible detection of prey (much in the same way as owls) (MacWhirter and Bildstein 1996).

Most aspects of northern harrier's population ecology are closely linked to prey availability, particularly local abundance and population cycles of small mammals (CPIF 2000). Rodent populations often experience population cycles between years. Because small mammals (e.g., voles) typically comprise the majority of the harrier's diet during the breeding season, northern harrier populations are sensitive to these cycles. For example, Northern harriers can experience increased nest densities, clutch sizes, nest success rates, and frequency of polygyny during peaks and increase phases in rodent cycles (Hamerstrom et al. 1985; Simmons et al. 1986; MacWhirter and Bildstein 1996).

Passerine birds, particularly nestlings and fledglings, are also important prey for northern harriers. Bernard et al. (1987) found that this prey group constituted the second most important diet for nesting northern harriers. Passerines have higher levels of calcium, iron, crude fat, and gross energy than grasshoppers and voles (Bird et al. 1982). Also, the timing of northern harrier nestling periods corresponded with passerine nestling periods, when young passerines were relatively abundant and available to foraging harriers (Bernard et al. 1987).

Northern harriers are generally opportunistic predators, and commonly shift their diets within a breeding season in response to prey availability and changes in local vegetation structure (MacWhirter 1985; Barnard et al. 1987). For example, Martin (1987) reported that northern harriers foraging in alfalfa fields preyed primarily on voles until vegetation height reached 18 inches (46

centimeters). Thereafter, harriers abandoned alfalfa and switched their diets to passerines and reptiles. After the alfalfa was cut, northern harriers switched their diet back to voles.

Movement and Migration Patterns

Northern harrier breeding populations in the northern portions of the species' range are more migratory than those at more southern latitudes (MacWhirter and Bildstein 1996). In the United States, migrating northern harriers depart their breeding grounds in August to December, and leave their wintering grounds in February to March. Migratory birds may winter in California, and some migrate south through Central and South America (MacWhirter and Bildstein 1996).

Many northern harrier populations breeding in California are residents; however, this species is nomadic and moves within and between seasons in response to prey availability (MacWhirter and Bildstein 1996). Northern harriers winter throughout California and typically occupy habitats similar to those used during the breeding season (MacWhirter and Bildstein 1996).

Territoriality, Home Range, and Spacing

Northern Harriers are not strongly territorial during the breeding season, except near the nest where both sexes defend the territory. Reported territory sizes for males have ranged from 2.0 to 271.8 acres (0.8 to 110 hectares). Females typically defend a smaller territory (Simmons 1983; Martin 1987). Territory sizes vary with habitat and prey availability (Martin 1987; Temeles 1987). Temeles (1987) showed that, in Yolo County, California, northern harriers adapted their territory sizes to maintain a consistent rate of prey capture. During winter, female territory size varies greatly. Temeles (1987, 1989) reported that female territory sizes in winter ranged from 9.6 to 308.6 acres (3.9 to 124.9 hectares) (mean = 83 acres [33.6 hectares]), and were inversely correlated with house mouse (*Mus musculus*) availability and pressure by intruders. In addition, prey availability was the only significant predictor of territory size in abundant food years. During winter, females defend territories and exclude non-territorial males. Females are approximately 12.5 percent larger and 50 percent heavier than males and dominate most aggressive interactions with males (MacWhirter and Bildstein 1996). Males are not considered territorial during winter.

During the breeding season, reported average home range sizes from eight studies were 420.1 to 37,066.5 acres (170 to 15,000 hectares); while the median size was 642.5 acres (260 hectares) (MacWhirter and Bildstein 1996 *citing* Smith and Murphy 1973, Rees 1976, Toland 1985, Martin 1987, Serrentino 1987). Females tend to hunt closer to the nest, and maintain smaller home ranges, than males (Martin 1987, Temeles 1987, MacWhirter and Bildstein 1996). Males reportedly will hunt ≥ 10 kilometers from the nest (Barnard 1983, Thompson-Hanson 1984). As the nestling period progresses, males and females can increase their home range by a

factor of 2.5 or greater (MacWhirter and Bildstein 1996). In California, during the winter, males maintain considerably larger foraging ranges than females, presumably because they are non-territorial, or they use areas with lower prey densities or different prey composition than those favored by females (MacWhirter and Bildstein 1996).

Prey availability and habitat quality also affect northern harrier breeding densities, inter-nest distances, and spacing (MacWhirter and Bildstein 1996). Loughman and McLandress (unpubl. data, *cited in* CPIF 2000) estimated breeding densities of northern harrier in four regions of California. In the Sacramento Valley, San Joaquin Valley, Suisun Marsh, and northeastern California, nest densities (number of nests per square kilometer) were 4.2 to 5.7 (for 1987 - 1988), 5.0 to 6.7 (for 1987–1991), 3.3 to 24.8 (for 1987–1992), and 7.4 to 9.0 (for 1987–1989), respectively. The highest density reported, 24.8 nests per square kilometer at Suisun Marsh, occurred during an unusually high vole population year.

NOHA Habitat Requirements and Ecology

Northern harrier breeds in a variety of open grassland, wetland, and agricultural habitats. Open wetland habitats used for breeding include marshy meadows, wet and lightly grazed pastures, and freshwater and brackish marshes. Northern Harrier breeding habitat also includes dry upland habitats, including grasslands, croplands, drained marshlands, and shrub-steppe in cold deserts. Although Midwestern populations use wetland habitats more frequently, western populations tend to use upland habitats (e.g., grasslands) disproportionately. Northern harriers winter throughout California where suitable habitat occurs. Wintering habitat includes open areas dominated by herbaceous vegetation, including grasslands, pastures, croplands, coastal sand dunes, brackish and freshwater marsh, and estuaries. Northern harriers rarely occur in forested areas (Grinnel and Miller 1944; Martin 1987; MacWhirter and Bildstein 1996).

The quality of open nesting habitats for northern harrier appears to be a function of five primary factors: 1) vegetation composition and structure; 2) prey abundance; 3) levels of ground disturbance during the nesting season; 4) site moisture; and 5) predation. Successful nesting by northern harriers generally require open habitats with dense, tall vegetation, a high prey base and few predators (CPIF 2000), and no agricultural or other disturbances that destroy their nests. Also, northern harriers appear to prefer moist or wet sites; however they will nest in dry sites that support other elements of suitable habitat (e.g., dense, tall vegetation). These factors are discussed below.

Vegetation height and structure particularly affect northern harrier habitat quality, especially because this species is a ground-nester. Northern Harriers nest on the ground in open, vegetated habitats such as grasslands and wetlands. Harrier nests in upland fields are typically surrounded by grasses and forbs; whereas nests in wet sites are often surrounded by marsh

grasses and cattails (Hamerstrom and Kopeny 1981; Simmons and Smith 1985; Loughman and McLandress unpubl. data, and LBWA unpubl. data *cited in* CPIF 2000). Nests are typically built in dense, tall vegetation in areas that are undisturbed during the nesting period; and nest sites are often in wet areas. Nests are bowls or platforms constructed with vegetation (e.g., grasses, forbs). Northern Harriers often construct platforms below the nest using sturdy vegetative material (e.g., cattails), to elevate the nest, particularly in wet areas.

Loughman and McLandress (unpubl. data, *cited in* CPIF 2000) reported the average vegetation height at nest sites in four regions of California (Sacramento Valley, San Joaquin Valley, Suisun Marsh, and Northeastern California). Vegetation height was lowest in the Suisun Marsh (12.6 to 24.1 inches [32.0 to 61.2 centimeters]) and greatest in the San Joaquin Valley (23.3 to 37.8 inches [59.2 to 96.0 centimeters]). Nest sites in Northeastern California were dominated by residual vegetation, while live vegetation was dominant in the other three study areas. Vegetation composition documented around northern harrier nests includes annual and perennial grasses (Poaceae), rushes (*Carex* spp.), sedges (*Juncus* spp.), hemlock (*Conium* spp.), milk thistle (*Silybum* spp.), dock (*Rumex* spp.), mustard (*Brassica* spp.), clover (*Trifolium* spp.), and goldenrod (*Sildago* spp.) (Simmons and Smith 1985; Loughman and McLandress unpubl. data, and LBWA unpubl. data *cited in* CPIF 2000).

Northern harrier nest sites are characterized by partial or complete vegetation cover around the nest circumference (Loughman and McLandress unpubl. data, LBWA unpubl. data *cited in* CPIF 2000); however, the canopies directly above nests are typically open (i.e., the nests are not concealed). Simmons and Smith (1985) reported lower success of concealed nests. Loughman and McLandress (unpubl. data *cited in* CPIF 2000) reported that 71 percent of nests at Suisun Marsh and 93 percent of nests in northeastern California were characterized by no canopy cover. Also, 78 percent of nests located at Los Banos and Salt Slough Wildlife Areas were characterized by open canopies (LBWA unpubl. data *cited in* CPIF 2000). Northern Harrier nests on state and federal wildlife refuges in California were located in upland fields managed for waterfowl breeding (Loughman and McLandress unpubl. data). Nest sites were surrounded by tall annual or perennial grasses with no nest canopy cover.

Site moisture is also associated with the quality of northern harrier nesting habitat. In most nesting habitats, including dry uplands, a disproportionate number of nests are located in wet sites (Simmons and Smith 1985, Martin 1987, Grant et al. 1991). Simmons and Smith (1985) reported that northern harriers in Canada had higher nest success in wet sites (wetland fringe or wet meadows) than in dry sites; and wet sites were selected more than expected based on availability (Simmons and Smith 1985). Although both moisture and vegetation characteristics were correlated with nest success, moisture was the best predictor. Wet sites may be preferred due to reduced predation rates there (Simmons and Smith 1985; MacWhirter and Bildstein

1996). Also, moisture may be simply correlated with or affect other factors that directly determine habitat quality (e.g., vegetation structure and prey abundance).

Where agricultural lands provide suitable vegetation characteristics and prey availability, and are free of disturbances during the nesting period, these areas can provide important nesting habitat for northern harrier. Northern Harriers will attempt to nest in agricultural fields that support suitable vegetation characteristics and prey availability early in the nesting cycle. In Yolo County, California, harrier nests were found in three different upland types: uncultivated field of grasses and weeds, cultivated rice field, and cultivated field of clover (Temeles 1987). Also, in Yolo County, Hopkins (pers. comm.) reported nesting by northern harriers in hayfields. However, where northern harriers nest in agricultural lands, practices such as mowing, disking, and haying during the nesting cycle cause nest destruction (MacWhirter and Bildstein 1996); and these lands can function as population sinks. Because northern harriers are ground nesters with a long nesting period (approximately 75 days between nest construction and fledging young), nest success in croplands remains very sensitive to agricultural practices. Without landowner commitments to avoid nest destruction, the attractiveness of some croplands to northern harriers early in the nesting period can significantly threaten regional population dynamics, particularly in the Central Valley where agricultural lands are abundant.

Hamerstrom and Kopeny (1981) reported that northern harriers were very adaptive nesters, and continued nesting in marsh areas that were drained and converted to farmland or grasslands; however, it is unknown whether survival and reproduction vary between disturbed and natural habitats (CPIF 2000).

Some agricultural lands also provide high-quality foraging habitat for northern harrier. Agricultural lands that are suitable for foraging are those that support abundant rodent populations (e.g., alfalfa and irrigated pasture). Williams et al. (2000) compared winter use of croplands and rangelands by northern harrier and other raptors in eastern Kansas. Harrier densities were higher in croplands than in rangelands; and harriers generally preferred idle land. The authors hypothesized that the importance of cropland as winter foraging habitat was a function of high prey abundance, good visibility of prey in harvested fields, and a relatively high amount of suitable hunting habitat.

There is no empirical information on effects of habitat fragmentation and habitat patch size on the viability of northern harrier populations (CPIF 2000). The spatial requirements of northern harriers, and how reproductive success and long-term persistence varies with landscape-level parameters, are not known. Although these relationships are not documented, it is assumed that small and isolated habitat patches are less likely to sustain high reproductive success or long-term persistence than larger areas. Northern Harriers using isolated habitats may experience frequent disturbances from adjacent land uses (e.g., nest disturbance, habitat degradation, predation).

Important biotic interactions between harriers and rodent populations may be disrupted, because some rodent populations may be sensitive to habitat area and surrounding land uses as well. For example, the availability of voles and other rodent prey may be limited in isolated habitats, and rodents may abandon or be eradicated from small parcels of habitat.

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for northern harrier are identified in Table G-3.23.1 and have been derived from input from local species experts.

Table G-3.23-1. Habitat Elements for Northern Harrier

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak savanna, cropland, irrigated pasture grassland, valley grassland, vernal impoundment, vernal pool, vernal swale, seasonal wetlands, seasonal impoundment, swale, and freshwater marsh.	Abundant rodent populations.
Nesting	Blue oak savanna, cropland, irrigated pasture grassland, and valley grassland.	Open habitats with dense, tall vegetation, a high prey base, and few predators. Nests are typically built in dense, tall vegetation in areas that are undisturbed during the nesting period; and nest sites are often in wet areas.

NOHA Species Distribution and Population Trends

NOHA Species Distribution

Breeding populations of northern harrier primarily occur throughout most of Canada and Alaska; central, coastal, and southwestern California into the Baja Peninsula, Mexico; and the west-central and northeastern United States. Northern harriers winter in most of the coterminous United States except portions of the northern-most states; Mexico and Central America; and Cuba and the Bahamas. Most wintering birds occur in the western and southern United States (MacWhirter and Bildstein 1996).

In California, northern harriers historically bred throughout the state except in deserts, woodlands, and forested mountains. Historical breeding localities included the interior from Siskiyou County south to western Riverside and San Bernardino Counties and coastal regions from Marin County to San Diego County (Grinnell and Miller 1944). The northern harrier's range also includes the Sierra Nevada foothills up to 3,600 feet elevation (CPIF 2000). Breeding populations were probably concentrated in most of the Central Valley, Sacramento-San Joaquin River Delta, Suisun Marsh, and portions of the San Francisco Bay (Zeiner et al. 1990). The

northern harrier's present California breeding range is similar to its historical distribution; however, extensive local population declines continue as a result of habitat loss (Remsen 1978; Martin 1989; MacWhirter and Bildstein 1996; CPIF 2000).

NOHA Central Valley Distribution

Northern harrier's breeding range in California includes most of the Central Valley, where this species is a year-round resident (Zeiner et al. 1990;MacWhirter and Bildstein 1996).

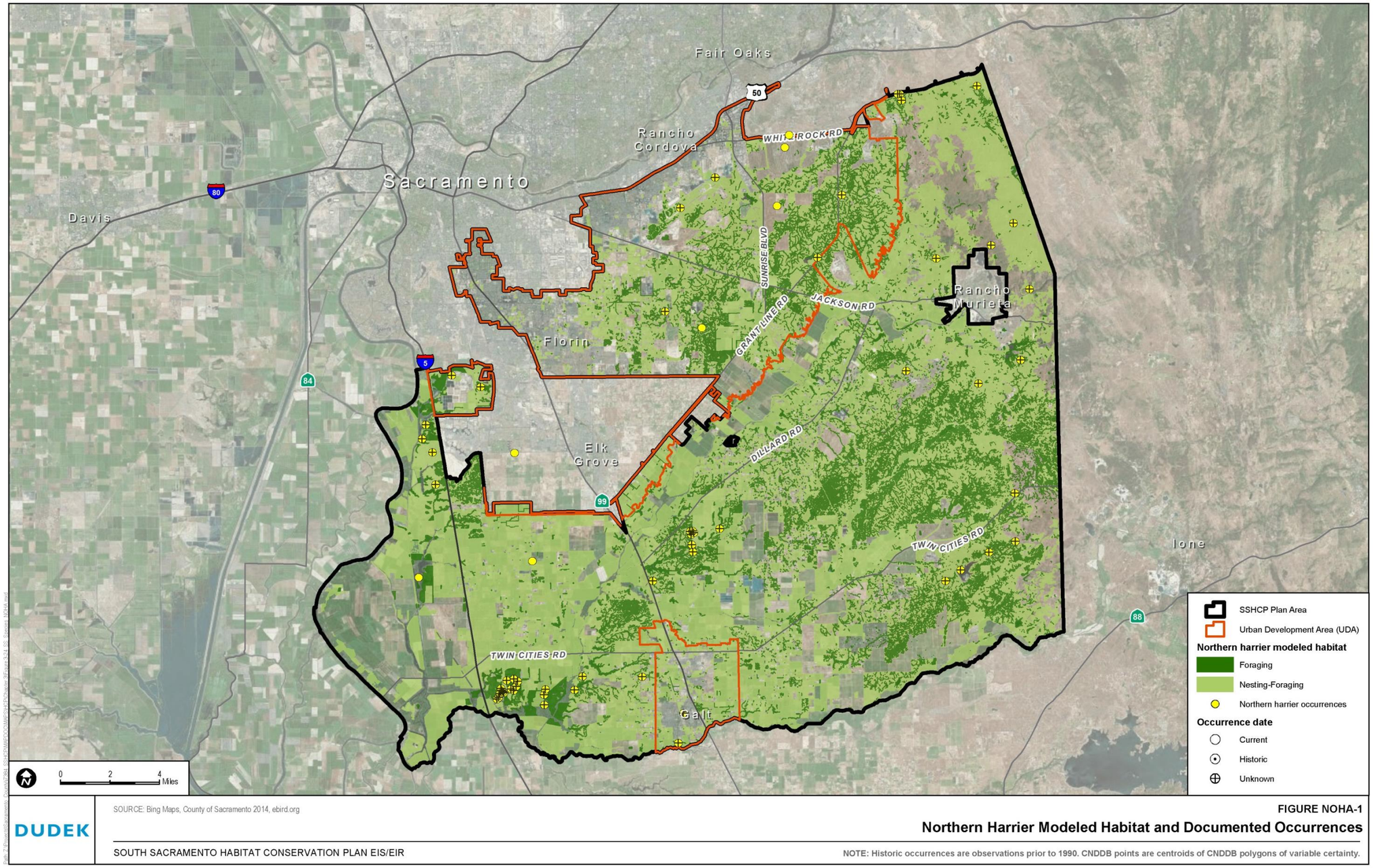
NOHA Distribution Within the Planning Area

Northern harriers occur in suitable habitat within the Planning Area and are probably regular breeders (Trochet pers. comm.). Their overall distribution, abundance, and population structure are not well known. The CNDDB (CDFG 2010) reports no occurrences of northern harrier in Sacramento County, but this simply reflects the failure of local biologists to report records of the species since it is regularly observed in the area during the breeding season. Occurrences of northern harrier shown in Figure NOHA-1 are from various other sources (ebird.oeg 2005-2010; Klotz Property 2005). Land-cover types used by northern harriers, such as irrigated pasture-grassland, and valley grassland occur throughout much of the Central Valley and are well-represented in Sacramento County and the Planning Area.

Sacramento-area ornithologists C. Conard and J. Trochet provided additional occurrence and habitat distribution information, which is summarized below.

- Two nests have been documented at the Sacramento Regional County Sanitation District (SRCSD) Bufferlands. One nest was located in a hayfield approximately 50 to 60 acres in size. The other nest was in cropland (Conard pers. comm.).
- Nesting was documented approximately three years ago at The Nature Conservancy's Howard Ranch (Trochet pers. comm.).
- Approximately six nests have been documented at the Cosumnes River Preserve in the Lower Preserve area (Trochet pers. comm.). Additionally, in 2004, an immature male and an adult female were observed copulating at the Cosumnes River Preserve. This pair was observed there into early summer. The most suitable habitat at the preserve appears to occur in areas where water is drained away latest (Trochet pers. comm.).
- Other habitat identified as suitable for nesting northern harriers in the Planning Area includes areas along Scott and Latrobe Roads, in the eastern portion of the Planning Area (Trochet pers. comm.).

Figure NOHA-1 Northern Harrier Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, ebird.org

DUDEK

FIGURE NOHA-1

Northern Harrier Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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Because comprehensive surveys or monitoring efforts for northern harrier in the Planning Area have not been conducted, and because the existing data of known occurrences are based mostly on incidental observations or limited surveys (e.g., anecdotal records, surveys conducted within limited areas), the population size and nesting locations of this species in the Planning Area are not known. Nonetheless, , the species is considered to occur throughout the Planning Area.

NOHA Population Levels and Trend

Northern harrier has experienced an overall population decline over its distribution during the 20th century (del Hoyo et al. 1995, MacWhirter and Bildstein 1996); however, specific population status and trends vary regionally. White (1994) considered harrier population trends variable, but possibly decreasing, in western North America. Furthermore, he cited habitat modification (particularly wetlands loss) as the most important cause of possible declines. Analysis of Breeding Bird Survey (BBS) data indicates an overall decline of northern harrier populations throughout the species breeding range, although trends vary regionally. In the Western BBS Region, BBS data indicate a population decrease between 1996 and 2003 (N = 408, $P < 0.01$), 1966–1979 (N = 123, $P = 0.14$), and 1980–2003 (N = 372, $P < 0.01$) (Sauer et al. 2004).

In California, northern harrier has experienced localized population declines (CPIF 2000). BBS data suggest a slight statewide (California) population increase between 1966 and 2003 (N = 56, $P = 0.36$), 1966 to 1979 (N = 31, $P = 0.15$), and 1980 to 2003 (N = 45, $P = 0.51$) (Sauer et al. 2004); although this trend is not considered statistically significant. The BBS trend for northern harrier in the Central Valley is similar to the statewide trend. Furthermore, based on Christmas Bird Count (CBC) data, the winter population as of 1990 was estimated at 13,200 birds (Johnsgard 1990).

NOHA Threats to the Species

The primary threat to northern harrier, particularly in California, is habitat loss and degradation as a result of urbanization, development, and agricultural conversion. North American populations of northern harrier have declined during the 20th century, mainly as a result of the extensive draining of wetlands, implementation of monoculture farming, and reforestation of open farmlands (MacWhirter and Bildstein 1996). White (1994) also cited habitat modification, particularly loss of wetlands, as the most important cause of possible population declines. In agricultural landscapes, overgrazing of pastures, fewer fencerows and larger croplands, and widespread use of insecticides and rodenticides have reduced prey availability for northern harriers (MacWhirter and Bildstein 1996).

Direct or indirect human disturbance of nesting activities, particularly in agricultural areas, threatens northern harrier populations. Where northern harriers nest in agricultural lands, practices such as early mowing, disking, and haying during the nesting cycle can cause nest

destruction (MacWhirter and Bildstein 1996); and these lands can function as population sinks. Also, these activities near a nest can cause parents to abandon the nest (MacWhirter and Bildstein 1996). Because northern harriers are ground nesters with a long nesting period (approximately 75 days between nest construction and fledging young), nest success in croplands remains very sensitive to agricultural practices for a long duration.

Reproductive failure and declines in northern harrier populations in the mid-20th century have been linked to organochloride pesticide contamination, particularly dichlor-diphenylethylene (DDE), the major metabolite of Dichlorodiphenyltrichloroethane (DDT). However, these populations apparently recovered quickly after regulation of DDT in the early 1970s (Hamerstrom 1969, 1986; MacWhirter and Bildstein 1996).

In south Sacramento County, northern harrier is specifically threatened by habitat loss and fragmentation as a result of conversion of habitat to urban uses and agriculture, particularly the conversion of grasslands to vineyards. Also, the loss of suitable agricultural land to development has reduced the extent of suitable foraging habitat. It is possible that the use of rodenticides and insecticides have reduced prey populations, resulting in lowered survivorship and reproductive success.

NOHA Data Gaps and Conservation Implications

The ecology, status, and management of northern harriers have received considerable attention in recent years. There are several sources of uncertainty regarding northern harrier and its requirements in the Planning Area. These data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

NOHA Population and Habitat Distribution within the Planning Area

Northern harriers occur in suitable habitat within the Planning Area; however, their overall distribution, abundance, and population structure are not well known. Land-cover types used by northern harriers, such as grasslands, occur throughout much of the Central Valley and are well-represented in Sacramento County and the Planning Area. At most sites with these land-cover types, the status of northern harrier is not known.

Because comprehensive surveys for northern harrier in the Planning Area have not been conducted and because the existing occurrence data are based primarily on incidental observations (e.g., anecdotal records), the population size, nesting locations, and important wintering areas of this species throughout the Planning Area are not known. Although the distribution of grasslands is mapped and quantifiable, the quality of habitat for northern harriers within most of these areas is unknown.

Until this data gap is remedied, the conservation value of grassland and agricultural land-cover types for northern harrier will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, and/or are adjacent to these areas.

Effectiveness of Grassland and Wetland Enhancement and Restoration Techniques in Creating Suitable Habitat Structure for Northern Harrier

Achieving the conservation goals and objectives for northern harrier will require successful enhancement and restoration of grassland and wetland habitats. The structure of these habitats (e.g., dense, tall vegetation) is an important factor for suitability of northern harrier. Whether restored or grasslands and wetlands can retain the structural attributes suitable for northern harrier is unknown.

If restoration and enhancement techniques cannot eventually create grassland and wetland habitats with structural characteristics suitable for northern harrier, then those lands would not support breeding pairs or contribute directly toward the conservation strategy for the species.

Landscape-level Habitat and Preserve Design Requirements for Viable Populations

The minimum habitat size and connectivity requirements for northern harrier are not well documented. This causes uncertainty in determining whether the preserve design will be effective in meeting the conservation goals for northern harrier.

Effectiveness of Mammalian Prey Population Enhancement Measures in Improving Foraging Habitat for Northern Harrier

Achieving the conservation goals and objectives for northern harrier may require successful enhancement of mammalian prey populations. Mammalian prey populations, particularly California vole, should be passively or actively promoted on all lands acquired and managed for northern harrier habitat. Whether these efforts will succeed at increasing the available prey base and enhancing habitat for northern harrier is unknown.

Other Data Gaps

Other data gaps that could be important for northern harrier conservation include: 1) responses of northern harrier populations to habitat management and enhancement techniques; 2) prey population dynamics and cycles; 3) variation in recruitment and survival between natural and disturbed habitats; 4) habitat use and nest success between wet and dry habitats; and 5) an appropriate livestock grazing and fire regime appropriate for northern harrier habitat management and enhancement.

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WHITE-TAILED KITE (WHKI)

White-tailed Kite (WHKI)

(Elanus leucurus)

Status USFWS: None

Status CDFW: Fully Protected Species

Ron Wolf 2008

WHKI Listing Status

The white-tailed kite (*Elanus leucurus*) is legally protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-7012). It is also protected under the California Fish and Game Code (Section 3503.5, 3513, and 3800) and is identified and protected as a California Fully Protected Species (Section 3511). White-tailed kite is not listed as a species of special concern by the California Department of Fish and Wildlife (CDFW) (Shuford and Gardali 2008).

WHKI Life History and Ecology

WHKI Species Description and Life History

Physical Description

White-tailed kites are medium-sized hawks (total length 12.6 to 15 inches) with a long white tail and large, black shoulder patches. In adults, these features contrast with a gray back and white underparts. The sexes are similar is size, but females tend to have darker backs than males. Adults have red eyes and juveniles have yellow eyes. Juveniles have fluffy streaks on the breast and head, and gray and white-tipped feathers on the back. White-tailed kites are also recognized by their foraging behavior, frequently hovering in the air "kiting" while searching for prey (Sibley 2000; Sibley 2001).

Reproduction

White-tailed kites are monogamous and breed between February and October. Pairs select nest sites and build stick nests in trees, and are generally considered territorial to other kites and most large raptors (Dunk 1995; Henry 1983). Alternate nests are commonly built and may be used in subsequent breeding attempts (Waian 1973) even when first nest is successful and young are still dependent (Wright 1978). Most white-tailed kite nest studied by Erichsen (pers. comm.) failed during the first attempt due to factors including weather, predation or harassment (i.e. by Swainson's hawks [*Buteo swansonii*] or Corvids). Two broods are more common during periods of high prey abundance (Stendell 1972).

Nests are built by both sexes and the age at first breeding is unknown. Each sex gathers sticks to build nest and carries them in bill or with feet, although female places most of the sticks during nest construction (Dunk 1995). Most nests are located within the upper third of the tree and may be shaded or exposed to direct sunlight for long periods. The nests are primarily composed of small twigs and lined with grass, hay, or leaves and can take as long as 28 days to build (Dixon et al. 1957).

Females typically lay a clutch of four eggs and lay one egg every other day (Stendell 1972). Females incubate eggs exclusively (Dixon et al. 1957). Incubation begins after first or second egg is laid (Stendell 1972) and lasts for 30 to 32 days (Hawbecker 1942). Females take breaks from incubation to preen, stretch (Dixon et al. 1957), remove pellets which are dropped greater than 164 feet (50 meters) from the nest (Dunk 1995), and receive prey from the male.

Males continue to deliver prey to female when young hatch, although only female feeds prey to altricial young (Dixon et al. 1957). Prey are torn apart and fed to young until they are about 3.5 weeks old (Moore and Barr 1941). Although siblings attempt to monopolize food, females discourage aggressive young, and siblicide is not reported (Dixon et al. 1957; Dunk 1995). Young fledge around four to five weeks after hatching, and adults may teach young to fly by hovering over nest and fledglings (Waian 1973). Within two months of fledging, immature White-tailed kites are known to establish and hold territories (Dunk 1995).

Longevity, Survival, and Mortality

Little data is available for longevity and survival of white-tailed kites. The maximum life span recorded is five years and eleven months (Clapp et al. 1982). Mortality of white-tailed kites primarily occurs from natural causes (inclement weather and predation) (Stendell 1972). Predation by other large raptors is suspected from the remains of immature white-tailed kites found beneath larger raptor perches (Dunk 1995).

Dispersal Patterns

Little information is available for dispersal patterns of white-tailed kites. No evidence of natal philopatry exists, although one individual immature established a territory adjacent to natal territory (Dunk 1995).

Diet and Foraging

White-tailed kites may be observed in California hovering over grassland and ruderal habitat along the side of and in-between the Interstate 5 corridor. The species hunts almost exclusively by hovering at heights between five to 25 meters, often facing into the wind. A white-tailed kite will hover for longer periods (greater than one minute) in windy conditions, but will hover for a shorter duration until it attacks, flies to another hover location, soars, or flies to a perch (Dunk 1995; Jacsic et al. 1987). Hunting from a perch is rarely recorded (Dunk 1995). An attacking bird holds its wings nearly vertical and then drops straight down feet first. Once prey is captured, individuals fly to nearby perch to consume prey by first eviscerating, then decapitating and eating the head and body parts (Dunk 1995). During time periods when the male is feeding female or young, males fly to nest site with prey and exchange with female by perching side-by-side or by aerial exchange where female approaches hovering male from behind and grasps prey with talons from male (Dunk 1995; Waian 1973).

White-tailed kites predominantly feed on small mammals (greater than 95 percent), although a remarkable number of 10,959 different prey items have been reported from California (Dunk 1995). The species is considered a small mammal specialist, and several dietary studies (Hawbecker 1940, 1942; Dixon et al. 1957; Waian and Stendell 1970; Waian 1973; Wright 1978; Stendell 1972) from pellet analysis reveal that voles (*Microtus* spp.), house mice (*Mus musculus)*, and harvest mice (*Reithrodontomys* spp.) are the most frequent prey species eaten. Vole is most frequently eaten and is a prey species known to dramatically fluctuate in abundance. Small mammals other than house and harvest mice are occasionally eaten (2.1 to 18 percent). White-tailed kites are not known to drink water, and pellet casting is related to timing of feeding (Stendell 1972).

Movement and Migration Patterns

White-tailed kites are generally thought of as resident species throughout their range although nomadism is suggested (Dunk 1995). White-tailed kites have expanded their range during the last 40 years (Waian and Stendell 1970; Eisenmann 1971; Pruett-Jones et al. 1980) and colonized San Clemente Island from mainland California, a distance of 50 miles (Scott 1994). Nomadism appears to be linked to low abundances of California voles (*Microtus californicus*). Individuals are reported moving prior to the breeding season (January through April) (Stendell 1972).

Individuals banded as nestlings were found 12 miles away from natal site in 8 months after banding, and 100 miles after two years (Dixon et al. 1957). Stendell (1972) recovered four nestlings that were banded. One individual was found one mile of the natal site, and the other three were found between 10 and 30 miles from the natal site.

Territoriality/Home Range

Territoriality of white-tailed kites during the nesting season likely varies by an order of magnitude throughout the species range (Dunk 1995). Competitors proximately regulate territoriality size, but ultimately prey numbers regulate territory size because they apparently control competitor's numbers (Dunk and Cooper 1994). Territory sizes estimated along the south coast of California near Long Beach ranged from 22 to 128 acres (nine to 52 hectares) (Waian 1973) and near San Diego from 42 to 217 acres (17 to 88 hectares) (Henry 1983).

Breeding densities of white-tailed kites vary with local prey abundance, ranging from one pair per 64 acres to one pair per 1,116 acres in occupied habitat (Stendell 1972). Winter densities along the north coast ranged from one white-tailed kite per 15 acres to one per 28 acres in occupied areas that supported large vole populations (Dunk and Cooper 1994).

White-tailed kites roost individually or communally during winter and often reuse roost sites annually, sometimes greater than 30 years (Erichsen pers. comm.). Communal roosts typically contain between 10 and 40 individuals (Waian 1973), and have supported more than 100 (Bolander and Arnold 1965). Communal roost sites are located in a variety of locations including woodlands and even large trees within urban areas (Erichsen pers. comm.). Human disturbance in urban areas has caused white-tailed kites to abandon some communal roost sites (Waian 1973; Dunk 1995), but in some instances, attempts to discourage communal roosting by kites are difficult and unsuccessful (Erichsen pers. comm.). White-tailed kites are known to travel over twenty miles to communally roost together (Erichsen pers. comm.).

Ecological Relationships

Predator-prey relationships are important for white-tailed kites, particularly because they are predators and affected by prey (small mammals) population cycles and abundance; and predation by other taxa is a source of mortality. Populations appear regulated by prey availability (Stendell 1972; Dunk and Cooper 1994), therefore availability of nesting and roosting sites may be important in areas where prey is abundant. Population distribution is also attributed to prey abundance (Dunk and Cooper 1994), as white-tailed kites have expanded their range during the last 40 years (Waian and Stendell 1970), even across ocean waters some 50 miles away to colonize San Clemente Island (Scott 1994).

Increased competition for nest sites with other raptors and corvids is suspected to negatively affect white-tailed kite populations (Dunk 1995). In areas where competitors occur, territory size is negatively influenced by competitor abundance (e.g. northern harriers [*Circus cyaneus*], red-tailed hawks [*Buteo jamaicensis*], red-shouldered hawks [*B. lineatus*], American kestrels [*Falco sparverius*], short-eared owls [*Asio flammeus*], and barn owls [*Tyto alba*]) (Dunk and Cooper 1994). Some competitors (red-tailed hawks, common ravens [Corvus *corax*]) are kleptoparasitic.

Suitable nesting substrates have declined in some regions where isolated trees have fallen and new regeneration is lacking.

WHKI Habitat Requirements and Ecology

White-tailed kites generally inhabit low-elevation grasslands, wetlands dominated by grasses, oak woodlands, and agricultural and riparian areas (Dunk 1995). Nests are built in trees that occur in isolation or in riparian areas. Other nesting raptor species as well as other conspecifics are known to compete for nest sites and territory size, but ultimately abundance of prey species is the primary factor that influences their numbers and distribution (Dunk 1995).

Nest tree selection has not been well studied. White-tailed kites have been found nesting in isolated trees and in trees within large stands (greater than 100 hectares) (Dunk 1995). Nests are built in several tree species and even in a few shrubs. These species include valley oak (*Quercus lobata*), interior live oak (*Q. wislizeni*), boxelder (*Acer negundo*), ornamental trees, cottonwood (*Populus* spp.), olive (*Olea* spp.), (CDFG 2010; Pickwell 1930; Hawbecker 1942; Dixon et al*.* 1957). The height of nest trees/shrubs ranges from 10 feet (three meters) [e.g., coyote-brush (*Baccharis* spp*.)* and saltbush (*Atriplex* spp*.)*] (Stendell 1972) to 164 feet (50 meters) [e.g. coast redwood (*Sequoia sempervirens)* and sitka spruce (*Picea sitchensis)*] (Dunk 1995). In the Central Valley, white-tailed kites have been observed nesting in valley oak, cottonwood, and pine (*Pinus* spp.) trees (Hopkins pers. comm.). White-tailed kites are territorial with conspecifics, and are known to nest at relatively close distances (e.g. 153 meters) (Dixon et al*.* 1957; Pickwell 1930; Hawbecker 1942). Erichsen (pers. comm.) reported that white-tailed kite nests in riparian areas were typically located within 0.25 miles of one another.

The size and structural diversity of woodlands supporting white-tailed kite nests has not been well documented. Nest sites are rarely found in isolated trees. They are usually located on the edge or riparian habitats, or in hedgerows and groups of trees, and are commonly found adjacent to natural vegetation, pasture crops (alfalfa) and sugar beets (Erichsen pers. comm.).

White-tailed kites use a variety of habitat types for foraging and the importance of these habitats is dependent on vegetation structure and prey abundance. Lightly grazed or ungrazed grasslands/pastures support larger prey populations and are thus considered more suitable,

although intensively cultivated areas are also used (Dunk 1995). In cultivated areas, perennial crops such as alfalfa and sugar beets tend to support higher prey numbers, and White-tailed kite nest densities have been highly correlated with these two crops (Erichsen et al. 1994). Nesting studies conducted by Hawbecker (1942) showed that white-tailed kites foraged up to within 0.5 miles from the nest during the breeding season. During winter and the breeding season, Warner and Rudd (1975) found foraging from nest or perch sites extended up to 1.8 miles, but most were less than 0.6 miles. Foraging primarily occurred in two habitat types, riparian and irrigated cultivated land (e.g. alfalfa, tomatoes, sugar beets).

The occurrence and abundance of white-tailed kites during the breeding and non-breeding seasons are strongly affected by the dynamics of local rodent prey populations. Because rodent population cycles are often irruptive, and kite populations are sensitive to the availability of rodent prey, the suitability of an area and its occupancy by white-tailed kites may vary during certain years. Stendell (1972) found the density of voles at the onset of the breeding season affects the presence and abundance of nesting white-tailed kites. Winter densities of white-tailed kites are strongly correlated with the abundance of voles. The mean number of California Voles/territory was estimated at 1,483 for territories ranging from 3.9 to 53 acres (1.6 to 21.5 hectares) in northern California (Dunk and Cooper 1994). In other studies occurring in southern California (Waian 1973; Henry 1983), no prey abundances were reported with nesting territories.

Because white-tailed kites are highly dependent on voles, understanding habitat types optimal for prey species is of high importance. Many small mammal studies have been conducted including two studies in and adjacent to the Planning Area (Jones et al. 1999; Wyatt et al. 1991). The three most abundant species in both studies were the deer mouse (*Peromyscus maniculatus*), house mouse, and meadow vole (*Microtus californicus*). Jones et al. (1999) found the highest numbers of small mammals in perennial grassland, ruderal roadside vegetation, and restored riparian habitat when compared to alfalfa, annual grassland, and seasonal wetland. Abundance indices for these species varied by season and habitat type. When abundance indices for each of the three dominant species were combined for each season, the highest total index (1.47) occurred in perennial grassland habitat during spring.

The level of human disturbance that white-tailed kites can tolerate during the breeding season is unknown. The species generally avoids areas with regular human disturbance, although a small number of pairs appear to tolerate humans and nest at rural and urban margins (Erichsen pers. comm.). Communal roosts during the non-breeding season have been disturbed by humans and caused abandonment (Dunk 1995); however, if not disturbed, the species is known to roost communally in residential areas in cities for several consecutive years (Whisler pers. comm).

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for white-tailed kite are identified in Table G-3.24.1 and have been derived from input from local species experts.

Table G-3.24.1. Habitat Elements for White-tailed Kite

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak savanna, cropland, irrigated pasture grassland, valley grassland, vernal impoundment, vernal pool, seasonal wetlands, seasonal impoundment, and freshwater marsh.	White-tailed kites predominantly feed on small mammals (>95%). The occurrence and abundance of white-tailed kites during the breeding and non-breeding seasons are strongly affected by the dynamics of local rodent prey populations. Because rodent population cycles are often irruptive, and kite populations are sensitive to the availability of rodent prey, the suitability of an area and its occupancy by white-tailed kites may vary during certain years. CFP (2000) listed an objective of identifying habitat requirements of prey populations. In agricultural areas, prey populations vary, but perennial crops (ex. pasture, alfalfa) generally provide better foraging opportunities compared to annual crops (e.g. grains).
Nesting	Blue oak woodland, mixed riparian scrub, mine tailing riparian woodland, and mixed riparian woodland.	Nest tree or woodland nest site selection has not been well studied and may not be as important as prey abundance. Nests can be found in isolated trees, but are more often associated with small or medium size riparian woodlands with associated grasslands, irrigated pastures, or cultivated crops such as alfalfa and sugar beets. Dunk (1995) suggests that adding nest trees in open grasslands where there are few trees may be useful if White-tailed kites are limited by nest sites. A few white-tailed kites are known to nest in urban and suburban areas.

WHKI Species Distribution and Population Trends

WHKI Species Distribution

In the United States, the white-tailed kite breeds primarily in the Central Valley, coastal valleys and prairies of California. A few instances of breeding have been documented in Oregon and Washington. The white-tailed kite also commonly nests in southern Texas, and small nesting populations can be found in Florida. Outside the United States, white-tailed kites are found along the coastal areas of Mexico, Panama, the slope of the Caribbean, Colombia, Venezuela, Guyana, Brazil, Paraguay, Uruguay, and northern Argentina (Dunk 1995).

WHKI Central Valley Distribution

White-tailed kites can be found throughout the Central Valley where grasslands, vernal pool complexes, low-growing agriculture crops, and oak savannah and woodlands occur. No studies have documented the densities of breeding or wintering population numbers within the Central Valley.

WHKI Distribution within Planning Area

White-tailed kites occur in suitable habitat throughout the Planning Area; their overall distribution, abundance, and population structure are not well known. Land cover types used by white-tailed kites, such as grasslands, vernal pool grasslands, riparian, oak savannah and woodlands, fallow agricultural fields, and cultivated agricultural fields occur throughout most of the Planning Area, particularly outside the Urban Development Area (UDA). At most sites within these land cover types, the presence and population status of white-tailed kites is not known.

No regularly occurring surveys have been conducted throughout the Planning Area, however, white-tailed kites are known to nest or forage throughout the Planning Area (Connard pers. comm.). These areas include Mather Lake (Conard pers. comm.), Mather Regional Park, Laguna Creek (Jones pers. comm.), and Morrison Creek and adjacent lands (Jones pers. comm.). They are also known to nest or forage in the Cosumnes River corridor, The Nature Conservancy's (TNC) Howard Ranch (Trochet pers. comm.), and suspected to nest at Stone Lakes National Wildlife Refuge (NWR) (Conard pers. comm.). The above areas constitute a subset of the potential habitat available for nesting and foraging white-tailed kites.

Some additional information on white-tailed kite distribution is also available from Swainson's hawks surveys conducted by the CDFW. These surveys are conducted throughout the Central Valley and include sixteen 3.1 square miles (five square kilometers) survey plots in the Planning Area. During the Swainson's hawk surveys, the presence of white-tailed kites were recorded if they were observed on any one of the three survey visits conducted during the Swainson's hawk breeding season. White-tailed kites were found in nine of the sixteen survey plots. The location of these survey plots where the kites were found primarily occurred in the southwestern portion of the Planning Area. Interestingly, no white-tailed kites were found in four study plots located in the central eastern portion of the county (i.e., near the area of Rancho Murrieta).

Because comprehensive surveys or monitoring efforts for the white-tailed kite in the Planning Area have not been conducted, and because the existing data of known occurrences are based mostly on incidental observations or limited surveys, the population size and nesting distribution of this species in the Planning Area are not well known. In the Planning Area, the CNDDB reports six occurrences inside the UDA, and four occurrences outside the UDA (CDFG 2010). These numbers do not provide an estimate of the distribution or population size of the

kites because they are based on a very small number of surveys in a limited area. Figure WHKI-1 illustrates the distribution of occurrences of white-tailed kites within and adjacent to the Planning Area as recorded in the CNDDB (CDFG 2010) and from other sources (ebird.org 2005-2010; Estep 2007; Klotz Property 2005).

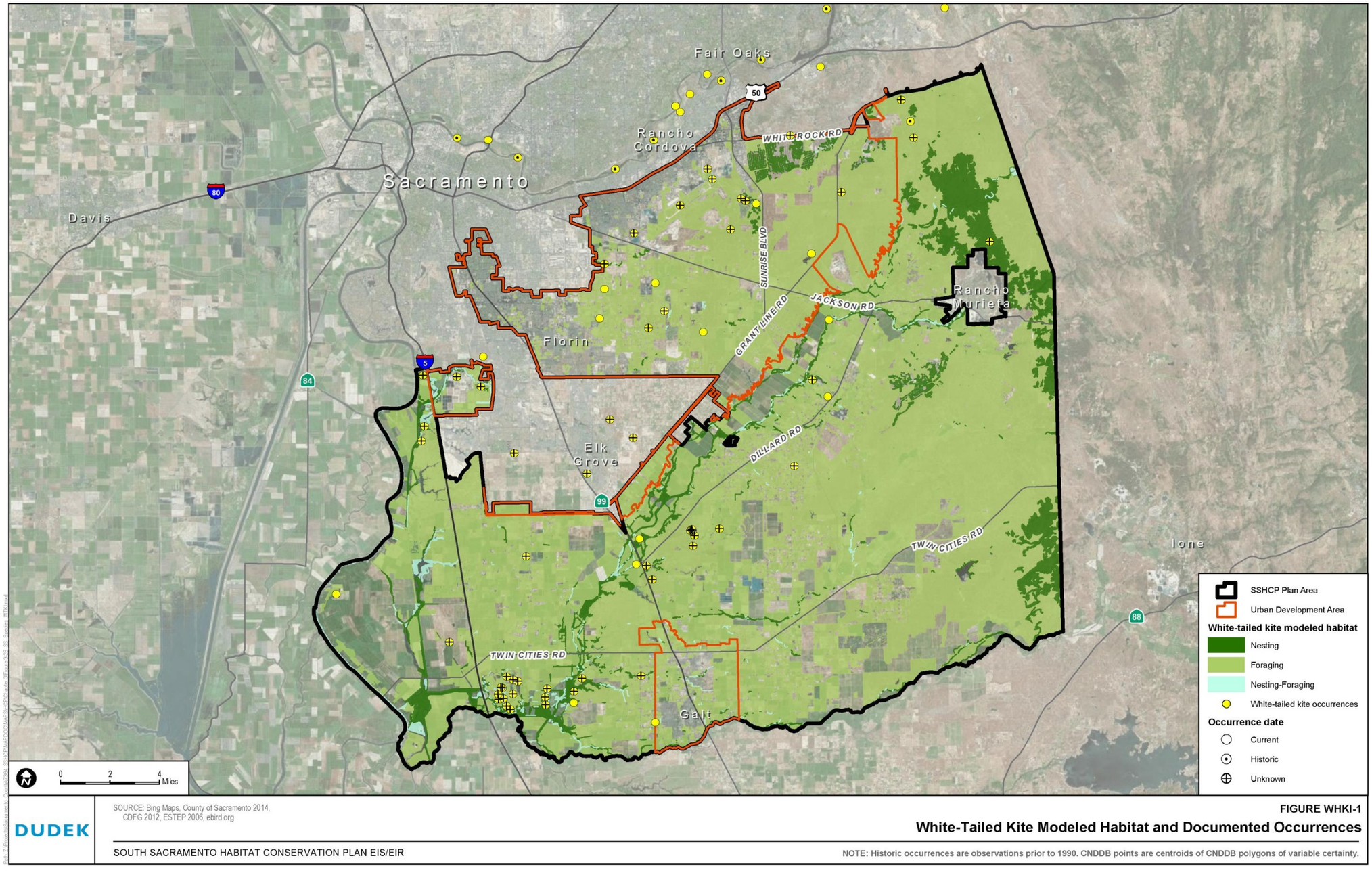
WHKI Population Levels and Trend

White-tailed kite populations have fluctuated greatly over the past century. According to Grinnel and Miller (1944), this species was common and widespread in the Central Valley and foothills before 1895 but was rare or entirely gone from many areas by the 1940's. The declines in California populations during this period have been attributed to a combination of habitat loss, shooting (kites were considered a pest species), and possibly egg collecting (Waian and Stendell 1970). From the 1940's to the early 1980's California populations increased dramatically (Fry 1966; Waian and Stendell 1970; Pruett-Jones et al. 1980), and their range expanded greatly (Dunk 1995). Factors that may have contributed significantly to this population increase include increased agricultural irrigation, reduced hunting, and the natural potential of the species for population growth.

Since the early 1980's, white-tailed kite populations have steadily decreased again throughout much of their range in California. The most significant declines have occurred in southern California grassland regions (i.e. 38.7 percent between 1982 and 1991) (Dunk 1995). No other values for percent declines in other regions were reported; however, ten of the remaining 13 regions showed declines. Factors possibly contributing to this decline include:

- The conversion of natural habitat or agricultural lands to urban development;
- Conversion of grassland, pastures, and agricultural fields to non-suitable crops such as vineyards;
- Increased disturbance of kites by human activities, farming techniques that remove vegetation along field margins that host prey species; and
- Increased competition for nesting sites with other raptors or with corvids (crows, ravens, and jays).

Figure WHKI-1 White-Tailed Kite Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, ESTEP 2006, ebird.org

DUDEK

FIGURE WHKI-1

White-Tailed Kite Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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No population size or population trends have been specifically studied for the Central Valley or within the Planning Area. From Breeding Bird Surveys, Sauer et al. (1999) determined that overall numbers in California have increased, but increases were not statistically significant. Regional areas found to be decreasing included the Central Valley, southern California grasslands, and southern Pacific rainforests (CPF 2000). The California Natural Diversity Database (CNDDB) of the CDFW listed 10 occurrences in the Planning Area (CDFG 2010). These data are based on a small number of reports and do not represent an accurate measure of local population size. The actual population size in Planning Area is unknown and expected to be much larger than reported.

WHKI Threats to the Species

The white-tailed kite is threatened by habitat loss and alteration, and possibly from shooting, collisions with stationary/moving structure or objects, and disturbance at nest and communal roost sites. Few studies have good empirical data on population declines and because the species is known to vary in its nesting distribution, identifying whether once occupied habitat has become unsuitable is difficult. The following summarizes threats to white-tailed kite populations.

WHKI Habitat Loss and Alteration

Both nesting and foraging habitat for white-tailed kites has been lost to urbanization or converted to agricultural crops that do not support prey species or that are used for foraging. In addition, much of the grassland habitat used for foraging by white-tailed kite has been converted to other uses. DeHaven (2000) quantified changes in California cropping patterns and found that white-tailed kite “friendly” habitats such as rangelands, grassland, and pastures have decreased. These habitats have been replaced by a variety of other crops (e.g. fruit and nuts, cotton, and vineyards) that are not used by white-tailed kites, or by crops (e.g., vegetables and melons, tomatoes, beans, potatoes) that are suspected of lower quality than grassland habitats for foraging white-tailed kites.

Habitat loss and alteration also threatens white-tailed kites by fragmenting habitat, minimizing natural tree recruitment, and potentially lowering reproductive success by requiring kites to forage over longer distances. In fragmented habitat, increased foraging time theoretically also increases the time susceptible to predation and agonistic interactions with competitors. Fredrickson and Laubhan (1995) documented increasing fragmentation by urbanization, and in some areas, encroaching woody vegetation was decreasing grassland patch size. Some bird species are only found in grassland patches that are 100 times the size of an average territory of a given species (CDFW and PRBO 2003). In rangelands, natural tree recruitment has been minimized, and the decreased number of trees may limit nesting opportunities for white-tailed kites (Dunk 1995).

WHKI Shooting

White-tailed kites were once considered a pest species and were shot (Waian and Stendel 1970). No new research such as banding studies has been conducted that may prove that shooting still occurs. In general, white-tailed kites and other raptors are not regularly shot and this threat is not considered to seriously affect their populations (Hunt pers. comm.).

WHKI Disturbance at Nest and Communal Roost Sites

White-tailed kites are sensitive to human disturbance during communal roosting and nesting (Dunk 1995). They are known to travel greater than twenty miles during winter to roost together (Erichsen pers. comm.), most often in areas of little human disturbance, and nesting pairs are usually found in areas with minimal disturbance. Waian (1973) reported that white-tailed kites temporarily abandoned a communal roost site, although the type of disturbance and season was not reported. During this study, all terrain vehicles repeatedly disrupted a communal roost and the kites abandoned the site one day after the disturbance (Dunk 1995). Some individuals are known to tolerate disturbance of regular vehicle traffic and human activities, especially during winter. White-tailed kites are known roost communally in residential areas and also at urban fringes (Whisler pers. comm.). At one communal roost site in Davis, a landowner tried several measures to disturb greater than 100 kites communally roosting in pine trees. The white-tailed kites simply flew in at dark. Eventually, and landowner removed the tops of the trees to discourage their use by kites (Erichsen pers. comm.). Even during the nesting season, white-tailed kites have established nest sites in areas such as parks and areas at the urban fringe (CDFG 2010; Whisler pers. comm.), although one nest site monitored by Erichsen (pers. comm.) failed to produce young.

WHKI Data Gaps and Conservation Implications

Several researchers have documented many of the life history traits, habitat requirements, distribution, population trends, and threats to the species throughout its range. This information is important for the development of the white-tailed kite Conservation Strategy; however, the data gaps have implications for the species conservation.

WHKI Unknown Number of Undiscovered White-tailed Kite Nesting Territories/ Breeding Areas and Communal Roost Sites.

Additional unsurveyed and partially surveyed potentially suitable habitat exists within the Planning Area and elsewhere within the range of the species. In the Planning Area, discovery of nesting territories/breeding areas or communal roost sites of white-tailed kites may occur anywhere that suitable habitat is present.

WHKI Unknown Relationship Between Apparently Suitable Habitat Conditions but Unoccupied by Nesting Individuals

White-tailed kites do not currently occupy habitat that appears suitable (Jones pers. comm). Although specific habitat elements are present (i.e., nest trees), and general habitats such as fallow fields occur nearby, no active nest sites have been identified.

WHKI Pesticide and Herbicide Application

The use of pesticides and herbicides in agricultural areas and their impacts on prey items for white-tailed kite are unknown. Traditional efforts of rodent control may have impacts on white-tailed kite foraging opportunities.

WHKI Unknown Relationship between West Nile Virus and White-tailed Kites

West Nile Virus has only recently been reported in North America and has been found to primarily affect crows and other corvids by causing direct mortality. Many other birds species are also exposed, and owls appear to be a susceptible family of birds that develop both clinical signs and significant mortality (Fitzgerald et al. 2002). It is unknown if the virus can affect other raptors, such as the white-tailed kite, but some researchers believe that raptors may develop West Nile Virus by ingestion of infected prey such as smaller birds or mice, rather than direct transmission by biting mosquitoes (Garmendia et al. 2000).

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GREATER SANDHILL CRANE (SACR)

Greater Sandhill Crane (SACR)

(Grus candadensis tabida)

Status USFWS: None

Status CDFW: Threatened, Fully Protected Species

SACR Listing Status

Greater sandhill crane (*Grus canadensis tabida*) is listed as threatened under the California Endangered Species Act (CESA) and is legally protected under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-7012) and the California Fish and Game Code (Section 3503.5 and 3800). It is also a California Fully Protected Species (Section 3511 of the California Fish and Game Code).

SACR Life History and Ecology

SACR Species Description and Life History

Physical Description

The greater sandhill crane is the largest of six subspecies occurring in North America. All sandhill cranes subspecies physically appear similar except for size. Adult sandhill cranes are

gray overall with a dull red skin on their crown and lores. They have white colored feathers on the chin, throat, and cheek, and black colored primary feathers. The males and females are similar in plumage. Juveniles lack the dull red crown, and the gray colored body is irregularly mottled with brownish-red. Adults can also appear mottled brownish-red, but the color is from "stains" and not a true feather color.

SACR Demography

Reproduction

In California, nesting greater sandhill cranes occur in Lassen, Modoc, Plumas, Shasta, Sierra, and Siskiyou Counties (Littlefield 1989; CDFG 1997).

Greater sandhill cranes nest in open areas of wet meadows. These areas are often interspersed with emergent marsh. Sandhill cranes usually build their nests over shallow water. Clutch size is typically two, and adults and young forage in emergent marsh and meadow habitat during the nesting season (CDFG 1997).

Longevity, Survival, and Mortality

The maximum age in the wild for any subspecies of sandhill crane is 21 years (Tacha et al. 1992), while in an eastern unhunted population of greater sandhill cranes, annual survival rates for post-juvenile males and females were 0.87 and 0.86 respectively. Ivey (pers. comm.) calculated survival rates for greater sandhill cranes nesting at Malheur National Wildlife Refuge (NWR) and Modoc NWR. For Malheur NWR, he found an annual survival rate of 0.9 (se=0.013) for adults and 0.66 (se=0.096) for juveniles. At Modoc NWR, annual survival rate was calculated to be 0.88 (se = 0.016) for the population.

Mortality can occur from a variety of factors. Greater sandhill cranes are not legally hunted in California and hunting is not considered a serious threat to the species. Collisions with transmission lines are known to cause crane mortality, especially in areas with high winds and fog (Tacha et al. 1992), while sandhill cranes also die from diseases such as avian botulism and cholera (Windingstad 1988).

Mortality from predation by foxes (*Vulpes* spp.), racoon (*procyon lotor*), coyote (*Canis latrans*), gray wolf (*C. lupus*), bobcat (*Lynx rufus*), common raven (*Corvus corax*), eagles, and owls typically occurs with eggs and young (Walkinshaw 1973).

Dispersal Patterns

Adults and young generally expand their range after breeding which leads to pre-migration staging (Tacha et al. 1992). Pairs and family groups consistently return to breeding areas and wintering sites if habitat conditions are suitable. Juveniles remain with adults during the first year in family groups and do not disperse until they return to the breeding areas the following year. Males are more philopatric to the natal site than females, although distances moved have not been reported (Tacha et al. 1992).

Diet and Foraging

Sandhill Cranes forage on a variety of food items by probing with their bills and gleaning food on the ground surface. They are considered omnivorous and have been reported to feed on cultivated grains, berries, small mammals, insects, snails, reptiles, amphibians, nestling birds, and seeds.

Studies by Ivey and Herziger (2003) show that within and adjacent to the Planning Area, wintering greater sandhill cranes feed in a variety of agriculture crop types; however, food items consumed in the study have not been documented.

Movement and Migration Patterns

Greater sandhill cranes are migratory and leave the northern breeding areas in mid-September. Cranes migrate in small groups (20 to 50 individuals) composed of pairs and family groups. By late October, most greater sandhill cranes have left their northern breeding or staging areas and have arrived on the wintering grounds. Once on the wintering grounds, greater sandhill cranes use traditional areas throughout the winter. Migration back to the breeding areas starts in February and is completed by mid-March (Ivey and Herziger 2003).

Territoriality/Home Range

Winter home ranges of greater sandhill cranes using the Staten Island area averaged 0.66 square miles (1.71 square kilometers), varying from 0.07-2.12 square miles (0.17-5.49 square kilometers). Cranes using other areas (e.g., Tyler Island, Cosumnes River Floodplain, and Sacramento-San Joaquin River Delta) were found to not travel far during winter. Only one of thirty-nine color marked greater sandhill cranes left the main winter use area. The rest remained in the main winter use area (Ivey and Herziger 2003).

Linear distances greater sandhill cranes traveled to forage from roost sites were also calculated by Ivey and Herzier (2003) and Pogson (1990). The average distance traveled was 0.88 mi (range 0.17-1.89 mi) (Ivey and Herziger 2003) and 1.74 miles (Pogson 1990) between roost sites and foraging areas.

SACR Habitat Requirements and Ecology

Greater sandhill cranes wintering in and adjacent to the Planning Area use open agricultural habitats, natural vegetation communities, and seasonally managed wetlands. After the onset of winter rains, Sandhill Cranes begin foraging for invertebrates by probing soils in grassland habitats and overturning cattle dung. They also hunt for mice in taller grassland vegetation (Littlefield and Ivey 2000). They appear to avoid grassland habitats when vegetation exceeds 10 inches (25 centimeters). Invertebrates are also consumed in natural and managed seasonal wetlands.

Grain is also an important component to the sandhill crane's diet and as such agricultural habitat types are frequently utilized as foraging habitat. Common habitat types used for foraging include pastures, alfalfa, corn (chopped, disced, flooded, and stubble), tomatoes (flooded, ripped), and wheat (disced, ripped, flooded, stubble) (Ivey and Herziger 2003). Ivey (pers. comm.) rated agriculture crops in the Planning Area in order of importance. Rice and corn were rated the highest, followed by winter wheat and irrigated pasture. Alfalfa was the next highest rated crop, followed by hay, dryland pasture, and row crops. Sandhill Crane use in the above crop types occurs even though the crops are harvested for farming income. Allowing the crops to mature (e.g., corn) and serve as "food plots" for cranes has been successful in attracting cranes to refuges (Littlefield and Ivey 2000).

Habitats also important for greater sandhill cranes include flooded fields for roosting and rocky uplands (e.g., dirt and gravel roads) for collecting "grit." Roosting areas are located in shallowly flooded areas where cranes loaf during the day and seek protection from terrestrial predators at night. Although they will select sites with emergent vegetation along the periphery of the wetland, they rarely use roosts with heavy emergent vegetation (Littlefield and Ivey 2000). The size of roost sites is variable. Sandhill cranes roosting in Oregon used sites between 1-300 acres (0.5 to 120 hectares), with water depths averaging 4.5 inches (11.7 centimeters). Littlefield (1993) reported cranes abandoning roost sites when water depths reached eight to 11 inches (20 to 29 centimeters). He recommended roost sites should be at least 20 acres (8 hectares) in size, with water maintained from early September to mid-March. Collection of grit by cranes is important when their diet is composed of grain seeds. Grit collected in dirt and gravel roads can be essential when none is available near foraging sites. Sandhill Cranes in Sutter County have been reported flying up to five miles (eight kilometers) to obtain grit (Littlefield and Ivey 2000).

Greater sandhill cranes travel limited distances to foraging sites from night roost areas. Typically, the foraging areas are located within two miles of the night roost site. Most of the roost sites within the Planning Area are known.

Greater sandhill cranes are intolerant of excessive human disturbance and such disturbance may play an important role in habitat selection. Excessive disturbance has caused cranes to

abandon foraging and roosting sites, and repeated disturbance affects their ability to feed and store energy needed for survival. Ivey and Herziger (2003) documented disturbance of greater sandhill cranes on Staten Island, a highly used area by cranes, and found that aircraft, vehicles, hunting, and recreational activities (e.g., birding, walking, horseback riding, bicycling, boating) can cause cranes to run or fly away. Ivey (pers. comm.) found that cranes generally avoid suitable agricultural foraging habitat near occupied dwellings, and foraging areas within 100 yards of human structures should not be considered suitable.

Greater sandhill cranes generally use open areas without significant distances of fencing. For example, the 9,200 acres on Staten Island contain virtually no fences. The only fencing on the entire island is located around a few residences. Sandhill cranes run and flap when initiating flight and this behavior prevents them from gaining altitude quickly and avoiding fences.

SACR Habitat Elements

Habitat elements are those basic aspects of the environment which are needed for survival and propagation of the species. The habitat elements for greater sandhill crane are identified in Table G-3.25-1 and have been derived from input from local species experts.

Table G-3.25-1. Habitat Elements for Greater Sandhill Crane

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Cropland, irrigated pasture grassland, valley grassland, freshwater marsh, and seasonal wetlands.	Open agricultural habitats (preferred without fencing). Foraging items (e.g. invertebrates or grains). Manage grassland habitats to not exceed 10 in height.
Roosting	Vernal impoundment, vernal pool, seasonal wetland, seasonal impoundment, and freshwater marsh.	Flooded fields with water maintained from early September to mid-March. Rocky uplands (e.g., dirt and gravel roads) for collecting "grit." Cranes abandon roost sites when water depths reached 8-11 in. Cranes are intolerant of excessive human disturbance.

SACR Species Distribution and Population Trends

SACR Species Distribution

Greater sandhill cranes nest in the Great Lakes states, northwestern Minnesota, southeastern Manitoba; Rocky Mountain states; northeastern Nevada; southern British Columbia; southwestern Washington; central, eastern, and southeastern Oregon; and the Great Basin portion of California. Wintering sandhill cranes are found in southern Georgia and Florida, Texas Gulf Coast, New Mexico, southeastern Arizona, northern Mexico, southeastern California, and the Central Valley of California. In California, greater sandhill cranes nest in northeastern

California and winter in the Central Valley, Sacramento-San Joaquin River Delta, southern Imperial County, Lake Havasu NWR, and the Colorado River Indian Reserve (Zeiner et al. 1990).

SACR Central Valley Distribution

Greater sandhill cranes occur in limited locations in the Central Valley. A winter population estimate of 8,500 individuals was reported in January 1993. Of this estimate, 61 percent were using the Butte Basin, while the other two major areas used included the Cosumnes Floodplain and Delta. In the mid-1980's, crane biologists believed 61 percent of the wintering greater sandhill cranes were found in the Delta, and the number of Cranes using the Cosumnes Floodplain increased from one percent in 1983 to 23 percent in 1984 (Littlefield and Ivey 2000). Apparently, Crane use of the Cosumnes Floodplain increases during flood years (Ivey pers. comm.).

Sandhill Cranes are counted each winter in the Central Valley during the "Mid-winter Waterfowl Survey Program" which is conducted from airplanes. No attempt is made to separate the species observed during the survey, but on occasion, ground surveys have been conducted concurrently with aerial surveys in order to determine relative proportions of Greater and Lesser Sandhill Cranes. Hoffman (pers. comm.) found that in the Sacramento Valley, most of the cranes observed were greater sandhill cranes, while those in the Sacramento-San Joaquin River Delta had a more even distribution of Greater and lesser sandhill cranes. The mid-winter waterfowl count conducted January 3rd to 6th, 2005 found 7,786 sandhill cranes in the Sacramento Valley, 2,611 in the Sacramento-San Joaquin River Delta, and 1,335 in the San Joaquin Valley.

The nearest greater sandhill crane use outside of the Planning Area occurs on the Stone Lakes NWR where several hundred greater sandhill cranes occur each winter. Crane use on the NWR and adjacent agriculture land occurs in wetland and irrigated pasture (Harvey pers. comm.). Greater sandhill crane use adjacent to the refuge has decreased from agriculture conversion.

SACR Distribution within the Planning Area

Greater sandhill crane use in the Planning Area principally occurs in the Cosumnes River Floodplain. During the 1970's, few cranes were found in the Cosumnes River Floodplain, but by 1984, an estimated 24 percent of the wintering population was found using the flooded meadows and pastures of this latter area in late January (Littlefield and Ivey 2000). Pogsen and Lindstedt (1988) recorded a peak of 1,631 greater sandhill cranes during the 1983/84 winter along the Cosumnes River Foodplain and between the preserve and State Highway 99. Apparently, greater sandhill cranes use the Sacramento-San Joaquin River Delta in early winter. When local duck clubs dewater fields after hunting season (i.e., early January), these cranes move to the Cosumnes River Floodplain. Surveys in 1999 suggest crane use in the Sacramento-

San Joaquin River Delta and Cosumnes River Floodplain is similar to that found in the mid-1980's (Littlefield and Ivey 2000).

Greater sandhill cranes that are foraging and roosting at the Cosumnes River Preserve tend to be concentrated in the roadless area south of Desmond Road, one to two miles east of Franklin Boulevard, and north of the Cosumnes River (Figure SACR-1) (Ivey and Herziger 2003). Greater sandhill cranes also use the area immediately west of the Planning Area south of Lambert Road (Harvey pers. comm.).

The of wintering greater sandhill crane is that area identified as use areas in the *Conservation Assessment for Greater Sandhill Crane Wintering on the Cosumnes River Floodplain and Delta Region* (Littlefield and Ivey 2000); however, this area was extended to include recorded occurrences (ebird.org 2005-2010) and all suitable habitat within a two-mile buffer of the occurrence location. In coordination with USFWS and CDFW modeled habitat for this species was extended to include other adjacent habitat that is otherwise consistent with that previously defined.

SACR Population Levels and Trend

Market hunting between 1880 and 1915 has been cited as having a severe impact on greater sandhill cranes (Littlefield and Ivey 2000). In the 1920's, Dawson (1923 *in* Littlefield and Ivey 2000) reported there were no more than six nesting pairs left in California. Two decades later, in 1944, Walkinshaw (1949 *in* Littlefield and Ivey 2000) estimated only three to five nesting pairs in California. In 1988, 276 pairs were reported and by 2000, 465 pairs were recorded at 127 sites (i.e., an increase of 68 percent).

Although population estimates have been regularly recorded on the breeding grounds in northern California, solid population data is not available for greater sandhill cranes wintering in California. The last detailed winter estimate was conducted in the Central Valley in January 1984. Surveyors found 6,000 greater sandhill cranes. Surveys in 1991 to 1993 estimated 8,500 individuals. During the mid-1980's, 23 percent (1,380) of the sandhill cranes occurred in the Cosumnes River Floodplain (Pogson 1990 *in* Littlefield and Ivey 2000). No recent detailed winter estimates are available for the Cosumnes River Floodplain. Ivey (pers. comm.) estimated that around 1,000 individuals used the area during the 2002/03 winter, while approximately 1,500 were documented using nearby Staten Island.

SACR Threats to the Species

Historic threats to the species included market hunting, agricultural expansion, and wetland drainage. Although sandhill cranes are no longer hunted in California, agricultural expansion and wetland impacts still occur and affect the species. These and other threats are described below.

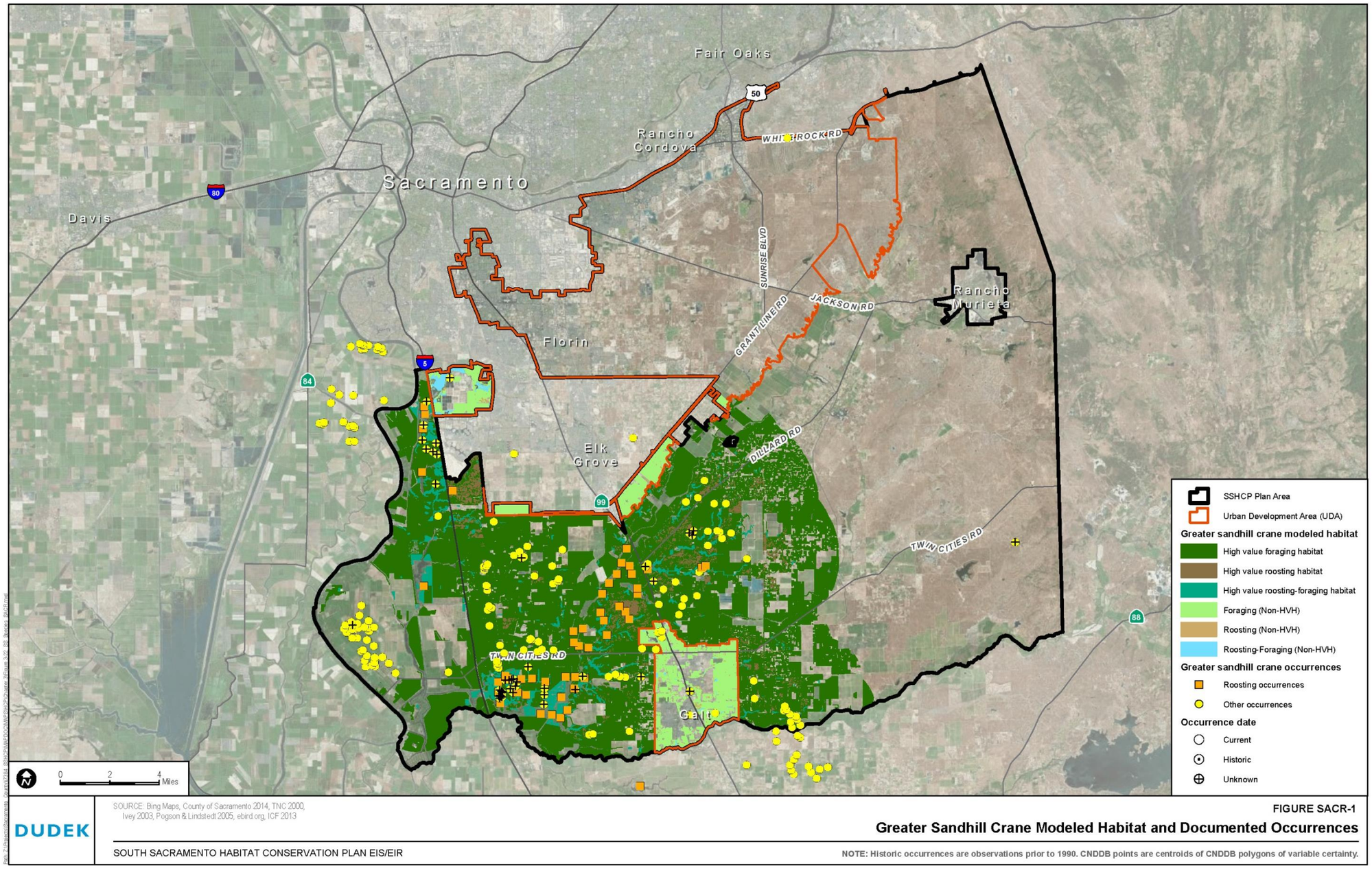
SACR Habitat Loss and Alteration

Foraging and roosting habitat for the greater sandhill crane has been lost to urbanization or converted to agricultural crops that do not provide habitat for the species (i.e., vineyards, orchards). Conversion of grassland habitats to urban and agricultural uses proportionately exceeds the conversion of any other habitat type in California (Ewing et al. 1988; Moore et al. 1990 *in* Hunting 2001). Much of the grassland and grassland/vernal pool habitat used by foraging cranes has been converted to other uses. Some of these uses, including agricultural crops such as rice, corn, winter wheat, and irrigated pasture provide high quality habitat for cranes. However, many of these crops have been recently replaced by a variety of other crops (e.g., fruit and nuts, and vineyards) (DeHaven 2000) that are not used by greater sandhill cranes, or by crops (e.g., cotton, potatoes, tomatoes) that are rarely used or are of lower quality than grassland habitats (Ivey and Herziger 2003).

Recent habitat loss in the area of Stone Lakes NWR near the Planning Area has affected greater sandhill cranes. Greater Sandhill Cranes have been displaced from suitable habitat associated with the East Franklin Project (roughly 3,000 acres). Similarly, the conversion of approximately 1,200 acres of suitable habitat to vineyards at the Circle K Ranch has displaced cranes. Additional future expansion in the area (i.e., City of Elk Grove) could impact even more crane habitat.

Decreasing patch size of natural habitats and agriculture crops has been found to reduce habitat suitability for many bird species (including sandhill cranes). Ivey (pers. comm.) found that greater sandhill cranes generally will not use suitable foraging areas that are within 100 yards of a human dwelling. Cranes also flush and are disturbed when automobiles approach within such distances. When larger, more continuous tracks of lands are split and made smaller for other crops, vehicle traffic from farming operations often increases, and this increase in human activity negatively affects crane use.

Figure SACR-1 Greater Sandhill Crane Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, TNC 2000, Ivey 2003, Pogson & Lindstedt 2005, ebird.org, ICF 2013

DUDEK

FIGURE SACR-1

Greater Sandhill Crane Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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SACR Collision with Transmission Lines, Fences, and Television/Radio Towers

Greater Sandhill Crane collisions with distribution lines have been reported by several authors (Pogson et al. 1988; Tacha et al. 1978; Walkinshaw 1956; Wheeler 1966; Drewien 1973; Lewis 1974; Nesbitt and Gilbert 1976 *in* California Energy Commission 1995). These collisions typically occur in foggy and windy conditions and result in mortality (Tacha et al. 1978; Lewis 1974; Nesbitt and Gilbert 1976; Littlefield and Ivey 2000). It is unknown if these collisions occur frequently enough to be considered a threat to the overall population. Drewien (1973) found that collisions with power lines accounted for 37 percent of the observed Sandhill Crane mortality in his study population, while Pogson et al. (1988) concluded that power line collisions seem to be the largest source of unnatural mortality for California's Central Valley Sandhill Crane population. In one incident in Texas (i.e., one day), 52 sandhill cranes were found dead or dying from collision with distribution lines (Tacha et al. 1978). Limiting distribution lines in areas where Sandhill Cranes forage and roost during the breeding season is considered an effective means of minimizing mortality (Ludwig pers. comm.)

SACR Disturbance of Foraging and Roosting Areas

Greater Sandhill Cranes do not tolerate regular disturbances. Types of disturbances that are detrimental to the subspecies include hunting, birding, photography, operating equipment for habitat management, boating, and aircraft. Disturbance forces them to expend unnecessary energy that is needed for survival during winter and migration. Disturbance during pre-dawn hours, such as hunting activities has caused cranes to leave roosts in darkness, increasing their risk for collisions with transmission lines or other obstructions. Only one pre-dawn disruption is usually necessary before cranes abandon a site (Littlefield and Ivey 2000).

Aircraft were found to affect the greatest numbers of greater sandhill cranes using Staten Island (Ivey and Herziger 2003). Aircraft disturbance documented during the study occurred from planes assessing water levels for mosquito abatement, weeds, levee integrity, as well as flying for recreational reasons. While aircraft have the ability to affect more cranes because they can cover large areas quickly, the most frequent disturbance type occurred from vehicles, including all-terrain vehicles (ATV's) (Ivey and Herziger 2003). Cars and trucks disturb cranes less than ATV's, providing the drivers stay inside the vehicle. This study also showed cranes are more tolerant to vehicles during mid-day compared to pre-dawn. Slow moving farm equipment only slightly disturbed cranes.

Disturbance from hunting also poses a serious threat to greater sandhill cranes. Hunters accessing hunt areas during pre-dawn hours flush cranes from their roosts and hunter presence can keep cranes from roosting or foraging in an area (Ivey and Herziger 2003). Because of hunting-related disturbances to cranes, Staten Island implemented a crane friendly hunting

program. This program has been considered successful at minimizing disturbances and increasing crane use of the island. Ivey and Herziger (2003) noted that the number of greater sandhill cranes roosting on Staten Island more than doubled after the opening day of waterfowl season. This increase in crane numbers was attributed to the disturbance of cranes in nearby crane use areas (i.e., adjacent Delta Islands).

Waterfowl hunting may impact cranes less that pheasant hunting if hunters are limited to using blinds. During pheasant hunting, hunters and dogs who are on foot are more disruptive to cranes than waterfowl hunters sitting concealed in blinds (Ivey and Herziger 2003).

SACR Epizootic Events

Like other waterfowl, sandhill cranes are limited by the low availability of wetland roost areas. For example, less than twenty salt lakes in western Texas provide roost areas for up to 80 percent of the mid-continent population during winter. Thus, greater numbers of Sandhill Cranes are "forced" to use these limited roost areas and are more susceptible to epizootic events such as cholera, avian botulism, aspergillosis, salmonella, and avian tuberculosis. Each of the above diseases has been documented to kill Sandhill Cranes (Tacha et al. 1992).

Avian cholera has resulted in greater sandhill crane mortality in San Joaquin County (S. Lindstedt pers. comm. with G. Ivey). Although no details were reported with this event, it is assumed to have only affected a small number of Sandhill Cranes. Several years of data collected from waterfowl surveys may support this assumption. Sandhill Cranes have been observed roosting in areas where thousands of dead waterfowl were being recovered due to death from avian cholera (Gifford pers. comm.). During an avian cholera abatement program from the mid-1970's to 2000 in the Sacramento-San Joaquin River Delta and Yolo Bypass area, two greater sandhill cranes were documented to succumb to avian cholera. In addition, another 32 records of sandhill cranes (subspecies unknown) were reported dead over a period of 20 years (Gifford pers. comm.). These numbers appear low, but may be important from a population perspective given there are fewer than 10,000 greater sandhill cranes wintering in California.

SACR Data Gaps and Conservation Implications

Several researchers have documented the life history traits, habitat requirements, distribution, population trends, and threats to the subspecies throughout its range. This information is important for the development of the greater sandhill crane Conservation Strategy. The discovery of new information, considered here as data gaps, has additional implications for the species conservation. These topics are discussed below.

SACR Population and Habitat Distribution within the Planning Area

Greater Sandhill Cranes occur in suitable habitat within the Planning Area. Greater Sandhill Cranes are not known to utilize many other apparently suitable lands within the EIS/EIR study area. Furthermore, it is unclear as to

Until this data gap is remedied, the conservation value of grassland, seasonal wetlands, vernal pools, and suitable agricultural land-cover types for greater sandhill crane will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, or are adjacent to these areas.

SACR Amount of Wintering Habitat

Most of the greater sandhill crane wintering population within the Planning Area is assumed to occur in the Cosumnes River Floodplain. However, in severe winters where the amount of flooded area is greatly expanded, suitable foraging habitat may be limited if preserve boundaries have not included enough land.

SACR Pesticide and Herbicide Application

The use of pesticides and herbicides in agricultural areas and their direct and indirect impacts (i.e., through effects on prey species) on greater sandhill cranes are unknown. Traditional methods for controlling invertebrates may cause toxicitiy effects or reduce foraging opportunities.

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LOGGERHEAD SHRIKE (LOSH)

Loggerhead Shrike (LOSH)

(Lanius ludovicianus)

Status USFWS: Bird of Conservation Concern

Status CDFW: Species of Special Concern

LOSH Listing Status

Loggerhead shrike (*Lanius ludovicianus*) is legally protected under the federal Migratory Bird Treaty Act (16 U.S.C. 703-712) and the California Fish and Game Code (Section 3800). This species is designated as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW) (Shuford and Gardali 2008); and a Bird of Conservation Concern (BCC) by the U.S. Fish and Wildlife Service (USFWS) (USFWS 2002).

LOSH Life History and Ecology

LOSH Species Description and Life History

Physical Description

Loggerhead shrike is a medium-sized (7.9 to 9.8 inches [20 to 25 centimeters]), large-headed Passerine with dark gray on the back and white on the breast. Its distinguishing feature is a black face mask that extends over the bill (Yosef 1996).

Taxonomy

There is considerable geographic variation in plumage and morphometrics within *Lanius ludovicianus.* The current systematics (Clements 2000) recognize 11 subspecies of *L. ludovicianus*. Five subspecies occur in California: *L. l gambeli*, *L. l. excubitorides, L. l. mearnsi, L. l. anthonyi,* and *L. l. grinnelli*. *L. l. gambeli* breeds from Washington south to southwestern California, including the Planning Area; *L. l. grinnelli* breeds from San Diego County south to north-central Baja California, Mexico. *L. l. excubitorides* breeds in southeast California, east *of L. l gambeli*; *L. l. mearnsi* is a resident on San Clemente Island; and*, L. l. anthonyi* is a resident on Santa Cruz, Santa Rosa, and Santa Catalina Islands (Yosef 1996).

Reproduction

The breeding season for loggerhead shrike generally begins before most other sympatric Passerine species (in late January or early February), and extends to July. In non-migratory populations, shrikes remain paired during the winter. Territory establishment probably begins between February and March. There is no information available about the specific timing of nest construction; however, it probably begins soon after territory establishment. Nest construction lasts approximately six to 11 days. Loggerhead shrikes build open cup nests, placing them in well-hidden microsites on a tree or shrub. Eggs are typically laid between March and June. Females normally lay five to six eggs and incubate for 15 to 17 days. The female usually feeds the nestlings until they fledge at 16 to 20 days after hatching; however, the male will feed the nestlings if the female is absent from the nest for extended periods. During the nestling period, the male provides the brooding female with food and participates in nest sanitation (e.g., removing fecal matter and regurgitated pellets) (Yosef 1996).

Survival and Longevity

There are no reliable juvenile or adult survival estimates for loggerhead shrike.

Dispersal Patterns

Banding studies indicate that adult loggerhead shrikes exhibit some site fidelity, and juveniles disperse widely. Recapture rates of loggerhead shrikes banded as juveniles are low. In Alberta, the average distance of juvenile dispersal was 4.2 mi (6.7 kilometers). Over the period of three years since the time of banding, shrikes dispersed up to 43.5 miles (70 kilometers) from their natal site. The rates of breeding adults returning to breeding sites between selected years were 73 percent in Idaho, 68 percent in Indiana, 60 percent in Virginia, 54 percent in Missouri, 57 percent in Iowa, and 41 percent and 59 percent in Minnesota. On San Clemente Island, California, return rates between years were 30 to 90 percent between 1985 and 1988. In other areas, (e.g., Alberta and North Dakota) return rates of breeding adults were lower (Yosef 1996).

Diet and Foraging

Loggerhead shrikes eat small to medium-sized animal matter, including arthropods, birds, amphibians, reptiles, and small mammals. They also eat roadkills and carrion. Shrikes forage primarily on large ground-dwelling insects that require little to no water (Miller and Stebbins 1964). A loggerhead shrike is able to carry prey as heavy as its own mass with its feet. It can carry smaller items in its bill. Hunting perches are especially important for loggerhead shrike foraging (Brooks and Temple 1990; Yosef and Grubb 1994). Loggerhead shrikes hunt from perches such as fences, shrubs, trees, utility lines, and poles. Shrikes kill their vertebrate prey by attacking the nape and tearing the cerebral vertebrae. They often impale their prey on barbed wire and other sharp objects. Loggerhead shrikes forage primarily in the morning (Yosef 1996).

Movement and Migration Patterns

Migration in loggerhead shrikes is poorly understood. Northern populations of loggerhead shrike are migratory. They migrate annually between their breeding and wintering grounds. Their spring migration to the breeding grounds begins in January and extends to March, peaking between February and March. Fall migration to the wintering grounds generally begins in August and extends through November, peaking between September and November. Birds apparently migrate individually during the day (Yosef 1996.) Although not explicitly reported, Loggerhead shrike populations in Sacramento County are presumably resident and non-migratory.

Territoriality/Home Range

Loggerhead shrikes are territorial and aggressive during the breeding season. They maintain relatively large territories, and all activities associated with reproduction (i.e., mating, foraging, brooding) occur within the territory. In mainland California, the average size of territories averaged 21 acres (8.5 hectares) and ranged between 10.9 acres (4.4 hectares) and 39.5 acres (16 hectares) (Yosef 1996). In areas of year-round residence (such as much of lowland California) members of a pair are known to defend adjoining territories during the non-breeding season and then defend a single nesting territory comprised of the adjoining winter territories during the breeding season (Lefranc 1997).

Ecological Relationships

There is little data available on predation of loggerhead shrike. Nest predators have included feral cats, black-billed magpies (*Pica pica hudsonia*), weasels (*Mustela* spp.), raccoons (*Procyon lotor*), and snakes. Potential nest predators are often mobbed by shrikes. These species include American crow (*Corvus brachyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), and northern harrier (*Circus cyaneus*) (Yosef 1996).

Prior to nesting, loggerhead shrikes engage in "group meetings," where neighboring shrikes convene to call and display. This behavior is thought to facilitate familiarity among neighboring territorial shrikes and minimize agonistic behavior among them during breeding activities. Shrikes interact with, and appear to dominate, many species that share their habitat. Nest parasitism of loggerhead shrike by Brown-headed Cowbird was first documented in Iowa in 1991. Shrikes readily chase cowbirds that approach nests containing eggs (Yosef 1996). The extent and intensity of cowbird nest parasitism on loggerhead shrike is unknown.

LOSH Habitat Requirements and Ecology

Loggerhead shrikes occur in dry, open habitats including grasslands, pastures with fence rows, agricultural fields, open woodlands (savannahs), scrub, and riparian areas. Suitable breeding habitat has the following characteristics: 1) short, sparse vegetation; 2) scattered or isolated low trees or large shrubs for nest sites; and 3) available hunting perches with an open view (Yosef 1996; Cade and Woods 1997). Loggerhead shrikes typically avoid completely treeless and shrubless areas (Cade and Woods 1997), as well as urbanized and densely wooded areas (Grinnell and Miller 1944). Winter foraging habitat is similar to summer breeding and foraging habitat, however, shrikes also use idle pastures and hayfields during the winter (Bartgis 1992).

In many areas, loggerhead shrike abundance is correlated with the amount of pastureland and available perches (Gawlik and Bildstein 1993; Yosef 1996). Hunting perches are especially important for loggerhead shrike foraging (Brooks and Temple 1990; Yosef and Grubb 1994). Loggerhead shrikes hunt from perches such as fences, shrubs, trees, utility lines, and poles. Yosef and Grubb (1994) experimentally added wooden posts (averaging 53 inches tall) to loggerhead shrike territories. They found that productivity increased and territory size decreased in territories where perches were added compared to control sites. The authors concluded that habitats managed for loggerhead shrikes should include abundant hunting perches, as well as an adequate prey base and nest sites.

Loggerhead shrikes may also forage in areas where vegetation is tall and dense, although these areas are considered suboptimal. Foraging success in these areas may be similar to that in more open and sparse areas, but involves more hovering, more flights, and increased perch-switching (Yosef and Grubb 1993).

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for loggerhead shrike are identified in Table G-3.26.1 and have been derived from input from local species experts.

Table G-3.26-1. Habitat Elements for Loggerhead Shrike

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak savanna, cropland, irrigated pasture/grassland, and valley grassland.	Open habitats with abundant, large arthropods (e.g., grasshoppers) and numerous hunting perches.
Nesting	Blue oak woodland, blue oak savanna, mine tailing riparian woodlands, mixed riparian scrub, and orchards.	Structurally diverse woodland habitats that dense vegetation for siting nests.

LOSH Species Distribution and Population Trends

LOSH Species Distribution

The breeding range of loggerhead shrike is extensive. It includes Alberta, Saskatchewan, and Manitoba in Canada; most of the United States with the exception of the Pacific Northwest and most of the northeastern states; and most of Mexico. Northern populations of loggerhead shrike are migratory. Their winter distribution includes northern California, northern Nevada, northern Utah, central Colorado, Kansas, western Missouri, northern Kentucky, and northern Virginia south through the southern United States and Mexico (Yosef 1996). Loggerhead shrike has apparently always been more frequent throughout the western and southern portions of its range than other areas of its distribution (Cade and Woods 1997).

In California, loggerhead shrike is a year-round resident throughout the foothill and lowland regions in the central to southern portion of the state. Although it does not breed or winter in the north coast region of California, winter migrants occur there (Zeiner et al. 1990).

LOSH Central Valley Distribution

Loggerhead shrike is a resident in the Central Valley where there is suitable habitat. The Central Valley may have historically functioned as a core area for interior populations of loggerhead shrike in California. Although shrikes occur in successional habitats, the Central Valley supported abundant breeding habitat that is considered more permanent or stable, such as perennial grasslands and open savannahs (Cade and Woods 1997).

LOSH Distribution Within Planning Area

Loggerhead shrikes occur year-round in suitable habitat throughout the Planning Area. They are probably regular breeders in the Planning Area in low densities (Trochet pers. comm.); however, their overall distribution, abundance, and population structure are not well known. The CNDDB (CDFG 2010) reports no occurrences of loggerhead shrike in Sacramento County. There are occurrences from other sources (Ebird.org 2005-2010) that report the species

throughout the Planning Area. Figure LOSH-1 shows the occurrences of loggerhead shrike within and adjacent to the Planning Area.

Land cover types used by loggerhead shrikes, such as irrigated pasture-grassland, cropland, blue oak savanna, blue oak woodland, orchards, and valley grassland occur throughout much of the Central Valley and are well-represented in Sacramento County and the Planning Area; however, at most sites within these land-cover types, the presence of loggerhead shrike is not known.

Sacramento-area ornithologists C. Conard and J. Trochet provided occurrence and habitat distribution information, which is summarized below.

- At the Sacramento Regional County Sanitation District (SRCSD) Bufferlands (and at nearby Stone Lakes National Wildlife Refuge), approximately two to three shrike nests are located each year. Loggerhead shrikes occur regularly throughout the agricultural lands and grasslands where suitable habitat features exist (Conard pers. comm.).
- Loggerhead shrikes occur regularly during summer at The Nature Conservancy's Howard Ranch; although their abundance is not high. Also, a nest that produced two young was documented there in 2001 (Trochet pers. comm.).
- At the Consumes River Preserve, shrikes nested successfully from 1995–1997 north of the Tall Forest. This area supports pastureland with scattered small trees and shrubs, and was considered the most reliable location to observe shrikes during all seasons. The area has since been converted to rice fields and no longer supports loggerhead shrikes during the breeding season (Trochet pers. comm.).
- On County land northeast of the Tall Forest, shrikes nested successfully near pasture and fallow rice fields (Trochet pers. comm.). Also, along Bruceville Road, 0.2 to 0.3 miles south of Twin Cities Road, adult shrikes with four young were observed over a period of time (Trochet pers. comm.).
- Nesting has not been documented at Valensin Ranch, although some locations there provide suitable breeding habitat.
- Loggerhead shrikes have been documented at least twice during the breeding season at the Schneider property, along Meiss Road approximately 1.75 miles from Ione Road, although nesting has not been documented there. This property may not support suitable nest sites (small trees or shrubs). Nesting could have occurred in the adjacent dredge spoils area that supports small trees or shrubs; however this area has not been searched (Trochet pers. comm.).
- In general, loggerhead shrikes occur regularly during the breeding season throughout south Sacramento County, in open country with elevated perches and appropriate vegetation for breeding. They are probably regular, low-density breeders throughout the entire southern portion of the County where suitable habitat exists (Trochet pers. comm.).

Because comprehensive surveys or monitoring efforts for loggerhead shrike in the Planning Area have not been conducted, and because the known occurrences are based mostly on incidental observations or limited surveys (e.g., anecdotal records, surveys conducted over a limited area), the population size and nesting locations of this species in the Planning Area are not well known.

LOSH Population Levels and Trend

Prior to the mid-1900s, loggerhead shrike was considered widespread and abundant (Yosef 1996; Cade and Woods 1997); however, loggerhead shrike populations have been declining rangewide since that time, and it has been extirpated locally throughout the species' range (Cade and Woods 1997). Much of the evidence for population declines has come from analysis of Breeding Bird Survey (BBS) data. Loggerhead shrike is one of the few species that show a significant decline (based on BBS data) in most states.

Analysis of Breeding Bird Survey (BBS) data indicates an overall decline of loggerhead shrike populations throughout the species breeding range, although trends vary regionally (Sauer et al. 2004). In California, loggerhead shrike has experienced extensive local population declines. BBS data suggest a significant statewide (California) population decrease between 1966 and 2003 (N = 108, $P = 0.01$). The BBS trend for loggerhead shrike in the Central Valley is similar to the statewide trend.

LOSH Threats to the Species

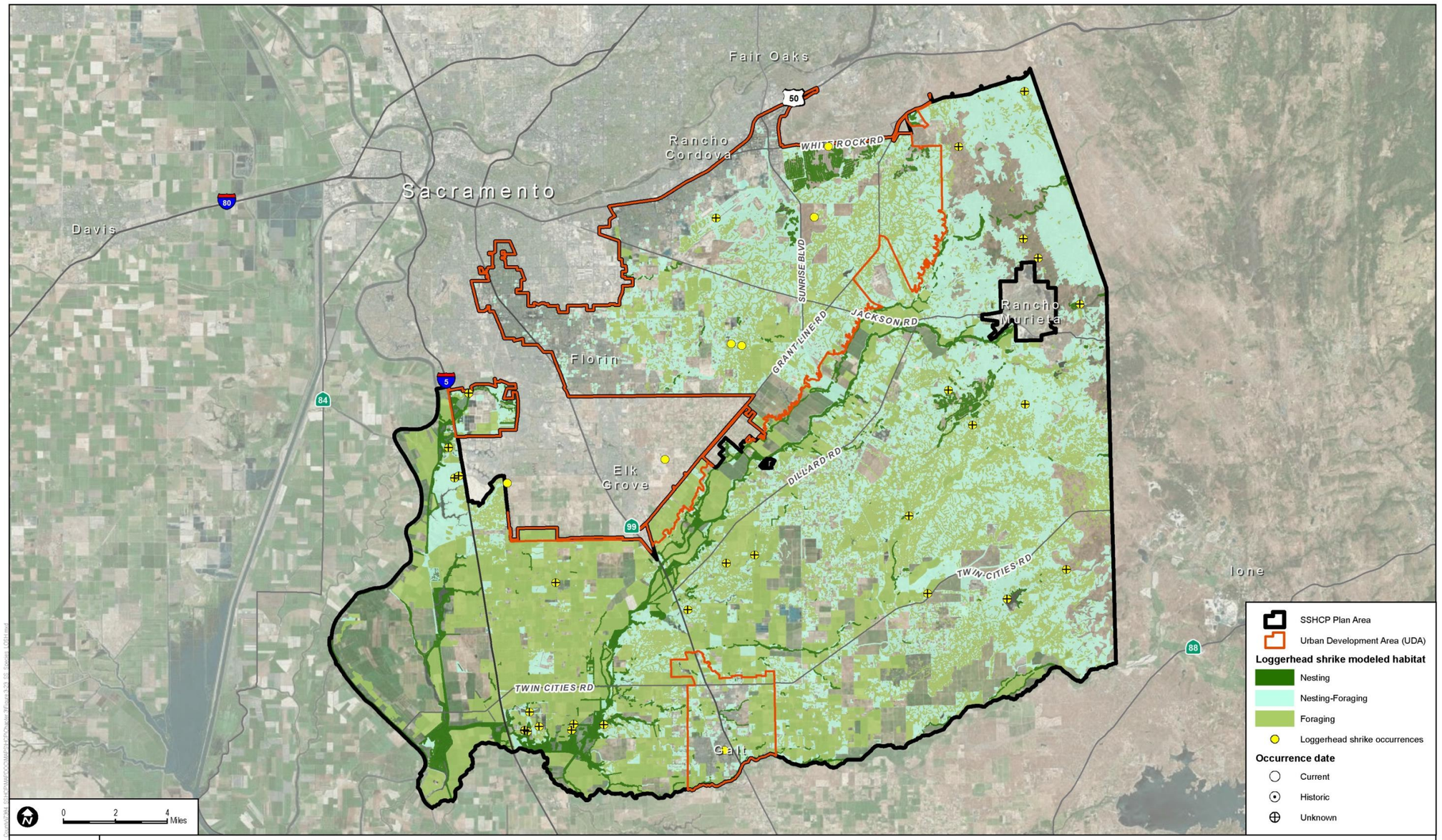
The primary cause of loggerhead shrike population declines is breeding habitat loss and degradation as a result of urbanization, development, and agricultural conversion (Morrison 1981; Yosef 1996; Cade and Woods 1997). Another important cause of population declines is related to pesticides that are ingested with the species' prey (Yosef 1996).

Shooting of perched shrikes due to dislike of their raptor-like habits contributed to the species decline in the past century (Yosef 1996), but is not likely to be a significant source of mortality in current populations. Road kills and increased predation of young and eggs by common raven, domestic cats, and foxes may also be factors in the species decline.

LOSH Data Gaps and Conservation Implications

There are several sources of uncertainty regarding loggerhead shrikes and their requirements in the Planning Area. These data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

Figure LOSH-1 Loggerhead Shrike Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2012

DUDEK

FIGURE LOSH-1

Loggerhead Shrike Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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LOSH Population and Habitat Distribution within the Planning Area

Loggerhead shrikes occur in suitable habitat within the Planning Area; however, their overall distribution, abundance, and population structure are not well known. Land-cover types used by shrikes, such as grasslands and pastureland, occur throughout much of the Central Valley and are well-represented in Sacramento County and the Planning Area. At most sites with these land cover types, the presence of loggerhead shrike is not known.

Because comprehensive surveys for loggerhead shrike in the Planning Area have not been conducted and because the existing occurrence data are based primarily on incidental observations (e.g., anecdotal records), the population size, nesting locations, and important wintering areas of this species throughout the Planning Area are not known. Although the distribution of grasslands and other open habitats is mapped and quantifiable, the quality of habitat for shrikes within most of these areas is unknown.

These information gaps limit our ability to identify the best lands available for preserving loggerhead shrike habitat and accurately estimate the impacts resulting from covered activities. Until this data gap is remedied, the conservation value of valley grassland, blue oak savannah, and pasture land-cover types for loggerhead shrike will be considered relatively high in lands that support (or recently supported) known occurrences, are large in extent, or are adjacent to these areas.

LOSH Effectiveness of Habitat Enhancement Techniques in Creating Suitable Nest and Perch Sites for Loggerhead Shrike

Achieving the conservation goal and objectives for loggerhead shrike will require successful enhancement of grassland and other habitats. The structure of these habitats (e.g., short, sparse vegetation), and presence of nest and perch sites, are important factors for suitability. Whether enhancement and management can retain the elements suitable for loggerhead shrike is unknown.

If restoration techniques cannot eventually create grassland and other habitats with characteristics suitable for nesting shrikes, then those lands would not support breeding pairs or wintering individuals.

It is assumed that careful design and implementation of grassland enhancement plans could create suitable loggerhead shrike breeding habitat. Habitat enhancement and restoration efforts to achieve conservation objectives for loggerhead shrike will incorporate habitat requirements into their objectives, designs, and performance standards. Also, restoration and enhancement projects will be established as working experiments. It is expected that enhancement and management efforts aimed at burrowing owl conservation will also benefit loggerhead shrike.

LOSH Landscape-level Habitat and Preserve Design Requirements for Viable Populations

The minimum habitat size and connectivity requirements for loggerhead shrike are not understood. This causes uncertainty in determining whether the preserve design will be effective in meeting the conservation goal for loggerhead shrike. The criteria for designing preserves will be based on the best available information on or inferences about spatial requirements for all covered species. The minimum size and connectivity requirements of preserves will be expected to meet or exceed requirements to maintain loggerhead shrike populations.

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WESTERN RED BAT (WRB)

Western Red Bat (WRB)

(Lasiurus blossevillii)

Status USFWS: None

Status CDFW: Species of Special Concern

WRB Listing Status

The western red bat (*Lasiurus blossevillii*) is considered a Species of Special Concern by the California Department of Fish and Wildlife (CDFW) (Bolster 1998). This status is based largely on the findings of the Western Bat Working Group (WBWG), which rates management concern for the western red bat as high priority, indicating that this species is imperiled or at high risk of imperilment (WBWG 1998).

WRB Life History and Ecology

WRB Species Description and Life History

The western red bat is a member of the taxonomic Order Chiroptera and Family Vespertilionidae, the largest of the three bat families present in California. The generic name *Lasiurus* may be translated as "hairy-tailed." Until 1988 the western red bat was considered a subspecies of *Lasiurus borealis* and was known as *L. b. teliotis* (Shump and Shump 1982). Current taxonomy recognizes the eastern red bat (*L. borealis*) and the western red bat (*L. blossevillii*; Baker et al. 1988) as full species.

Identification

This species is a medium-sized bat (six to 13 grams in the Sacramento Valley, Johnson unpubl. data) with long pointed wings (forearm 35 to 45 mm, Pierson et al. 2002) and a wingspan of 28 to 32 centimeters (Harvey et al. 1999). As its name suggests it is a distinctive rusty reddish color washed with white. The underparts are slightly paler. Color can vary from "a very distinct red to a yellow-brown" (Pierson et al. 2002). The wing membranes are black with orange demarcations along the fingers and the interfemoral membrane is heavily furred (bat species outside this genus usually have naked or partially furred tail membranes). Barbour and Davis (1969) state that the tail is long and extends straight out in flight, which gives this bat a distinctive silhouette against the sky as compared to other species with shorter tails. The

western red bat has short, broad, and rounded ears that do not extend much above the dorsal fur line (Barbour and Davis 1969). The tragus is triangular. The nose is plain and short. The feet are small, slender, and furred and there is fur on the wrists.

The western red bat is not likely to be confused with other species known to occur in Sacramento County due to its distinctive coloration; however, two congeners occur in California: the yellow bat (*L. xanthinus*) and hoary bat (*L. cinereus*). The northernmost known occurrences for the yellow bat are in Los Angeles and San Bernardino Counties (Constantine 1998). Therefore, this species is not expected to occur in Sacramento County. The hoary bat may occur in Sacramento County, but it is a larger bat (forearm 46 to 58 millimeters, Pierson et al. 2002), its fur is generally dark gray with whitish hair tips giving it a frosty appearance, and it has yellow fur around the face with black rimmed ears. Although *L. blossevillii* can appear somewhat frosted and have a yellowish tinge to its fur, it is never as dark nor as frosted as *L. cinereus*, nor as yellow as *L. xanthinus* (Pierson et al. 2002).

Life History

The life history of the western red bat centers on reproduction and meeting the energetic demands of a small insectivorous mammal. Several aspects of this species' life history are uncommon among bats in northern California, namely its roosting, social, reproductive, and migratory habits. The western red bat is solitary and roosts in foliage. During the day, it shelters on the underside of overhanging leaves. It most often roosts individually; however, females with dependent young roost together and multiple individuals are sometimes found in clusters during migration (e.g., roosting in the same tree). The western red bat uses torpor to conserve energy during the day when it is inactive (Shump and Shump 1982; Willis and Brigham 2001). It hangs by one foot in a compact position and it is thought that the furred tail membrane acts as a blanket. The fur on its feet and wrists and the overall thickness of the fur are adaptations to the greater exposure of its chosen roost sites.

This species makes north-south migrations in spring and fall that may be hundreds of miles. Cryan (2003) studied seasonal dispersal of the western red bat on a continental scale and stated that seasonal dispersal from California is apparently limited, and it is unclear if California populations mix with others to the south and east. During migration western red bats may form small groups (Constantine 1959), though males and females may travel separately (Barclay 1984). Western red bats may be year-round residents in the Bay Area (Orr 1950). During winter cold snaps the eastern red bat extends torpor (hibernates) and the western red bat may do so as well. Most of the life history traits of the eastern red bat and western red bat are assumed to be shared.

Pups are born from late spring to early summer (Pierson et al. 2002). Three pups are usual in a litter, but there may be as many as five (Allen 1939; Pierson et al. 2002). It is thought that red bats have more young than other bat species because their roosting habits in foliage expose

them to greater predation. The literature contains numerous accounts of birds attacking red bats and their young (Allan 1947; Constantine 1959; Downing and Baldwin 1961; Elwell 1962; Hoffmeister and Downes 1964; Wilks and Laughlin 1961). The large number of pups seem especially burdensome to females because grounded mothers have often been found unable to fly due to the weight of the clinging pups (Allan 1947; Pearson pers. comm. 2004; Stains 1965). Western red bat pups are weaned between six to eight weeks of age when they have grown to adult size and are thus able to fly.

The only longevity record known for the western red bat is two years for an individual in captivity; however, this species does not adapt well to captivity (Pearson pers. comm. 2004). Potential predators of this species include jays (Allan 1947; Constantine 1959; Elwell 1962; Hoffmeister and Downes 1964), American crows (*Corvus brachyrhynchos*), American kestrels (*Falco sparverius*), hawks (*Buteo* spp.), owls (*Bubo* spp., *Asio* spp.) (Allen 1939), opossums (Sperry 1933), skunks (*Mephitis* spp.), weasels (*Mustela* spp.), rats (*Rattus* spp.), snakes (Allen 1939), and cats. Terrestrial predators may capture bats roosting in low-growing branches. Western red bats, like all mammals, can also contract the rabies virus. In addition, infected bats may be a vector for the disease before they die.

WRB Habitat Requirements and Ecology

The western red bat occurs primarily in the low and middle elevations in broadleaf tree communities (Pierson et al*.* 1999). It is less abundant in mixed conifer forests. This species roosts in the foliage of large shrubs and trees in habitats bordering forests, rivers, agricultural areas, and urban areas (Harvey et al*.* 1999). Roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas with mature trees (WBWG 1998).

Pierson et al*.* (1999) describe roosting habitat as large diameter riparian cottonwoods and sycamores, and older orchard trees (particularly walnuts). Constantine (1958, 1959, 1966) studied red bats in California, Georgia, and Iowa. He found that roosts have the following attributes: protection from view from all directions except below; no obstructions below allowing the bat to drop downward to begin flight; no lower perches from which predatory birds or mammals can see or reach the bat; dark ground cover minimizing the reflection of sunlight; sufficient adjacent vegetation to break up wind currents and retard the distribution of dust; location on the south or southwest side of the tree; and height usually four to 10 feet above ground. The western red bat usually hangs from the leaf petiole, but occasionally hangs from a twig or branch (Barbour and Davis 1969). Hanging from one foot it closely resembles a dead leaf and the wing markings are thought to add to the camouflage.

Foraging occurs in and amongst vegetation and regularly occurs over the same territory (Allen 1939). Foraging has been noted in habitats such as mature orchards, oak woodland, low elevation conifer forest, and non-native trees in urban and rural residential areas. In addition,

this species may forage in habitats adjacent to streams and rivers that do not provide roosting habitat. No dietary information is available for western red bats in California (Pierson et al. 2002); however, eastern red bats prey on moths, flies, beetles, and tiny wasps (WBWG 1998). Western red bats may forage all night (perhaps males and nonreproductive females), but there is often an initial foraging period after sunset and a minor secondary activity period before sunrise that corresponds to periods of increased insect activity (WBWG 1998).

Habitat requirements in Sacramento County may include open water for drinking and foraging, undisturbed foliage roost sites that provide protection from predators, and structurally diverse vegetation that supports a diversity of insect prey. Water features are a vital habitat component because bats often drink immediately after emergence and water is an important source of concentrated insects. Studies by Pierson et al. (1999) comparing mature riparian habitat extending greater than 50 meters back from the Sacramento River to areas with less extensive or degraded habitat suggest that this species prefers the mature, extensive riparian habitat. Mature orchards with dense canopies provide alternate roosting sites and may provide foraging habitat (Pierson et al. 1999).

Habitat Elements

Habitat elements are those basic aspects of the environment, which are needed for survival and propagation of the species. The habitat elements for western red bat are identified in Table G-3.27-1 and have been derived from input from local species experts.

Table G-3.27-1. Habitat Elements for Western Red Bat

Essential Activities	Land Cover Types	Habitat Elements
Foraging	Blue oak woodland, blue oak savanna, mine tailing riparian woodlands, valley oak riparian woodlands, mixed riparian woodland, orchards, mixed riparian scrub, vernal impoundment, vernal pool, seasonal wetlands, seasonal impoundment, freshwater marsh, open water, and streams/creeks.	A variety of habitats including oak woodland and savanna, grassland, riparian areas, and wetlands are suitable foraging habitat. Nearby water features are a vital habitat component because bats typically have high water needs. Furthermore, water features are an important source of concentrated insects.
Roosting	Blue oak woodland, blue oak savanna, mine tailing riparian woodlands, valley oak riparian woodlands, and mixed riparian woodland.	Roosts are provided by the foliage of large shrubs and trees in habitats bordering forests, rivers, agricultural areas, and urban areas Roosts have the following attributes: protection from view from all directions except below; no obstructions below allowing the bat to drop downward to begin flight; no lower perches from which predatory birds or mammals could see or reach the bat; dark ground cover minimizing the reflection of sunlight; sufficient adjacent vegetation to break up wind currents and retard the distribution of dust; location on the south or southwest side of the tree; and height usually 4-10 feet above ground.

WRB Species Distribution and Population Trends

Anecdotal observations suggest that the historical abundance of eastern red bat and western red bat was likely much greater than at present (O'Shea et al. 2003). Carter et al. (2003) concluded that quantitative information concerning long-term population trends of solitary foliage roosting bats cannot be drawn from existing data because of the lack of standardized reporting and inability to determine the proportion of total population sampled. Carter et al. (2003) noted that indices of abundance such as submissions to health agencies for rabies testing and trends in habitat are the only present means to indirectly assess population trend.

WRB Range Wide Distribution

The western red bat ranges from southern British Columbia south to Baja California and Mexico, and east to Wyoming (Hall 1981). This species regularly occurs in California, Arizona, New Mexico, and throughout western and central Mexico to South America (Baker et al. 1988; Cryan 2003; Hall 1981). The only known region where both red bat species overlap is in west Texas (WBWG 1998).

WRB Central Valley Distribution

The western red bat occurs throughout the Central Valley in suitable habitat. Although its range includes much of western North America, the only areas with multiple records for breeding females are California river valleys west of the Sierra Nevada crest (Pierson et al. 1999). Breeding females appear to be highly associated with lower elevation riparian habitats, particularly relatively intact stands of cottonwood and sycamore in the Central Valley (Pierson et al. in review, 2002). Cryan (2003) summarized capture data from California as follows "Males and females are together at lower elevations in California during winter (Grinnell 1918, Orr 1950) but segregate during spring and summer; females remain in lowland areas, whereas males apparently move to higher elevations (Grinnell 1918; Shump and Shump 1982)." Sutter County capture data is consistent with these findings (Johnson 2000).

The Museum of Vertebrate Zoology (MVZ) at the University of California Berkeley has museum specimens from Tehama, Sutter, Butte, Yolo, Yuba, Sacramento, Solano, San Joaquin, Merced, Madera, Fresno, Tulare, Kings, and Kern Counties. Specimens have also been collected in San Joaquin County in 1950 and 1987 and deposited in the California Academy of Sciences. Johnson (2000) captured western red bats in blue oak woodland in the Sutter Buttes, Sutter County. Roost sites have been found in orange and apricot orchards near Esparto and Rumsey, Yolo County (Constantine 1959).

The four MVZ records for Sacramento County are from the following locations: (1) Eddinger–Johnson Ranch south of Sacramento, (2) two miles northwest of Folsom, and (3) Sacramento

(two specimens taken in 1952 and in 1990). A dead western red bat was found on a sidewalk in downtown Sacramento in 1995 (Johnson pers. obs.). In addition, from 1977 to 2002 at least 56 western red bats were submitted to the Sacramento County Public Health Laboratory (Constantine unpubl. data 2004). Though the California Natural Diversity Database (CNDDB) does not contain records for this species in Sacramento County (CDFG 2010), the CNDDB does provide scattered occurrence records for western red bat throughout California.

WRB Distribution within the Planning Area

Western red bat records were obtained from the numerous bat specimens annually submitted for rabies testing to the Sacramento County Public Health Laboratory. Fifty-six records for the western red bat (1977 to 2002) varied in location precision from "Sacramento County" to "Sacramento" to an actual address (CDFG 2010). Over 30 western red bats were from localities reported as the City of Sacramento, Folsom, Rancho Cordova, Wilton, Elk Grove, or Galt (Constantine unpubl. data 2004). These specimens included females and immature individuals indicating the presence of a reproductive population. Further details are unavailable on most of the occurrence localities, but seven addresses were given for locations inside the Planning Area (Figure WRB-1). Though a bat monitoring project conducted at the Cosumnes River Preserve has also detected western red bats, there has been no area-wide assessment of whether available habitats within the Planning Area provide appropriate roosting and foraging habitat for the species.

WRB Population Levels and Trends

Estimates of historic and current population levels for the western red bat are currently unavailable; however, detailed information on the species, including population trends, should be available when a report on the distribution and status of the western red bat in California becomes available (Pierson et al. in review). More information may also become available as a result of the release of the revised Mammal Species of Special Concern by the CDFW (Brylski et al. in review).

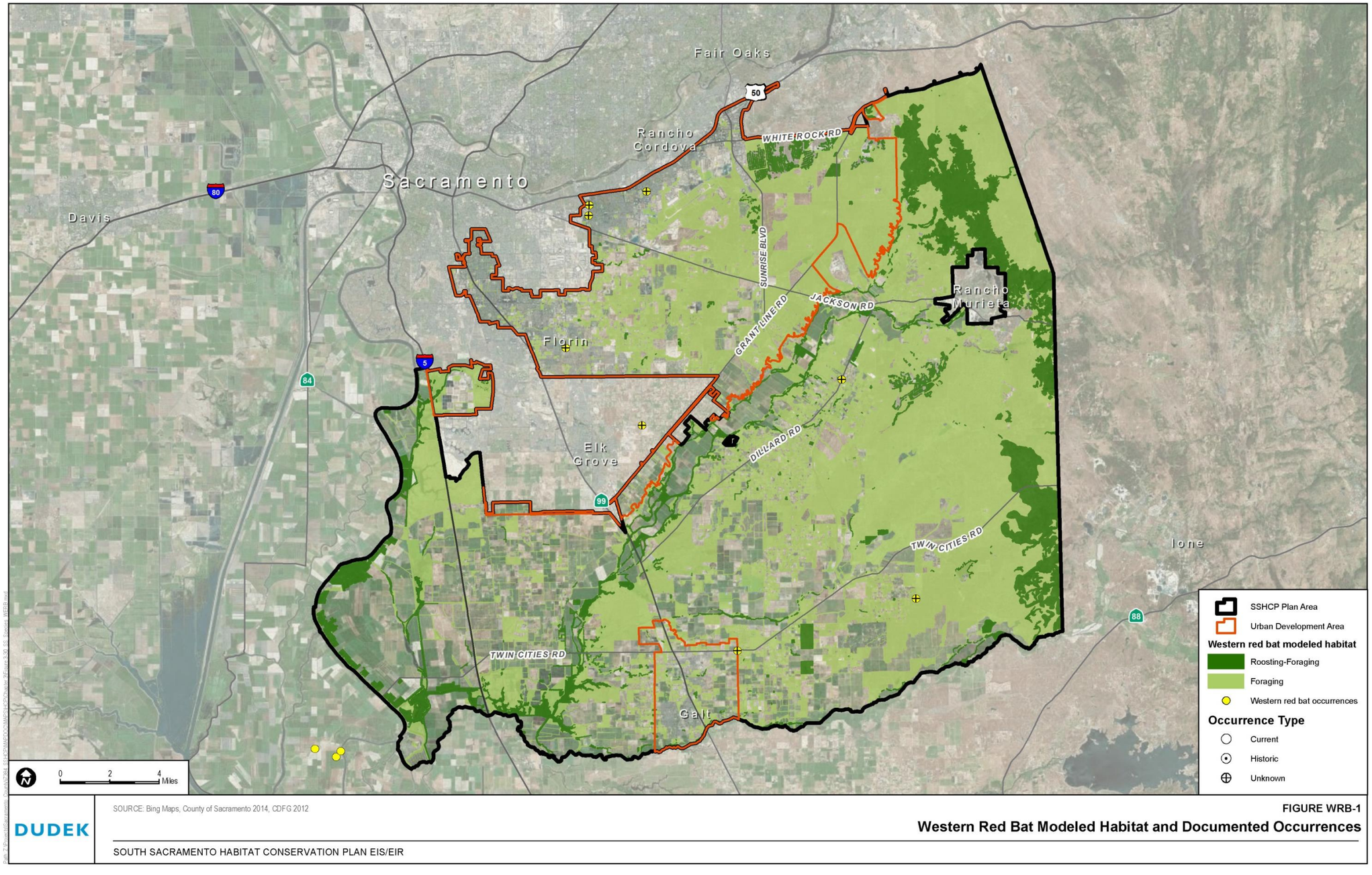
In order to assess the trend of the species, long-term monitoring of both roosting and foraging habitat conducted over multiple years is needed. Biologists recognize that "most efforts at monitoring bat populations involve use of indices that are uncalibrated in relation to population size, do not incorporate measures of variation or detectability, are discontinuous in time and space, and sometimes lack standard protocols" (O'Shea et al. 2003). Roost count indices are typically used to monitor bat populations; however, aspects of the life history of the western red bat (i.e., roosting individually or in small groups in inconspicuous locations) make it especially difficult to study. Ball (2002) proposed that if land uses and bat habitat can be monitored simultaneously, patterns in the availability and condition of bat habitat will emerge to guide their management.

O'Shea et al. (2003) states that current estimates of the relative abundance of low density foliage roosting species come primarily from capture and echolocation-detector index measures. Pierson and Rainey (Stillwater Sciences et al. 2003) were able to infer western red bat roost locations, as well as migratory and foraging activity by observing riparian woodland at sunset and visually and acoustically monitoring bats as they emerged. Though the USGS has a report in press that may suggest improved methods for estimating numbers of bats with this type of life history (O'Shea and Bogan 2003), acoustic monitoring of foraging activity may be the primary available means of monitoring this species and assessing habitat condition.

WRB Threats to the Species

Potential threats to the western red bat in the Planning Area include habitat removal, direct mortality, and increased predation. Furthermore, roosting habitat in riparian cottonwood and sycamore stands may be lost as result of reduced regeneration due to hydrological alteration of watersheds (WBWG 1998). Direct mortality may occur from pesticide use in orchards (WBWG 1998). Pierson et al. (2002) state "the intensive use of pesticides in fruit orchards may constitute a threat to roosting bats and may significantly reduce the amount of insect prey available." Although western red bats occur in urban and agricultural habitats, they may suffer higher levels of predation from the unnaturally high numbers of urban-tolerant species such as jays, crows, opossums, and domestic cats that occur in and are concentrated in these habitats (Pierson et al. 2002; Johnson pers. obs.).

Figure WRB-1 Western Red Bat Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012

DUDEK

FIGURE WRB-1

Western Red Bat Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

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WRB Data Gaps and Conservation

The ecology, status, and management of the western red bat have received increased attention in recent years; however, there are several sources of uncertainty regarding western red bat and its requirements in the Planning Area. The primary data gaps, their implications for the success of the conservation strategy, and current operating assumptions are summarized below.

WRB Population and Habitat Distribution within the Planning Area

Western red bats occur in suitable habitat within the Planning Area. However, their overall distribution, abundance, and population structure are not well known. Land cover types used by western red bats occur throughout much of the Central Valley and are well represented in Sacramento County and the Planning Area.

Because comprehensive surveys for western red bat in the Planning Area have not been conducted and the existing occurrence data are based primarily on incidental observations (e.g., CNDDB, anecdotal records), the population size and distribution of the species throughout the Planning Area are not known. In addition, though the distribution of different land cover types is mapped and quantifiable, the quality of habitat for western red bat within most of these areas is unknown. These information gaps limit our ability to identify the best lands available for preserving western red bat habitat and accurately estimate the impacts resulting from covered activities.

Until this data gap is remedied, the conservation value for western red bat will be considered relatively high in lands that support (or recently supported) known occurrences (particularly roost sites) or are adjacent to these areas.

WRB Determining Threat Severity

Although it is unknown if western red bats have declined rangewide, most bats for which there is good data have shown population declines (particularly those species with limited roost sites and special roost site requirements). Activities that directly remove or replace suitable habitat (particularly roost sites) with incompatible land uses are more easily quantifiable than factors that indirectly affect an area or population. Therefore, to improve conservation planning efforts for western red bat in the Planning Area and elsewhere, additional empirical data are needed, specifically when analyzing factors that indirectly affect known populations and their habitats.

WRB Effectiveness of Habitat Enhancement and Restoration Techniques in Creating Suitable Habitat for Western Red Bat

Achieving the conservation goals and objectives for western red bat will require successful enhancement and restoration of suitable habitat that functions as both roosting and foraging habitat; however, whether restored or enhanced habitats can retain the structural attributes suitable for western red bat is unknown.

If habitat restoration and enhancement techniques cannot eventually create habitats with functional characteristics suitable for western red bat, then those lands would not support sustainable populations.

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AMERICAN BADGER (AMB)

American Badger (AMB)

(Taxidea taxus)

Status USFWS: None

Status CDFW: Species of Special Concern

AMB Listing Status

American Badger (*Taxidea taxus*) is designated as a Species of Special Concern by the California Department of Fish and Wildlife (CDFW) (Williams 1986).

AMB Life History and Ecology

AMB Species Description and Life History

Physical Description

American Badgers are heavy-bodied, short-legged, grayish mammals that have a white medial stripe from the nose over the top of the head and down the back. Badgers have a black nose, white cheeks, and a black spot in front of each ear. Their feet are black with extremely long front claws. The belly and the short tail are yellowish (Burt and Grossenheider 1980).

Taxonomy

There are four described extant subspecies of *T. taxus* (Long 1973); two of these occur in California: *T. t. jeffersonii and T. t. berlandieri*. Long (1972) noted that some of these specimens from the Central Valley exhibit intermediate characters, suggesting intergradation (Williams 1986). According to Long (1973), Sacramento County is within the estimated range of *T. t. jeffersonii;* however, Kyle et al. (2004) shows Sacramento County within the range of *T. t. berlandieri.*

Generally *T. t. jeffersonii* occurs in the Coast Ranges, Sierra Nevada and northeast into Oregon, Washington, northern Nevada, Idaho, Colorado, Montana, and into Canada (Long 1973; Kyle et al. 2004). *T. t. jeffersonii* (Harlan) generally ranges in the better-watered areas of California, including

coastal areas, most of the Sierra Nevada, and most of the Great Basin Province (Williams 1986). This subspecies is generally larger and darker-colored and occurs in cooler, moister areas (Williams 1986). *T. t. berlandieri* ranges throughout the Central Valley and southern California, and east through Arizona, New Mexico, southern Nevada, and Texas (Kyle et al. 2004). *T. t. berlandieri* Baird ranges through the hotter, drier desert and grassland associations of southeastern California and the Central Valley and are generally smaller and lighter-colored.

Reproduction

Badgers mate in summer and early fall. Young are born in March to early April in burrows, and are raised by the female (Long 1973; Minta 1993). Natal burrows are dug typically in dry, sandy soil in areas with sparse overstory cover (Zeiner et al. 1990). Juveniles disperse approximately three to four months following birth (Minta 1993).

Survival and Longevity

In captivity, the typical and maximum reported longevity of badgers is 11 and 15.5 years, respectively (Long 1973). There are no known survival rates reported for badger populations.

Diet and Foraging

Badgers are mostly carnivorous and prey primarily on fossorial (i.e., digging) mammals, especially ground squirrels and pocket gophers (Whitaker 1989). Badgers dig their prey out of burrows. They also prey on reptiles, insects, worms, eggs, birds, and carrion. Badgers shift their diet seasonally and annually in response to prey availability (Zeiner et al. 1990).

Movement and Migration Patterns

American Badgers are nocturnal and diurnal, active year-round, and non-migratory (Long 1973; Zeiner et al. 1990). Dispersing young females may move greater than 32 miles, whereas males may move greater than 63 miles (Messick and Hornocker 1981).

Territoriality/Home Range

Badgers are solitary and exhibit a simple social structure (Lindzey 1982; Messick 1987; Minta 1993). Olfactory communication is well-developed in this species. Badgers mark their territories with urine, feces, and scent glands. Males appear more territorial than females (Minta 1993). Female and male home range sizes in Utah have been estimated at 338 to 751 acres and 1,327 to 1,549 acres, respectively (Lindzey 1978). In Idaho, female and male badger home ranges averaged 400 acres and 600 acres, respectively (Messick and Hornocker 1981). Minimum patch

size is 25 acres (Laudenslayer and Parisi 2007). Above 100 acres, area alone does not increase habitat suitability for an individual badger (Laudenslayer and Parisi 2007).

AMB Habitat Requirements and Ecology

American Badger occurs in a variety of open habitats, including grasslands, shrublands, savannahs, and meadows. Factors that positively affect habitat suitability for badgers are food availability, presence of friable soils, and uncultivated ground (Williams 1986). Badgers dig their own burrows, and excavate their prey in friable soils. Badgers prey primarily on fossorial rodents, particularly ground squirrels. In Wyoming, badger density was correlated with ground squirrel density (Minta 1993). Accordingly, it is assumed that the quality of badger habitat in the Planning Area is closely and positively related to the occurrence and population viability of California ground squirrel (*Spermophilus beechyi*) in an area.

AMB Species Distribution and Population Trends

AMB Species Distribution

American Badger is distributed in North America from the south-central Canadian provinces south throughout the western and central United States, and south to central Mexico (Williams 1986). Its distribution does not include the eastern or southeastern United States.

AMB Central Valley Distribution

In California, American Badger's range includes open habitat throughout the state, including the Central Valley. This species does not occur in the humid forests of northwestern California in Del Norte and northwestern Humboldt Counties (Williams 1986).

AMB Distribution Within The Planning Area

The Planning Area is positioned within American Badger's range in California. American Badgers have been documented in the northeastern portion of the Planning Area (Figure AMB-1); however, their overall distribution, abundance, and population structure are not well known. Land-cover types used by badgers, including cropland (foraging), blue oak savanna, and valley grassland, occur throughout the Central Valley and are represented in Sacramento County and the Planning Area, particularly outside the Urban Development Area (UDA). Within suitable habitat in the Planning Area, the presence of badgers has not been established by extensive surveys. It is assumed that most of this habitat is not occupied.

There are few occurrence records of badger in Sacramento County and the Planning Area. There are four CNDDB records and one additional occurrence record (Trochet pers. comm.)

within Sacramento County, two of which are within the UDA (CDFG 2010). One occurrence record is within the City of Sacramento, south of Jackson Highway (State Hwy 16) near Power Inn Road and is presumed extant (CDFG 2010). Of the four occurrence records within the Planning Area, only one that is located in southeastern Rancho Cordova is extirpated (CDFG 2010). Trochet (pers. comm.) observed a badger at Valensin Ranch, Cosumnes River Preserve, in approximately 1997–1998. There is also a 1938 CNDDB record located north of Hood recorded within the Museum of Vertebrate Zoology (CDFG 2010; also reported in Williams 1986). Both of these occurrences are inside the Planning Area and outside the urban services boundary (USB). These records do not provide an estimate of the distribution or population size of American Badger, because they are based on a very small number of surveys in a limited area.

AMB Population Levels and Trend

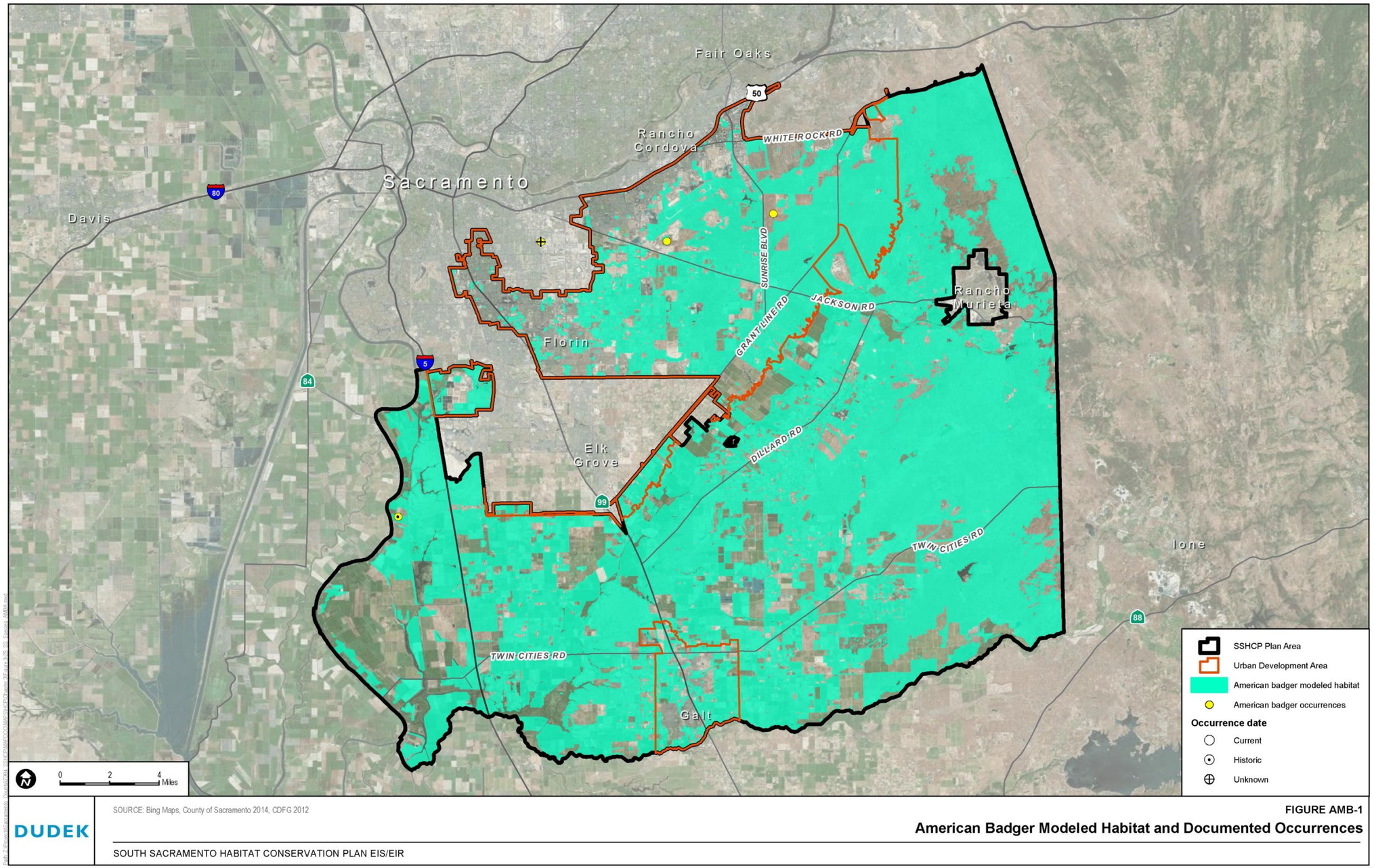
Although there is very little empirical information about American Badger population status and trends in California, badger populations have clearly declined or were extirpated in several areas of California (Williams 1986). Badger populations in some parts of the State may be stable; however, in the middle Central Valley, the population size and number of locations occupied by badgers have declined. The overall population decline and local extirpations in the middle Central Valley are probably greater than in any other portion of California (Larsen 1987).

AMB Threats to the Species

The American badger is threatened by habitat conversion to urban and agricultural uses, farming operations, shooting and trapping, poisoning, and reduction of prey base as a result of rodent control activities (Williams 1986). Loss of prey species (through poisoning), fur harvesting, and mortality from vehicles are other likely contributors to the downward trend of this species (Apps et al. 2002; Newhouse and Kinley 2000; Scobie 2002). Furthermore, badgers have a history of persecution, and are often perceived by humans as a pest species, for which they are shot or poisoned (Rahme et al. 1995). Shooting and trapping may have been important factors in population declines historically (Williams 1986).

In California, the primary threat to American Badger is habitat loss and degradation as a result of urbanization, development, and agricultural conversion (Williams 1986; Neal and Cheeseman 1996). The conversion of pasture and grasslands to farmland has led to a decline in the number of badgers as suitable foraging and denning habitat is reduced.

Figure AMB-1 American Badger Modeled Habitat and Documented Occurrences



SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012

DUDEK

FIGURE AMB-1

American Badger Modeled Habitat and Documented Occurrences

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN EIS/EIR

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Predator control with the usage of indiscriminate trapping and poisons have caused extensive loss (Ahlborn 2005). In some parts of the USA and Canada, badger numbers have declined because of indiscriminate "pest control" activities (traps set for coyotes, and poisons meant for other predators), unregulated sport hunting, and trapping (some 50,000 badgers were taken every year for their fur in the 1970's, though this number fell to 20,000 in the 1980's) (Jackson 2010).

Vehicular accidents are also a major cause of badger mortality (USFS 2008). A peak in the number of road casualties occurs in February through March. According to the University of California at Davis California Roadkill Observation System (CROS), there were approximately 15 observed roadkills of American Badger reported in California between 2009 and 2010, out of approximately 4,000 reports of medium-sized mammals (i.e., skunks, raccoons, coyotes, jackrabbits, and foxes) (CROS 2010).

AMB Data Gaps

Little research or monitoring has been conducted on the populations of the American Badger in California. As a result, many knowledge gaps exist with regard to the abundance, distribution and population trends of this species, as well as its behavior, habitat requirements, prey species, mortality factors and ecological role. The primary data gap for American Badger is lack of distributional data for the species within the Planning Area and throughout California. It is not feasible economically or temporally to survey the entire Planning Area. Some specific areas will need to be physically verified as to whether they support badger habitat and species presence. In addition, quantitative bioassessment may be necessary to determine the ecological functions and values of selected preserve areas to assess their suitability and value as preservation habitats for this species.

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EIS/EIR APPENDIX G-4

Covered Species Habitat Models

Habitat models described in further detail below were prepared for each of the 28 species proposed to be Covered Species in the South Sacramento Habitat Conservatin Plan (SSHCP). The habitat models were developed to identify where suitable habitat is most likely to be present in the Plan Area for each species; thereby helping identify where implementation of activities in the plan area could affect that species. The assumptions used to develop the habitat model for each species are identified below, as well as the acreages of habitat within the Plan Area based on the model.

As the models were developed, the best available information about the life history and biology of each species was used. Specifically, information concerning the species needs for breeding, feeding, and sheltering at each life history stage; information from Plan Area species-surveys; documented species-occurrences within the Plan Area; and information on species range, including soil type associations and elevation limits. This information was compiled using GIS to generate a map-based model of suitable habitat within the Plan Area for each species. Details on the biology of each proposed Covered Species can be found above in Appendix G-3, including regulatory status, ecological information, range, threats, population trends, and conservation and management considerations.

DWARF DOWNINGIA

Model Assumptions

- Soil types known to support dwarf downingia in the Planning Area include Amador-Gillender complex, 2% to 15% slopes; Clear Lake clay, partially drained, 0 to 2% slopes, frequently flooded; Corning complex, 0 to 8% slopes; Hadselville-Pentz complex, 2% to 30% slopes; Redding gravelly loam, 0 to 8% slopes; San Joaquin silt loam, 0 to 3% slopes; and San Joaquin-Galt complex, 0 to 3% slopes.
- Dwarf downingia is known to occupy commonly occurring, smaller and/or shallower vernal pools but has also been found at the margins of larger or deeper vernal pools.

Dwarf Downingia Modeled Habitat:

Modeled habitat for dwarf downingia is considered to be all Vernal Pool and Swale land cover on Amador-Gillender complex, 2% to 15% slopes; Clear Lake clay, partially drained, 0 to 2% slopes, frequently flooded; Corning complex, 0 to 8% slopes; Durixeralfs-Galt complex, 0 to 2% slopes; San Joaquin silt loam, 0 to 3% slopes; and San Joaquin-Galt complex, 0 to 3% slopes.

Table G-4.1. Dwarf Downingia Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	24,260.96	3,084.08	21,176.88
Valley Grassland	22,240.71	2,673.10	19,567.61
Vernal Pool	1,661.56	305.28	1,356.28
Seasonal Wetland	358.69	105.70	252.99

BOGGS LAKE HEDGE HYSSOP

Model Assumptions

- Soil types known to support Bogg's lake hedge-hyssop in the Planning Area include Red Bluff loam, 2% to 5% slopes; Red Bluff-Redding complex, 0 to 5% slopes; Red Bluff-Xerarents complex, 0 to 2% slopes; Redding gravelly loam, 0 to 8% slopes; San Joaquin silt loam, 0 to 3% slopes; San Joaquin-Durixeralfs complex, 0 to 1% slopes; and Vleck gravelly loam, 2% to 15% slopes.
- Bogg's lake hedge-hyssop is known to occupy well-developed vernal pools, and playa lakes, as well as along the seasonally fluctuating margins of more permanent water bodies.

Bogg's Lake Hedge-Hyssop Modeled Habitat

Modeled habitat for Bogg's lake hedge-hyssop is Vernal Pool and Seasonal Wetland cover types on Red Bluff loam, 2% to 5% slopes; Red Bluff-Redding complex, 0 to 5% slopes; Red Bluff-Xerarents complex, 0 to 2% slopes; Redding gravelly loam, 0 to 8% slopes; San Joaquin silt loam, 0 to 3% slopes; San Joaquin-Durixeralfs complex, 0 to 1% slopes; Sailboat silt loam, drained, 0 to 2% slopes; occasionally flooded, and Vleck gravelly loam, 2% to 15% slopes.

Table G-4.2. Bogg's Lake Hedge-Hyssop Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	36,646.93	14,953.19	21,693.74
Valley Grassland	35,115.33	14,345.91	20,769.42
Vernal Pool	1,531.60	607.28	924.32
Seasonal Wetland	354.27	17.92	336.35
GRAND TOTAL	**37,001.19**	**14,971.10**	**22,030.09**

AHART'S DWARF RUSH

Model Assumptions

- Soil types known to support the single documented occurrence of Ahart's dwarf rush in the Planning Area include Red Bluff loam, 0 to 2% slopes; Red Bluff-Redding complex 0 to 5% slopes; and Redding gravelly loam, 0 to 8% slopes.
- Ahart's dwarf rush occupies shallow vernal pools, vernal pool margins, and swales.

Ahart's Dwarf Rush Modeled Habitat

Modeled habitat for Ahart's dwarf rush is all Vernal Pool and Swale land covers on Fiddyment fine sandy loam, 1% to 8% slopes; Red Bluff-Redding complex, 0 to 5% slopes; and Redding gravelly loam, 0 to 8% slopes.

Table G-4.3. Ahart's Dwarf Rush Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	25,136.08	13,001.64	13,134.44
Valley Grassland	23,885.06	12,222.74	11,662.32
Vernal Pool	937.12	584.98	352.14
Swale	313.90	193,92	119.98

LEGENERE

Model Assumptions

- Soil types at documented legenere occurrences in the Planning Area include Clear Lake clay, partially drained, 0 to 2% slopes, frequently flooded; Corning complex, 0 to 8% slopes; Creviscreek sandy loam, 0 to 3% slopes; Dierssen sandy clay loam, drained, 0 to 2% slopes; Fiddyment fine sandy loam, 1% to 8% slopes; Hedge loam, 0 to 2% slopes; Madera-Galt complex, 0 to 2% slopes; Red Bluff loam, 0 to 2% slopes; Red Bluff loam, 2% to 5% slopes; Red Bluff-Redding complex, 0 to 5% slopes; Redding gravelly loam, 0 to 8% slopes; San Joaquin silt loam, 0 to 3% slopes; and San Joaquin-Galt complex, 0 to 3% slopes.
- Legenere grows in well-developed vernal pools, as well as along the seasonally fluctuating margins of more permanent water bodies and basins within seasonal drainages.
- Legenere has been reported to inhabit vernal wetlands ranging in size from 40 square feet to 100 acres.

Legenere Modeled Habitat:

Modeled habitat for legenere is considered to be all Vernal Pool and Seasonal Wetland cover types on Clear Lake clay, partially drained, 0 to 2% slopes; frequently flooded, Corning complex, 0 to 8% slopes; Creviscreek sandy loam, 0 to 3% slopes; Dierssen sandy clay loam, drained, 0 to 2% slopes; Fiddyment fine sandy loam, 1 to 8% slopes; Hedge loam, 0 to 2% slopes; Madera-Galt complex, 0 to 2% slopes; Red Bluff loam, 0 to 2% slopes; Red Bluff loam, 2% to 5% slopes; Red Bluff-Redding complex, 0 to 5% slopes; Redding gravelly loam, 0 to 8% slopes; San Joaquin silt loam, 0 to 3% slopes; and San Joaquin-Galt complex, 0 to 3% slopes.

Table G-4.4. Legenere Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	50,085.55	17,864.15	32,221.40
Valley Grassland	47,526.07	17,039.56	30,486.51
Vernal Pool	2,559.48	824.59	1,734.89
Seasonal Wetland	885.99	58.60	827.40
GRAND TOTAL	50,971.54	10,778.40	33,048.79

PINCUSHION NAVARRETIA

Model Assumptions

- Soil types known to support pincushion navarretia occurrences in the Planning Area include Amador-Gillender complex, 2% to 15% slopes; Corning complex, 0 to 8% slopes; Corning-Redding complex, 8 to 30% slopes; Creviscreek sandy loam, 0 to 3% slopes; Hadselville-Pentz complex, 2% to 30% slopes; Hicksville sandy clay loam, 0 to 2% slopes; occasionally flooded, Pardee-RanchoSeco complex, 3% to 15% slopes; Pentz-Lithic Xerorthents complex, 30% to 50% slopes; Peters clay, 1% to 8% slopes; and Redding gravelly loam, 0 to 8% slopes.
- Pincushion navarretia occupies small to medium size vernal pool types and the margins of larger and/or deeper pools.

Pincushion Navarretia Modeled Habitat

Modeled habitat for pincushion navarretia is considered to be all Vernal Pool and Swale land cover on Amador-Gillender complex, 2% to 15% slopes; Corning complex, 0 to 8% slopes; Corning-Redding complex, 8% to 30% slopes; Creviscreek sandy loam, 0 to 3% slopes; Hadselville-Pentz complex, 2% to 30% slopes; Hicksville sandy clay loam 0 to 2% slopes; Pardee-

Ranchoseco complex, 3% to 15% slopes; Pentz-Lithic Xerorthents complex, 30% to 50% slopes; and Redding gravelly loam, 0 to 8% slopes.

Table G-4.5. Pincushion Navarretia Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	57,437.42	12,100.64	45,336.78
Valley Grassland	54,967.33	11,440.08	43,527.25
Vernal Pool	1,843.44	474.84	1,368.59
Swale	96.26	185.71	440.94

SLENDER ORCUTT GRASS

Model Assumptions

- Soil types known to support slender Orcutt grass in the Planning Area include Redding gravelly loam, 0 to 8% slopes.
- Slender Orcutt grass occupies medium to large size vernal pool types.

Slender Orcutt Grass Modeled Habitat

Modeled habitat for slender Orcutt grass is all vernal pools on Redding gravelly loam, 0 to 8% slopes.

Table G-4.6a. Slender Orcutt Grass Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	34,491.26	12,426.29	22,064.97
Valley Grassland	33,264.96	11,970.62	21,294.35
Vernal Pool	1,226.29	455,67	190.90

Table G-4.6b. Slender Orcutt Grass Acres of Habitat in Core Recovery Areas

Habitat Model Land Cover Types	Total Core Areas (Acres)	Mather Core Area (Acres)	Cosumnes/Racho-Seco Core Area (Acres)
Vernal Pool Ecosystem	25,428.01	10,466.24	14,364.77
Valley Grassland	24,404.98	10,039.20	14,365.77
Vernal Pool	1,023.03	145.99	595.99

SACRAMENTO ORCUTT GRASS

Model Assumptions

- Soil types known to support Sacramento Orcutt grass occurrences in the Planning Area include Corning complex, 0 to 8% slopes; Hicksville sandy clay loam, 0 to 2% slopes; Red Bluff-Redding complex, 0 to 5% slopes; and Redding gravelly loam, 0 to 8% slopes soil types.
- Sacramento Orcutt grass occupies medium to large size vernal pool types.

Sacramento Orcutt grass Modeled Habitat

Modeled habitat for Sacramento Orcutt grass is considered to be all vernal pools on Corning complex, 0 to 8% slopes; Hicksville sandy clay loam, 0 to 2% slopes; Red Bluff-Redding complex, 0 to 5% slopes; and Redding gravelly loam, 0 to 8% slopes soil types.

Table G-4.7a. Sacramento Orcutt Grass Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	34,491.26	12,426.29	22,064.97
Valley Grassland	336,264.96	11,970.62	21,294.35
Vernal Pool	1,226.29	455.67	770.62

Table G-4.7b. Sacramento Orcutt Grass Acres of Habitat in Core Recovery Areas

Habitat Model Land Cover Types	Total Core Areas (Acres)	Mather Core Area (Acres)	Cosumnes/Rancho-Seco Core Area (Acres)
Vernal Pool Ecosystem	25,428.01	10,466.24	14,961.77
Valley Grassland	24,404.98	10,039.20	14,365.77
Vernal Pool	1,023.03	427.04	595.99

SANFORD'S ARROWHEAD

Model Assumptions

- Soil types known to support Sanford's arrowhead in the Planning Area include Argonaut-Auburn complex, 3% to 8% slopes; Clear Lake clay, partially drained, 0 to 2% slopes; frequently flooded, Columbia sandy loam, partially drained, 0 to 2% slopes; Columbia sandy loam, drained, 0 to 2% slopes, occasionally flooded; Cosumnes silt loam, drained, 0 to 2% slopes, occasionally flooded; Creviscreek sandy loam, 0 to 3% slopes; Dierssen sandy clay loam, drained, 0 to 2% slopes; Dierssen clay loam, deep, drained, 0 to 2%

slopes; Durixeralfs, 0 to 1% slopes, Egbert clay, partially drained, 0 to 2% slopes; Egbert clay, partially drained, 0 to 2% slopes; frequently flooded, Fiddyment fine sandy loam, 1% to 8% slopes; Fluvaquents, 0 to 2% slopes; frequently flooded, Hedge loam, 0 to 2% slopes; Hicksville loam, 0 to 2% slopes; occasionally flooded, Hicksville gravelly loam, 0 to 2% slopes; occasionally flooded, Kimball-Urban land complex, 0 to 2% slopes; Liveoak sandy clay loam, 0 to 2% slopes; occasionally flooded, Madera loam, 2% to 8% slopes; Mokelumne-Pits, mine complex, 15% to 50% slopes; Red Bluff-Redding complex, 0 to 5% slopes; Redding loam, 2% to 8% slopes; Redding gravelly loam, 0 to 8% slopes; San Joaquin silt loam, leveled, 0 to 1% slopes; San Joaquin silt loam, 0 to 3% slopes; San Joaquin silt loam, 3% to 8% slopes; San Joaquin-Galt complex, leveled, 0 to 1% slopes; San Joaquin-Urban land complex, 0 to 2% slopes; San Joaquin-Xerarents complex, leveled, 0 to 1% slopes; Reiff fine sandy loam, 0 to 2% slopes; occasionally flooded, Scribner clay loam, partially drained, 0 to 2% slopes; and Tinnin loamy sand, 0 to 2% slopes.

- Sanford's Arrowhead is strictly associated with wetland systems supporting emergent marsh vegetation, both naturally occurring and built/created.

Sanford's Arrowhead Modeled Habitat

Modeled habitat for Sanford's Arrowhead is all Seasonal Wetland, Freshwater Marsh, Open Water, and Stream/Creek associated with Argonaut-Auburn complex, 3% to 8% slopes; Clear Lake clay, partially drained, 0 to 2% slopes; frequently flooded Columbia sandy loam partially drained, 0 to 2% slopes; Columbia sandy loam, drained, 0 to 2% slopes; occasionally flooded, Cosumnes silt loam, drained, 0 to 2% slopes; occasionally flooded, Creviscreek sandy loam, 0 to 3% slopes; Dierssen sandy clay loam, drained, 0 to 2% slopes; Dierssen clay loam, deep, drained, 0 to 2% slopes; Durixeralfs, 0 to 1% slopes; Egbert clay, partially drained, 0 to 2% slopes; Egbert clay, partially drained, 0 to 2% slopes; frequently flooded, Fiddyment fine sandy loam, 1% to 8% slopes; Fluvaquents, 0 to 2% slopes; frequently flooded, Hedge loam, 0 to 2% slopes; Hicksville loam, 0 to 2% slopes; occasionally flooded, Hicksville gravelly loam, 0 to 2% slopes; occasionally flooded, Kimball-Urban land complex, 0 to 2% slopes; Liveoak sandy clay loam, 0 to 2% slopes; occasionally flooded, Madera loam, 2% to 8% slopes; Mokelumne-Pits, mine complex, 15% to 50% slopes; Red Bluff-Redding complex, 0 to 5% slopes; Redding loam, 2% to 8% slopes; Redding gravelly loam, 0 to 8% slopes; San Joaquin silt loam, leveled, 0 to 1% slopes; San Joaquin silt loam, 0 to 3% slopes; San Joaquin silt loam, 3% to 8% slopes; San Joaquin-Galt complex, leveled, 0 to 1% slopes; San Joaquin-Urban land complex, 0 to 2% slopes; San Joaquin-Xerarents complex, leveled, 0 to 1% slopes; Reiff fine sandy loam, 0 to 2% slopes; occasionally flooded, Scribner clay loam, partially drained, 0 to 2% slopes; and Tinnin loamy sand, 0 to 2% slopes.

Table G-4.8. Sanford's Arrowhead Acres if Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Freshwater Marsh	2,044.21	350.05	1,694.15
Open Water	1,086.43	86.04	1,000.36
Seasonal Wetlands	1,425.06	117.28	1,307.78
Streams/Creeks	898.48	126.35	767.13
Valley Grassland	47,374.82	17,411.92	29,962.90
GRAND TOTAL	52,824.00	18,091.64	34,732.36

MID-VALLEY FAIRY SHRIMP

Model Assumptions

- SSHCP land cover types that provide suitable habitat based on life history descriptions are all Vernal Pool and all Swale land cover.

Mid-Valley Fairy Shrimp Modeled Habitat

Modeled habitat for mid-valley fairy shrimp is all Vernal Pool and all Swale land cover types throughout the Planning Area.

Table G-4.9a. Mid-Valley Fair Shrimp Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	53,697.61	20,577.91	33,119.68
Valley Grassland	50,050.12	19,268.59	30,791.52
Vernal Pool	2,818.11	860.28	1,957.82
Swale	759.30	393.16	366.14
Streams/Creeks	60.08	55.88	4.20

Table G-4.9b. Mid-Valley Fairy Shrimp Acres of Habitat in Core Recovery Areas

Habitat Model Land Cover Types	Total Core Areas (acres)	Mather Core Recovery Area (acres)	Cosumnes/Rancho-Seco Core Recovery Area (acres)
Vernal Pool Ecosystem	25,791.92	14,365.69	11,426.23
Valley Grassland	24,080.47	13,404.77	10,675.70
Vernal Pool	1,259.28	642.46	616.82
Swale	403.34	269.63	133.71
GRAND TOTAL	**48.83**	**48.83**	**0**

VERNAL POOL FAIRY SHRIMP

Model Assumptions

- Vernal pool fairy shrimp are widely distributed throughout the Planning Area, although they appear to be more abundant outside of the Urban Development Area (UDA) than inside the UDA.
- All Vernal Pool and Swale cover types are suitable habitat.
- A select group of ephemeral steams or portions of those streams in this Planning Area are considered suitable habitat.

Vernal Pool Fairy Shrimp Modeled Habitat

Modeled habitat for vernal pool fairy shrimp is all vernal Pool, Swale, and Stream/Creek (VPIH) throughout the Planning Area.

Table G-4.10a. Vernal Pool Fairy Shrimp Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	103,209.61	26,047.79	77,161.86
Valley Grassland	97,349.20	24,583.80	72,765.40
Vernal Pool	4,545.57	934.86	3,600.72
Swale	1,251.65	460.73	790.92
Streams/Creeks	73.19	68.37	4.82

Table G-4.10b. Vernal Pool Fairy Shrimp Acres of Habitat in Core Recovery Areas

Habitat Model Land Cover Types	Total Core Recovery Areas (Acres)	Mather Core Recovery Area (Acres)	Cosumnes/Racho-Seco Core Recovery Area (Acres)
Vernal Pool Ecosystem	56,631.47	18,117.19	38,514.28
Valley Grassland	53,366.85	17,022.88	36,343.97
Vernal Pool	2,463.99	709.37	1,754.62
Swale	739.65	323.96	415.69
Streams/Creeks	60.98	60.98	0

Table G-4.10c. Vernal Pool Fairy Shrimps Acres of Critical Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	30,736.73	1,203.74	29,442.77
Valley Grassland	29,052.25	1,145.83	27,825.00
Vernal Pool	1,328.34	31.24	1,288.77
Swale	343.84	14.37	326.00
Streams/Creek	12.30	12.30	0

VALLEY ELDERBERRY LONGHORN BEETLE

Model Assumptions

- The valley elderberry longhorn beetle is completely dependent upon the elderberry plant.
- The elderberry and the valley elderberry longhorn beetle are largely found within riparian ecosystems.
- Isolated elderberry shrubs separated from contiguous habitat provide limited habitat value.

Valley Elderberry Longhorn Beetle Modeled Habitat

Modeled habitat for valley elderberry longhorn beetle is Mine Tailing Riparian Woodland, Mixed Riparian Woodland, and Mixed Riparian Scrub throughout the Planning Area.

Table G-4.11. Valley Elderberry Longhorn Beetle Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Mine Tailing Riparian Woodland	641.07	219.81	421.26
Mixed Riparian Woodland	5,784.78	244.21	5,540.57
Mixed Riparian Scrub	1,451.82	241.47	1,210.35
TOTAL	**7,877.67**	**705.49**	**7,172.18**

RICKSECKER'S WATER SCAVENGER BEETLE

Model Assumptions

- Ricksecker's water scavenger beetle is not sensitive to the size of vernal pools or other aquatic habitats.

- All Vernal Pool and Swale cover types are suitable habitat.

Ricksecker's Water Scavenger Beetle Modeled Habitat

Modeled habitat for Ricksecker's water scavenger beetle is all Vernal Pool and Swale land cover types within the Planning Area.

Table G-4.12. Ricksecker's Water Scavenger Beetle Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	103,136.42	25,519.66	77,157.04
Valley Grassland	97,349.20	24,583.80	72,765.40
Vernal Pool	4,535.57	934.86	3,600.72
Swale	1,251.65	0	760.92

VERNAL POOL TADPOLE SHRIMP

Model Assumptions

- Vernal pool tadpole shrimp are widely distributed throughout the Planning Area, although they appear to be more abundant within the Urban Development Area (UDA) than outside the UDA.
- All Vernal Pool, Vernal Stream, and Swale cover types are suitable habitat.
- A select group of ephemeral steams or portions of those streams in the Planning Area are considered suitable habitat (classified as Stream/Creek (VPIH)).

Vernal Pool Tadpole Shrimp Modeled Habitat

Modeled habitat for vernal pool tadpole shrimp is all Vernal Pool, Swale, and Stream/Creek (VPIH) land cover types throughout the Planning Area.

Table G-4.13a. Vernal Pool Tadpole Shrimp Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	103,209.61	26,047.76	77,161.86
Valley Grassland	97,349.20	24,583.80	72,765.40
Vernal Pool	4,535.57	934.86	3,600.72
Swale	1,251.65	460.73	790.92
Streams/Creeks	73.19	68.37	4.82

Table G-4.13b. Vernal Pool Tadpole Shrimp Acres of Habitat in Core Recovery Areas

Habitat Model Land Cover Types	Total Core Recovery Areas (acres)	Mather Core Recovery Areas (acres)	Cosumnes/Rancho-Seco Core Recovery Area (acres)
Vernal Pool Ecosystem	56,631.47	18,117.19	8,499.95
Valley Grassland	53,366.85	17,022.88	8,117.96
Vernal Pool	2,463.99	709.37	1,754.62
Swale	739.65	323.96	415.69
Streams/Creeks	60.98	60.98	0

Table G-4.13c. Vernal Pool Tadpole Shrimp Acres of Critical Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Vernal Pool Ecosystem	30,736.73	1,203.74	29,442.77
Valley Grassland	29,052.25	1,145.83	27,825.00
Vernal Pool	1,328.34	31.24	1,288.77
Swale	343.84	14.37	329.00
Streams/Creeks	12.30	12.30	0

CALIFORNIA TIGER SALAMANDER

Model Assumptions

- California tiger salamanders have not been recorded within the Sacramento County Urban Services Boundary or north of the Cosumnes River despite extensive surveys in very large areas with presumably suitable habitat including Mather Field, Sacramento Valley Conservancy's Vernal Pool Prairie Preserve, the Sunrise Douglas Area, Kiefer landfill, Rancho Murieta, and areas East of Grant Line Road.
- In a 5-year study found the majority of California tiger salamanders migrated at least 0.5 mile (0.8 kilometer) from the breeding site. A smaller number of salamanders appeared to migrate even farther, traveling 0.75 mile (1.2 kilometer) to almost 1.3 miles (2.2 kilometers) to and from the breeding ponds and upland habitat on adjacent property.
- A study found that California tiger salamanders are physiologically capable of migrating up to 2,484 meters (1.5 miles) each breeding season and that 95% of the population occurs in upland habitat within 1,867 meters of the breeding pond.
- Recommended that plans to maintain local populations of California tiger salamanders should include pond(s) surrounded by at least 173-meter (567-foot) wide buffers of terrestrial habitat occupied by burrowing mammals.
- California Tiger Salamander Modeled Habitat

- Modeled aquatic habitat for California tiger salamander is Vernal Pool and Seasonal Wetland land cover located south of the Cosumnes River. Modeled upland refugia habitat is all Blue Oak Woodland, Blue Oak Savanna, and Valley Grassland land cover located within 1.5 miles of modeled aquatic habitat (i.e., within 1.5 miles of any Vernal Pool or Seasonal Wetland that is south of the Cosumnes River).

Table G-4.14. California Tiger Salamander Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Upland Habitat			
Blue Oak Savanna	3,321.53	0	3,321.53
Blue Oak Woodland	3,773.56	0	3,773.56
Valley Grassland	78,273.71	1,487.57	76,786.56
Total Upland Habitat	*85,368.80*	*1,487.57*	*83,881.23*
Aquatic Habitat			
Vernal Pool	3,033.33	36.34	2,996.98
Seasonal Wetland	1,391.17	26.87	1,364.29
Total Aquatic Habitat	*4,424.50*	*63.21*	*4,361.27*
GRAND TOTAL	**89,793.309**	**1,550.78**	**88,242.50**

WESTERN SPADEFOOT

Model Assumption

- Very little information is available regarding dispersal distances or minimum habitat size.
- Semlitsch and Brodie (2003) summarized data from the literature on the use of terrestrial habitats by 19 frog and 13 salamander species representing 1,363 individuals that are otherwise typically associated with wetlands. In general, plethodontid stream salamanders (e.g., *Desmognathus fuscus, Eurycea bislineata, Eurycea longicauda*), although migratory at some stage of their life cycle, remain close to the edges of ponds and streams and seldom move more than 20 to 30 meters from aquatic habitats. Alternatively, some species of frogs, toads and newts are highly mobile and move 1,000 to 1,600 meters (5,249 feet or about 1 mile) (e.g., *Bufo bufo, Rana catesbbeiana*, *Notophthalmus viridescens*). The majority of the remaining species occur at intermediate distances, where they emigrate to find suitable terrestrial habitat. The overall core terrestrial habitat ranged from 159 to 290 meters (522 to 951 feet) from the edge of aquatic breeding sites.

Western Spadefoot Modeled Habitat

Modeled aquatic habitat for western spadefoot is Vernal Pool, Seasonal Wetland, Swale, Open Water, and Stream/Creek land cover types in the Planning Area. Modeled upland habitat is Blue Oak Woodland, Blue Oak Savanna, and Valley Grassland within 1,600 meters (5,249 feet or approximately 1 mile) from modeled aquatic habitat.

Table G-4.15a. Western Spadefoot Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Upland Habitat			
Blue Oak Savanna	5,637.07	17.84	5,619.24
Blue Oak Woodland	9,131.84	0	9,131.84
Valley Grassland	134,833.67	30,326.56	104,766.78
Total Upland Habitat	*149,602.58*	*30,344.40*	*119,517.86*
Aquatic Habitat			
Vernal Pool	4,535.57	934.86	3,600.72
Swale	1,251.65	460.73	790.92
Seasonal Wetland	2,600.12	162.55	2,437.57
Open Water	2,343.81	237.11	2,106.70
Streams/Creeks	2,673.93	163.21	2,510.72
Streams/Creeks (VPIH)	73.19	68.37	4.82
Total Aquatic Habitat	*13,478.27*	*2,026.83*	*11,451.45*
GRAND TOTAL	**163,080.85**	**32,371.23**	**130,969.30**

Table G-4.15b. Western Spadefoot Acres of Habitat in Core Recovery Areas

Habitat Model Land Cover Types	All Core Recovery Areas (acres)	Mather Core Recovery Area (acres)	Cosumnes/Rancho-Sec Core Recovery Area (acres)
Upland Habitat			
Blue Oak Savanna	2,368.16	318.89	2,067.28
Blue Oak Woodland	419.21	0	414.31
Valley Grassland	53,366.85	17,022.88	36,343.98
Total Upland Habitat	*56,172.22*	*17,346.66*	*38,825.57*
Aquatic Habitat			
Vernal Pool	2,463.99	709.37	1,754.62
Swale	739.65	323.96	415.69
Seasonal Wetland	138.92	7.07	131.85
Open Water	270.56	92.20	178.36
Streams/Creeks	196.23	27.80	168.44
Streams/Creeks (VPIH)	60.98	60.98	0
Total Aquatic Habitat	*3,870.33*	*1,221.38*	*2,648.96*
GRAND TOTAL	**60,042.55**	**18,568.04**	**41,474.53**

WESTERN POND TURTLE

Model Assumptions

- Western pound turtle has been recorded along creek and stream reaches throughout the Planning Area.
- In the fall and spring, hatchling turtles may move as far as 400 meters (0.25 mile) from their upland nest locations to aquatic sites nearby.

Western Pond Turtle Habitat Model

Western pond turtle modeled aquatic habitat include all Stream/Creek land cover that occurs throughout the Planning Area and Freshwater Marsh and Open Water land covers within 400 meters (0.25 mile) of all Stream/Creek land cover. Western pond turtle modeled upland habitat is Blue Oak Woodland, Blue Oak Savanna, Mine Tailing Riparian Woodland, Mixed Riparian Woodland, Mixed Riparian Scrub, and Valley Grassland within 0.25 mile of modeled aquatic habitat.

Table G-4.16. Western Pond Turtle Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Upland Habitat			
Blue Oak Savanna	7,609.66	0	7,609.66
Blue Oak Woodland	4,925.00	0.05	4,824.95
Valley Grassland	91,579.83	13,034.00	78,824.95
Mine Tailing Riparian Woodland	306.47	41.32	265.15
Mixed Riparian Woodland	5,347.42	232.40	5,115.03
Mixed Riparian Scrub	1,177.72	195.85	981.87
Total Upland Habitat	*110,846.10*	*13,503.62*	*97,342.49*
Aquatic Habitat			
Vernal Pool	2,239.66	326.58	1,913.08
Open Water	1,441.44	148.43	1,293.01
Streams/Creeks	2,673.93	162.21	2,510.73
Total Aquatic Habitat	*6,355.03*	*638.22*	*5,716.82*
GRAND TOTAL	**117,201.13**	**14,141,84**	**103,059.31**

GIANT GARTERSNAKE

Model Assumptions

- Giant gartersnake occurrences have been documented along Planning Area stream reaches, primary in the southwestern portion of the Planning Area.
- The historical range of giant gartersnake within the Planning Area included the historical Central Valley great "tule" marsh (below 70 feet above sea level), and likely included emergent marsh areas along floodplains of streams and creeks up to an elevation of 230 feet above sea level.
- Stream reaches considered important suitable habitat owing to known use within the Planning Area include the following:
- Elliot Mitigation site contains a prominent drainage that links to Stone Lakes and is wet year round.
- Drainage canals south of Elk Grove have a past occurrence and link to Stone Lakes. The perennial segments of these canals are suitable habitat.
- Badger Creek and all other creeks that drain into the marsh at the Cosumnes River Preserve is likely high-quality habitat due to its proximity and connectivity to a significant population of giant gartersnake. The perennial segments of these creeks are suitable habitat.
- The perennial segments of Laguna Creek (south) and tributaries are suitable habitat due to presence of Freshwater Marsh habitat and proximity to documented occurrences.
- The perennial segments drainages and canals leading from the Cosumnes River Preserve including Deadman's Gulch.
- Giant gartersnakes use rice lands extensively and depend on them for habitat.
- The average distance between upland, over wintering sites and aquatic breeding sites is thought to be approximately 150 meters, ranging from 50 to 400 meters.
- Hansen and Brode (1993) also documented giant gartersnakes moving at least 400 meters (0.25 mile) between small lateral ditches and larger canals within the Natomas Basin.

Giant Garter Snake Modeled Habitat

The following streams, creeks or drainages are locations that are known to support giant gartersnakes within the Planning Area.

- A prominent drainageway on the Elliot mitigation site, which links to Stone Lakes National Wildlife Refuge (NWR) and is wet year-round.

- Drainage canals south of Elk Grove, which have a past occurrence and link to Stone Lakes NWR; the perennial segments of these canals are suitable habitat.
- Badger Creek and all other creeks that drain into the marsh at the Cosumnes River Preserve, which are likely high-quality habitat due to proximity and connectivity to a significant population of giant gartersnakes; the perennial segments of these creeks are suitable habitat.
- The perennial segments of Laguna Creek (south) and tributaries, which are suitable habitat due to presence of Freshwater Marsh habitat and proximity to documented occurrences.
- The perennial segments of drainages and canals leading from the Cosumnes River Preserve including Deadman's Gulch, which provides suitable habitat.

Giant gartersnake is known to occur at elevations of up to 230 feet above sea level and to travel up to 400 meters (0.25 mile) between aquatic and upland habitat. Therefore, the waterways described above plus Stream/Creek, Freshwater Marsh, Open Water, and Seasonal Wetland that are entirely or partially within 0.25 mile of the aforementioned waterways and are at or below 230 feet in elevation are modeled as high-value aquatic habitat. In addition to high-value aquatic habitat, non-high value aquatic habitat was defined as Stream/Creek, Freshwater Marsh, Open Water, and Seasonal Wetland that is up to 0.25 mile away from high-value habitat and is at or below 230 feet in elevation.

Upland habitat for giant gartersnake is Mixed Riparian Scrub and Valley Grassland within a distance of 0.25 mile from modeled aquatic habitat and is at or below an elevation of 230 feet. High-value upland habitat for giant gartersnake is defined as upland habitat within 200 feet of high-value aquatic giant gartersnake habitat (i.e., Stream/Creek, Freshwater Marsh, Open Water, and Seasonal Wetland) that is at or below 230 feet in elevation.

Table G-4.17a. Giant Gartersnake Acres of High-Value and Non-High-Value Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Upland Habitat			
Mixed Riparian Scrub	1,043.00	170.83	872.70
Valley Grassland	26,825.06	3,882.27	22,942.79
Total Upland Habitat	*27,868.06*	*4,053.10*	*23,815.49*
Aquatic Habitat			
Seasonal Wetland	1,624.8	86.99	1,537.81
Freshwater Marsh	2,588.75	299.01	2,289.74
Open Water	1,282.12	43.20	1,238.91
Streams/Creeks	1,793.95	53.90	1,740.05
Total Aquatic Habitat	*7,289.62*	*483.10*	*6,806.51*
GRAND TOTAL	**35,157.68**	**4,536.10**	**30,622.00**

Table G-4.17b. Giant Gartersnake Acres of High-Value Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Upland Habitat			
Mixed Riparian Scrub	569.68	143.20	426.48
Valley Grassland	6,284.53	334.84	5,371.28
Total Upland Habitat	*6,854.21*	*461.21*	*5,797.76*
Aquatic Habitat			
Seasonal Wetland	740.86	57.25	683.61
Freshwater Marsh	1,194.13	272.62	921.52
Open Water	679.02	5.21	691.81
Streams/Creeks	995.09	33.67	961.42
Total Aquatic Habitat	*3,627.10*	*368.75*	*3,258.36*
GRAND TOTAL	**10,481.31**	**1,425.20**	**9,056.12**

COOPER'S HAWK

Model Assumptions

- Overall distribution, abundance, and population structure for Cooper's hawk are not well known within the Planning area.
- In urban Tucson, Arizona, home range size for nine subadult Cooper's hawks during their first fall/winter averaged 1,905 acres (771 hectares).
- In Tucson, Mannan and Boal (2000) studied the movements of adult male Cooper's hawks in adjacent home ranges during the breeding season. Home range sizes for nine individuals ranged between 33 and 323 acres (13 and 131 hectares) and averaged 162 acres (66 hectares).
- In a study of nesting Cooper's hawks in the Sacramento area, the average distance between adjacent nests was 0.99 mile (1.6 kilometers).
- Most Cooper's hawks breeding in California are permanent, non-migratory residents; however, Cooper's hawks breeding in montane habitats may exhibit seasonal movements, moving to snow-free lower elevations during winter.

Cooper's Hawk Habitat Model

Modeled foraging habitat is Blue Oak Woodland, Blue Oak Savanna, Mine Tailing Riparian Woodland, Mixed Riparian Woodland, and Mixed Riparian Scrub throughout the Planning Area. Modeled nesting habitat is Blue Oak Woodland, Mine Tailing Riparian Woodland, Mixed Riparian Woodland, and Mixed Riparian Scrub throughout the Planning Area.

Table G-4.18. Cooper's Hawk Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting/Foraging Habitat			
Blue Oak Woodland	9,122.39	0	9,122.39
Mixed Riparian Woodland	5,784.78	244.21	5,540.57
Mixed Riparian Scrub	1,451.82	241.47	1,210.35
Mine Tailing Riparian Woodland	641.07	219.81	421.26
Total Nesting/Foraging Habitat	*17,000.06*	*705.49*	*16,294.57*
Foraging Habitat			
Blue Oak Savanna	5,637.07	17.84	5,583.44
Total Foraging Habitat	*5,637.07*	*17.84*	*5,583.44*
GRAND TOTAL	**22,637.13**	**723.33**	**21,838.01**

TRICOLORED BLACKBIRD

Model Assumptions

- Over the past couple of decades tricolored blackbird colony sites have been documented throughout the Planning Area.
- DeHaven et al. (1975) banded 33,058 nestlings and only 39% of band recoveries were re-located within 16 kilometers (10 miles) of natal colonies.
- Most tricolored blackbirds forage within five kilometers (three miles) of their colony sites (Orians 1961), but commute distances of up to 13 kilometers (8 miles) have been reported.

Tricolored Blackbird Habitat Model

Modeled foraging habitat is Cropland, Irrigated Pasture-Grassland, Valley Grassland, Vernal Pool, Seasonal Wetland, Swale, Freshwater Marsh, and Open Water throughout the Planning Area. Modeled nesting habitat is Cropland, Valley Grassland, Seasonal Wetland, and Freshwater Marsh throughout the Planning Area.

Table G-4.19. Tricolored Blackbird Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting/Foraging Habitat			
Valley Grassland	13,511.61	30,344.83	104,766.78
Cropland	47,904.83	5,480.89	42,423.94
Seasonal Wetland	2,600.12	162.55	2,437.57
Freshwater Marsh	2,921.94	391.68	2,530.26
Total Nesting/Foraging Habitat	*66,938.50*	*36,379.95*	*152,158.55*
Foraging Habitat			
Irrigated Pasture-Grassland	15,991.26	3,218.48	12,772.79
Vernal Pool	4,658.17	1,057.46	3,600.72
Swale	1,251.65	460.73	760.72
Open Water	2,343.81	237.11	760.92
Total Foraging Habitat	*24,244.89*	*4,973.78*	*19.241.13*
GRAND TOTAL	**91,183.39**	**41,353.73**	**171,399.68**

WESTERN BURROWING OWL

Model Assumptions

- During the breeding season, adult male Burrowing Owls have been documented foraging over a range of 0.8 to 1.2 square miles (2 to 3 square kilometers) (Haug and Oliphant 1987), and primarily within 0.4 mile (600 meters) of the nest burrow.
- In two burrowing owl demography studies conducted in the San Francisco Bay Area, owls moved an average distance of 0.5 to 0.9 mile (0.8 to 1 kilometers) between breeding seasons. Of this sample population, 27% remained at the same nest site; 14% dispersed less than 265 feet (81 meters) away; 34% dispersed 0.05 to 0.5 mile (80 to 805 meters); 8% dispersed 0.5 to 1.0 mile (805 meters to 2 kilometers); 14% dispersed 1 to 5 mile (2 to 8 kilometers); and 2% moved 5 to 10 miles (8 to 16 kilometers).
- Western burrowing owls occur in suitable habitat throughout the Planning Area; however, their overall distribution, abundance, and population structure are not well known.
- Although burrowing owl populations have declined or disappeared from much of their historical habitat, outlying areas of Sacramento County still provide suitable habitat for the species. Burrowing owls are known to occupy patches of habitat in the western part of the Planning Area that extend from the Sacramento Regional County Sanitation District Bufferlands (Jones, pers. comm. 2004) to The Nature Conservancy's Cosumnes River Preserve (Reiner, pers. comm. 2004), as well as patches of habitat in the rolling grasslands in eastern Sacramento County. The Meadowview and Pocket areas within the

City of Sacramento (outside the Planning Area) support disjunct, isolated populations north to Florin Road.

Burrowing Owl Habitat Model

Modeled foraging habitat is Blue Oak Savanna, Cropland, Irrigated Pasture-Grassland, Valley Grassland, Vernal Pool, Seasonal Wetland, Swale, and Stream/Creek (VPIH) throughout the Planning Area. Modeled nesting habitat is Valley Grassland, Blue Oak Savanna, Cropland, and Irrigated Pasture-Grassland throughout the Planning Area.

Table G-4.20. Western Burrowing Owl Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting/Foraging Habitat			
Cropland	47,904.83	5,480.89	42,423.94
Irrigated Pasture-Grassland	15,991.26	3,218.48	12,772.79
Valley Grassland	165,111.61	30,344.83	104,766.78
Blue Oak Savanna	5,637.37	17.84	5,619.24
TOTAL	**204,644.77**	**39,062.04**	**165,582.75**

FERRUGINOUS HAWK

Model Assumptions

- Ferruginous hawks do not regularly breed in California, with the most recent breeding being recorded in 1989 in northeastern California.
- Occurrence information is not well documented from within the Planning Area.
- The spatial requirements of ferruginous hawks during winter have not been widely reported and what constitutes the minimum size of suitable winter foraging habitat is unknown for most areas.
- The Ferruginous hawk may defend winter territories. Winter densities in Utah have been reported at one individual per 3.60 square miles (Smith and Murphy 1978), and Plumpton and Andersen (1997) found a mean daily Minimum Convex Polygon home range size of 1.36 square miles.

Ferruginous Hawk Habitat Model

Modeled foraging habitat is Valley Grassland, Irrigated Pasture-Grassland, Vernal Pool, Seasonal Wetland, and Swale land cover located anywhere in the Planning Area.

Table G-4.21. Ferruginous Hawk Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting/Foraging Habitat			
Valley Grassland	135,111.60	30,344.83	104,766.78
Irrigated Pasture-Grassland	15,991.26	3,218.48	12,772.79
Seasonal Wetland	2,600.12	162.55	2,437.57
Vernal Pool	4,658.17	1,057.46	3600.72
Swale	1,251.65	460.73	760.92
TOTAL	159,612.80	35,244.05	124,368.78

SWAINSON'S HAWK

Model Assumptions

- Radio-tagged male Swainson's hawks were recorded to travel as far as 18 miles from a nest to exploit more favorable agricultural foraging opportunities.
- Estep (1989) found mean home ranges to be 6,818 acres. While Babcock (1995) plotted out 9,978 acres as the mean home range in his study area in eastern Yolo County.
- Swainson's hawks are typically not found at elevations above 500 feet in Sacramento County.
- Swainson's hawk occurrences are recorded throughout the Planning Area.

Swainson's Hawk Habitat Model

Modeled foraging habitat is Cropland, Irrigated Pasture-Grassland, Valley Grassland, Vernal Pool, Seasonal Wetland, and Swale throughout the Planning Area at elevations below 500 feet. Modeled nesting habitat is mixed Riparian Woodland and Mixed Riparian Scrub throughout the Planning Area at elevations below 500 feet.

High-value habitat for Swainson's hawk is defined by as modeled foraging habitat occurring in the western portion of the Planning Area (within PPUs 4, 6, and 8).

Table G-4.22a. Swainson's Hawk Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting/Foraging Habitat			
Mixed Riparian Woodland	5,784.78	244.21	5,540.57
Mixed Riparian Scrub	1,451.82	241.47	1,207.45
Total Nesting/Foraging Habitat	*7,236.60*	*485.68*	*6,748.02*
Foraging Habitat			
Valley Grassland	133,704.65	30,344.83	632.23
Cropland	47,904.83	5,480.89	362.91
Irrigated Pasture-Grassland	15,991.26	3,218.48	155.49
Vernal Pool	4,535.19	934.86	34.16
Seasonal Wetland	2,600.12	162.55	3.67
Swale	1,251.57	460.73	1.86
Total Foraging Habitat	*205,987.62*	*40,602.34*	*1,190.32*
GRAND TOTAL	**213,244.22**	**41,088.02**	**1,231.22**

Table G-4.22b. Swainson's Hawk Acres of High-Value Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Foraging Habitat			
Valley Grassland	20,189.92	2,626.53	17,563.39
Cropland	38,669.94	3,491.49	35,179.44
Irrigated Pasture-Grassland	8,381.65	1,433.80	6,947.86
Vernal Pool	1,001.49	57.71	943.78
Seasonal Wetland	1,740.42	104.98	1,635.44
Swale	143.08	18.53	124.55
Total High-Value Habitat	**70,126.50**	**7,733.04**	**62,393.46**

NORTHERN HARRIER

Model Assumptions

- Reported territory sizes for males range from 2 to 272 acres (0.8 to 110 hectares); females typically defend a smaller territory.
- During the breeding season, reported average home range sizes from eight studies were 420 to 37,067 acres (170 to 15,000 hectares).
- Males reportedly will hunt ≥10 kilometers (≥6 miles) from the nest.

- Northern harriers occur in suitable habitat within the Planning Area and are probably regular breeders; however, their overall range, abundance, and population structure are not well known.

Northern Harrier Habitat Model

Modeled foraging habitat is Cropland, Irrigated Pasture-Grassland, Valley Grassland, Vernal Pool, Seasonal Wetland, Swale, and Freshwater Marsh throughout the Planning Area. Modeled nesting habitat is Cropland, Irrigated Pasture-Grassland, and Valley Grassland throughout the Planning Area.

Table G-4.23. North Harrier Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting/Foraging Habitat			
Valley Grassland	135,111.61	30,344.83	104,766.78
Cropland	47,914.83	5,480.89	42,423.94
Irrigated Pasture-Grassland	15,991.26	3,218.48	12,772.19
Total Nesting/Foraging Habitat	*199,007.70*	*39,044.20*	*159,962.91*
Foraging Habitat			
Vernal Pool	4,035.57	934.86	3,600.72
Seasonal Wetland	2,600.12	162.55	2,437.57
Freshwater Marsh	2,921.94	391.68	2,530.26
Swale	1,251.65	460.73	790.92
Total Foraging Habitat	*10,809.28*	*1,949.82*	*9,359.47*
GRAND TOTAL	**209,816.98**	**40,994.02**	**169,322.38**

WHITE-TAILED KITE

Model Assumptions

- Territory sizes estimated along the south coast of California near Long Beach ranged from 22 to 128 acres (nine to 52 hectares) and near San Diego from 42 to 217 acres (17 to 88 hectares).
- During winter and the breeding season, foraging from nest or perch sites extend up to 2 miles, but most were less than 0.6 mile.
- No regularly occurring surveys have been conducted throughout the Planning Area, however, White-tailed kites are known to nest or forage throughout the Planning Area.

White-Tailed Kite Habitat Model

Modeled foraging habitat is Blue Oak Savanna, Cropland, Irrigated Pasture-Grassland, Valley Grassland, Mixed Riparian Scrub, Vernal Pool, Seasonal Wetland, and Swale throughout the Planning Area. Modeled nesting habitat is Blue Oak Woodland, Mine Tailing Riparian Woodland, Mixed Riparian Woodland, and Mixed Riparian Scrub throughout the Planning Area.

Table G-4.24. White-Tailed Kite Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting Habitat			
Blue Oak Woodland	9,131.84	0	9,131.84
Mixed Riparian Woodland	5,784.78	244.21	5,540.57
Mine Tailing Riparian Woodland	641.07	219.81	421.26
Total Nesting Habitat	*15,557.69*	*464.02*	*15,936.67*
Nesting/Foraging Habitat			
Mixed Riparian Scrub	1,451.82	241.47	1,210.35
Total Nesting/Foraging Habitat	*1,451.82*	*241.47*	*1,210.35*
Foraging Habitat			
Valley Grassland	135,111.61	30,344.83	104,766.78
Cropland	47,914.83	5,480.89	42,423.94
Irrigated Pasture-Grassland	15,991.26	3,218.48	12,772.79
Blue Oak Savanna	5,637.07	17.84	5,619.24
Vernal Pool	4,658.17	1,057.46	3,600.72
Seasonal Wetland	2,600.12	162.55	4,437.57
Swale	1,251.65	460.73	790.92
Total Foraging Habitat	*213,154.71*	*40,742.78*	*172,411.96*
GRAND TOTAL	**230,164.22**	**41,448.27**	**189,558.98**

GREATER SANDHILL CRANE

Model Assumptions

- Greater sandhill cranes travel limited distances to foraging sites from night roost areas. The average distance traveled was 0.88 mile (range 0.17 to 1.89 miles) and 1.74 miles between roost sites and foraging areas.
- The size of roost sites is variable. Sandhill cranes roosting in Oregon used sites between 1 and 300 acres (0.5 and 120 hectares).
- Littlefield (1993) recommended roost sites should be at least 20 acres (8 hectares).
- Greater sandhill crane use in the Planning Area principally occurs in the Cosumnes Floodplain.

Greater Sandhill Crane Habitat Model

Modeled night roosting habitat is Vernal Pool, Seasonal Wetland, and Freshwater Marsh within 2 miles of greater sandhill crane occurrences per consultation with USFWS and CDFW. This element of the species' model is consistent with the Conservation Assessment for Greater Sandhill Cranes Wintering on the Cosumnes River Floodplain and Delta Regions of California although extends beyond the Cosumnes River Floodplain within the Planning Area. Modeled foraging habitat is Cropland, Irrigated Pasture-Grassland, Valley Grassland, Seasonal Wetland, and Freshwater Marsh within 1.75 miles of modeled roosting habitat.

Table G-4.25. Greater Sandhill Crane Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Roosting/Foraging Habitat			
Seasonal Wetland	1,825.17	105.58	1,771.29
Freshwater Marsh	2,609.79	275.97	2,333.81
Total Roosting/Foraging Habitat	*4,434.96*	*281.55*	*4,105.10*
Roosting Habitat			
Vernal Pool	1,155.75	57.71	1,098.04
Total Roosting Habitat	*1,155.75*	*57.71*	*1,098.04*
Foraging Habitat			
Cropland	42,628.06	3,600.42	39,027.63
Valley Grassland	30,585.36	2,717.57	27,867.79
Irrigate Pasture-Grassland	10,908.05	1,533.58	9,374.47
Total Foraging Habitat	*84,121.47*	*7,881.57*	*76,269.89*
GRAND TOTAL	**89,712.18**	**8,320.83**	**81,473.03**

High-value habitat for greater sandhill crane is defined as modeled habitats above sea level and outside the UDA (i.e., modeled habitats within the UDA are excluded).

LOGGERHEAD SHRIKE

Model Assumptions

- In mainland California, the average size of territories averaged 21 acres (9 hectares) and ranged between 11 acres (4 hectares) and 40 acres (16 hectares).
- Loggerhead shrikes occur year-round in suitable habitat throughout the Planning Area. They are probably regular breeders in the Planning Area in low densities; however, their overall distribution, abundance, and population structure are not well known.

Loggerhead Shrike Habitat Model

Modeled foraging habitat is Cropland, Irrigated Pasture-Grassland, Valley Grassland, Vernal Pool, Seasonal Wetland, and Swale throughout the Planning Area. Modeled nesting habitat is Mine Tailing Riparian Woodland, Mixed Riparian Scrub, and Valley Grassland throughout the Planning Area.

Table G-4.26. Loggerhead Shrike Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Nesting Habitat			
Mixed Riparian Woodland	5,784.78	244.21	5,540.57
Mixed Riparian Scrub	1,451.82	214.47	1,210.35
Mine Tailing Riparian Woodland	641.07	219.81	421.26
Total Roosting/Foraging Habitat	*7,877.67*	*678.49*	*7,172.18*
Nesting/Foraging Habitat			
Valley Grassland	135,111.61	30,344.83	104,766.78
Total Roosting Habitat	*135,111.61*	*30,344.83*	*104,766.78*
Foraging Habitat			
Cropland	47,904.83	5,480.89	42,423.94
Irrigated Pasture-Grassland	15,991.26	3,218.48	12,772.79
Vernal Pool	4,658.17	1,057.46	3,600.72
Seasonal Wetland	2,600.12	162.55	4,427.57
Swale	1,251.65	460.73	790.92
Total Foraging Habitat	*72,406.03*	*10,380.11*	*62,025.94*
GRAND TOTAL	**215,395.31**	**41,403.43**	**173,964.30**

RED BAT

Model Assumptions

- Data regarding reported territory sizes and distances traveled between roosting and foraging sites is not available.
- Fifty-six records for the western red bat (1977 to 2002) varied in location precision from "Sacramento County" to "Sacramento" to an actual address. Over 30 western red bats were from localities reported as the City of Sacramento, Folsom, Rancho Cordova, Wilton, Elk Grove, and Galt.

Western Red Bat Habitat Model

Modeled foraging habitat is Valley Grassland, Blue Oak Woodland, Blue Oak Savanna, Orchard, Mine Tailing Riparian Woodland, Mixed Riparian Woodland, Mixed Riparian Scrub, Vernal Pool, Seasonal Wetland, Swale, Freshwater Marsh, Open Water, and Stream/Creek throughout the Planning Area. Modeled roosting habitat is Blue Oak Woodland, Blue Oak Savanna, Orchard, Mine Tailing Riparian Woodland, and Mixed Riparian Woodland throughout the Planning Area.

Table G-4.27. Western Red Bat Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Foraging Habitat			
Valley Grassland	135,111.61	30,344.83	104,766.78
Vernal Pool	4,535.57	934.86	3,600.72
Seasonal Wetlands	2,600.12	162.55	2,437.57
Freshwater Marsh	2,921.94	391.68	2,530.26
Streams/Creeks	2,673.93	163.21	2,510.73
Open Water	2,343.81	237.11	2,106.70
Mixed Riparian Scrub	1,451.82	241.47	1,210.35
Swale	1,251.65	460.73	790.92
Total Roosting Habitat	*152,890.44*	*32,936.43*	*119,954.02*
Roosting/Foraging Habitat			
Blue Oak Woodland	9,131.84	0	9,131.84
Mixed Riparian Woodland	5,784.78	244.21	5,540.57
Blue Oak Savana	5,637.07	17.84	5,619.24
Orchards	3,646.02	212.81	3,433.75
Mine Tailing Riparian Woodland	641.07	219.81	421.26
Total Foraging Habitat	*24,840.78*	*649.14*	*24,146.65*
GRAND TOTAL	**177,731.23**	**33,360.56**	**144,100.67**

AMERICAN BADGER

Model Assumptions

- Female and male home range sizes in Utah have been estimated at 338–751 acres and 1,327–1,549 acres, respectively. In Idaho, female and male badger home ranges averaged 400 acres and 600 acres, respectively.
- The Study Area is positioned within American badger's California range; and Badgers have been documented in the northeastern portion of the Planning Area.
- Badgers require large relatively undisturbed areas; therefore, primary habitat occurs in the eastern grasslands and rangelands of the Planning Area.

American Badger Habitat Model

Modeled habitat is Blue Oak Savanna, Valley Grassland, Vernal Pool, Seasonal Wetland, and Swale within rural portions of the Planning Area.

Table G-4.28. American Badger Acres of Habitat

Habitat Model Land Cover Types	Total Available Acres in the Planning Area	Total Available Acres Inside the UDA	Total Available Acres Outside the UDA
Entire Lifecycle			
Valley Grassland	135,111.61	30,344.83	668.91
Blue Oak Savanna	5,637.07	17.84	35.80
Vernal Pool	4,535.57	934.86	34.16
Seasonal Wetland	2,600.12	162.55	790.92
Swale	1,251.65	460.73	2,437.57
TOTAL	**149,136.02**	**3,192.80**	**117,215.22**

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EIS/EIR APPENDIX H

Modeling Data and Assumptions for Air Quality and Greenhouse Gas Analyses

South Sac HCP

Sacramento County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	100.00	Acre	100.00	4,356,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2016
Utility Company	Sacramento Municipal Utility District				
CO2 Intensity (lb/MWhr)	590.31	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase -

Off-road Equipment - representative equipment for preserve construction

Operational Off-Road Equipment - maintenece equipment that could be used during operations.

Table Name	Column Name	Default Value	New Value
tblOffRoadEquipment	HorsePower	400.00	255.00
tblOffRoadEquipment	LoadFactor	0.38	0.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblProjectCharacteristics	OperationalYear	2014	2016
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	6.8984	74.9167	50.5226	0.0646	9.2955	3.5858	12.4873	5.0349	3.2990	6.9560	0.0000	6,652.4690	6,652.4690	1.9462	0.0000	6,693.3391
2017	6.4823	69.6841	48.0452	0.0646	8.9015	3.3187	12.2202	3.6570	3.0532	6.7102	0.0000	6,541.4879	6,541.4879	1.9447	0.0000	6,582.3255
Total	**13.3807**	**144.6008**	**98.5679**	**0.1292**	**18.1969**	**6.9046**	**24.7075**	**8.6919**	**6.3522**	**13.6662**	**0.0000**	**13,193.9569**	**13,193.9569**	**3.8909**	**0.0000**	**13,275.6647**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	6.8925	74.8481	50.4775	0.0646	9.2955	3.5826	12.4840	5.0349	3.2959	6.9529	0.0000	6,646.5836	6,646.5836	1.9444	0.0000	6,687.4165
2017	6.4767	69.6203	48.0023	0.0645	8.9015	3.3157	12.2171	3.6570	3.0504	6.7074	0.0000	6,535.6957	6,535.6957	1.9429	0.0000	6,576.4961
Total	**13.3691**	**144.4683**	**98.4798**	**0.1291**	**18.1969**	**6.8982**	**24.7011**	**8.6919**	**6.3464**	**13.6604**	**0.0000**	**13,182.2793**	**13,182.2793**	**3.8873**	**0.0000**	**13,263.9125**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.0862**	**0.0916**	**0.0893**	**0.0774**	**0.0000**	**0.0918**	**0.0256**	**0.0000**	**0.0918**	**0.0426**	**0.0000**	**0.0885**	**0.0885**	**0.0915**	**0.0000**	**0.0885**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	109.8140	1.0000e-004	0.0105	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0219	0.0219	6.0000e-005		0.0232
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	1.7675	1.2922	6.9180	0.0136	0.9100	0.0186	0.9285	0.2431	0.0171	0.2601		1,177.2236	1,177.2236	0.0483		1,178.2386
Offroad	1.6990	17.8594	10.1361	0.0202		0.9294	0.9294		0.8566	0.8566		2,079.3492	2,079.3492	0.6155		2,092.2741
Total	**113.2805**	**19.1517**	**17.0646**	**0.0338**	**0.9100**	**0.9480**	**1.8580**	**0.2431**	**0.8737**	**1.1167**		**3,256.5947**	**3,256.5947**	**0.6639**	**0.0000**	**3,270.5359**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	109.8140	1.0000e-004	0.0105	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0219	0.0219	6.0000e-005		0.0232
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	1.7675	1.2922	6.9180	0.0136	0.9100	0.0186	0.9285	0.2431	0.0171	0.2601		1,177.2236	1,177.2236	0.0483		1,178.2386
Offroad	1.6990	17.8594	10.1361	0.0202		0.9294	0.9294		0.8566	0.8566		2,079.3492	2,079.3492	0.6155		2,092.2741
Total	**113.2805**	**19.1517**	**17.0646**	**0.0338**	**0.9100**	**0.9480**	**1.8580**	**0.2431**	**0.8737**	**1.1167**		**3,256.5947**	**3,256.5947**	**0.6639**	**0.0000**	**3,270.5359**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**1.4998**	**93.2523**	**59.3983**	**59.7041**	**0.0000**	**98.0391**	**50.0234**	**0.0000**	**98.0439**	**76.7034**	**0.0000**	**63.8504**	**63.8504**	**92.7108**	**0.0000**	**63.9734**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	5/20/2016	8/11/2016	5	60	
2	Grading	Grading	8/12/2016	3/16/2017	5	155	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1		174	0.41
Site Preparation	Off-Highway Trucks	3	4.00	255	0.40
Site Preparation	Rubber Tired Dozers	3	4.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	2	4.00	97	0.37
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	9	23.00	0.00	0.00	15.00	8.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	15.00	8.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2016

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.0331	0.0000	9.0331	4.9653	0.0000	4.9653			0.0000			0.0000
Off-Road	3.1461	34.9844	23.2272	0.0297		1.6308	1.6308		1.5004	1.5004		3,084.6623	3,084.6623	0.9304		3,104.2016
Total	**3.1461**	**34.9844**	**23.2272**	**0.0297**	**9.0331**	**1.6308**	**10.6640**	**4.9653**	**1.5004**	**6.4657**		**3,084.6623**	**3,084.6623**	**0.9304**		**3,104.2016**

3.2 Site Preparation - 2016

Unmitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.4818	0.1184	1.5930	3.3200e-003	0.2623	1.8300e-003	0.2642	0.0696	1.6800e-003	0.0713		273.1115	273.1115	0.0129		273.3823
Total	**0.4818**	**0.1184**	**1.5930**	**3.3200e-003**	**0.2623**	**1.8300e-003**	**0.2642**	**0.0696**	**1.6800e-003**	**0.0713**		**273.1115**	**273.1115**	**0.0129**		**273.3823**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.0331	0.0000	9.0331	4.9653	0.0000	4.9653			0.0000			0.0000
Off-Road	3.1432	34.9523	23.2059	0.0297		1.6293	1.6293		1.4990	1.4990	0.0000	3,081.8323	3,081.8323	0.9296		3,101.3537
Total	**3.1432**	**34.9523**	**23.2059**	**0.0297**	**9.0331**	**1.6293**	**10.6625**	**4.9653**	**1.4990**	**6.4643**	**0.0000**	**3,081.8323**	**3,081.8323**	**0.9296**		**3,101.3537**

3.2 Site Preparation - 2016

Mitigated Construction Off-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.4818	0.1184	1.5930	3.3200e-003	0.2623	1.8300e-003	0.2642	0.0696	1.6800e-003	0.0713		273.1115	273.1115	0.0129		273.3823
Total	**0.4818**	**0.1184**	**1.5930**	**3.3200e-003**	**0.2623**	**1.8300e-003**	**0.2642**	**0.0696**	**1.6800e-003**	**0.0713**		**273.1115**	**273.1115**	**0.0129**		**273.3823**

3.3 Grading - 2016

Unmitigated Construction On-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.4795	74.8137	49.1374	0.0617		3.5842	3.5842		3.2975	3.2975		6,414.9807	6,414.9807	1.9350		6,455.6154
Total	**6.4795**	**74.8137**	**49.1374**	**0.0617**	**8.6733**	**3.5842**	**12.2576**	**3.5965**	**3.2975**	**6.8940**		**6,414.9807**	**6,414.9807**	**1.9350**		**6,455.6154**

3.3 Grading - 2016

Unmitigated Construction Off-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.4190	0.1030	1.3852	2.8900e-003	0.2281	1.5900e-003	0.2297	0.0605	1.4600e-003	0.0620		237.4883	237.4883	0.0112		237.7237
Total	**0.4190**	**0.1030**	**1.3852**	**2.8900e-003**	**0.2281**	**1.5900e-003**	**0.2297**	**0.0605**	**1.4600e-003**	**0.0620**		**237.4883**	**237.4883**	**0.0112**		**237.7237**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.4735	74.7451	49.0923	0.0617		3.5810	3.5810		3.2945	3.2945	0.0000	6,409.0953	6,409.0953	1.9332		6,449.6927
Total	**6.4735**	**74.7451**	**49.0923**	**0.0617**	**8.6733**	**3.5810**	**12.2543**	**3.5965**	**3.2945**	**6.8910**	**0.0000**	**6,409.0953**	**6,409.0953**	**1.9332**		**6,449.6927**

3.3 Grading - 2016

Mitigated Construction Off-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.4190	0.1030	1.3852	2.8900e-003	0.2281	1.5900e-003	0.2297	0.0605	1.4600e-003	0.0620		237.4883	237.4883	0.0112		237.7237
Total	**0.4190**	**0.1030**	**1.3852**	**2.8900e-003**	**0.2281**	**1.5900e-003**	**0.2297**	**0.0605**	**1.4600e-003**	**0.0620**		**237.4883**	**237.4883**	**0.0112**		**237.7237**

3.3 Grading - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.0991	69.5920	46.8050	0.0617		3.3172	3.3172		3.0518	3.0518		6,313.3690	6,313.3690	1.9344		6,353.9915
Total	**6.0991**	**69.5920**	**46.8050**	**0.0617**	**8.6733**	**3.3172**	**11.9905**	**3.5965**	**3.0518**	**6.6483**		**6,313.3690**	**6,313.3690**	**1.9344**		**6,353.9915**

3.3 Grading - 2017

Unmitigated Construction Off-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3831	0.0921	1.2402	2.8900e-003	0.2281	1.5400e-003	0.2297	0.0605	1.4200e-003	0.0619		228.1189	228.1189	0.0102		228.3340
Total	**0.3831**	**0.0921**	**1.2402**	**2.8900e-003**	**0.2281**	**1.5400e-003**	**0.2297**	**0.0605**	**1.4200e-003**	**0.0619**		**228.1189**	**228.1189**	**0.0102**		**228.3340**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					8.6733	0.0000	8.6733	3.5965	0.0000	3.5965			0.0000			0.0000
Off-Road	6.0935	69.5281	46.7621	0.0617		3.3142	3.3142		3.0490	3.0490	0.0000	6,307.5768	6,307.5768	1.9326		6,348.1621
Total	**6.0935**	**69.5281**	**46.7621**	**0.0617**	**8.6733**	**3.3142**	**11.9875**	**3.5965**	**3.0490**	**6.6455**	**0.0000**	**6,307.5768**	**6,307.5768**	**1.9326**		**6,348.1621**

3.3 Grading - 2017

Mitigated Construction Off-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.3831	0.0921	1.2402	2.8900e-003	0.2281	1.5400e-003	0.2297	0.0605	1.4200e-003	0.0619		228.1189	228.1189	0.0102		228.3340
Total	**0.3831**	**0.0921**	**1.2402**	**2.8900e-003**	**0.2281**	**1.5400e-003**	**0.2297**	**0.0605**	**1.4200e-003**	**0.0619**		**228.1189**	**228.1189**	**0.0102**		**228.3340**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.7675	1.2922	6.9180	0.0136	0.9100	0.0186	0.9285	0.2431	0.0171	0.2601		1,177.2236	1,177.2236	0.0483		1,178.2386
Unmitigated	1.7675	1.2922	6.9180	0.0136	0.9100	0.0186	0.9285	0.2431	0.0171	0.2601		1,177.2236	1,177.2236	0.0483		1,178.2386

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	159.00	159.00	159.00	429,813	429,813
Total	159.00	159.00	159.00	429,813	429,813

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	15.00	7.50	8.50	33.00	48.00	19.00	66	28	6

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.504516	0.068219	0.178179	0.147873	0.044976	0.006346	0.020386	0.015946	0.002304	0.002308	0.006193	0.000574	0.002181

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	109.8140	1.0000e-004	0.0105	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0219	0.0219	6.0000e-005		0.0232
Unmitigated	109.8140	1.0000e-004	0.0105	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0219	0.0219	6.0000e-005		0.0232

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	16.5946					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	93.2184					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0200e-003	1.0000e-004	0.0105	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0219	0.0219	6.0000e-005		0.0232
Total	**109.8140**	**1.0000e-004**	**0.0105**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**		**0.0219**	**0.0219**	**6.0000e-005**		**0.0232**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	16.5946					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	93.2184					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0200e-003	1.0000e-004	0.0105	0.0000		4.0000e-005	4.0000e-005		4.0000e-005	4.0000e-005		0.0219	0.0219	6.0000e-005		0.0232
Total	**109.8140**	**1.0000e-004**	**0.0105**	**0.0000**		**4.0000e-005**	**4.0000e-005**		**4.0000e-005**	**4.0000e-005**		**0.0219**	**0.0219**	**6.0000e-005**		**0.0232**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Off-Highway Trucks	1	8.00	260	400	0.38	Diesel
Tractors/Loaders/Backhoes	2	8.00	260	97	0.37	Diesel
Dumpers/Tenders	1	8.00	260	16	0.38	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	lb/day										lb/day					
Dumpers/Tenders	0.0740	0.4695	0.2511	7.5000e-004		0.0188	0.0188		0.0188	0.0188		60.9403	60.9403	6.6500e-003		61.0799
Off-Highway Trucks	0.9466	10.9062	5.0793	0.0132		0.4115	0.4115		0.3785	0.3785		1,373.6788	1,373.6788	0.4144		1,382.3801
Tractors/Loaders/Backhoes	0.6784	6.4837	4.8057	6.2000e-003		0.4992	0.4992		0.4593	0.4593		644.7302	644.7302	0.1945		648.8141
Total	**1.6990**	**17.8594**	**10.1361**	**0.0202**		**0.9294**	**0.9294**		**0.8566**	**0.8566**		**2,079.3492**	**2,079.3492**	**0.6155**		**2,092.2741**

10.0 Vegetation

South Sac HCP

Sacramento County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
City Park	100.00	Acre	100.00	4,356,000.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	3.5	**Precipitation Freq (Days)**	58
Climate Zone	6			**Operational Year**	2016
Utility Company	Sacramento Municipal Utility District				
CO2 Intensity (lb/MWhr)	590.31	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase -

Off-road Equipment - representative equipment for preserve construction

Operational Off-Road Equipment - maintenece equipment that could be used during operations.

Table Name	Column Name	Default Value	New Value
tblOffRoadEquipment	HorsePower	400.00	255.00
tblOffRoadEquipment	LoadFactor	0.38	0.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	2.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOffRoadEquipment	UsageHours	8.00	4.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	2.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblProjectCharacteristics	OperationalYear	2014	2016
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.4565	4.8374	3.2782	4.2300e-003	0.9619	0.2301	1.1920	0.4327	0.2117	0.6443	0.0000	394.3787	394.3787	0.1148	0.0000	396.7902
2017	0.1748	1.8817	1.2921	1.7400e-003	0.6781	0.0896	0.7677	0.2803	0.0824	0.3628	0.0000	159.6854	159.6854	0.0476	0.0000	160.6857
Total	**0.6313**	**6.7191**	**4.5703**	**5.9700e-003**	**1.6400**	**0.3197**	**1.9597**	**0.7130**	**0.2941**	**1.0071**	**0.0000**	**554.0641**	**554.0641**	**0.1625**	**0.0000**	**557.4759**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.4560	4.8316	3.2744	4.2200e-003	0.9619	0.2298	1.1917	0.4327	0.2114	0.6441	0.0000	393.9292	393.9292	0.1147	0.0000	396.3379
2017	0.1746	1.8795	1.2905	1.7300e-003	0.6781	0.0895	0.7676	0.2803	0.0823	0.3627	0.0000	159.5014	159.5014	0.0476	0.0000	160.5005
Total	**0.6306**	**6.7111**	**4.5650**	**5.9500e-003**	**1.6400**	**0.3193**	**1.9593**	**0.7130**	**0.2938**	**1.0067**	**0.0000**	**553.4306**	**553.4306**	**0.1623**	**0.0000**	**556.8384**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.1109**	**0.1186**	**0.1157**	**0.3350**	**0.0000**	**0.1189**	**0.0194**	**0.0000**	**0.1190**	**0.0357**	**0.0000**	**0.1143**	**0.1143**	**0.1108**	**0.0000**	**0.1143**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	20.0410	1.0000e-005	1.3100e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.4800e-003	2.4800e-003	1.0000e-005	0.0000	2.6300e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.3109	0.2538	1.1762	2.2800e-003	0.1600	3.3800e-003	0.1634	0.0429	3.1100e-003	0.0460	0.0000	179.6002	179.6002	7.9700e-003	0.0000	179.7676
Offroad	0.2209	2.3217	1.3177	2.6200e-003		0.1208	0.1208		0.1114	0.1114	0.0000	245.2260	245.2260	0.0726	0.0000	246.7503
Waste						0.0000	0.0000		0.0000	0.0000	1.7457	0.0000	1.7457	0.1032	0.0000	3.9123
Water						0.0000	0.0000		0.0000	0.0000	0.0000	111.6609	111.6609	5.4900e-003	1.1300e-003	112.1279
Total	**20.5728**	**2.5755**	**2.4952**	**4.9000e-003**	**0.1600**	**0.1242**	**0.2842**	**0.0429**	**0.1145**	**0.1573**	**1.7457**	**536.4896**	**538.2353**	**0.1892**	**1.1300e-003**	**542.5608**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	20.0410	1.0000e-005	1.3100e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.4800e-003	2.4800e-003	1.0000e-005	0.0000	2.6300e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.3109	0.2538	1.1762	2.2800e-003	0.1600	3.3800e-003	0.1634	0.0429	3.1100e-003	0.0460	0.0000	179.6002	179.6002	7.9700e-003	0.0000	179.7676
Offroad	0.2209	2.3217	1.3177	2.6200e-003		0.1208	0.1208		0.1114	0.1114	0.0000	245.2260	245.2260	0.0726	0.0000	246.7503
Waste						0.0000	0.0000		0.0000	0.0000	1.7457	0.0000	1.7457	0.1032	0.0000	3.9123
Water						0.0000	0.0000		0.0000	0.0000	0.0000	111.6609	111.6609	5.4900e-003	1.1300e-003	112.1279
Total	**20.5728**	**2.5755**	**2.4952**	**4.9000e-003**	**0.1600**	**0.1242**	**0.2842**	**0.0429**	**0.1145**	**0.1573**	**1.7457**	**536.4896**	**538.2353**	**0.1892**	**1.1300e-003**	**542.5608**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**1.0736**	**90.1457**	**52.8094**	**53.4694**	**0.0000**	**97.2788**	**42.5188**	**0.0000**	**97.2829**	**70.7838**	**0.0000**	**45.7094**	**45.5611**	**38.3607**	**0.0000**	**45.4788**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	5/20/2016	8/11/2016	5	60	
2	Grading	Grading	8/12/2016	3/16/2017	5	155	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Graders	1		174	0.41
Site Preparation	Off-Highway Trucks	3	4.00	255	0.40
Site Preparation	Rubber Tired Dozers	3	4.00	255	0.40
Site Preparation	Tractors/Loaders/Backhoes	2	4.00	97	0.37
Grading	Excavators	2	8.00	162	0.38
Grading	Graders	1	8.00	174	0.41
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Scrapers	2	8.00	361	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	9	23.00	0.00	0.00	15.00	8.50	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	15.00	8.50	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Site Preparation - 2016

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0944	1.0495	0.6968	8.9000e-004		0.0489	0.0489		0.0450	0.0450	0.0000	83.9508	83.9508	0.0253	0.0000	84.4825
Total	**0.0944**	**1.0495**	**0.6968**	**8.9000e-004**	**0.2710**	**0.0489**	**0.3199**	**0.1490**	**0.0450**	**0.1940**	**0.0000**	**83.9508**	**83.9508**	**0.0253**	**0.0000**	**84.4825**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0142	3.9500e-003	0.0406	9.0000e-005	7.6000e-003	6.0000e-005	7.6500e-003	2.0200e-003	5.0000e-005	2.0700e-003	0.0000	6.7131	6.7131	3.5000e-004	0.0000	6.7205
Total	**0.0142**	**3.9500e-003**	**0.0406**	**9.0000e-005**	**7.6000e-003**	**6.0000e-005**	**7.6500e-003**	**2.0200e-003**	**5.0000e-005**	**2.0700e-003**	**0.0000**	**6.7131**	**6.7131**	**3.5000e-004**	**0.0000**	**6.7205**

3.2 Site Preparation - 2016

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0943	1.0483	0.6960	8.9000e-004		0.0489	0.0489		0.0450	0.0450	0.0000	83.8509	83.8509	0.0253	0.0000	84.3820
Total	**0.0943**	**1.0483**	**0.6960**	**8.9000e-004**	**0.2710**	**0.0489**	**0.3199**	**0.1490**	**0.0450**	**0.1939**	**0.0000**	**83.8509**	**83.8509**	**0.0253**	**0.0000**	**84.3820**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0142	3.9500e-003	0.0406	9.0000e-005	7.6000e-003	6.0000e-005	7.6500e-003	2.0200e-003	5.0000e-005	2.0700e-003	0.0000	6.7131	6.7131	3.5000e-004	0.0000	6.7205
Total	**0.0142**	**3.9500e-003**	**0.0406**	**9.0000e-005**	**7.6000e-003**	**6.0000e-005**	**7.6500e-003**	**2.0200e-003**	**5.0000e-005**	**2.0700e-003**	**0.0000**	**6.7131**	**6.7131**	**3.5000e-004**	**0.0000**	**6.7205**

3.3 Grading - 2016

Unmitigated Construction On-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.6722	0.0000	0.6722	0.2787	0.0000	0.2787	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3272	3.7781	2.4814	3.1200e-003		0.1810	0.1810		0.1665	0.1665	0.0000	293.8884	293.8884	0.0887	0.0000	295.7500
Total	**0.3272**	**3.7781**	**2.4814**	**3.1200e-003**	**0.6722**	**0.1810**	**0.8532**	**0.2787**	**0.1665**	**0.4453**	**0.0000**	**293.8884**	**293.8884**	**0.0887**	**0.0000**	**295.7500**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0207	5.7800e-003	0.0594	1.3000e-004	0.0111	8.0000e-005	0.0112	2.9600e-003	7.0000e-005	3.0300e-003	0.0000	9.8264	9.8264	5.1000e-004	0.0000	9.8372
Total	**0.0207**	**5.7800e-003**	**0.0594**	**1.3000e-004**	**0.0111**	**8.0000e-005**	**0.0112**	**2.9600e-003**	**7.0000e-005**	**3.0300e-003**	**0.0000**	**9.8264**	**9.8264**	**5.1000e-004**	**0.0000**	**9.8372**

3.3 Grading - 2016

Mitigated Construction On-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.6722	0.0000	0.6722	0.2787	0.0000	0.2787	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3268	3.7736	2.4785	3.1100e-003		0.1808	0.1808		0.1663	0.1663	0.0000	293.5388	293.5388	0.0885	0.0000	295.3982
Total	**0.3268**	**3.7736**	**2.4785**	**3.1100e-003**	**0.6722**	**0.1808**	**0.8530**	**0.2787**	**0.1663**	**0.4451**	**0.0000**	**293.5388**	**293.5388**	**0.0885**	**0.0000**	**295.3982**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0207	5.7800e-003	0.0594	1.3000e-004	0.0111	8.0000e-005	0.0112	2.9600e-003	7.0000e-005	3.0300e-003	0.0000	9.8264	9.8264	5.1000e-004	0.0000	9.8372
Total	**0.0207**	**5.7800e-003**	**0.0594**	**1.3000e-004**	**0.0111**	**8.0000e-005**	**0.0112**	**2.9600e-003**	**7.0000e-005**	**3.0300e-003**	**0.0000**	**9.8264**	**9.8264**	**5.1000e-004**	**0.0000**	**9.8372**

3.3 Grading - 2017

Unmitigated Construction On-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.6722	0.0000	0.6722	0.2787	0.0000	0.2787	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1647	1.8790	1.2637	1.6700e-003		0.0896	0.0896		0.0824	0.0824	0.0000	154.6396	154.6396	0.0474	0.0000	155.6346
Total	**0.1647**	**1.8790**	**1.2637**	**1.6700e-003**	**0.6722**	**0.0896**	**0.7617**	**0.2787**	**0.0824**	**0.3611**	**0.0000**	**154.6396**	**154.6396**	**0.0474**	**0.0000**	**155.6346**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0101	2.7600e-003	0.0283	7.0000e-005	5.9500e-003	4.0000e-005	5.9900e-003	1.5800e-003	4.0000e-005	1.6200e-003	0.0000	5.0458	5.0458	2.5000e-004	0.0000	5.0511
Total	**0.0101**	**2.7600e-003**	**0.0283**	**7.0000e-005**	**5.9500e-003**	**4.0000e-005**	**5.9900e-003**	**1.5800e-003**	**4.0000e-005**	**1.6200e-003**	**0.0000**	**5.0458**	**5.0458**	**2.5000e-004**	**0.0000**	**5.0511**

3.3 Grading - 2017

Mitigated Construction On-Site

Acres of Grading: 387.5

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.6722	0.0000	0.6722	0.2787	0.0000	0.2787	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1645	1.8768	1.2622	1.6600e-003		0.0895	0.0895		0.0823	0.0823	0.0000	154.4556	154.4556	0.0473	0.0000	155.4495
Total	**0.1645**	**1.8768**	**1.2622**	**1.6600e-003**	**0.6722**	**0.0895**	**0.7616**	**0.2787**	**0.0823**	**0.3610**	**0.0000**	**154.4556**	**154.4556**	**0.0473**	**0.0000**	**155.4495**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0101	2.7600e-003	0.0283	7.0000e-005	5.9500e-003	4.0000e-005	5.9900e-003	1.5800e-003	4.0000e-005	1.6200e-003	0.0000	5.0458	5.0458	2.5000e-004	0.0000	5.0511
Total	**0.0101**	**2.7600e-003**	**0.0283**	**7.0000e-005**	**5.9500e-003**	**4.0000e-005**	**5.9900e-003**	**1.5800e-003**	**4.0000e-005**	**1.6200e-003**	**0.0000**	**5.0458**	**5.0458**	**2.5000e-004**	**0.0000**	**5.0511**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.3109	0.2538	1.1762	2.2800e-003	0.1600	3.3800e-003	0.1634	0.0429	3.1100e-003	0.0460	0.0000	179.6002	179.6002	7.9700e-003	0.0000	179.7676
Unmitigated	0.3109	0.2538	1.1762	2.2800e-003	0.1600	3.3800e-003	0.1634	0.0429	3.1100e-003	0.0460	0.0000	179.6002	179.6002	7.9700e-003	0.0000	179.7676

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	159.00	159.00	159.00	429,813	429,813
Total	159.00	159.00	159.00	429,813	429,813

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	15.00	7.50	8.50	33.00	48.00	19.00	66	28	6

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.504516	0.068219	0.178179	0.147873	0.044976	0.006346	0.020386	0.015946	0.002304	0.002308	0.006193	0.000574	0.002181

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
City Park	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	20.0410	1.0000e-005	1.3100e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.4800e-003	2.4800e-003	1.0000e-005	0.0000	2.6300e-003
Unmitigated	20.0410	1.0000e-005	1.3100e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.4800e-003	2.4800e-003	1.0000e-005	0.0000	2.6300e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.0285					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	17.0124					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.3000e-004	1.0000e-005	1.3100e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.4800e-003	2.4800e-003	1.0000e-005	0.0000	2.6300e-003
Total	**20.0410**	**1.0000e-005**	**1.3100e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.4800e-003**	**2.4800e-003**	**1.0000e-005**	**0.0000**	**2.6300e-003**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.0285					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	17.0124					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.3000e-004	1.0000e-005	1.3100e-003	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.4800e-003	2.4800e-003	1.0000e-005	0.0000	2.6300e-003
Total	**20.0410**	**1.0000e-005**	**1.3100e-003**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.4800e-003**	**2.4800e-003**	**1.0000e-005**	**0.0000**	**2.6300e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	111.6609	5.4900e-003	1.1300e-003	112.1279
Unmitigated	111.6609	5.4900e-003	1.1300e-003	112.1279

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 119.148	111.6609	5.4900e-003	1.1300e-003	112.1279
Total		**111.6609**	**5.4900e-003**	**1.1300e-003**	**112.1279**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
City Park	0 / 119.148	111.6609	5.4900e-003	1.1300e-003	112.1279
Total		**111.6609**	**5.4900e-003**	**1.1300e-003**	**112.1279**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	1.7457	0.1032	0.0000	3.9123
Unmitigated	1.7457	0.1032	0.0000	3.9123

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	8.6	1.7457	0.1032	0.0000	3.9123
Total		**1.7457**	**0.1032**	**0.0000**	**3.9123**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
City Park	8.6	1.7457	0.1032	0.0000	3.9123
Total		**1.7457**	**0.1032**	**0.0000**	**3.9123**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Off-Highway Trucks	1	8.00	260	400	0.38	Diesel
Tractors/Loaders/Backhoes	2	8.00	260	97	0.37	Diesel
Dumpers/Tenders	1	8.00	260	16	0.38	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	tons/yr										MT/yr					
Tractors/Loaders/Backhoes	0.0882	0.8429	0.6247	8.1000e-004		0.0649	0.0649		0.0597	0.0597	0.0000	76.0356	76.0356	0.0229	0.0000	76.5173
Dumpers/Tenders	9.6200e-003	0.0610	0.0327	1.0000e-004		2.4400e-003	2.4400e-003		2.4400e-003	2.4400e-003	0.0000	7.1869	7.1869	7.8000e-004	0.0000	7.2034
Off-Highway Trucks	0.1231	1.4178	0.6603	1.7200e-003		0.0535	0.0535		0.0492	0.0492	0.0000	162.0035	162.0035	0.0489	0.0000	163.0296
Total	**0.2209**	**2.3217**	**1.3177**	**2.6300e-003**		**0.1208**	**0.1208**		**0.1114**	**0.1114**	**0.0000**	**245.2260**	**245.2260**	**0.0726**	**0.0000**	**246.7503**

10.0 Vegetation

GHG Emissions from Land Conversion

No Project

Land Cover	Acres Converted	MT/C/acre/year[1]	MT CO2/year
Riparian Woodland	147	0.737	108.339
Riparian Shrub	189	0	0
Riparian Woodland (mine tailing)	218	0.737	160.666
Grassland	23,428	0	0
Woodland	55	0.425	23.375
Savana	86	0	0
cropland	5,703	0.081	461.943
pasture grassland	2,781	0	0
orchard	219	0.081	17.739
vineyard	1,525	0	0
Total	34,351		772.062

Proposed Project

Land Cover	Acres Converted	MT/C/acre/year[1]	MT CO2/year
Riparian Woodland	184	0.737	135.608
Riparian Shrub	189	0	0
Riparian Woodland (mine tailing)	218	0.737	160.666
Grassland	22,014	0	0
Woodland	10	0.425	4.25
Savana	38	0	0
cropland	5,285	0.081	428.085
pasture grassland	2,749	0	0
orchard	207	0.081	16.767
vineyard	1,455	0	0
Total	32,349		745.376

Difference between Alternatives 26.686

Reduce Permit Term

Land Cover	Acres Converted	MT/C/acre/year[1]	MT CO2/year
Riparian Woodland	197	0.737	145.189
Riparian Shrub	194	0	0
Riparian Woodland (mine tailing)	219	0.737	161.403
Grassland	23,672	0	0
Woodland	9	0.425	3.825
Savana	38	0	0
cropland	5,464	0.081	442.584
pasture grassland	2,665	0	0
orchard	224	0.081	18.144
vineyard	1,430	0	0
Total	34,112		771.145

	Stored Carbon				Annual Sequestration			
	2015 CAP	2012 CAP	2015 CAP	2012 CAP	2015 CAP	2012 CAP	2015 CAP	2012 CAP
Land Use Type	Carbon stored per acre (MT C/acre) (a)	Carbon stored per acre (MT C/acre)	2015 CAP Source	2012 CAP Source	Annual Net Carbon Sequestration per acre (MT C/acre/year) (b)	Annual Net Carbon Sequestration per acre (MT C/acre/year)	2015 CAP Source	2012 CAP Source
Oak Woodlands	29.5	95.1	4) EPA 2015. Western Oak. 8) has more specific oak woodland data, but reports lower carbon densities. Method consistency is vital.	1) EPA 2010. Unknown method. Western Oak is 58.1 MT C/acre.	0.425	0.425	2) hardwoods	2) Brown 2004
Riparian Woodlands	77.0	80.9	4) Straight average of Redwood, Oak, and Tanoak/Laurel per description in County GP DEIR (p. 4.5-6)	1) EPA 2010. Unknown method.	0.737	0.425	2) Straight average of Redwood and hardwood per description in County GP DEIR (p. 4.5-6)	2) Brown 2004
Coniferous Forest	78.2	58.1	4) Straight average of Ponderosa Pine, Redwood, and Mixed Conifer per description in County GP DEIR (p. 4.5-6). Weighted average would be preferrable, but no available data.	1) EPA 2010. Unknown method.	0.701	0.666	2) Straight average of douglas fir, Redwood, and Mixed Conifer per description in County GP DEIR (p. 4.5-6). Weighted average would be preferrable, but no available data.	2) Brown 2004
Grasslands	2.6	1.4	3) Battles et al. Table 5	2) Brown 2004	0.000	0.000	2) P. 19	2) Brown 2004
Shrublands	12.8	16.2	3) Battles et al. p. 18	2) Brown 2004	0.000	0.000	2) P. 19	2) Brown 2004
Croplands (Not Vineyards)	2.2	3.8	2) 5) 6). Scaled by Crop Report acreage	2) Brown 2004. Unknown method.	0.081	0.057	7) 5) 6) Assumes vegetables and hay have	7) Kroodsma 2006
Vineyards	1.2	1.2	2)	2) Brown 2004	0.000	0.000	2)	2) Brown 2004
Wetlands	2	NA	3) Battles et al. Table 5	not accounted	1.335	NA	9)	not accounted

Note: Change in land use patterns do not immediately change soil carbon levels. Instead, changes to soil carbon may be gradual, while change in land use patterns would have immediate impacts on above-ground and some below-ground biomass. As such, soil carbon is not included in this analysis.

ARB's current GHG Emissions Inventory is still based on sequestration factors from the 2004 Brown/CEC study. There are no regional specific studies that can yet apply to Napa County regarding sequestration rates.

1) U.S. EPA. 2010. 2010 U.S. Greenhouse Gas Inventory Report- Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008 (Annex 3). U.S. EPA # 430-R-10-006. Released April 2010. Table A 21A1v -erage carbon density b

2) CEC.200. Brown, S., T. Pearson, A. Dushku, J. Kadyzewski and Y. Qi. 2004. Baseline Greenhouse Gas Emissions for Forest, Range and Agricultural Lands in California. CEC-500-04-069F. Prepared for the California Energy Commis

3) Battles et. al. 2014. Commissioned by ARB. Updates Brown et.al. 2004. Uses IPCC land categories. Table 5. 2008. Battles et. al. 2014 did not comment on sequestration rates for the different land use types.

4) U.S. EPA. 2015. 2013 U.S. Greenhouse Gas Inventory Report- Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013 (Annex 3)

5) Proietti et. al. 2014. Carbon footprint of an Olive Tree Grove

6) 2014 Napa County Crop Report

7) Kroodsma 2006. CARBON SEQUESTRATION IN CALIFORNIA AGRICULTURE, 1980–2000

8) Gaman 2008. Oaks 2040. Carbon Resources in California Oak Woodlands

9) Brevik and Homburg 2004. A 5000 year record of carbon sequestration from a coastal lagoon and wetland complex, Southern California, USA

EIS/EIR APPENDIX I

Final SSHCP Aquatic Resources Program

SSHCP South Sacramento Habitat Conservation Plan

AQUATIC RESOURCES PROGRAM

Photo credit Sean Wirth

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City of Galt

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Meaning
AMM	Avoidance and Minimization Measure
APE	area of potential effect
ARI	Aquatic Resources Impact
ARP	Aquatic Resources Program
BMP	best management practice
CDFW	California Department of Fish and Wildlife
CEDEN	California Environmental Data Exchange Network
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CRAM	California Rapid Assessment Method
CWA	Clean Water Act
DEESA	Determination of Environmentally Equivalent or Superior Alternative
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act (federal)
FCAM	Functional/Condition Assessment Method
GIS	geographic information system
GP	General Permit
HUC	Hydrologic Unit Code
ILF	in-lieu fee
ITP	Incidental Take Permit
IP	Individual Permit
JPA	Joint Powers Authority
LEDPA	least environmentally damaging practicable alternative
LID	low-impact development
LOP	Letter of Permission
LSA	Lake or Streambed Alteration Agreement
LTLSA	Long-Term Streambed Alteration Agreement
MBTA	Migratory Bird Treaty Act
MOU	Memorandum of Understanding
MSAA	Master Streambed Alteration Agreement
MSLTA	Master Streambed Long-Term Agreement
NEPA	National Environmental Policy Act
NFWF	National Fish and Wildlife Foundation
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OHWM	ordinary high-water mark
PGP	Programmatic General Permit
Porter-Cologne	Porter-Cologne Water Quality Control Act
PPU	Preserve Planning Unit

Acronym or Abbreviation	Meaning
RDM	residual dry matter
RGP	Regional General Permit
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SHPO	State Historic Preservation Office
SP	Standard Permit
SSHCP	South Sacramento Habitat Conservation Plan
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
USB	Urban Services Boundary
UDA	Urban Development Boundary
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VPIH	Vernal Pool Invertebrate Habitat
VWADI	Vernal Wetland Acre/Density Index
WDR	Waste Discharge Requirement
WQC	Water Quality Certification
WRAMP	Wetland and Riparian Area Monitoring Plan

EXECUTIVE SUMMARY

The South Sacramento Habitat Conservation Plan (SSHCP) Aquatic Resources Program (ARP) is a local jurisdiction-based aquatic resources permitting program that also supports the anticipated implementation of a more efficient permitting strategy by the state and federal aquatic resource regulatory agencies (see SSHCP Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR) Appendix C). The comprehensive, long-term watershed approach used in the ARP enables better protection and management of aquatic resources and enables increased permitting efficiency. It benefits the regulated public and initiates the formation of a large, connected conservation system that coordinates a balance between population growth and resource use. Such outcomes would not be possible under the conventional project-by-project resource agency review approach of the past.

The local jurisdiction based aquatic resources permitting program contained in the ARP promotes a regional approach to balancing development and conservation[1] of aquatic resources located within the SSHCP Plan Area. Application of procedures contained in the ARP will ensure that impacts to aquatic resources are avoided and minimized to the greatest extent practicable during implementation of future planned development.[2] The ARP also implements aquatic resource avoidance, minimization and compensatory mitigation at a landscape[3] level to protect largely intact watersheds in the Plan Area, including their associated aquatic resources. A primary goal of ARP implementation is to achieve an overall no net loss of aquatic resources functions and services.

The ARP local aquatic resources permitting program works in coordination with the SSHCP, and would complement the SSHCP's approach to evaluating SSHCP Covered Activities that require filling aquatic resources located within the Plan Area. The existing aquatic resources are described in terms of abundance, type, and condition as they occur in each Hydrologic Unit Code (HUC)-10 watershed of the SSHCP Plan Area. Under existing conditions, the Plan Area contains a total of approximately 24,255[4] acres of aquatic resources, comprised of 10

1 The Oxford Dictionary of Ecology defines conservation as "the maintenance of environmental quality and resources. In modern scientific usage, conservation implies sound biosphere management within given social and economic constraints, producing goods and services for humans without depleting natural ecosystem diversity, and acknowledging the naturally dynamic character of environmental systems. This contrasts with a "preservation" approach, which, it is argued, protects species or landscapes without reference to natural change in living systems or human requirements".

2 Planned development means the type and locations of future urban development and associated infrastructure as described in the approved General Plans for Sacramento County, Rancho Cordova, and Galt.

3 A landscape can be defined as a heterogeneous land area composed of interacting ecosystems that is repeated in a similar form throughout; a landscape is a land area at least a few kilometers wide (Forman and Godron 1981, 1986).

4 The total acreage of aquatic resources reported in the ARP is approximately 232 acres less than the total acreage of aquatic resources reported in the SSHCP. This is primarily due to three factors: (1) The use of different geographical information system (GIS) processes that result in fractional differences in acreage

different aquatic resource land cover types (e.g., freshwater marsh, vernal pool, open water); 8,280 acres of which are considered high-condition aquatic resources based on a landscape-level functional assessment.

The anticipated impacts to aquatic resources within the SSHCP Plan Area are used to project the abundance, diversity, and condition of remaining aquatic resources prior to considering compensatory mitigation. The predicted impacts, not considering compensatory mitigation, show an effect (reduction of 1,613 acres) on the abundance of aquatic resources. However, the overall types of aquatic resources and condition of the resources would remain largely unchanged even prior to considering the compensatory mitigation strategy of the SSHCP. The SSHCP's overall Conservation Strategy that requires landscape-scale and project-level avoidance and minimization measures (AMMs) would also contribute to maintaining the condition of aquatic resources. Landscape-scale measures include assembling a large network of interconnected preserves that preserve natural corridors, provide large blocks of contiguous habitat, and include buffers between new development and natural areas. From a project-level scale, avoidance and minimization of impacts would be ensured by requiring each development Covered Activity incorporate low-impact development (LID) design measures, implement best management practices (BMPs), comply with siting and design requirements, and provide Stream and Preserve Setbacks. All of these measures and practices synergistically combine to ensure maintenance of Plan Area aquatic resource functions and services.

In addition to the SSHCP and ARP's avoidance and minimization strategy, compensatory mitigation for unavoidable impacts to aquatic resources would be implemented with a watershed approach and would systematically prioritize compensatory mitigation projects based on anticipated impacts to aquatic resources, considering both watershed- and function-based factors. Upon consideration of the SSHCP and ARP compensatory mitigation strategy, the predicted future watershed profiles resulting from implementation of the SSHCP demonstrate that overall aquatic resource abundance, type, and condition within the Plan Area would be maintained or improved. There would not be a net loss of aquatic resources in terms of acreage; all aquatic resource types would remain intact; and the amount of high-condition resources within the Plan Area would be increased.

totals; (2) Rounding; and (3) Some of the acreage of riparian land cover types reported in the SSHCP are considered non-jurisdictional as they are mitigation sites comprised of created or restored riparian habitat. Non-jurisdiction aquatic resources are not discussed in the ARP. It is this last factor that accounts for the majority of the difference in reported aquatic resource acreage between the ARP and the SSHCP.

1 INTRODUCTION

1.1 Introduction to the ARP

The Aquatic Resources Program (ARP) is a local jurisdiction based aquatic resources permit program that adds to the strength of the South Sacramento Habitat Conservation Plan's (SSHCP or Plan's) framework of protection of natural communities and native plant and wildlife species, including protection of aquatic resources. The ARP identifies, classifies, and ranks the aquatic resources located within the SSHCP Plan Area (see discussion of Plan Area in ARP Section 1.2) (Figure 1), and describes a program to implement locally based permitting that relies on a systematic approach of aquatic resource avoidance, minimization, and compensatory mitigation. The implementation of this program is synergistic with other natural resources avoidance, minimization, and compensatory mitigation described in the SSHCP. Implementation of the SSHCP and ARP would protect ecological diversity and function in Southern Sacramento County, while allowing planned urban growth and development in accordance with approved General Plans and applicable laws. The ARP introduces a locally based permit program that would also promote more efficient permitting approaches by state and federal programs that regulate aquatic resources. The regional SSHCP Preserve System (see SSHCP Section 7.5) would be used within the ARP as part of a unified watershed strategy of avoidance, minimization, and compensatory mitigation. The ARP permitting framework (local, state, and federal, as envisioned by the Plan Permittees) would be more protective of aquatic resources compared to the current project-by-project permitting process, based on several factors described in this document.

While the ARP focuses on a permit program to address impacts to aquatic resources and the SSHCP focuses on permitting related to incidental take of species, both permitting processes are done in conjunction with one another and in coordination with a local jurisdictions' land use entitlement permitting process. Projects seeking permits to impact aquatic resources will follow the local permit application process described in Section 7 of this document. Some basic components of the permit package include a project description, submittal of a wetland delineation, a description of how a project complies with AMMs, and a compensatory mitigation plan.

The Plan Permittees (Sacramento County, the City of Galt, the City of Rancho Cordova, the Sacramento County Water Agency, the Southeast Connector Joint Powers Authority, and the SSHCP Implementing Entity) are also seeking concurrent and parallel authorizations from federal and state regulatory agencies for customized, more efficient permitting approaches to address impacts to waters of the United States and waters of the state as a result of implementing future activities and projects (Covered Activities) permitted under the SSHCP's ESA and CESA Incidental Take Permits (ITPs).

Broadly, the SSHCP and ARP provide a framework for an improved process for projects (Covered Activities) to obtain environmental permits for impacts to federally and state-regulated species, natural communities, and aquatic resources, while ensuring a comprehensive watershed-based mitigation strategy that includes avoidance, minimization, establishment, re-establishment, and preservation of aquatic resources. Because so many of the SSHCP's Covered Species live part or all of their lives in water bodies, the Plan conserves wetland and stream habitats that are subject to regulation under Sections 404 and 401 of the federal Clean Water Act (CWA), California's Porter-Cologne Water Quality Control Act, and California Fish and Game Code Section 1600 et eq. pursuant to California's Lake and Streambed Alteration Program.

Aquatic resources identified in the SSHCP Plan Area include those regulated by the U.S. Army Corps of Engineers (USACE), the State Water Resources Control Board (SWRCB), Central Valley Regional Water Quality Control Board (Central Valley RWQCB), the California Department of Fish and Wildlife (CDFW), and local zoning and aquatic resource ordinances.

The ARP is a watershed-based plan developed to be synergistic with and will be implemented in conjunction with the SSHCP for the purpose of improving the protection and management of Plan Area aquatic resources with a watershed-level approach and with a better evaluation of cumulative impacts.

1.1.1 ARP Overview

The ARP is a local-jurisdiction based aquatic resources regulatory program, that further hopes to enable a new state and federal regulatory framework with increased efficiencies, within a regional conservation approach (as described in the SSHCP) for aquatic resources located within the Plan Area. This regional approach avoids and minimizes impacts to Plan Area aquatic resources, and will provide compensatory mitigation at a landscape level to protect a subset of largely intact watersheds in the Plan Area, including their aquatic resources. A primary goal of ARP implementation is to achieve an overall no net loss of aquatic resource functions and services in accordance with the USACE's and U.S. Environmental Protection Agency's (EPA's) 2008 Compensatory Mitigation Rule, *33 C.F.R. Parts 325 and 332, Compensatory Mitigation for Losses of Aquatic Resources: Final Rule* (Mitigation Rule). The ARP is directly tied to the SSHCP and designed to be fully integrated with the SSHCP. The SSHCP includes a mitigation strategy that is consistent with the CWA Sections 404 and 401 implementing regulations, in particular the Mitigation Rule, California Fish and Game Code Section 1600, and the Porter-Cologne Water Quality Control Act (Porter-Cologne).

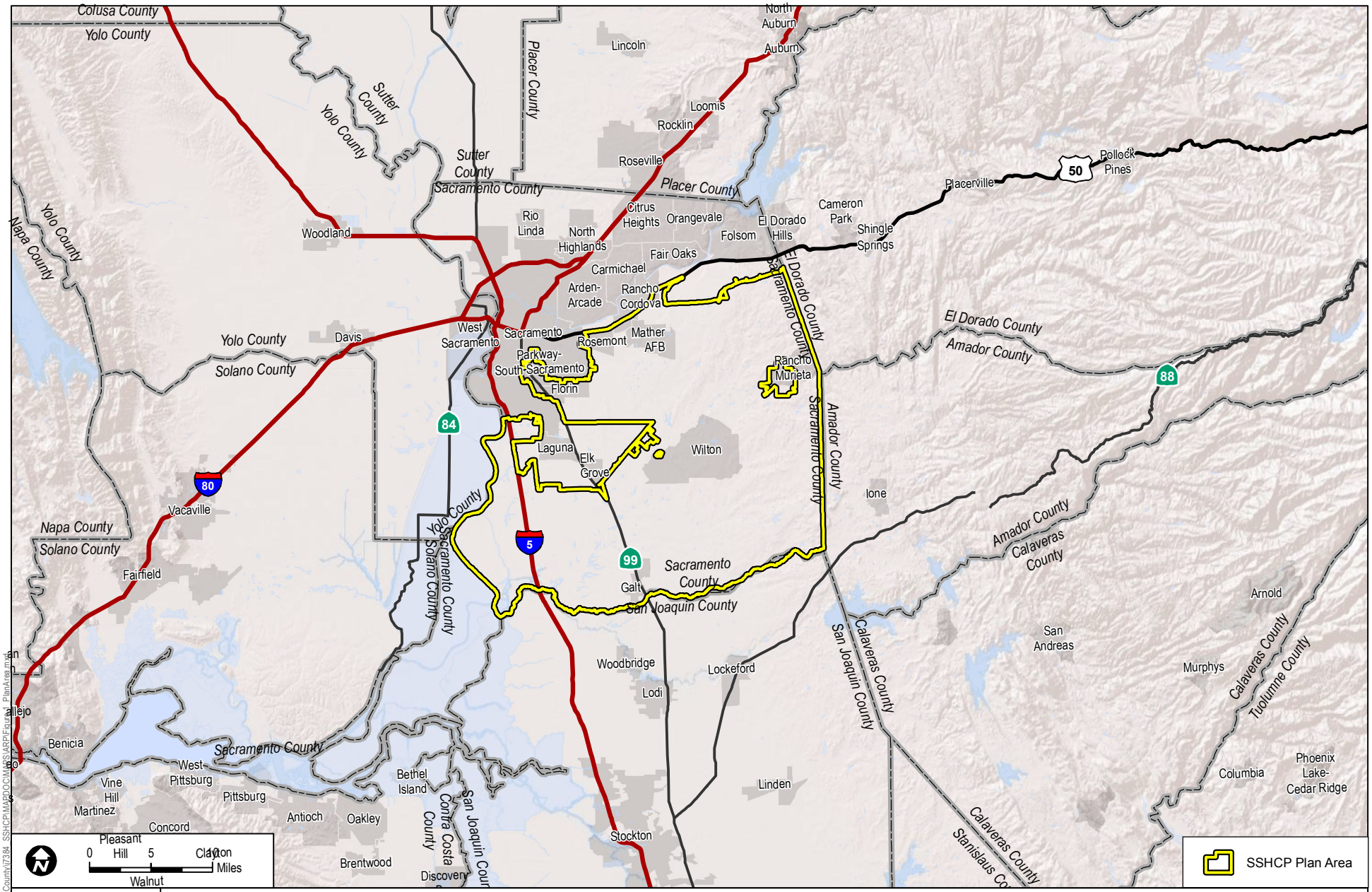

FIGURE 1

Plan Area

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SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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The ARP proposes to implement a regional compensatory mitigation strategy that recognizes the abundance, diversity, and condition of the aquatic resources so better decisions for avoidance, re-establishment, establishment, and preservation of aquatic resources are determined. This mitigation strategy is consistent with and provides for the planned urban growth and development described in the approved General Plans for Sacramento County, Galt and Rancho Cordova, and together they would result in improved economic and environmental planning for the Plan Area. This balanced regional approach to development and aquatic resource conservation in south Sacramento County provides a greater level of landscape- and watershed-scale protection of aquatic resources than has generally occurred with the conventional project-by-project agency review and permitting under the CWA Sections 404 and 401, and the California Fish and Game Code 1600 programs.

The avoidance, minimization, compensatory mitigation requirements coupled with the more efficient permitting process described in the ARP are derived from the SSHCP. However, the ARP focuses on Plan Area aquatic resources specifically, and, in some areas, addresses them in greater detail than the SSHCP. The ARP additionally articulates a proposed local jurisdiction-based aquatic resources permitting program that would be implemented via ordinances and would be implemented synergistically with the SSHCP.

1.1.2 ARP Program Objectives

The Plan Permittees and key stakeholders propose to implement a local aquatic resources permitting program, and have also coordinated with federal and state resource agencies to develop processes with a set of broad program goals for SSHCP Covered Activities that would collectively achieve the following ARP program objectives:

- **Local Implementation:** Establish local ordinances for successful implementation of the SSHCP and ARP.
- **Local Permitting Program:** Establish a local program carried out by the Plan Permittees to ensure improved permitting efficiency for future SSHCP Covered Activities for CWA 404 permits, 401 certifications, and California Fish and Game Code 1600 agreements. Such efficiency will help the regulated public and resource agencies save time and money, and will facilitate a better decision-making processes at the landscape and project levels.
- **Predictability:** Create a standardized and predictable permitting process for future SSHCP Covered Activities. A regionally integrated process allows permitting consistency and a more environmentally effective decision-making process.

- **Fair and Equitable Decisions:** Create a predictable decision-making outcome based upon a comprehensive approach that incorporates regionally important factors better serves the regulated public.
- **Greater Ecological Benefits:** Implement ecologically effective, watershed-based aquatic resource mitigation and conservation to achieve more robust protection for aquatic resources in the Plan Area.

1.2 SSHCP Summary

To offset expected impacts of future planned development described in the General Plans , the SSHCP would provide a landscape-level approach to protection of important biological and ecological resources, including suitable Covered Species habitats such as wetlands, streams, riparian, natural upland land covers, and certain types of agricultural lands that have important wildlife habitat value for SSHCP Covered Species (e.g., certain croplands and irrigated pasture-grassland). The SSHCP would provide Covered Activities with ESA and CESA incidental take coverage for their impact to 28 Covered Species of plants and wildlife, and to 17 land cover types that provide suitable habitat for the 28 Covered Species. The SSHCP Conservation Strategy will preserve approximately 36,282 acres. Properties would be acquired for the Preserve System from willing sellers via avoidance, land transfers in lieu of fees, and fees collected for development of the conservation mitigation strategy for Covered Activities located largely within urbanized areas. The 36,282 acres of new conservation would add to the approximately 64,535 acres of existing conservation in the Plan Area, resulting in total conservation of approximately 100,817 acres.

The Plan Area includes 317,655 acres within south Sacramento County, including the Cities of Galt and Rancho Cordova (see Figure 1, Plan Area). The Plan Area is defined as the area in which all SSHCP conservation actions would be implemented and where all SSHCP Covered Activities would occur. The boundary of the Plan Area was defined using political and ecological factors. The geographical boundaries are U.S. Highway 50 to the north, the Sacramento River levee and County Road J11 to the west, the Sacramento County line with El Dorado and Amador Counties to the east, and the San Joaquin County line to the south.

The Plan Area excludes the northern portion of Sacramento County, the City of Sacramento, the City of Elk Grove, the City of Folsom, the sovereign lands of the Miwok Tribe, and the Sacramento County community of Rancho Murieta. These areas were excluded from the Plan Area because they were either significantly built out, would not use the SSHCP, or were not likely to benefit from the SSHCP due to the absence of listed species or their habitats. The sovereign lands of the Miwok Tribe are not included as the tribe is not a proposed Plan Permittee.

A majority of development Covered Activities would occur within Sacramento County's Urban Services Boundary (USB). The USB is the limit to which urban services, such as public water

and sewer, would be provided; as such, it defines the "footprint" for urban development in Sacramento County. Development Covered Activities would also occur within the City limits of Galt and Rancho Cordova, and within the extra-territorial sphere of influence for the City of Galt. Together, the USB, the Galt and Rancho Cordova city limits, and the City of Galt's sphere of influence define the SSHCP Urban Development Area (UDA) (Figure 2). All urban development-related Covered Activities would occur within the UDA. Covered Activities outside the UDA are limited to a defined list of infrastructure projects (see Chapter 5 of the SSHCP), including specific rural transportation projects and specific water-related utilities (e.g., recycled water). See Chapter 6 of the SSHCP for a description of impacts to land covers and Covered Species resulting from Covered Activities.

The Plan Area is divided into two components: inside and outside of a UDA. Inside the UDA is where the planned development outlined in the General Plans (the SSHCP urban development Covered Activities) would occur. Consequently, most ground disturbance and associated species incidental take would occur inside the UDA. However, a limited amount of species incidental take is also requested for the specific infrastructure project Covered Activities and for preserve management Covered Activities proposed outside of the UDA. Under the SSHCP, natural resource preserves would be established in strategic locations within the Plan Area.

The UDA portion of the Plan Area totals 67,618 acres. Geographically, the UDA is the portion of the Sacramento County USB, the incorporated Cities of Rancho Cordova and Galt, and Galt's sphere of influence that are also within the Plan Area. The Plan Area outside of the UDA totals 250,038 acres.

To assist with development of the SSHCP Conservation Strategy, the Plan Area was further divided into eight Preserve Planning Units (PPUs) that encompass areas where important Covered Species habitat are present, and where habitat preservation is planned (Figure 3). These eight SSHCP PPUs are geographic subdivisions of the Plan Area designed to ensure that the SSHCP Biological Goals and Measurable Objectives (see Chapter 7 of the SSHCP) would be met for biological resources present in every part of the Plan Area.

1.3 ARP Purpose

The basic purpose of the ARP is to institute a locally based aquatic permitting program that is also anticipated to assist the Plan Permittees in complying with the requirements of federal, state, and local laws that protect aquatic resources. The ARP would be implemented locally using Aquatic Resources Protection Ordinances and would draw upon the comprehensive, landscape-, and project-level Conservation Strategy, as described in the SSHCP. The overall purpose of the ARP is to improve the protection of aquatic resources with a locally based, watershed-level approach and a better evaluation of individual and cumulative impacts. This strategy would benefit state and federal regulatory agencies by allowing for development of more efficient aquatic permitting

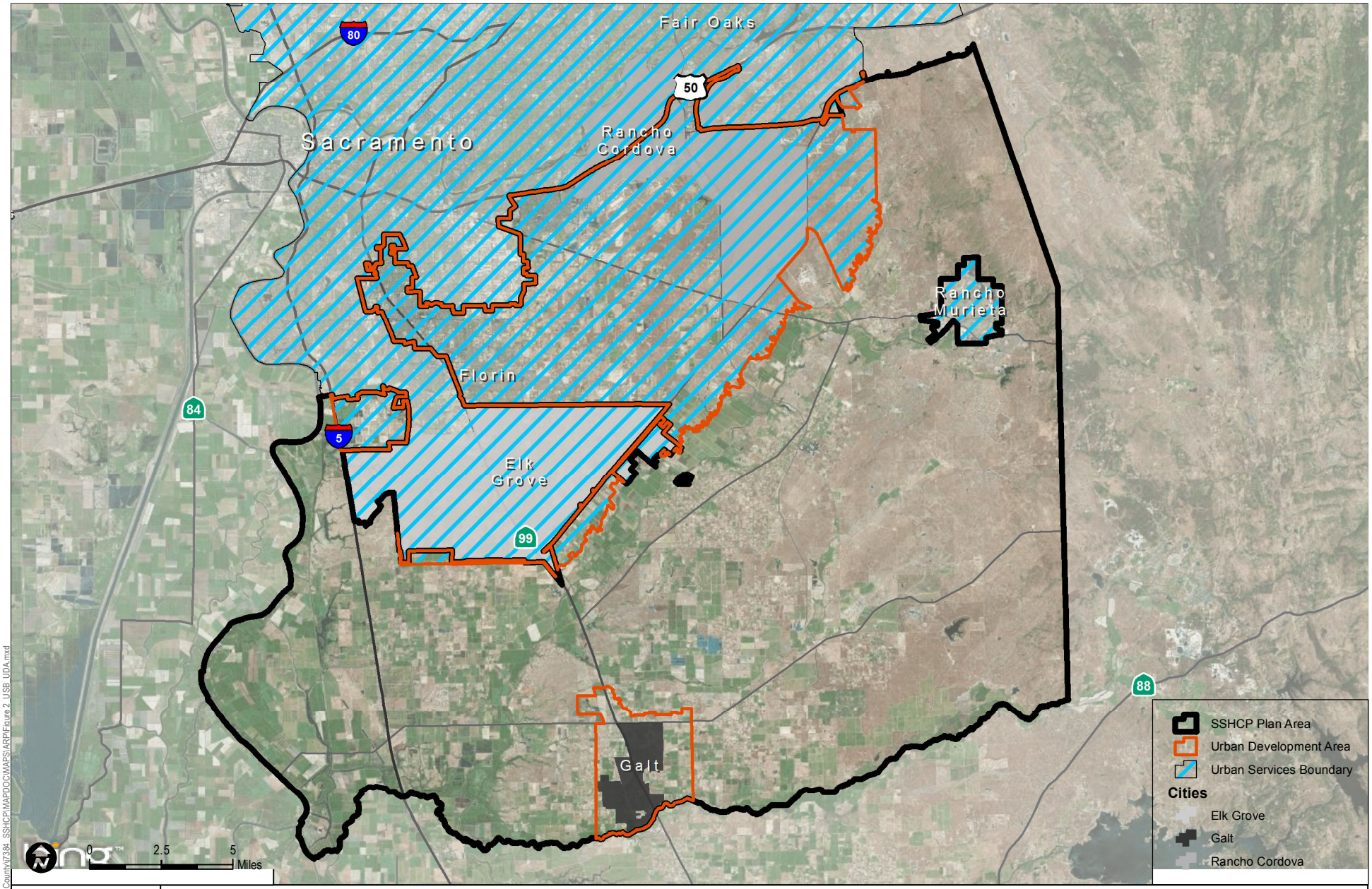
processes, and the regulated public by streamlining permitting processes to allow a consolidated view of projected impacts and compensatory mitigation needs. This strategy also provides opportunities to accomplish greater environmental benefits than could be achieved via the conventional project-by-project review process.

The three Land Use Authority Permittees (the County of Sacramento and the Cities of Galt and Rancho Cordova), along with the SSHCP Implementing Entity (see Chapter 9 of the SSHCP), would administer the ARP. Incorporating aquatic resources protection into the environmental permit review process at the local level, closer to where project impacts occur, is expected to result in greater benefits to aquatic resources and regulatory efficiency.

The three SSHCP Land Use Authority Permittees and the Implementing Entity would establish a locally implemented permit process to administer the requirements set forth in the ARP, including review of applications for SSHCP Covered Activities that propose to impact aquatic resources in the Plan Area. They would do so by enacting Aquatic Resources Protection Ordinances. Compliance with the ARP and Aquatic Resources Protection Ordinances would be monitored, as described in Section 5.3.1.3 of the ARP, and in Chapter 8 of the SSHCP. Environmental review implemented at the local level would ensure compliance with established ordinances to protect aquatic resources in conjunction with local government aquatic resources protection policies (i.e., General Plan Policies) as part of the decision-making process (see Section 9.7 of the SSHCP).

Administration of the requirements set forth in the ARP and the Aquatic Resources Protection Ordinances would be implemented by one of the Land Use Authority Permittees or the Implementing Entity, depending on which of these governmental organizations has jurisdiction over a project. Jurisdiction over a project would be ceded to the Land Use Authority Permittee in which jurisdiction the project is being implemented. If a Land Use Authority Permittee does not have land use jurisdiction over a project (e.g., school district projects), then the Implementing Entity would take jurisdiction for purposes of administrating the ARP and Aquatic Resources Protection Ordinances. All projects that are under the jurisdiction of the Implementing Entity and desire to use the local ARP program to satisfy CWA permitting requirements must comply with all aspects of the ARP and the Aquatic Resources Protection Ordinance. For instance, if a non-land-use-authority permittee (e.g., Capitol Southeast Connector JPA) qualifies for the PGP and local Aquatic Resource Permit, it must apply to the Implementing Entity for a local Aquatic Resource Permit, under the authority of the Implementing Entity's Aquatic Resources Protection Ordinance.

In addition to describing the local aquatic resources permit program, the ARP describes the types, abundance, diversity, and condition of existing aquatic resources. It then identifies the anticipated impacts to those aquatic resources as a result of implementation of the SSHCP Covered Activities. The ARP uses a regional and local conservation strategy administered with federal, state, and local permitting agencies to improve the protection of aquatic resources within the Plan Area.



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SOURCE: Bing Maps, County of Sacramento 2014

FIGURE 2

Urban Services Boundary and Urban Development Area

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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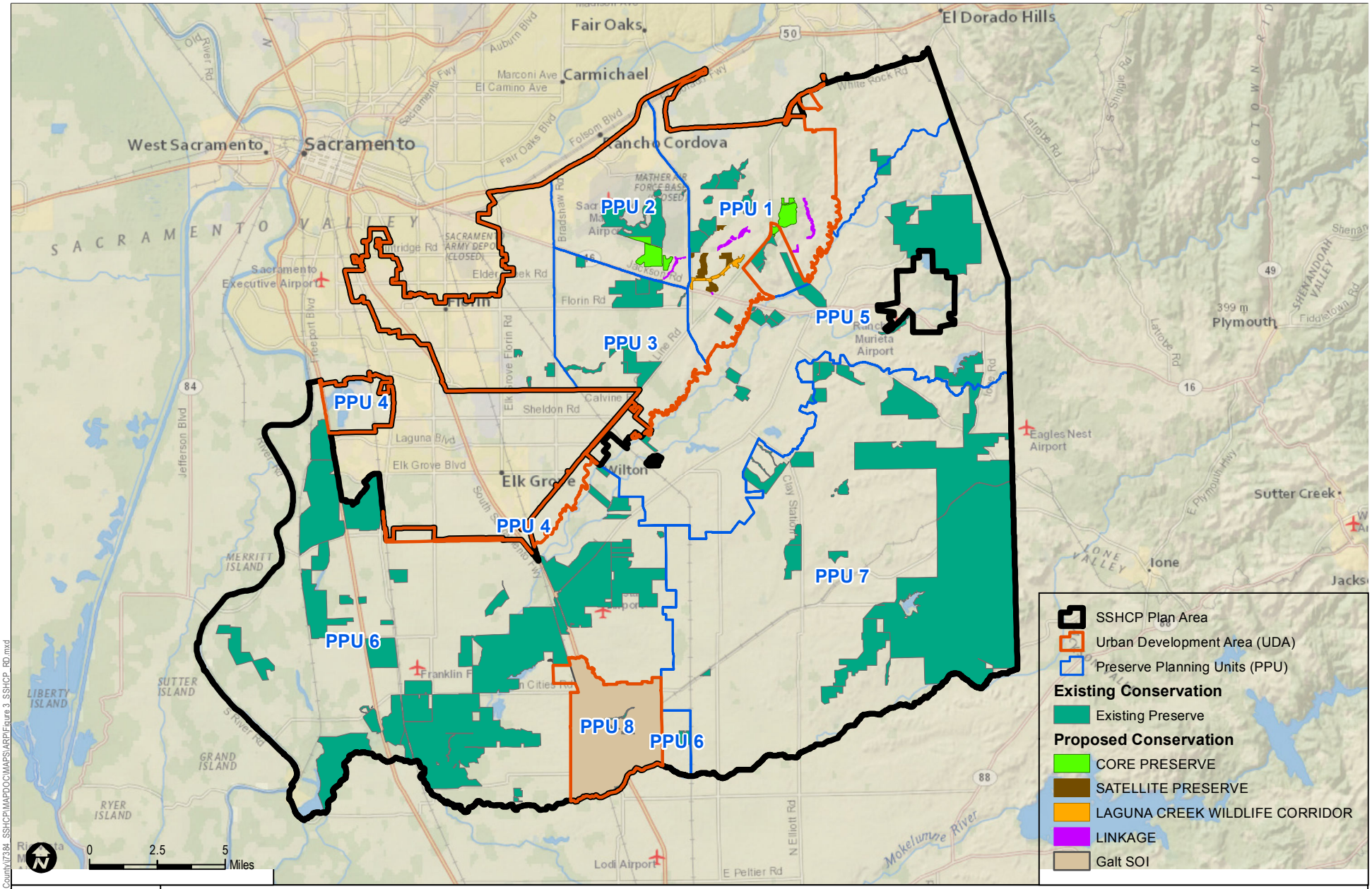

SOURCE: ESRI 2015, County of Sacramento 2014

FIGURE 3

Reserve Design Map

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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1.4 Relationship of ARP to the SSHCP

The ARP was developed in conjunction with the SSHCP to develop AMMs and compensatory mitigation requirements that meet or exceed the CWA and State of California Lake and Streambed Alteration Agreement Program mandates, and implement these standards in a local aquatic resources permit program. The ARP relies on (and is fully consistent with) the conservation plan of the SSHCP, including (1) Covered Activities that would use the ARP, (2) AMMs fully consistent with those of the SSHCP to avoid and reduce direct and indirect adverse impacts to aquatic habitats, (3) impacts analysis, and (4) mitigation for aquatic resources (e.g., the Conceptual SSHCP Preserve System, and proposed in-lieu fee (ILF) program). The ARP refers to SSHCP sections that describe or analyze aquatic resources, rather than re-stating facts and/or processes from the SSHCP. Thus, the synergistic relationship of the ARP to the SSHCP Conservation Strategy benefits Plan Area native plant and animal species and their habitats by providing a more effective strategy of protection of aquatic resources located within the SSHCP Plan Area. Together, the ARP and SSHCP would result in a comprehensive Conservation Strategy for conservation of all native plant and wildlife species of the Plan Area, including 28 special-status species of plants and wildlife, including 10 that are currently listed as threatened or endangered under the federal Endangered Species Act (ESA), the California Endangered Species Act (CESA).

The list of SSHCP Covered Species can be found in SSHCP Chapter 1 (Table 1-2). SSHCP Chapter 5 describes the Covered Activities and conditions that would be required during Covered Activity implementation to avoid, minimize, or mitigate Covered Activity impacts to Plan Area natural communities, aquatic resources, and each Covered Species. The SSHCP Conservation Strategy includes Biological Goals and Measureable Objectives for the operational SSHCP at the landscape, natural community, and Covered Species levels (SSHCP Chapter 7, Table 7-1). The ARP focuses on the SSHCP Covered Activities that could impact aquatic resources of the Plan Area.

The Permittees developed the ARP to apply the SSHCP's standards and procedures in an integrated aquatic resources permitting process that is guided by local ordinance. The SSHCP includes a mitigation program that will achieve the SSHCP Biological Goals and Measureable Objectives for the Plan Area aquatic resources (see SSHCP Chapter 7). Together, the ARP and SSHCP provide the Plan Permittees, third-party project proponents, and resource agencies with a comprehensive regional approach to natural resource conservation and project permitting (see SSHCP Chapter 1 for details).

The ARP and the SSHCP are synergistic. The SSHCP minimizes and mitigates for impacts to Covered Species suitable habitat, including aquatic natural communities and their associated uplands, and provides for the conservation and management of aquatic natural communities at a

landscape-level and community-level scale. The ARP provides a programmatic approach for Plan Permittees and third-party project proponents to obtain permits for Covered Activity impacts to aquatic resources. The approach results in a more efficient process for issuing state and federal permits for Covered Activity impacts to aquatic resources, while maintaining a robust conservation strategy that includes required avoidance, minimization, and compensatory mitigation. Where it is determined that Covered Activity impacts to aquatic resources are unavoidable, and after all required SSHCP AMMs have been incorporated into the Covered Activity project, compensatory mitigation would be required. The aquatic resource mitigation requirements outlined in the ARP are integral to achieving many of the SSHCP Biological Goals and Measurable Objectives (see SSHCP Chapter 7).

The ARP would expedite permitting of Covered Activities that may impact aquatic resources within the Plan Area. The ARP describes the type, diversity, abundance, and condition of aquatic resources in the Plan Area and describes a Covered Activity permitting process that includes measures to avoid and minimize impacts to aquatic resources; and when impacts to aquatic resources cannot be avoided, the ARP provides an aquatic resources compensatory mitigation strategy that is consistent with and would be implemented synergistically with the SSHCP mitigation and conservation strategy.

2 AQUATIC RESOURCES PERMITTING OVERVIEW

2.1 Regulatory Framework

The ARP is designed to be a local-jurisdiction-based aquatic resources permitting program that demonstrates consistency with the SSHCP's regulatory framework for Covered Activity impacts under the CESA and ESA. The ARP is also intended to be consistent with and either meet or exceed the requirements of Sections 404 and 401 of the federal CWA and Porter-Cologne. The ARP is also written to be consistent with California Fish and Game Code Sections 1600–1616 (Lake or Streambed Alteration Agreement). Together, the ARP and SSHCP would result in a comprehensive Conservation Strategy for the conservation of aquatic resources, natural communities, native species, and 28 species of plants and wildlife within the Plan Area, including 10 that are listed as threatened or endangered under the federal ESA, CESA, or both, in the Plan Area. Chapter 1 of the SSHCP provides an overview of the regulatory framework.

2.2 Local Aquatic Resources Permitting Program Overview

A local-jurisdiction-based permit program (as mentioned above and described in greater detail in Section 7 of this document) is intended to serve as a program/document that federal and state regulatory agencies (e.g., USACE, Central Valley RWQCB, CDFW) can rely upon to develop complementary and efficient permitting approaches representative of their jurisdictional mandates (e.g., CWA Section 404). The ARP is designed to demonstrate consistency with the requirements of these regulatory agencies by protecting aquatic resources using a comprehensive, long-term watershed approach. This would allow the ARP to enact more efficient permitting timelines as well as to improve the protection and management of aquatic resources in the Plan Area.

The local jurisdiction based permit program would be established via a local aquatic resources protection ordinance that would require a project applicant who is impacting aquatic resources within the SSHCP Plan Area to acquire an Aquatic Resources Impact Permit form a local Land Use Authority Permittee. Each Land Use Authority Permittee that is participating in the SSHCP (Sacramento County, City of Rancho Cordova, and City of Galt) would be required to adopt aquatic resources protection ordnances. Locally based permit programs will be developed to occur concurrently with the SSHCP permitting process as well as with local entitlement permitting processes required by Land Use Authority Permittees. A detailed description of the aquatic resources permitting process and the application requirements is included in Section 7 of this document.

Under the currently implemented project-by-project aquatic permit review approach, the regulatory agencies have fewer opportunities to evaluate impacts or compensatory mitigation on a regional scale; thus, often have difficulty addressing aquatic resource impacts in a comprehensive manner.

The ARP offers an opportunity to integrate local land use planning with aquatic resource protection, which is expected to improve aquatic resources protection in a coordinated fashion, on a regional scale, and with greater certainty for the Plan Permittees.

The ARP's local aquatic permitting program would be implemented through Aquatic Resources Protection Ordinances adopted by the County of Sacramento and the Cities of Galt and Rancho Cordova, whereby the Land Use Authority Permittees and the Implementing Entity would have a standardized and integrated permitting review process established for Covered Activities implemented in the Plan Area (see ARP Chapter 8). The Aquatic Resources Protection Ordinances would incorporate AMMs, as described in SSHCP Section 5.4, which are equal to or stronger than those historically required by federal and state regulatory agencies on a conventional project-by-project basis. In this way, the ARP and Aquatic Resources Protection Ordinances would lead to consistent and robust aquatic resource protection measures.

For Covered Activities that comply with the requirements of the ARP and the SSHCP, and which require environmental permits from the regulatory agencies, the ARP would provide the opportunity for a fully integrated regulatory approach, by, as described above, providing a local program upon which state and federal aquatic resource programs could develop programmatic and complementary approaches to streamline their permitting processes. The approach would establish clear permitting procedures, along with reasonable timelines for review. The permitting procedures would thereby increase efficiency for the Plan Permittees and for the regulatory agencies.

2.3 Associated State and Federal Aquatic Resources Permits/Approvals

The ARP and the Aquatic Resources Protection Ordinances are intended to be consistent with the following federal and state regulations. The following programs have also been coordinating with the Plan Partners for an extended period of time, including working as cooperating agencies on NEPA and CEQA compliance documents for the SSHCP. As such, while the ARP cannot dictate the final decisions that state and federal agencies may make concerning their own aquatic permit approaches that can align with the locally based program, it has been developed in close coordination with the state and federal agency programs in order to optimize its consistency and ability to serve as a basis for a suite of complementary state and federal aquatic permitting approaches.

2.3.1 Clean Water Act Section 404

Section 404 of the CWA regulates discharge of dredged or fill material into "waters of the United States." The USACE and the EPA administer Section 404 of the CWA. Waters of the United States

regulated under Section 404 of the CWA are identified in USACE regulations at 33 CFR 328.3. In addition to streams and other waters of the United States with an ordinary high-water mark (OHWM), the definition of waters of the United States includes wetlands. Wetlands are defined as areas "that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3 (7)(b)).

The USACE evaluates two types of permits under Section 404 of the CWA: general permits (nationwide, regional, and programmatic) and individual permits (letters of permission and standard permits). General permits are issued by the USACE on a nationwide or regional basis for a category or categories of activities when (1) those activities are substantially similar in nature and cause only minimal individual and cumulative environmental impact; or (2) the general permit would result in avoiding unnecessary duplication of the regulatory control exercised by another federal, state, or local agency provided it has been determined that the environmental consequences of the action are individually and cumulatively minimal (33 CFR 322.2(f)). Individual permits are evaluated on a case-by-case basis for activities that do not qualify for a general permit (i.e., that may have more than a minimal adverse environmental impact).

The USACE intends to use the ARP and Aquatic Resources Protection Ordinances in the development of a Section 404 CWA permitting strategy for SSHCP Covered Activities (see SSHCP Environmental Impact Statement/Environmental Impact Report [EIS/EIR], Appendix C). The strategy could potentially include a Programmatic General Permit (PGP) based on the ARP and/or a Regional General Permit (RGP) for Covered Activities that have no more than minimal impacts on the aquatic environment; a Letter of Permission (LOP) procedure for Covered Activities with impacts that meet certain requirements/thresholds and are more than minimal but would have less-than-significant impacts to waters of the U.S.; and an abbreviated Standard Permit (SP) procedure for other Covered Activities that exceed the LOP threshold and/or may have significant adverse impacts to waters of the U.S., but otherwise comply with the requirements of the ARP and SSHCP.

2.3.2 California Fish and Game Code/Section 1600 Master or Long-Term Streambed Alteration Agreement

Section 1600 of the California Fish and Game Code requires that a Streambed Alteration Application be submitted to the CDFW for "any activity that may substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake." CDFW reviews the proposed actions and, if necessary, submits to the applicant a proposal for measures to protect affected fish and wildlife resources. The final proposal that is mutually agreed upon by CDFW and the applicant is a Lake or Streambed Alteration Agreement (LSA). Covered Activities that require an

LSA may also require a permit from the USACE under Section 404 of the CWA. In these instances, the conditions of the CWA Section 404 permit and the LSA may overlap.

The ARP describes how the local Land Use Authority Permittees (County of Sacramento and Cities of Rancho Cordova and Galt) and the Implementing Entity would work with CDFW to develop a streamlined process for review of notifications of Lake or Streambed Alteration and, if applicable, issue Master Streambed Alteration Agreements (MSAA) or Routine Maintenance Agreements for future SSHCP Covered Activities to be implemented by a local Land Use Authority Permittee. Under the MSAA, a local Land Use Authority Permittee implementing a Covered Activity must submit a notification of streambed alteration to CDFW before construction. The notification requires an application fee for Streambed Alteration Agreements, with a specific fee schedule to be determined by CDFW.

For all other SSHCP Covered Activities that need a Streambed Alteration Agreement, the ARP would serve to quicken CDFW review by requiring projects' incorporation and compliance with the ARP's AMMs and the SSHCP conservation measures.

2.3.3 Clean Water Act Section 401 Porter-Cologne Act/Waste Discharge

Section 401 of the CWA requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into waters of the United States to obtain a certification that the discharge would comply with the state's applicable effluent limitations and water quality standards. In California, the RWQCB where the dredge or fill activity occurs administers CWA Section 401 requirements. For dredge or fill activities that occur in more than one RWQCB, the SWRCB administers CWA Section 401 requirements.

Porter-Cologne is California's primary statute governing water quality and water pollution issues with respect to both surface waters and groundwater. Porter-Cologne grants the SWRCB and the RWQCBs' power to protect water quality. Porter-Cologne grants the SWRCB and the RWQCBs' authority to adopt plans and policies, to regulate discharges of waste to surface and groundwater, to regulate waste disposal sites, and to require cleanup of discharges of hazardous materials and other pollutants. Covered Activities that require a CWA Section 401 water quality certification, a CWA Section 404 permit, and/or a SAA may also require a report of waste discharge.

The ARP would facilitate the Central Valley RWQCB's development of water quality certification strategies, in conjunction with USACE's development of a CWA Section 404 permitting strategy for the Plan Area.

3 AQUATIC RESOURCES IN THE PLAN AREA

The status of existing aquatic resources in the Plan Area can be described in terms of the aquatic resources' diversity, abundance, and condition. Diversity is described in terms of the variety of aquatic resources by SSHCP land cover type (common name) and Cowardin class. Abundance is described in terms of acreage of each aquatic resource type within the Plan Area and per watershed (at the Hydrologic Unit Code [HUC]-10 level). Condition is described using a landscape-level functional assessment to determine the relative capacity of aquatic resources to perform various functions and services related to hydrology, water quality, and habitat.

3.1 Diversity and Abundance of Aquatic Resources in the Plan Area

The SSHCP and ARP impact analyses and Conservation Strategy are based upon land cover type mapping of the Plan Area. Land cover type classification is based upon the California Natural Communities classification system developed by CDFW (Sawyer and Keeler-Wolf 1995) and consists of polygons, or non-linear resources. Chapter 3 of the SSHCP provides further detail for the land cover type definitions and mapping methods. The land cover types described in the ARP are identical to the land cover types described in the SSHCP. Land cover types in the Plan Area were identified and classified through interpretation of signatures of major vegetation and physical characteristics discernible on aerial photography. This information was refined through ground-truthing.

Ten of the land cover types mapped in the Plan Area are composed of or contain aquatic features and, for purposes of this analysis, are considered potential jurisdictional aquatic resources (see Table 3-1 in Chapter 3 of the SSHCP). The definition of these land cover types and classifications of land cover types as interpreted by the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979) are included below. This planning-level inventory of aquatic resources was mapped to be fully inclusive of all areas that could potentially be waters of the United States and waters of the state. As such, the acreages mapped as potentially jurisdictional are likely to be larger than the actual extent of waters of the United States and waters of the state. Exact extents of waters of the United States and waters of the state would be delineated and the mapping verified by the regulatory agencies for individual Covered Activities brought forth under the SSHCP ITPs.

3.1.1 Types of Wetland Waters

Vernal Pool Land Cover (Cowardin: Palustrine, Emergent Wetland, Nonpersistent)

Vernal Pools are a type of seasonal wetland that is characterized by a specific set of physical parameters and a unique assemblage of highly specialized endemic plants and animals that are adapted to the annual cycle of winter inundation and summer drought. The most important

feature of Vernal Pools is a distinct wet/dry hydrologic regime. Vernal Pools generally occur in complexes of interconnected pools either by swales, described below, or through a perched aquifer that exists between the soil surface and the sub-surface restricting layer or both.

All Vernal Pools may appear to be similar, yet each pool may exhibit different hydrologic behavior. In some Vernal Pool habitats, clay soils keep most water on or near the surface, so Vernal Pools receive nearly all of their water due to direct precipitation and are maintained by surface flows. In these sites, smaller and shallower pools dry quickly due to evapo-transpiration (Williamson et al. 2005). In other Vernal Pool habitats, the smaller and shallower Vernal Pools can be buffered against evapo-transpiration loss by perched aquifers (Williamson et al. 2005; Rains at al. 2006). The ecology of Vernal Pools located on duripan or claypan soils in the Central Valley appear to be supported by perched aquifers (Rains et al. 2006). In these soils, a sub-surface hydrologic restricting layer has formed preventing percolation of water into the groundwater aquifer and creates the sub-surface perched aquifer. In these soils and hydrologic conditions, seasonal surface water and perched groundwater hydrologically connect uplands, vernal pools, and streams at the catchment scale. Perched groundwater discharges from uplands to vernal pools thereby stabilizes the pools and causes them to remain inundated for longer periods than would be the case if they were recharged only by precipitation. The greater watershed can supply as much as 60% or more of the water needed to fill pools to the margin; however, individual Vernal Pools can display markedly different hydrology due to variations in topography and soil properties near each pool (Williamson et al. 2005; O'Geen et al. 2008; Leibowitz and Brooks 2008). Whether a Vernal Pool system is a direct-precipitation surface water overland flow driven (e.g., clay soil pools) or is a perched aquifer/surface flow system (e.g., duripan/claypan soil pools) also greatly influences water chemistry in vernal pools and seasonal wetlands (Rains et al. 2008; O'Driscoll and Parizek 2008).

Water chemistry and related abiotic factors have been shown to influence aquatic flora and fauna biodiversity and abundance (Kneitel and Lessin 2010; Lessin 2010; Poirier 2012), although the degree to which such changes affect vernal pools is poorly understood because the fundamental hydrogeological characteristics of perched aquifers remain relatively unexplored (Rains et al. 2006). It is possible that remnant Vernal Pools within altered landscapes, or higher densities of re-established or established Vernal Pools, may not have adequate surface and/or subsurface flows to adequately function as suitable habitat for certain species. Alternatively, the abiotic habitat components such as water chemistry, which is mediated by transport through subsurface and surface flows, may alter the suitability of the habitat to support tadpole shrimp if anthropogenic activities significantly affect upland watersheds (Rains et al. 2008). For example, truncating the upland watershed of a perched aquifer vernal pool system may convert the system from a perched aquifer/surface flow system to a direct precipitation surface water overland flow system, which may function similarly from a hydroperiod perspective but may be fundamentally altered from an abiotic water chemistry perspective. The vernal pools in the Plan Area are all perched

aquifer/surface flow type pools that are supported by sub-surface hydrology. Therefore, the hydrologic regime of Vernal Pools in the Plan Area is mediated by the interaction between the pool and the surrounding uplands that support the perched aquifer. The majority of Vernal Pools occurring within the Plan Area are largely supported by sub-surface perched aquifer hydrology. Factors affecting Vernal Pools are further discussed in SSHCP Chapters 2, Physical Setting; 3, Biological Resources Setting; and 6, Effects Analysis.

Vernal Pools in the Plan Area exhibit a variety of size and pool depth. Appendix B-1 describes the variation in Plan Area Vernal Pool complexes in greater detail. Approximately 4,537 acres of Vernal Pools have been identified within the Plan Area. Key physical parameters include landform, drainage area, geologic formation, slope, soil type, structure and depth, pool size and depth, timing of the hydrologic cycle, and pool interconnectivity. Different geologic formations in the Plan Area (see SSHCP Chapter 2) and their associated soils exhibit different propensities for the development of Vernal Pools (Keeley and Zedler 1998; Holland and Dains 1990; Metz 2001) and Vernal Pool physical parameters appear to vary by soil type. Various geological formations support characteristic Vernal Pool types that differ in fundamental physical and biological ways between geologic formations in a given region (Holland and Dains 1990; Smith and Verrill 1998, Platenkamp 1998; Metz 2001; Vollmar 2002; Helm and Vollmar 2002; Laabs et al. 2002; Dittes and Guardino 2002).

As discussed in SSHCP Chapter 3, the particular plant and animal species present in Vernal Pools vary based on physical, chemical, biologic and hydrologic parameters. In particular, several SSHCP Covered Species generally require large, deep pools that are long lasting to successfully complete their life cycles, including Boggs Lake hedge-hyssop (*Gratiola heterosepala),* Sacramento and slender Orcutt grasses (*Orcuttia viscida* and *O. tenuis*), vernal pool tadpole shrimp (*Lepidurus packardi*), California tiger salamander (*Ambystoma californiense*), and western spadefoot (*Spea hammondii*). Other vernal pool Covered Species occur in and around small to medium-sized pools, or the more "flashy" pools that dry out relatively quickly and may inundate and dry several times during the wet season, such as Ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*), dwarf downingia (*Downingia pusilla*), and pincushion navarretia (*Navarretia myersii*). For some plants in the latter category, the edges of larger Vernal Pools may provide conditions equivalent to small, flashy pools. The SSHCP Covered Species include two amphibian, four invertebrate, and seven plant Covered Species that depend on Vernal Pools (see SSHCP Table 3-2).

Seasonal Wetland Land Cover (Cowardin: Palustrine, Emergent Wetland, Nonpersistent)

Seasonal Wetlands are wetlands that saturate and/or pond for variable periods during a portion of the year, generally the rainy winter season, then dry relatively slowly, typically in the summer and early fall. Seasonal Wetlands tend to occur within moderate to large-sized depressional

features in valley grassland; along streams, creeks, and rivers; and along the edges of open water. Seasonal Wetlands are often characterized by herbaceous annual and perennial species, such as curly dock (*Rumex crispus*) and bulrush (*Scirpus* spp.).

Seasonal Wetlands provide habitat for some Covered Species (SSHCP Table 3-2). The SSHCP does not consider Seasonal Wetlands to be suitable habitat for the vernal pool invertebrate Covered Species. However, as discussed in SSHCP Section 3.4, Seasonal Wetlands do provide habitat for California tiger salamander, western spadefoot, Boggs lake hedge-hyssop, legenere (*Legenere limosa*), and Sanford's arrowhead (*Sagittaria sanfordii*). Other Covered Species that use seasonal wetland land cover as habitat are giant garter snake (*Thamnophis gigas*), all of the bird Covered Species except Cooper's hawk (*Accipiter cooperii;* mostly as foraging habitat), American badger (*Taxidea taxus*), and the three covered bat species. There are approximately 2,600 acres of Seasonal Wetlands mapped within the SSHCP Plan Area.

Swale Land Cover (Cowardin: Riverine, Intermittent, Nontidal)

Swales are shallow seasonal drainages typically found in flat to gently rolling valley grassland in association with vernal pool complexes on soils with an impermeable claypan or hardpan layer. Swales convey runoff as broad gently sloping ephemeral drainages during, and for short periods after, winter rainstorms. Swales are often associated with vernal pools and can provide conduits between vernal pools for movement of covered vernal pool plant and animal propagules (seeds, cysts, eggs, and spores) and adult California tiger salamanders and western spadefoots. Swales support several native plants commonly found in vernal pools. Swales also often include smaller shallow vernal pool riverine features that compose the headwaters of ephemeral tributaries within the Plan Area. The Plan Area includes approximately 1,252 acres of Swale.

Swales provide suitable habitat for portions or all of the life cycle of many of the Covered Species that occur in the vernal pool land cover type, including Ahart's dwarf rush, dwarf downingia, pincushion navarretia, mid-valley fairy shrimp (*Branchinecta mesovallensis*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp, Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*), and western spadefoot. In addition, all of the bird Covered Species (except Cooper's hawk and greater sandhill crane (*Grus canadensis*)) would use Swale land cover as foraging habitat, along with the American badger, and the three bat Covered Species (SSHCP Table 3-2).

Freshwater Marsh Land Cover (Cowardin: Palustrine, Emergent Wetland, Persistent)

The Freshwater Marsh land cover type is defined by herbaceous wetlands occurring along rivers, streams, lakes, and other linear or open bodies of water that are dominated by emergent hydrophytic (water-loving) plants such as grasses, reeds, rushes, and sedges (Kramer 1988).

Freshwater Marshes are typically perennial wetlands, but may dry out for short periods. Freshwater Marshes vary in size from small clumps to vast areas covering several kilometers (Kramer 1988). On the upper margins of this habitat, saturated or periodically flooded soils support several moist soil plant species, including big-leaf sedge (*Carex amplifolia*), Baltic rush (*Juncus balticus*), redroot flatsedge (*Cyperus erythrorhizos*), nutgrass (*Cyperus rotundus*), and on more alkali sites, saltgrass (*Distichlis spicata*). On wetter sites, common cattail (*Typha* spp.), bulrushes, and arrowhead (*Sagittaria* spp.) are potential dominant species.

Most of California's Freshwater Marshes occur in the Sacramento Valley and the San Joaquin Delta regions. Approximately 2,954 acres of freshwater marsh are mapped within the Plan Area. The majority of Freshwater Marsh in the Plan Area occurs along the perennial Cosumnes River and Deer Creek and along the margins of open water in the southeastern portion of the Plan Area in PPU 6. Freshwater Marsh is important habitat for western pond turtle, giant garter snake, and tricolored blackbird (*Agelaius tricolor*) (SSHCP Table 3-2).

Riparian Land Covers (Cowardin: Palustrine, Forested or Scrub/Shrub Wetland)

While "riparian" has various definitions, the SSHCP uses the National Research Council's 2002 definition: "Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect water bodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e., a zone of influence). Riparian areas in the Plan Area are adjacent to perennial, intermittent and ephemeral streams, lakes" (NRC 2002). The ARP assumes that riparian areas are aquatic resources so that the broadest suite of potential aquatic resources in the Plan Area are conserved.

Riparian ecosystems are highly dependent on landscape setting and numerous physical and biotic interactions. Riparian ecosystems provide essential foraging, shelter, and breeding habitat for several of the Covered Species and other native plant and animal species, including both resident and migratory species. SSHCP Covered Species that strongly depend on riparian land covers and often associated stream/creek land covers for at least some critical phase of their life history include valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), giant garter snake, western pond turtle, Cooper's hawk, Swainson's hawk (*Buteo swainsonii*), white-tailed kite (*Elanus leucurus*), pallid bat (*Antrozous pallidus*), western red bat (*Lasiurus blossevillii*), and Yuma myotis bat (*Myotis yumanensis*).

Over the last 150 years, there have been substantial anthropogenic alterations of streams and creeks that support riparian habitat in the Central Valley related to agriculture, rangeland use, and urban development (Katibah 1984), including straightening and deepening of channels;

construction of levees, dams, and other impoundments; riprap and concrete walls; vegetation clearing; and other alterations (see SSHCP Chapter 2). These alterations have adversely affected many riparian functions by isolating active stream and creek channels from their floodplains, altering natural flow patterns (e.g., timing and amount), and disrupting many other dynamic physical processes, such as groundwater recharge and sediment transport, scouring, and deposition that affect the fluvial dynamics of the system, including growth and distribution of riparian vegetation. In the Plan Area, these alterations may be expressed as small patches of riparian vegetation, usually as small clusters of trees and shrubs, or just a thin strip of riparian vegetation that is only one or two trees wide. In the eastern portion of the Plan Area (PPU 6 and PPU 8 in Figure 3), there are cottonwoods in some streamside locations, while along other streams, there is little riparian woodland vegetation. Streams flowing through vernal pool and valley grassland land covers in PPUs 1, 2, 3, 5, and 7 often exhibit little difference in vegetation between the riparian zone along the stream and the adjacent uplands; in some cases, there is just patchy distribution of mixed riparian scrub. Some streams in the urban areas of PPUs 3 and 4 are bounded by concrete walls and support no riparian vegetation, while others have narrow undeveloped riparian zones with a mix of trees, grasses, vernal pools, and seasonal wetlands (see SSHCP Chapter 2).

The SSHCP has identified three riparian land cover types totaling approximately 7,952 acres or 2.5% of the Plan Area: Mine Tailing Riparian Woodland, Mixed Riparian Scrub, and Mixed Riparian Woodland.

The Mine Tailing Riparian Woodland land cover type is distributed among older mine tailings. This land cover type contains species commonly found in riparian woodlands and riparian scrub habitats, such as Fremont cottonwood (*Populus fremontii*), blue elderberry (*Sambucus mexicana*), willow (*Salix* spp.), and coyote-brush (*Baccharis pilularis*). In the Plan Area, this land cover type can also intergrade with Mixed Riparian Forest along bodies of water.

Mixed Riparian Scrub land cover type is interspersed with Mixed Riparian Woodlands in the floodplains of waterways throughout Sacramento County. In the Plan Area, this land cover type consists of an open to dense shrubby thicket dominated by a mixture of sandbar willow (*Salix exigua*), arroyo willow (*S. lasiolepis*), red willow (*S. laevigata*), and immature stands of mixed riparian woodland tree species (see description below). This plant community can also be a subcanopy community in Mixed Riparian Woodlands. Though dense stands of riparian scrub in the Plan Area typically lack an understory, some of the more open canopy mixed riparian scrub stands do support an understory of native and non-native species, including wild rose (*Rosa californica*), wild grape (*Vitis californica*), perennial pepperweed (*Lepidium latifolium*), Himalayan blackberry (*Rubus discolor*), curly dock, and various non-native grasses.

The Mixed Riparian Woodland land cover type is distinguishable by an open canopy layer dominated by tall Fremont cottonwood trees. Beneath this open layer, a moderately dense mid-

canopy layer is composed of tree species such as Oregon ash (*Fraxinus latifolia*), Goodding's willow (*Salix gooddingii*), California black walnut (*Juglans californica* var. *hindsii*), valley oak (*Quercus lobata*), and box elder (*Acer negundo*). In some areas, a subcanopy of dense riparian scrub dominated by willow species, including arroyo willow and sandbar willow, is present. A discontinuous shrub layer is also present, particularly along the northern boundary of the Plan Area, and includes species such as blue elderberry, Himalayan blackberry, coyote-brush, wild rose, and wild grape. The understory is sparsely to densely vegetated with herbaceous species. Invasive weeds that have colonized portions of the mixed riparian woodland in the Plan Area include tamarisk (*Tamarix* spp.) and giant reed (*Arundo donax*).

Riparian land covers are associated with Plan Area streams and creeks (see SSHCP Section 3.2.1) and typically occur in the zone between the active stream channel mapped as streams/creeks and adjacent upland land covers.

The best-developed existing Riparian systems in the Plan Area are outside the UDA in PPU 6 along the parallel Cosumnes River and Deer Creek that run from the northeast to the southwest (Figure 3). In many areas, the Cosumnes River riparian woodland is relatively wide and is characterized by a multi-canopy structure, including a mix of cottonwood, sycamore, and valley oaks; a shrub layer of narrow-leaf willow (*Salix exigua*), California and Himalayan blackberry, and wild grape; and an understory layer of grasses, forbs, and sedges. This species and structural diversity provides suitable habitat for a rich diversity of wildlife, including several Covered Species.

Besides the Riparian land cover along the Cosumnes River and Deer Creek, the other main concentrations of Riparian land cover in the Plan Area are approximately 219 acres of Mine Tailing Riparian Woodland in the northern portion of the Plan Area (PPU 1) and approximately 345 acres of Mine Tailing Riparian Woodland just south of the Cosumnes River in the eastern portion of the Plan Area (north portion of PPU 7). The document treats Mine Tailing Riparian Woodland land cover as an aquatic resource.

3.1.2 Types of Non-Wetland Waters

Open Water Land Cover (Cowardin: Riverine and Limnetic, Unconsolidated Bottom, Nontidal)

The Open Water land cover type includes perennial or seasonal features, such as natural or manmade ponds, lakes, and reservoirs. Open Waters may contain either no vegetation, or non-rooted aquatic vegetation, such as algae, floating pondweeds, and other plants. Along shorelines, rooted, emergent vegetation may occur, forming freshwater marsh. Like freshwater marsh, open water habitats are used by numerous bird, mammal, amphibian, and reptile species, including several Covered Species, such as western pond turtle and giant garter snake. The marshy shorelines may be used by tricolored blackbird for nesting colonies (SSHCP Table 3-2).

Open Water habitat is found throughout the SSHCP area, and accounts for 2,342 acres in the Plan Area. The largest open water features are found on or near the Cosumnes River and Deer Creek. These open water features are largely unnamed with the exception of Blodgett Reservoir inside the UDA and Rancho Seco Lake outside the UDA.

Stream/Creek Land Cover (Cowardin: Riverine, Perennial or Intermittent, Nontidal)

The SSHCP Stream/Creek land cover includes rivers such as the Cosumnes River, streams such as Laguna Creek, and smaller intermittent or perennial creeks. This land cover also includes ephemeral streams outside the UDA; ephemeral streams inside the UDA were assumed to be associated with the vernal pool ecosystem and are categorized as stream/creek (vernal pool invertebrate habitat [VPIH]) below.

The Plan Area includes approximately 2,777 acres of Stream/Creek land cover. Polygons of the Stream/Creek land cover occur in areas that contain vernal pools and other wetlands, in Valley Grassland, Blue Oak Woodlands and Savannas, Agriculture, and Developed land cover types.

According to the National Hydrography Dataset, the Plan Area includes approximately 930 miles of "natural" streams and creeks (i.e., excluding artificial path, canal/ditch, connector, and pipeline). The larger streams inside the UDA, such as Laguna Creek, have perennial flow, due to summer runoff from irrigation. However, the upstream portions of these creeks, if undeveloped, generally have intermittent (i.e., seasonal) flows. Many smaller creeks and tributaries to larger creeks have intermittent or ephemeral (i.e., following rain events) flows. Most streams in the Plan Area are valley floor streams characterized by slow-moving water, except after rain events, and often carry substantial sediment loads as a result of land disturbances. Some reaches of tributaries in the eastern portion of the Plan Area flow over gently sloping terrain and have more of a pool and riffle structure. Due to their relatively small size and location among urban and farming or rangeland uses, most Plan Area creeks have been substantially affected in terms of water quality, invasive species, habitat loss, or other habitat degradation, although they still provide suitable habitat and important ecological functions for several of the Covered Species in the SSHCP, especially where the streams and creeks are associated with other riparian and wetland communities. The following streams are listed as impaired waters under Section 303(d) of the CWA: Carson Creek, Cosumnes River, Deer Creek, Elder Creek, Lower Mokelumne River, and Morrison Creek.

Covered Species associated with the Stream/Creek land cover type include Sanford's arrowhead, California tiger salamander, western spadefoot, giant garter snake, western pond turtle, and western red bat. Some streams or creeks provide habitat for vernal pool crustaceans, which are addressed in the Stream/Creek VPIH land cover below.

Over the last 150 years, there have been substantial man-made alterations of many of the streams and creeks in the Plan Area, including straightening and deepening of channels, construction of levees, dams and other impoundments, riprap and concrete walls, vegetation clearing, and other changes. These changes have adversely affected many stream and creek area functions by separating active channels from their natural floodplains, altering natural flow patterns, and disrupting many other dynamic physical processes that maintain stream and creek functions.

Stream/Creek (VPIH) Land Cover (Cowardin: Riverine, Intermittent, Nontidal)

The SSHCP Stream/Creek (VPIH) land cover type was only mapped in the UDA; outside the UDA these features are included in either the Swale land cover type or the Stream/Creek land cover type. Stream/Creek (VPIH) is typically vegetated (i.e., with valley grassland plant species) and conveys water only after rain events (ephemeral). Unlike most swales, streams/creeks (VPIH) are less likely to exhibit vegetation characteristic of vernal pools, and the SSHCP does not consider Stream/Creek (VPIH) land cover habitat for vernal pool plant Covered Species. However, the Stream/Creek (VPIH) land cover can provide suitable habitat for some vernal pool crustaceans in depressional features that may pond water between storm events. The Stream/Creek (VPIH) land cover type often occurs in association with vernal pools and swales. The Plan Area includes approximately 73 acres of stream/creek (VPIH).

3.1.3 Amounts (Abundance) of Aquatic Resources

Within the Plan Area, there are a total of approximately 24,256 acres of mapped potentially jurisdictional aquatic resources, spread throughout 10 different HUC-10 watersheds: American River (HUC 1802011102), Deer Creek (HUC 1804001305), Laguna (HUC 1804001307), Lower Cosumnes River (HUC 1804001308), Lower Dry Creek (HUC 1804001209), Lower Mokelumne River (HUC 1804001211), Morrison Creek (HUC 1802016304), Sherman Lake–Sacramento River (HUC 1802016307), Snodgrass Slough (HUC 1804001210), and Upper Cosumnes River (HUC 1804001306). The watersheds containing the greatest abundance of aquatic resources are Snodgrass Slough and Lower Cosumnes River (Figure 4). The watersheds containing the least amounts of aquatic resources are the American River, Sherman Lake–Sacramento River, and Lower Mokelumne River.

The most abundant aquatic resource types within the Plan Area are Mixed Riparian Woodland and vernal pool. The least abundant are Ephemeral Streams (likely due to the narrow width of such creeks) and Mine Tailing Riparian woodland. See Table 1 for a summary of aquatic resource types and amounts per watershed.

Table 1
Aquatic Resource Types and Amounts per Watershed within the Plan Area

Riparian, Wetland, or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Acres and Linear Miles (if applicable) per Watershed[1]										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake – Sac River*	*Snodgrass Slough*	*Upper Cosumnes*	
Riparian	Mine Tailing Riparian Woodland	R	47.9	40.7	158.3	17.3	0	0	129.4	2.0	0	245.5	**641.1**
	Mixed Riparian Scrub	R	0	80.4	58.1	271.8	47.1	2.4	57.0	130.1	528.2	99.7	**1,274.7**
	Mixed Riparian Woodland	R	0.4	835.8	261.7	1,877.0	400.6	196.4	157.1	50.6	1,292.6	732.6	**5,804.8**
Subtotal Riparian			*48.3*	*956.9*	*478.1*	*2,166.1*	*447.7*	*198.8*	*343.5*	*182.7*	*1,820.8*	*1,077.8*	*7,720.6*
Wetland Waters	Freshwater Marsh	PEM1	2.0	38.3	167.2	1,126.9	47.5	20.9	369.9	39.7	1,029.6	112.3	**2,954.1**
	Seasonal Wetland	PEM2	22.6	128.7	418.6	615.8	116.7	0	106.7	0	781.7	408.9	**2,599.8**
	Swales	R	2.8 (2.61 linear miles)	160.4 (127.55 linear miles)	428.2 (366.66 linear miles)	144.2 (96.86 linear miles)	65.2 (57.45 linear miles)	0	358.5 (218.44 linear miles)	1.4 (0.69 linear mile)	10.2 (8.10 linear miles)	80.6 (57.14 linear miles)	**1,251.5 (935.50 linear miles)**
	Vernal Pools	PEM2	6.9	274.3	1,917.0	619.1	202.8	0.1	766.5	5.3	420.9	324.7	**4,537.5**
Subtotal Wetland Waters			*34.3*	*601.7*	*2931*	*2,506.00*	*432.2*	*21*	*1,601.6*	*46.4*	*2,242.40*	*926.5*	*11,342.90*

Table 1
Aquatic Resource Types and Amounts per Watershed within the Plan Area

Riparian, Wetland, or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Acres and Linear Miles (if applicable) per Watershed[1]										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake – Sac River*	*Snodgrass Slough*	*Upper Cosumnes*	
Non-Wetland Waters	Open Water	POW	2.7	200.1	297.4	663.1	8.7	3.1	156.7	9.4	720.3	280.2	**2,341.6**
	Streams/ Creeks (Intermittent and Perennial)	R2UB/ R3UB	5.4 (7.30 linear miles)	228.2 (215.56 linear miles)	416.0 (257.08 linear miles)	345.0 (148.53 linear miles)	78.2 (77.63 linear miles)	67.4 (8.02 linear miles)	122.7 (69.82 linear miles)	23.9 (7.01 linear miles)	1,141.0 (151.77 linear miles)	349.7 (94.88 linear miles)	**2,777.4 (1,037.61 linear miles)**
	Streams/ Creeks VPIH (Ephemeral)	R4SB	0	18.7 (11.29 linear miles)	0	0	0	0	54.5 (38.19 linear miles)	0	0	0	**73.2 (49.48 linear miles)**
Subtotal Non-Wetland Waters			*8.1*	*447*	*713.4*	*1,008.1*	*86.9*	*70.5*	*333.9*	*33.3*	*1,861.3*	*629.9*	*5,192.20*
Subtotal Wetland Waters and Non-Wetland Waters			*42.4*	*1,048.7*	*3,644.4*	*3,514.10*	*519.1*	*91.5*	*1,935.5*	*79.7*	*4,103.70*	*1,556.4*	*16,535.10*
Grand Total[1]			**90.7**	**2,005.6**	**4,122.5**	**5,680.2**	**966.8**	**290.3**	**2,279.0**	**262.4**	**5,924.5**	**2,634.2**	**24,255.7**

Note: [1] Table may not total precisely due to rounding.
Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

3.2 Functions and Services of Aquatic Resources in the Plan Area

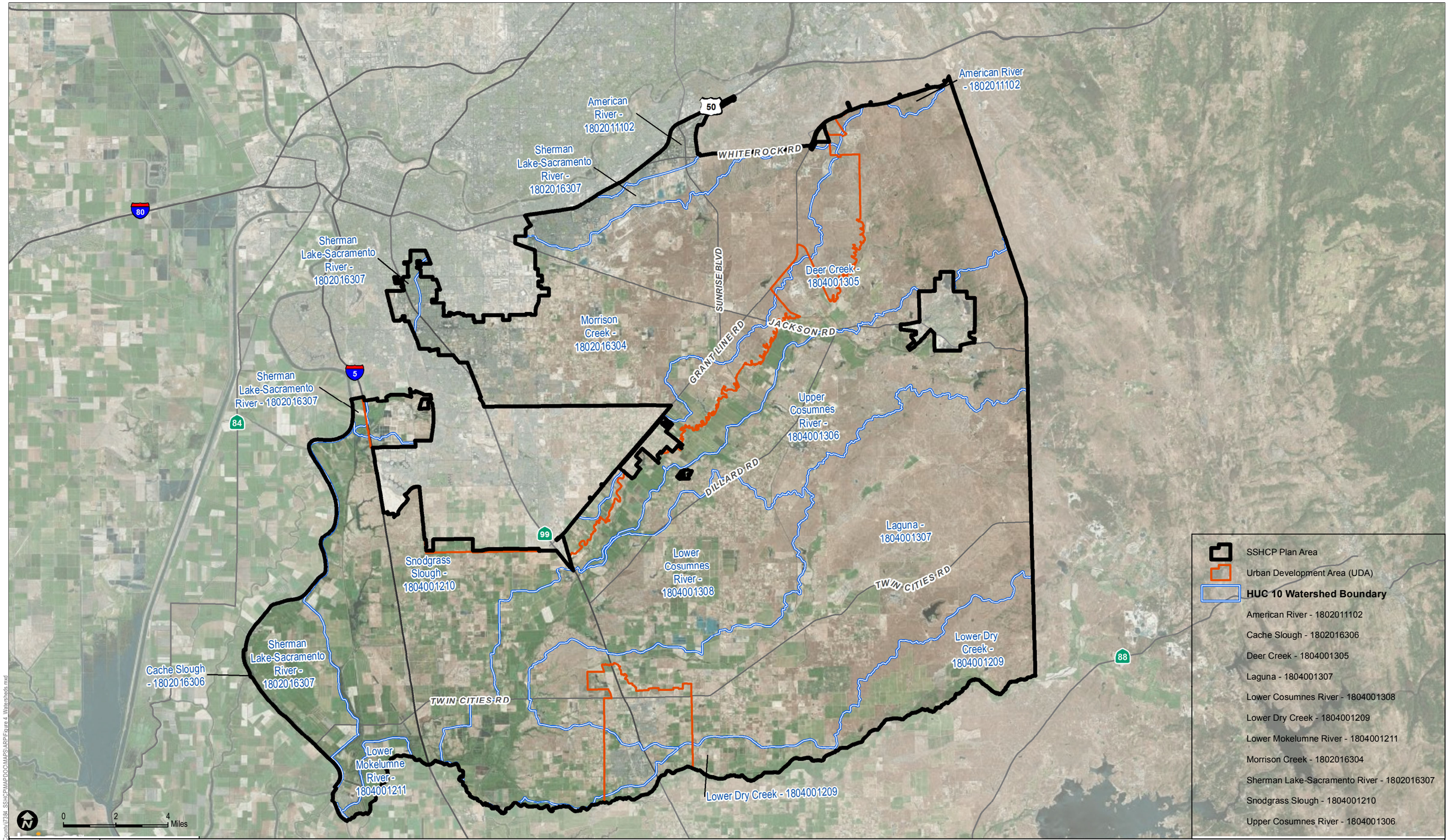
The current condition of aquatic resources within the Plan Area is used to describe the relative ability of the resources to support various functions and services. Condition is obtained from the results of the Functional Assessment for the South Sacramento Habitat Conservation Plan and Aquatic Resources Plan (Appendix C), which categorizes the Plan Area's aquatic resources into high, moderate, low, or very low condition relative to aquatic resources within the Plan Area.

3.2.1 Current Condition of Aquatic Resources

A landscape-level assessment of the relative quality of potentially jurisdictional waters of the United States and waters of the state was prepared for the aquatic resource types mapped in the Plan Area using a Functional/Condition Assessment Method (FCAM) developed for use by the ARP (Appendix C) and the SSHCP. The functional assessment assists in determining which potentially jurisdictional aquatic resource areas have the highest quality and greatest potential for re-establishment/establishment and preservation.

The overall quality of aquatic resources was assessed based on the following factors: area of the aquatic resource, HUC-10 watershed, primary adjacent land cover, secondary adjacent land cover, and aquatic resource type. Function scores were assigned for each of these factors, per aquatic resource feature, based upon ability to maintain or improve the following functions: habitat, water quality, and hydrology. Habitat was evaluated based on the ability of an aquatic resource to support wildlife and plant species. Water quality was evaluated based on the ability to improve or maintain water quality through processes such as filtration and/or trapping of contaminants such as sediment or toxicants and prevention of erosion. Hydrology was evaluated based on the ability of an aquatic resource to facilitate groundwater recharge and store floodwaters via beneficial flood storage and flood flow modifications.

The functional assessment factor related to the habitat, water quality, and hydrology conditions for each HUC-10 watershed was based on the results of a watershed study completed for the SSHCP and ARP (Appendix A). The watershed study results were used to develop appropriate scores for aquatic resources occurring in each HUC-10, based on Covered Species occurrences within each HUC-10 (habitat function score), percentage natural land cover within each HUC-10 (water quality function score), and percentage impervious surface within each HUC-10 (hydrology function score).



Path: Z:\Projects\Sacramento_County\7289_SSHCP\MAPDOC\MAPS\ARP\Figure 4_Watersheds.mxd

DUDEK

SOURCE: Bing Maps 2015, USGS 2013 National Hydrography Dataset (NHD)

FIGURE 4

Watersheds

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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The results of the FCAM analysis provide an overall functional score of very low, low, moderate, or high for each potentially jurisdictional land cover type. Table 2 summarizes the current condition of aquatic resources in the Plan Area, and Figure 5 is a graphical depiction of those data.

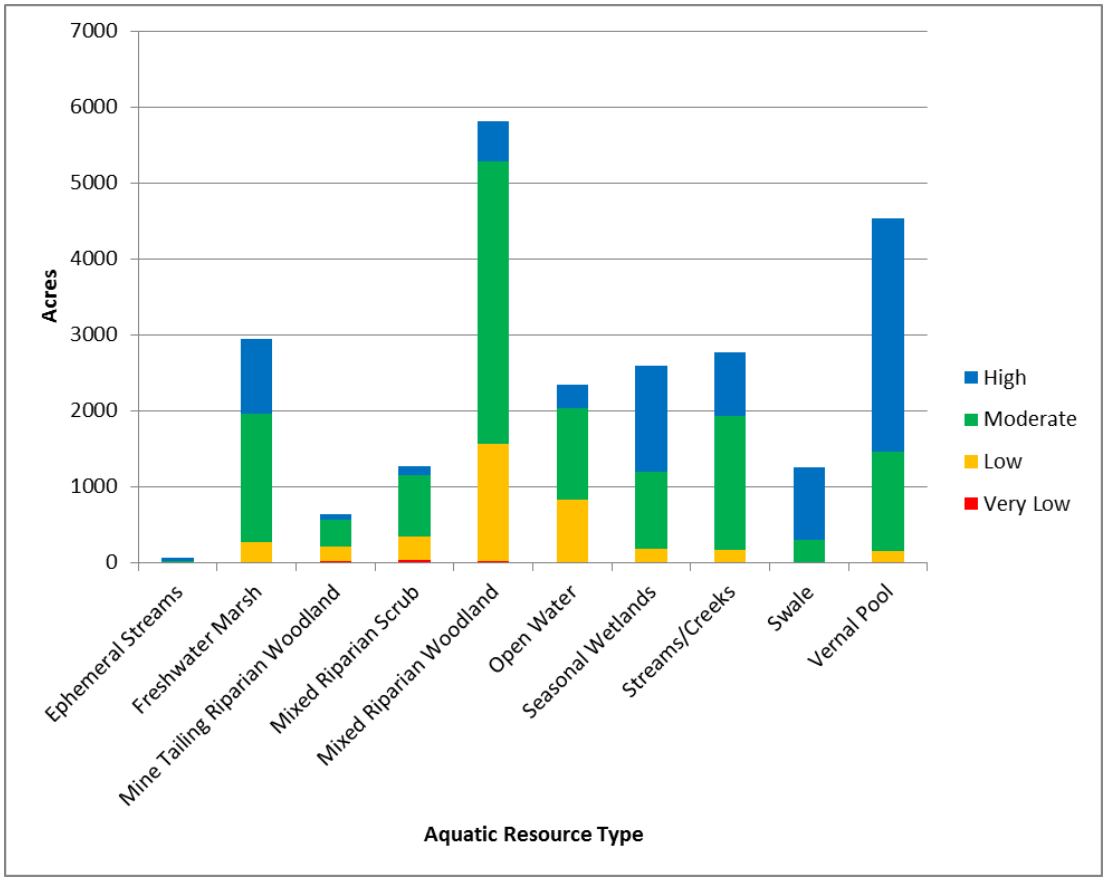
Table 2
Current Condition of Aquatic Resources in the Overall Plan Area

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	67.6	363.8	183.4	26.3	**641.1**
	Mixed Riparian Scrub	R2/R3	112.0	820.2	297.7	44.7	**1,274.7**
	Mixed Riparian Woodland	R2/R3	520.9	3,710.3	1,554.9	18.8	**5,804.8**
		Subtotal Riparian	*700.5*	*4,894.3*	*2,036.0*	*89.8*	*7,720.6*
Wetland Waters	Freshwater Marsh	PEM1	988.0	1,697.2	268.9	0	**2,954.1**
	Seasonal Wetland	PEM2	1,395.8	1,019.3	184.7	0	**2,599.8**
	Swales	R2/R3	944.3	302.2	5.0	0	**1,251.5**
	Vernal Pools	PEM2	3,067.5	1,313.0	157.0	0	**4,537.5**
		Subtotal Wetland Waters	*6,395.6*	*4,331.7*	*615.6*	*0*	*11,342.9*
Non-Wetland Waters	Open Water	POW	298.3	1,206.3	821.1	15.9	**2,341.6**
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	840.9	1,758.4	177.0	1.0	**2,777.4**
	Streams/Creeks VPIH (Ephemeral)	R4SB	44.3	27.4	1.5	0	**73.2**
		Subtotal Non-Wetland Waters	*1,183.5*	*2,992.1*	*999.6*	*16.9*	*5,192.2*
		Subtotal Wetland Waters and Non-Wetland Waters	*7,579.1*	*7,323.8*	*1,615.2*	*16.9*	*16,535.1*
		Grand Total[1]	**8,279.6**	**12,218.1**	**3,651.2**	**106.7**	**24,255.7**

Note: 1. Table may not total precisely due to rounding.
Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

Of the aquatic resource types, vernal pools exhibited the greatest acreage of high condition features (3,067 acres out of 4,053 acres). This result was expected, as the SSHCP and ARP recognize the highly specialized habitat functions that vernal pools serve (see Appendix B-1). Swales, Seasonal Wetlands, and Freshwater Marsh had the next largest high condition acreages (944 acres, 1,396 acres, and 988 acres, respectively). Approximately 50% of all aquatic resources within the Plan Area are considered to be of moderate condition. Mixed Riparian Woodland and Open Water resources had the largest acreages of low condition features (1,554 acres and 821 acres, respectively). The Plan Area overall did not exhibit large acreages or proportions of very low condition resources (only 107 acres total across all resource types).

Figure 5 Current Condition of Aquatic Resources in the Overall Plan Area



Current conditions of the aquatic resources can be further examined at the watershed (HUC-10) level. The following tables (Tables 3 through 12) and associated figures (Figures 6 through 15) describe the current condition of the aquatic resources within each of the ten watersheds located within the Plan Area (Figures 16 through 25). These figures, or watershed profiles, visually summarize the abundance, diversity, and condition of aquatic resources in each watershed. Deer

Creek, Laguna, Lower Cosumnes River, Lower Dry Creek, Morrison Creek, and Upper Cosumnes River watersheds all contain a majority of moderate to high condition aquatic resources. Of these, the watersheds with the greatest proportion of high condition aquatic resources are Laguna and Morrison Creek. American River, Lower Mokelumne, Sherman Lake–Sacramento River, and Snodgrass Slough watersheds currently contain no high condition aquatic resources, and the resources are mostly low to moderate in condition. Sherman Lake–Sacramento River watershed contains the greatest acreage of very low condition aquatic resources and has the highest proportion of low condition resources. Figure 26 summarizes aquatic resources condition acreages by watershed.

Table 3
American River Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	27.4	15.4	5.1	47.9
	Mixed Riparian Scrub	R2/R3	0	0	0	0	0
	Mixed Riparian Woodland	R2/R3	0	0.4	0	0	0.4
Subtotal Riparian			*0*	*27.8*	*15.4*	*5.1*	*48.3*
Wetland Waters	Freshwater Marsh	PEM1	0	2.0	0	0	2.0
	Seasonal Wetland	PEM2	0	22.6	0	0	22.6
	Swales	R2/R3	0	2.8	<0.1	0	2.8
	Vernal Pools	PEM2	0	5.1	1.0	0	6.1
Subtotal Wetland Waters			*0*	*32.5*	*1*	*0*	*33.5*
Non-Wetland Waters	Open Water	POW	0	0	2.7	0	2.7
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	0	5.4	<0.1	0	5.4
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*5.4*	*2.7*	*0*	*8.1*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*37.9*	*3.7*	*0*	*41.6*
Grand Total[1]			**0**	**65.7**	**19.1**	**5.1**	**89.9**

Note: 1. Table may not total precisely due to rounding.

Figure 6 Current Condition of Aquatic Resources in the American River Watershed

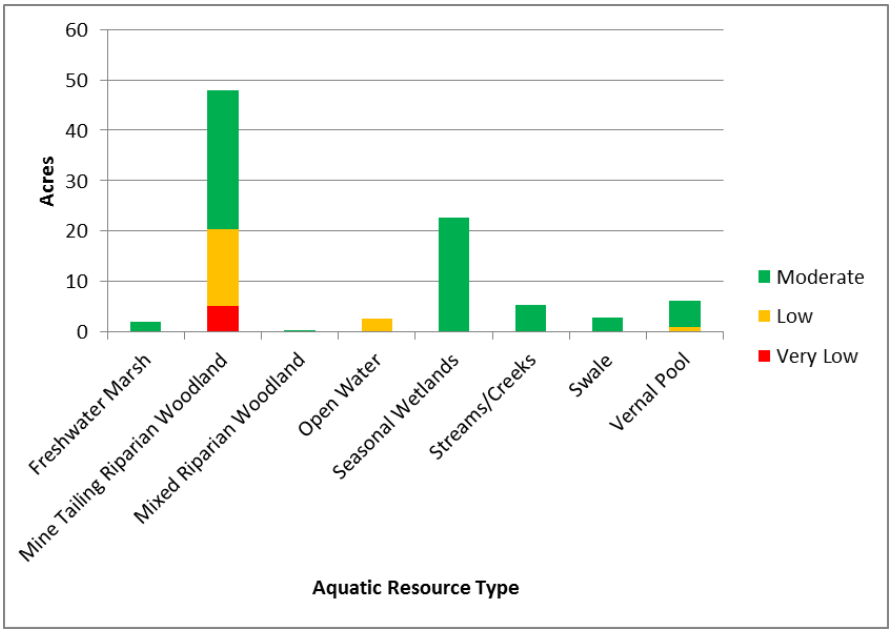


Table 4
Deer Creek Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	13.0	27.7	0	40.7
	Mixed Riparian Scrub	R2/R3	49.1	28.3	3.0	0	80.4
	Mixed Riparian Woodland	R2/R3	150.6	667.3	18.0	0	835.8
Subtotal Riparian			*199.7*	*708.6*	*48.7*	*0*	*956.9*
Wetland Waters	Freshwater Marsh	PEM1	15.5	22.8	0	0	38.3
	Seasonal Wetland	PEM2	70.8	57.9	0	0	128.7
	Swales	R2/R3	131.7	28.5	0.2	0	160.4
	Vernal Pools	PEM2	182.2	89.2	3.0	0	274.3
Subtotal Wetland Waters			*400.2*	*198.4*	*3.2*	*0*	*601.7*
Non-Wetland Waters	Open Water	POW	29.2	167.6	3.2	0	200.1
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	178.4	49.9	<0.1	0	228.2
	Streams/Creeks VPIH (Ephemeral)	R4SB	14.8	3.8	0	0	18.7
Subtotal Non-Wetland Waters			*222.4*	*221.3*	*3.2*	*0*	*447*
Subtotal Wetland Waters and Non-Wetland Waters			*622.6*	*419.7*	*6.4*	*0*	*1,048.7*
Grand Total[1]			**822.3**	**1,128.3**	**55.1**	**0**	**2,005.6**

Note: [1] Table may not total precisely due to rounding.

Figure 7 Current Condition of Aquatic resources in the Deer Creek Watershed

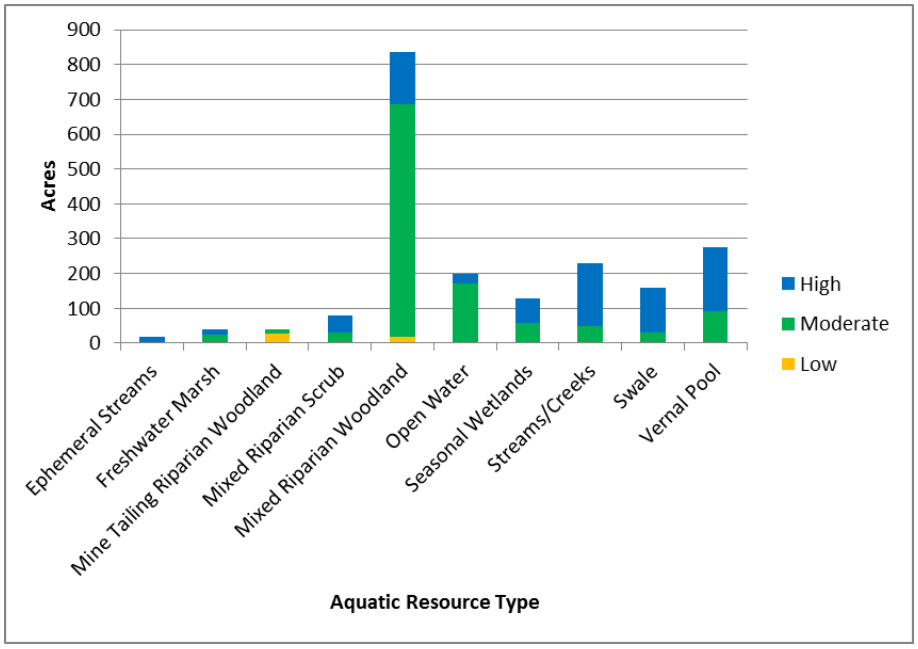


Table 5
Laguna Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	67.6	71.8	18.9	0	158.3
	Mixed Riparian Scrub	R2/R3	19.7	36.4	2.1	0	58.1
	Mixed Riparian Woodland	R2/R3	122.7	137.8	1.2	0	261.7
Subtotal Riparian			*210.0*	*246.0*	*22.2*	*0*	*478.1*
Wetland Waters	Freshwater Marsh	PEM1	147.7	19.1	0.4	0	167.2
	Seasonal Wetland	PEM2	400.7	17.9	0	0	418.6
	Swales	R2/R3	416.1	11.8	0.3	0	428.2
	Vernal Pools	PEM2	1,837.2	39.7	3.5	0	1,917.0
Subtotal Wetland Waters			*2,801.7*	*88.5*	*4.2*	*0*	*2,931.0*
Non-Wetland Waters	Open Water	POW	182.1	101.3	14.0	0	297.4
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	341.2	74.8	0	0	416.0
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*5,23.3*	*176.1*	*14.0*	*0*	*713.4*
Subtotal Wetland Waters and Non-Wetland Waters			*3,325.0*	*264.6*	*18.2*	*0*	*3,644.4*
Grand Total[1]			**3,535.0**	**510.6**	**40.4**	**0**	**4,122.5**

Note: [1] Table may not total precisely due to rounding.

Figure 8 Current Condition of Aquatic Resources in the Laguna Watershed

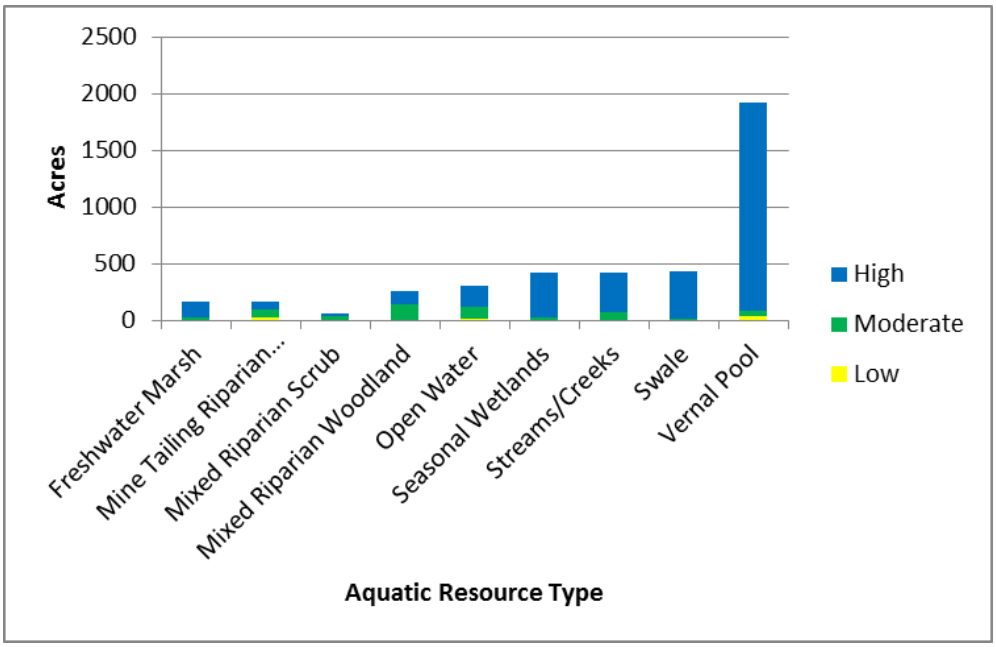


Table 6
Lower Cosumnes Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	17.3	0	0	17.3
	Mixed Riparian Scrub	R2/R3	0	257.2	14.6	0	271.8
	Mixed Riparian Woodland	R2/R3	0	1,438.4	438.6	0	1,877.0
Subtotal Riparian			*0*	*1,712.9*	*453.2*	*0*	*2,166.1*
Wetland Waters	Freshwater Marsh	PEM1	498.1	619.9	8.9	0	1,126.9
	Seasonal Wetland	PEM2	420.5	193.8	1.5	0	615.8
	Swales	R2/R3	16.0	126.9	1.3	0	144.2
	Vernal Pools	PEM2	273.5	300.5	45.1	0	619.1
Subtotal Wetland Waters			*1,208.1*	*1,241.1*	*56.8*	*0*	*2,506.0*
Non-Wetland Waters	Open Water	POW	0	279.3	383.8	0	663.1
	Streams/Creeks (Intermittent and Perennial)	R2UB/ R3UB	135.6	147.5	61.9	0	345.0
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*135.6*	*426.8*	*445.7*	*0*	*1,008.1*
Subtotal Wetland Waters and Non-Wetland Waters			*1,343.7*	*1,667.9*	*502.5*	*0*	*3,514.1*
Grand Total[1]			**1,343.7**	**3,380.8**	**955.7**	**0**	**5,680.2**

Note: 1. Table may not total precisely due to rounding.

Figure 9 Current Condition of Aquatic Resources in the Lower Cosumnes Watershed

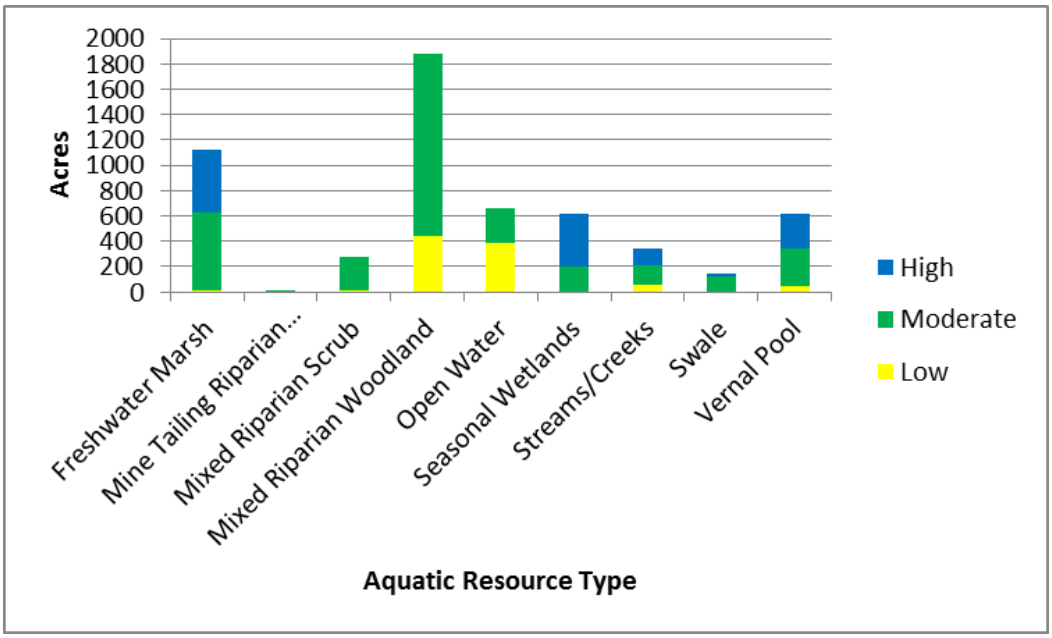


Table 7
Lower Dry Creek Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	3.1	39.8	4.2	0	47.1
	Mixed Riparian Woodland	R2/R3	0	378.4	22.3	0	400.6
Subtotal Riparian			*3.1*	*418.2*	*26.5*	*0*	*447.7*
Wetland Waters	Freshwater Marsh	PEM1	16.4	30.9	0.2	0	47.5
	Seasonal Wetland	PEM2	105.1	11.6	0	0	116.7
	Swales	R2/R3	42.8	22.4	<0.1	0	65.2
	Vernal Pools	PEM2	104.4	91.8	6.6	0	202.7
Subtotal Wetland Waters			*268.7*	*156.7*	*6.8*	*0*	*432.1*
Non-Wetland Waters	Open Water	POW	0	6.8	1.9	0	8.7
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	13.8	60.4	4.0	0	78.2
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*13.8*	*67.2*	*5.9*	*0*	*86.9*
Subtotal Wetland Waters and Non-Wetland Waters			*282.5*	*223.9*	*12.7*	*0*	*519*
Grand Total[1]			**285.6**	**642.1**	**39.2**	**0**	**966.7**

Note: 1. Table may not total precisely due to rounding.

Figure 10 Current Condition of Aquatic Resources in the Lower Dry Creek Watershed

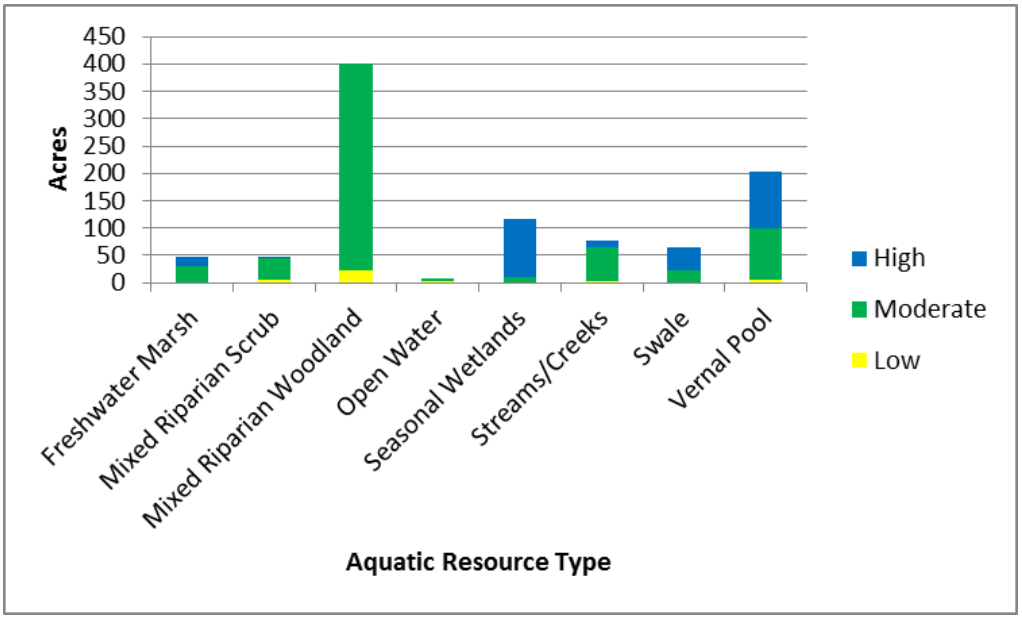


Table 8
Lower Mokelumne River Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	<0.1	2.4	0	2.4
	Mixed Riparian Woodland	R2/R3	0	19.5	176.8	0	196.4
		Subtotal Riparian	*0*	*19.5*	*179.2*	*0*	*198.8*
Wetland Waters	Freshwater Marsh	PEM1	0	20.9	0	0	20.9
	Seasonal Wetland	PEM2	0	0	0	0	0
	Swales	R2/R3	0	0	0	0	0
	Vernal Pools	PEM2	0	0.1	0	0	0.1
		Subtotal Wetland Waters	*0*	*21.0*	*0*	*0*	*21.0*
Non-Wetland Waters	Open Water	POW	0	3.1	0	0	3.1
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	0	65.1	2.2	0	67.4
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
		Subtotal Non-Wetland Waters	*0*	*68.2*	*2.2*	*0*	*70.5*
		Subtotal Wetland Waters and Non-Wetland Waters	*0*	*89.2*	*2.2*	*0*	*91.5*
		Grand Total[1]	**0**	**108.7**	**181.4**	**0**	**290.3**

Note: 1. Table may not total precisely due to rounding.

Figure 11 Current Condition of Aquatic Resources in the Lower Mokelumne River Watershed

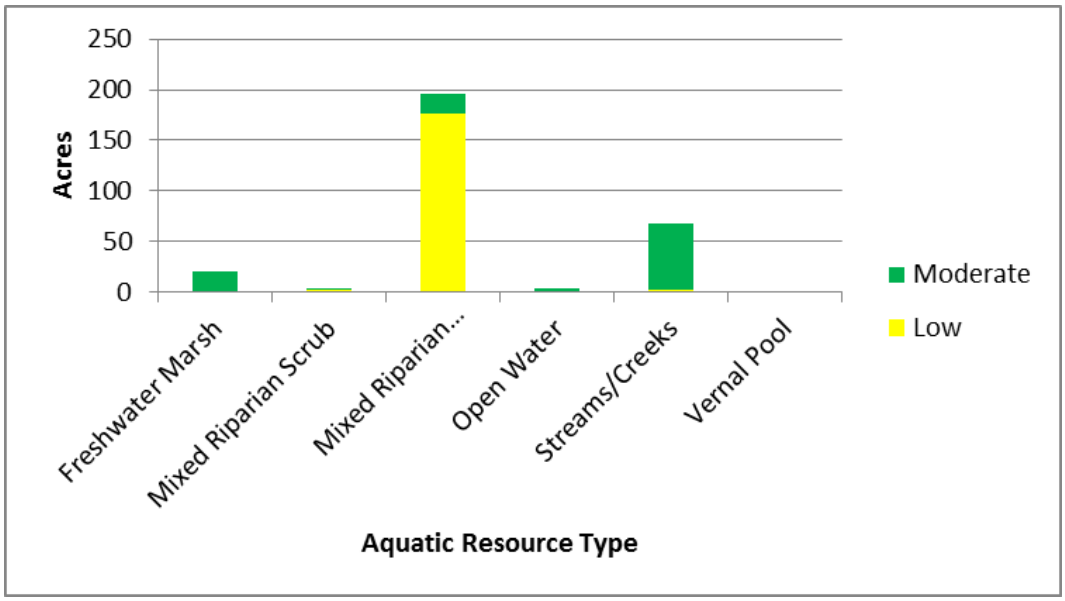


Table 9
Morrison Creek Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	25.9	84.3	19.2	129.4
	Mixed Riparian Scrub	R2/R3	3.2	47.0	6.8	0	57.0
	Mixed Riparian Woodland	R2/R3	0	98.9	58.2	0	157.1
Subtotal Riparian			*3.2*	*171.8*	*149.3*	*19.2*	*343.5*
Wetland Waters	Freshwater Marsh	PEM1	261.8	103.5	4.6	0	369.9
	Seasonal Wetland	PEM2	59.5	23.0	24.2	0	106.7
	Swales	R2/R3	277.2	80.0	1.4	0	358.5
	Vernal Pools	PEM2	522.3	231.4	12.6	0	766.3
Subtotal Wetland Waters			*1,120.8*	*437.9*	*42.8*	*0*	*1,601.4*
Non-Wetland Waters	Open Water	POW	0	118.8	37.9	0	156.7
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	7.3	93.0	22.4	0	122.7
	Streams/Creeks VPIH (Ephemeral)	R4SB	29.5	23.5	1.5	0	54.5
Subtotal Non-Wetland Waters			*36.8*	*235.3*	*61.8*	*0*	*333.9*
Subtotal Wetland Waters and Non-Wetland Waters			*1,157.6*	*673.2*	*104.6*	*0*	*1,935.3*
Grand Total[1]			**1,160.8**	**845**	**253.9**	**19.2**	**2,278.8**

Note: [1.] Table may not total precisely due to rounding.

Figure 12 Current Condition of Aquatic Resources in the Morrison Creek Watershed

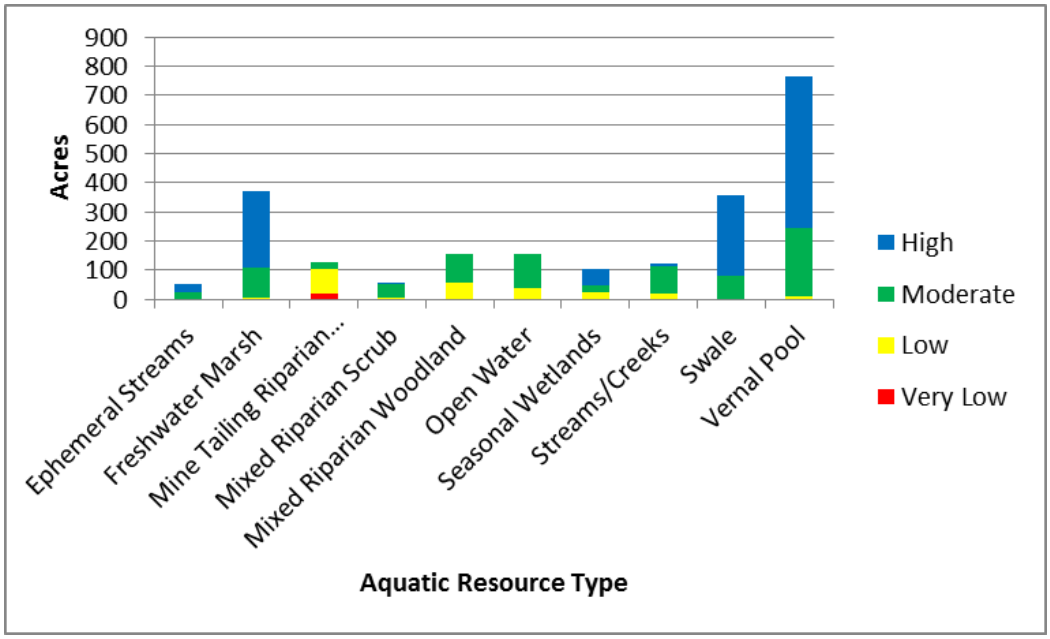


Table 10
Sherman Lake–Sacramento River Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	2.0	2.0
	Mixed Riparian Scrub	R2/R3	0	0	85.4	44.7	130.1
	Mixed Riparian Woodland	R2/R3	0	0	31.9	18.8	50.6
Subtotal Riparian			*0*	*0*	*117.3*	*65.5*	*182.7*
Wetland Waters	Freshwater Marsh	PEM1	0	7.2	32.5	0	39.7
	Seasonal Wetland	PEM2	0	0	0	0	0
	Swales	R2/R3	0	1.3	0.1	0	1.4
	Vernal Pools	PEM2	0	3.0	2.4	0	5.3
Subtotal Wetland Waters			*0*	*11.5*	*35.0*	*0*	*46.4*
Non-Wetland Waters	Open Water	POW	0	0	9.4	0	9.4
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	0	0.3	22.6	1.0	23.9
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*0.3*	*32.0*	*1.0*	*33.3*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*11.8*	*67.0*	*1.0*	*79.7*
Grand Total[1]			**0**	**11.8**	**184.3**	**66.5**	**262.4**

Note: [1] Table may not total precisely due to rounding.

Figure 13 Current Condition of Aquatic Resources in the Sherman Lake–Sacramento River Watershed

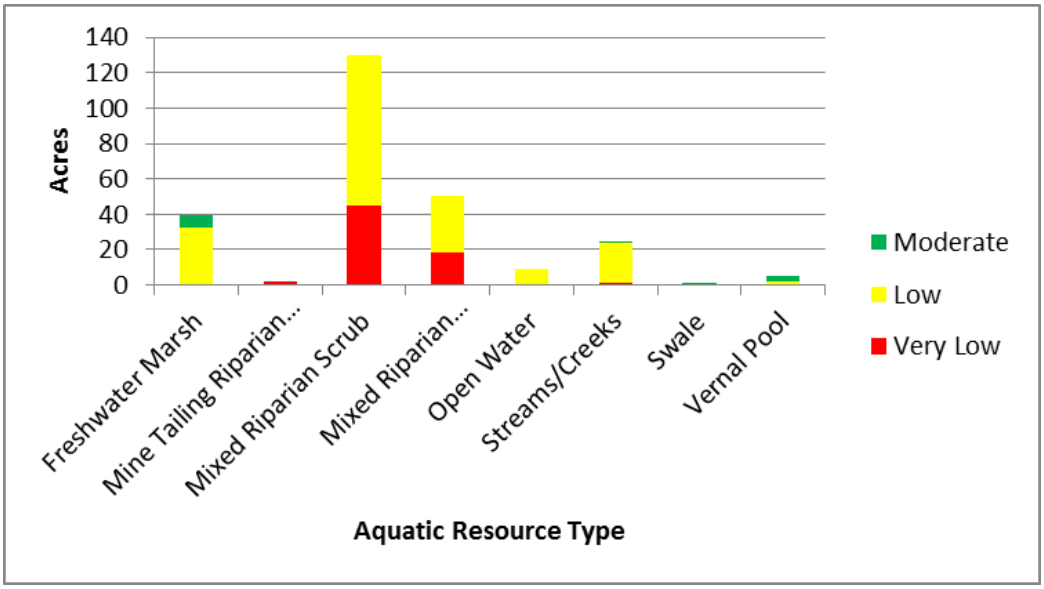


Table 11
Snodgrass Slough Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	350.7	177.5	0	528.2
	Mixed Riparian Woodland	R2/R3	0	488.1	804.4	0	1,292.6
Subtotal Riparian			*0*	*838.8*	*981.9*	*0*	*1,820.8*
Wetland Waters	Freshwater Marsh	PEM1	0	809.3	220.3	0	1,029.6
	Seasonal Wetland	PEM2	0	623.8	157.9	0	781.8
	Swales	R2/R3	0	9.7	0.5	0	10.2
	Vernal Pools	PEM2	0	407.5	13.4	0	420.9
Subtotal Wetland Waters			*0*	*1,850.3*	*392.1*	*0*	*2,242.5*
Non-Wetland Waters	Open Water	POW	0	417.4	287.0	15.9	720.3
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	0	1,077.2	63.9	0	1,141.0
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*1,494.6*	*350.9*	*15.9*	*1,861.3*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*3,344.9*	*743.0*	*15.9*	*4,103.8*
Grand Total[1]			**0**	**4,183.7**	**1,724.9**	**15.9**	**5,924.6**

Note: [1] Table may not total precisely due to rounding.

Figure 14 Current Condition of Aquatic Resources in the Snodgrass Slough Watershed

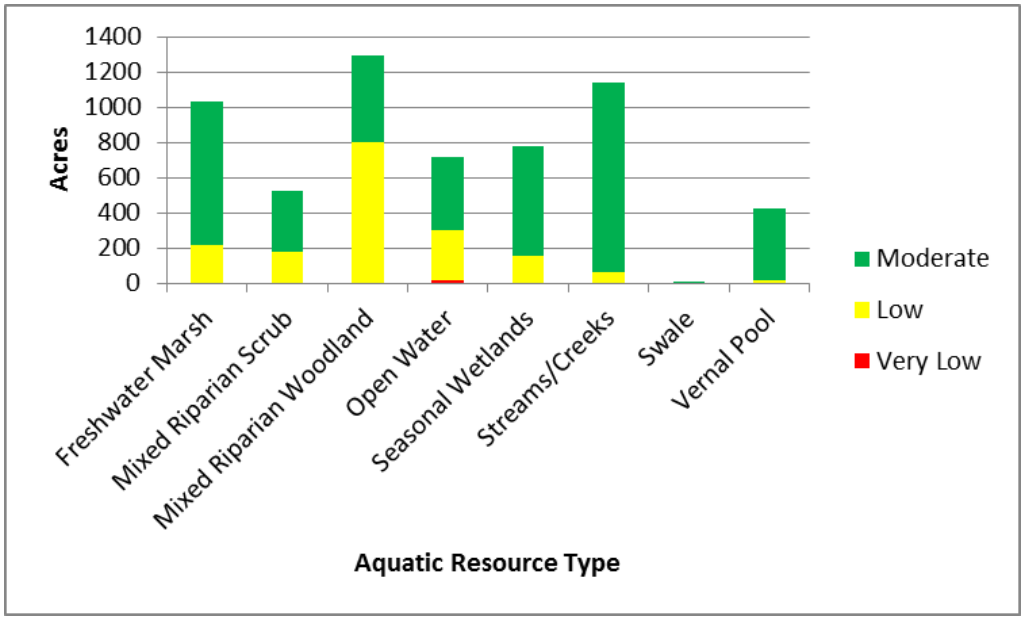
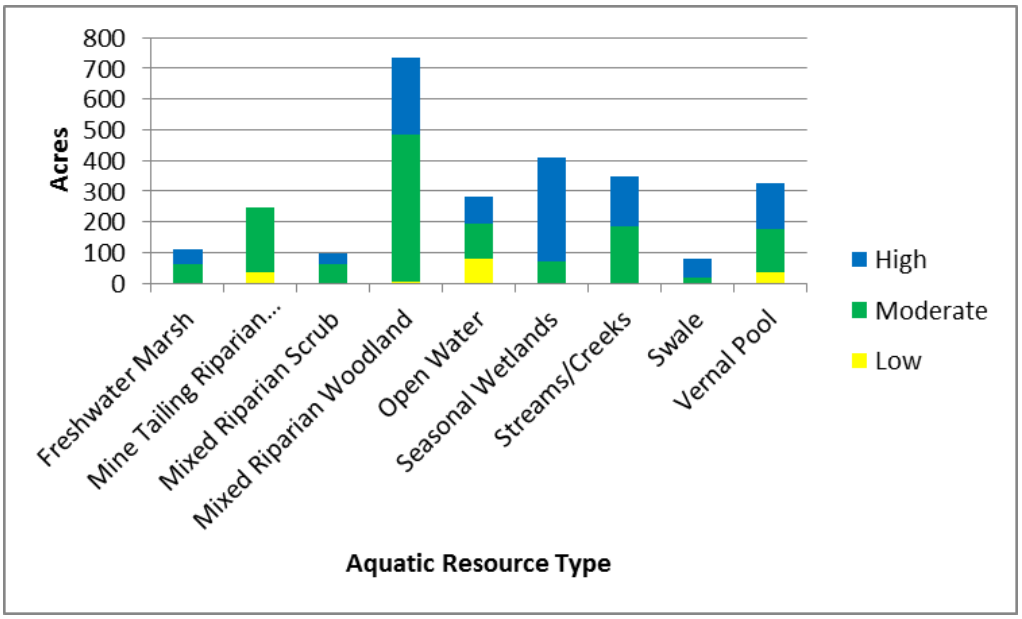


Table 12
Upper Cosumnes Watershed Current Conditions

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	High	Moderate	Low	Very Low	Total
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	208.4	37.1	0	245.5
	Mixed Riparian Scrub	R2/R3	37.0	61.0	1.7	0	99.7
	Mixed Riparian Woodland	R2/R3	247.6	481.7	3.4	0	732.6
		Subtotal Riparian	*284.6*	*751.1*	*42.2*	*0*	*1077.8*
Wetland Waters	Freshwater Marsh	PEM1	48.7	61.6	2.0	0	112.3
	Seasonal Wetland	PEM2	339.2	68.7	1.0	0	408.9
	Swales	R2/R3	60.6	18.8	1.2	0	80.6
	Vernal Pools	PEM2	147.0	143.8	34.0	0	324.7
		Subtotal Wetland Waters	*595.5*	*292.9*	*38.2*	*0*	*926.5*
Non-Wetland Waters	Open Water	POW	87.0	111.9	81.3	0	280.2
	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	164.8	184.9	<0.1	0	349.7
	Streams/Creeks VPIH (Ephemeral)	R4SB	0	0	0	0	0
		Subtotal Non-Wetland Waters	*251.8*	*296.8*	*81.3*	*0*	*629.9*
		Subtotal Wetland Waters and Non-Wetland Waters	*847.3*	*589.7*	*119.5*	*0*	*1,556.4*
		Grand Total[1]	**1,131.9**	**1,340.8**	**161.7**	**0**	**2,634.2**

Note: [1] Table may not total precisely due to rounding.

Figure 15 Current Condition of Aquatic Resources in the Upper Cosumnes Watershed



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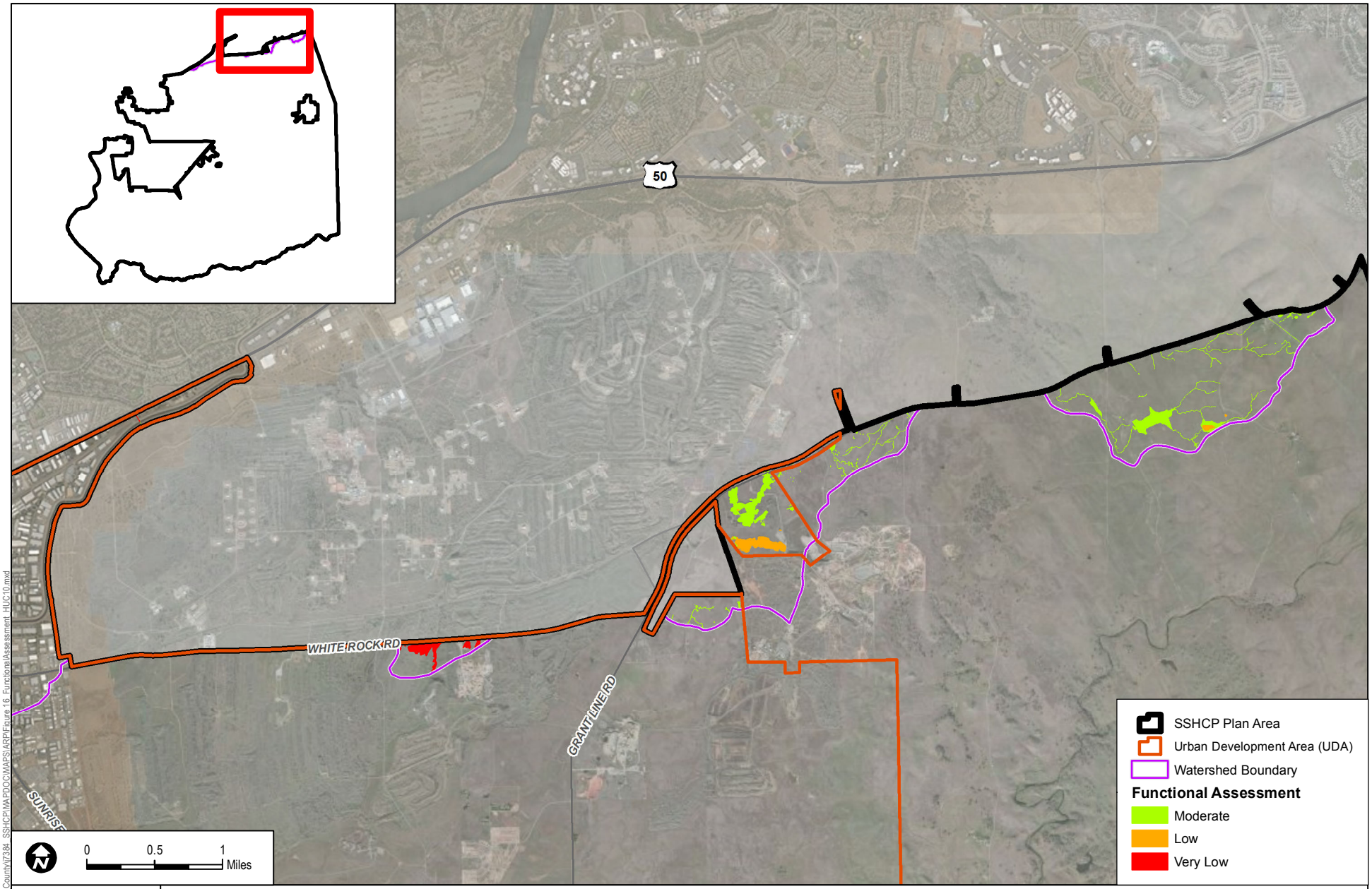

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SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

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FIGURE 16

Functional Assessment - American River Watershed

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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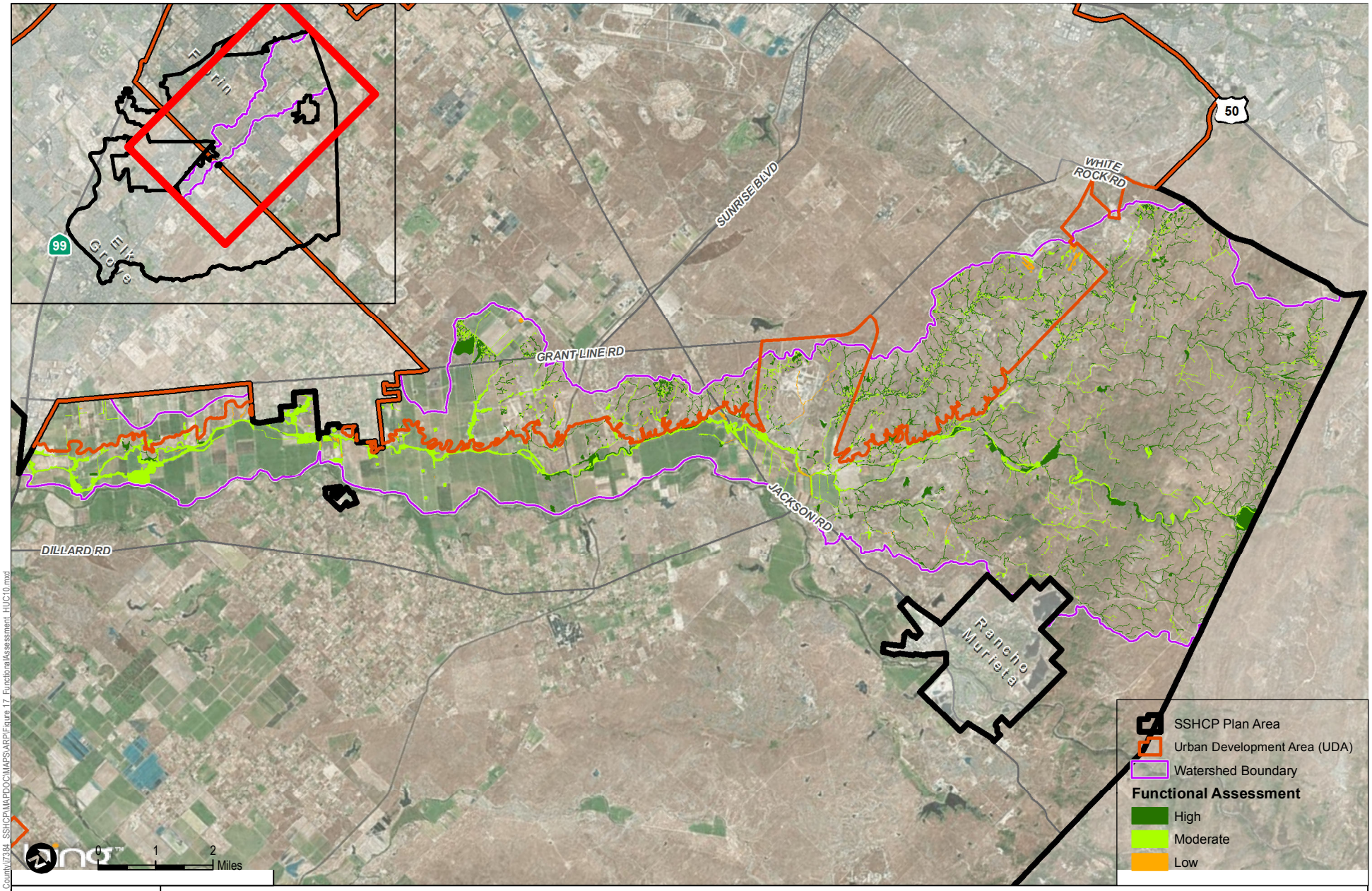

SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 17

Functional Assessment - Deer Creek Watershed

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SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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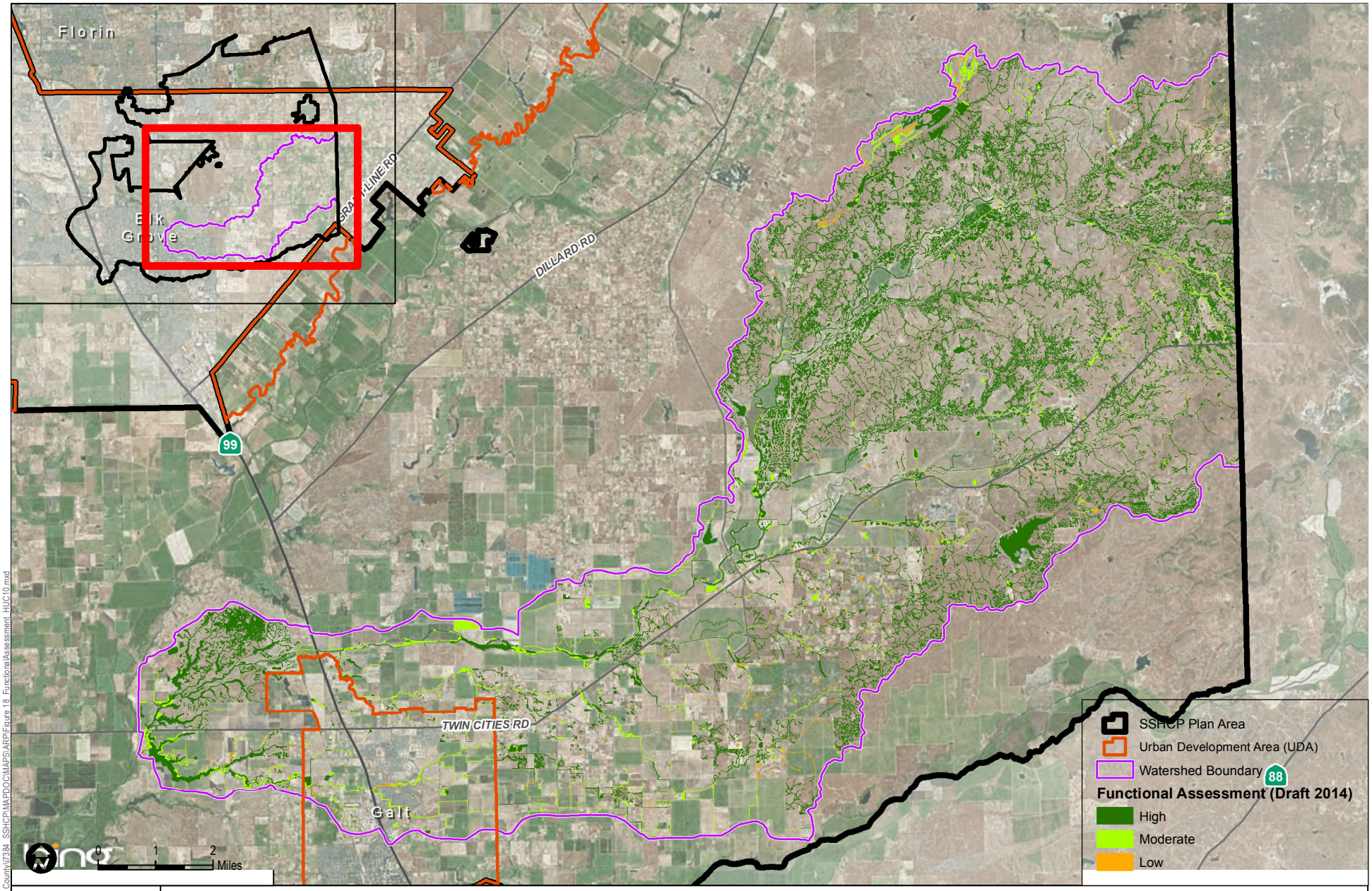

SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 18

Functional Assessment - Laguna Watershed

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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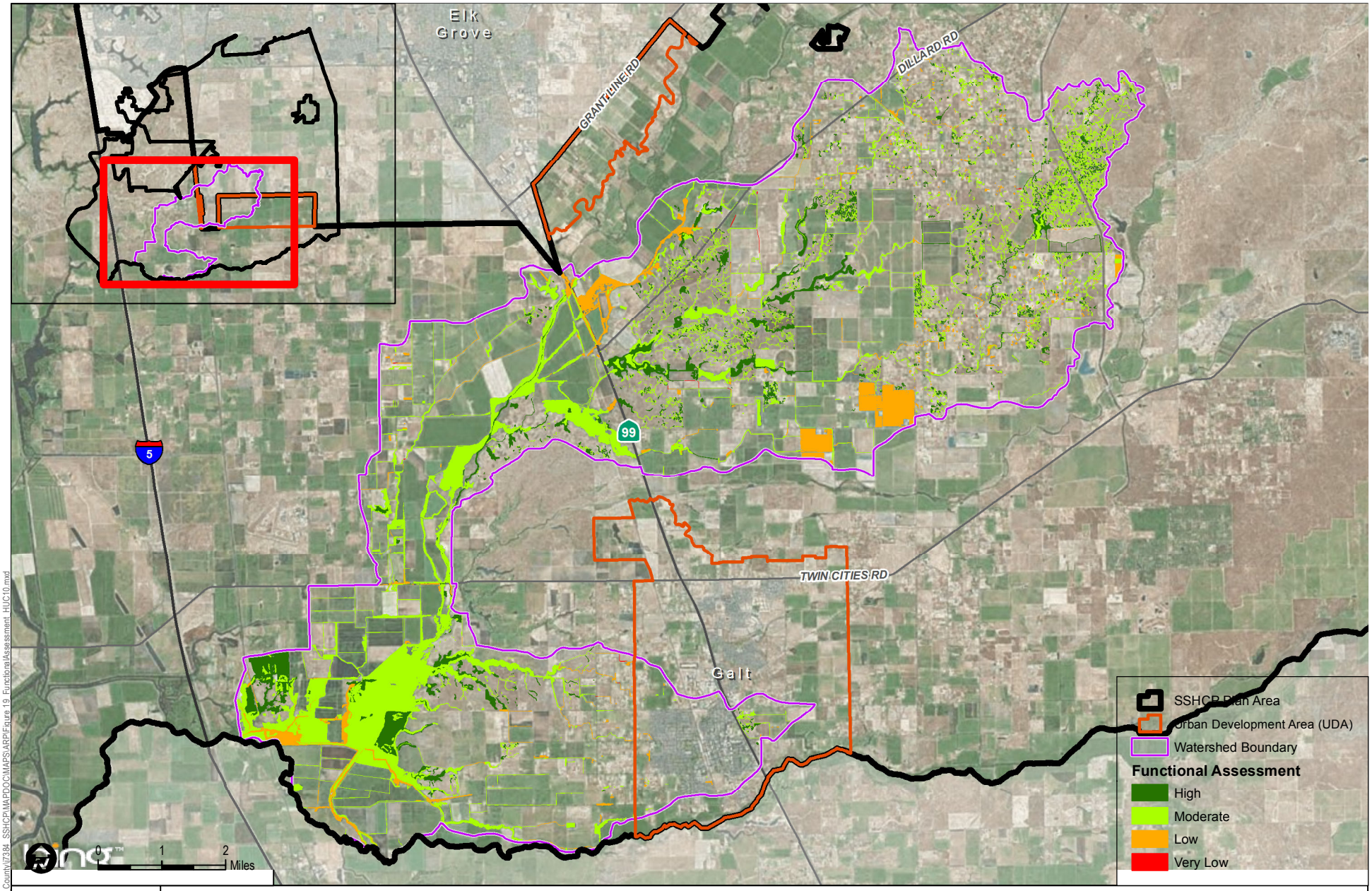

SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 19

Functional Assessment - Lower Cosumnes River Watershed

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SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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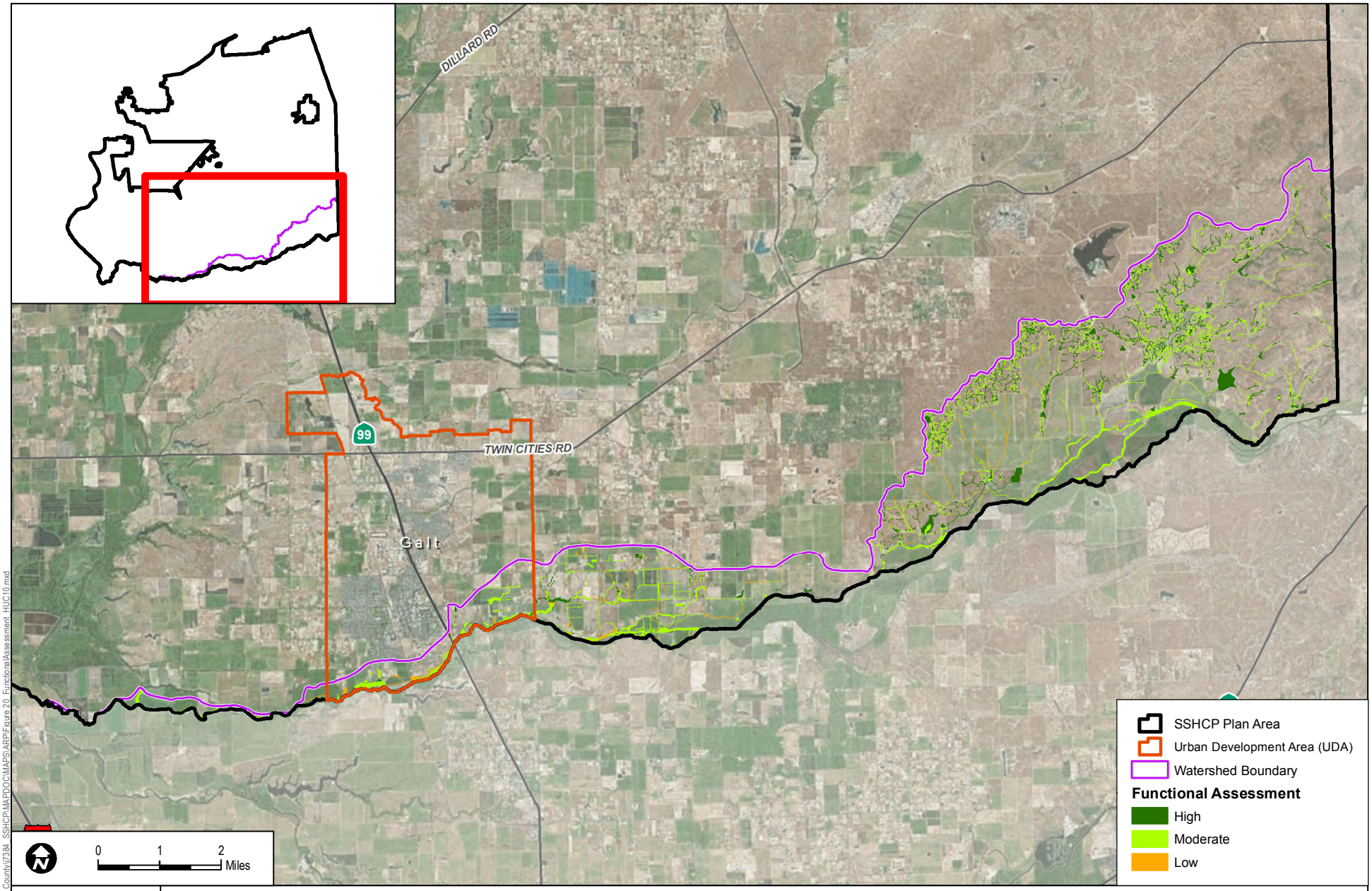

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SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 20

Functional Assessment - Lower Dry Creek Watershed

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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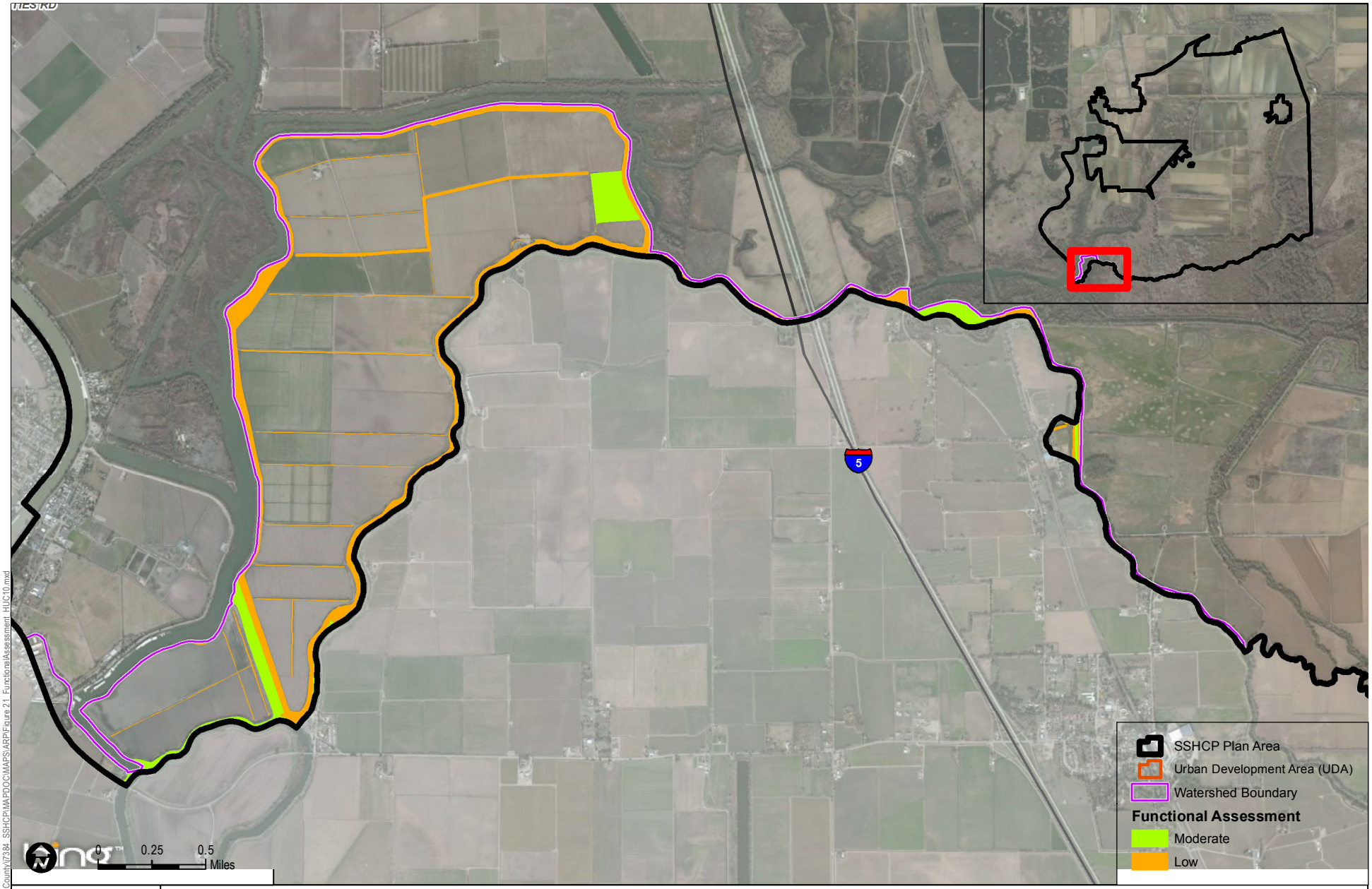

SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 21

Functional Assessment - Lower Mokelumne River Watershed

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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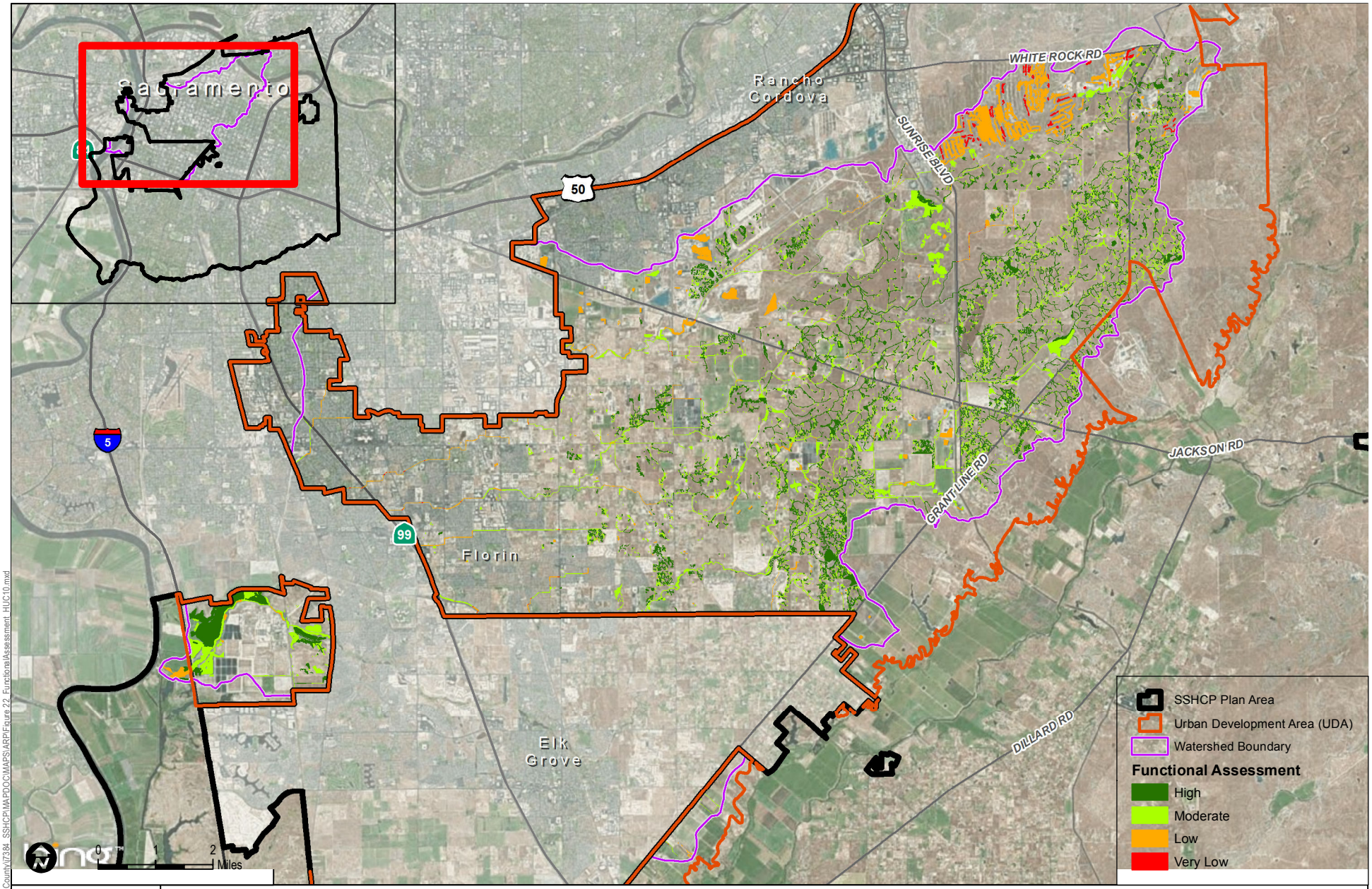

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SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

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FIGURE 22

Functional Assessment - Morrison Creek Watershed

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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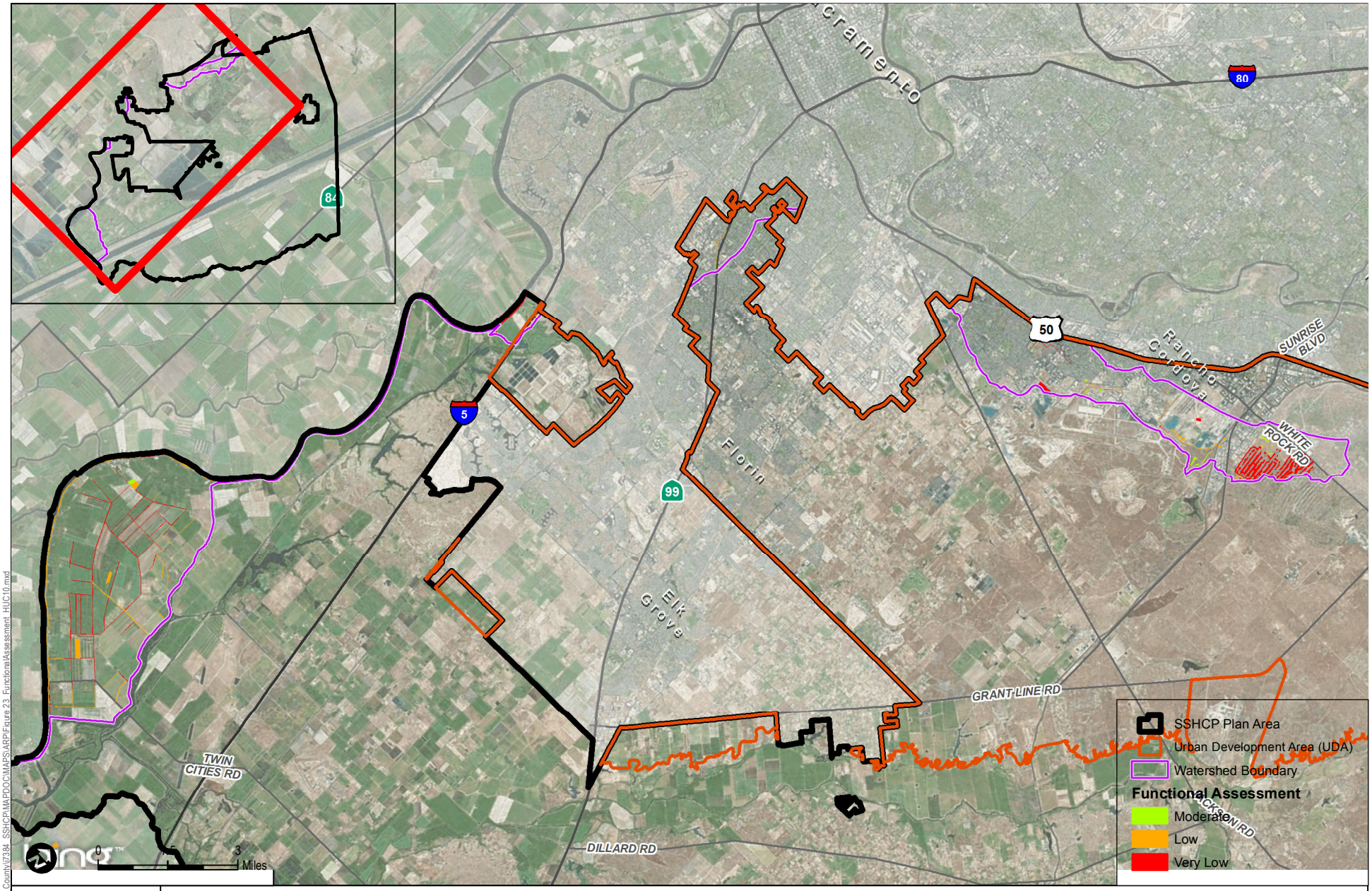

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SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 23

Functional Assessment - Sherman Lake-Sacramento River Watershed

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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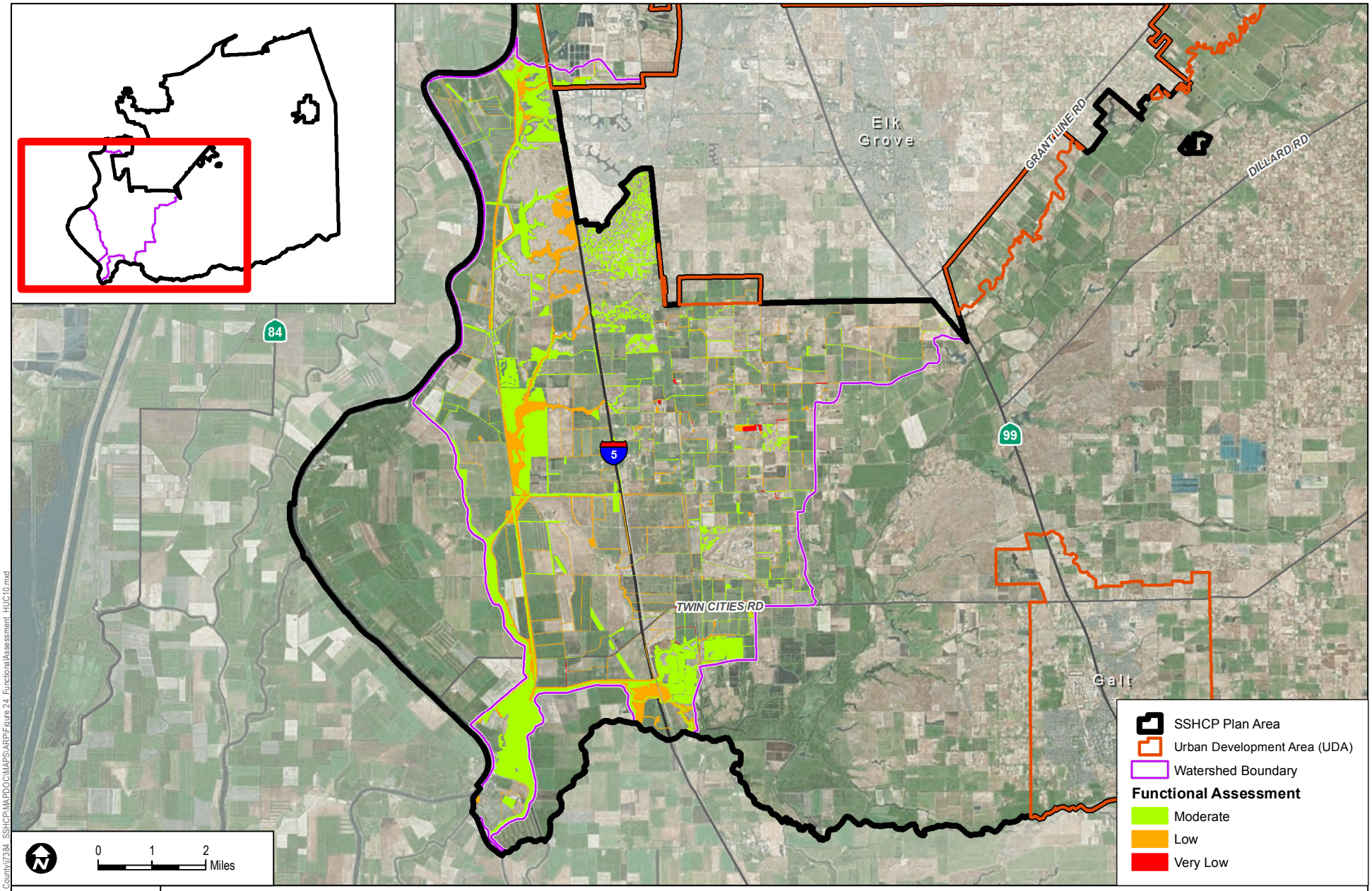

SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 24

Functional Assessment - Snodgrass Slough Watershed

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SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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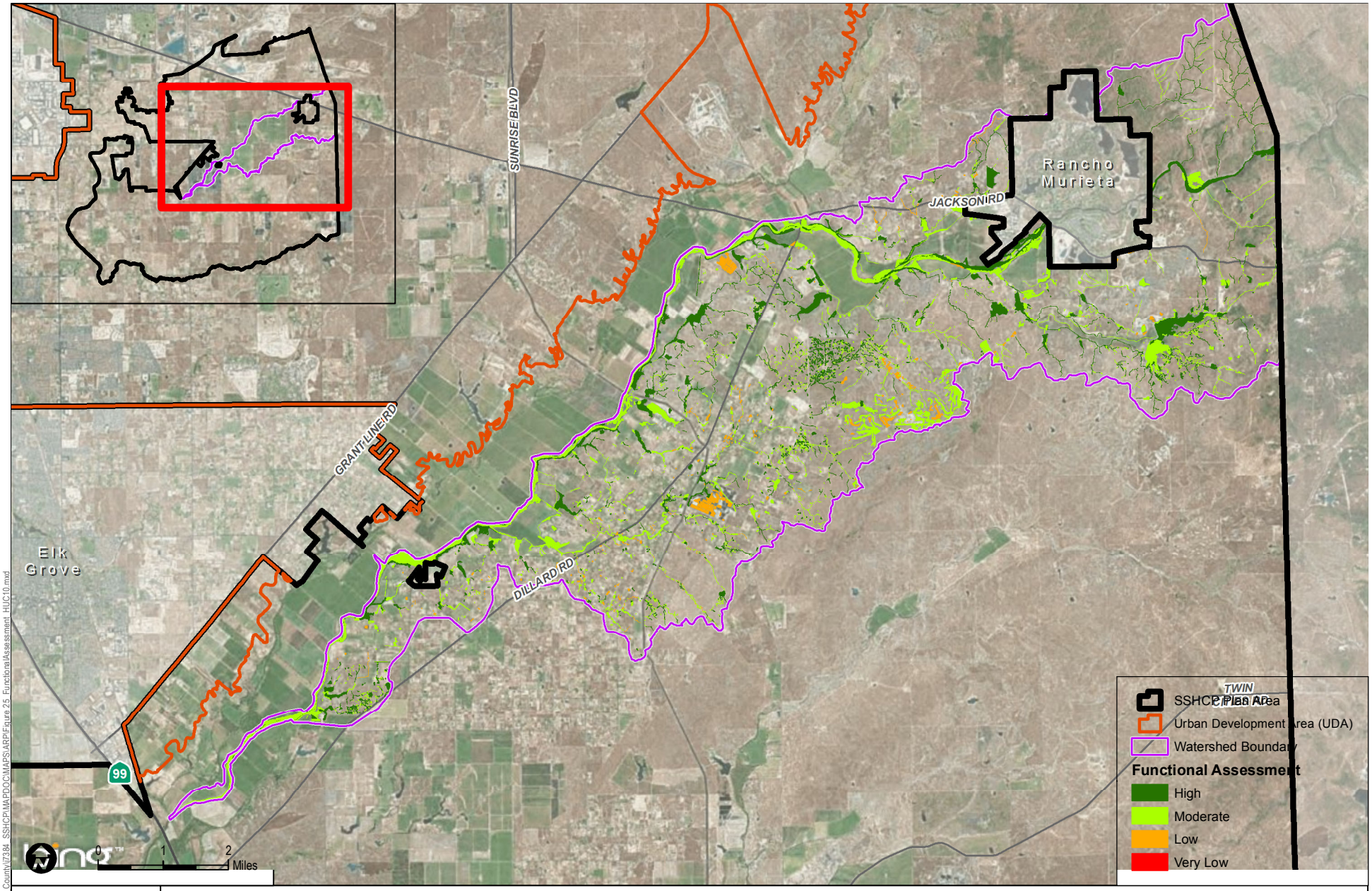

SOURCE: Bing 2015, County of Sacramento 2014, USGS 2013 NHD

FIGURE 25

Functional Assessment - Upper Cosumnes River Watershed

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN AQUATIC RESOURCES PROGRAM

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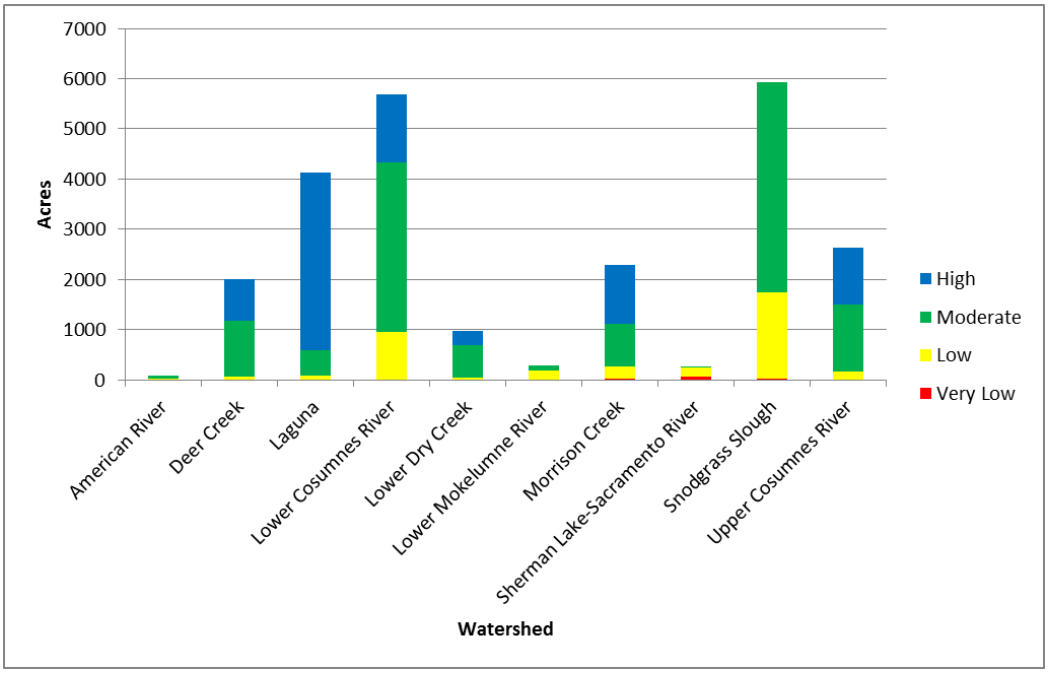
Figure 26 Summary of Overall Aquatic Resources Condition per Watershed



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4 PROPOSED IMPACTS TO AQUATIC RESOURCES

Proposed impacts to aquatic resources within the SSHCP in the Plan Area can be described in terms of the aquatic resources' resulting diversity, abundance, and condition, in the same manner as they were for the existing conditions. Diversity is again described in terms of the variety of aquatic resources by land cover type (common name) and Cowardin class that would be impacted, and the variety that would remain after impacts. Abundance is described in terms of acreage of each impacted aquatic resource type within the Plan Area and per watershed (at the HUC-10 level), and the acreage that would remain. Condition is described using a landscape-level functional assessment to determine the relative capacity of the remaining aquatic resources to perform various functions and services related to hydrology, water quality, and habitat. In this section, the effects of implementing the SSHCP are examined without considering compensatory mitigation (please see Chapter 6 for an assessment of effects after consideration of compensatory mitigation), but do consider incorporation of AMMs, whose implementation would be integral to carrying out Covered Activities in the SSHCP.

4.1 Estimated Impacts to Abundance and Diversity of Aquatic Resources within the Plan Area

The SSHCP allows for specific categories of Covered Activities to occur within the Plan Area and to receive incidental take authorization from the Wildlife Agencies (U.S. Fish and Wildlife Service (USFWS) and CDFW). Covered Activities are described in Section 5.2 of Chapter 5 of the SSHCP. Conditions on Covered Activities are described in Section 5.3 of the SSHCP. The majority of the Covered Activities would be implemented within the region of the Plan Area designated as the UDA. Such Covered Activities include urban development and mining in the UDA, as well as Covered Activities in Preserves, Preserve Setbacks, and Stream Setbacks. Urban development in the UDA comprises planned urban growth and all ground-disturbing activities associated with urban development. This includes the construction of typical urban facilities, public and private, such as residential, commercial, and industrial structures; park and recreation facilities; water supply facilities; flood control and stormwater management (including operations and maintenance activities, such as vegetation control, sediment removal in the immediate vicinity of bridges, culverts and pipes, and erosion repair); stream bank stabilization projects; public and private utilities; and urban transportation. Covered Activities in Stream Setbacks and in the Laguna Creek Wildlife Corridor include trails, low-velocity bio-retention swales, perpendicular stream crossings, stream bank stabilization, fencing, shade structures (e.g., awnings) and shade trees, interpretive signs and kiosks, riparian habitat re-establishment or establishment, outfalls, and flood control structures and stormwater management (see Section 5.2.6 in Chapter 5 of the SSHCP). Covered Activities in Preserve Setbacks include trails, low-velocity bio-retention swales, fencing, firebreaks, shade structures and shade trees, and interpretive signs and kiosks (see Section 5.2.5 in Chapter 5 of the SSHCP). Covered Activities

in preserves include management and monitoring; low-impact nature trails; habitat enhancement, re-establishment, and establishment; species surveys, research, and adaptive management activities; water supply for livestock; groundwater monitoring and extraction wells; and utility maintenance and repair (see Section 5.2.7 in Chapter 5 of the SSHCP). Covered Activities in preserve linkages include all of the Covered Activities described in preserves plus limited use of detention basins (see Section 5.2.7 in Chapter 5 of the SSHCP). Covered Activities outside the UDA are limited to rural transportation projects, recycled water projects, and SSHCP Preserve System Covered Activities. Complete descriptions of all categories of Covered Activities can be found in Section 5.2 of the SSHCP.

Direct impacts are assumed to result in a permanent loss[5] of aquatic resources. Direct impacts to aquatic resources resulting from the SSHCP's Covered Activities were quantified at a programmatic scale using a geographic information system (GIS). GIS was used to overlay an electronic map-layer of projected Covered Activity footprints onto an electronic map-layer of the SSHCP land cover baseline (existing conditions) map to quantify the acres of overlap to determine acres of direct impact to each potentially jurisdictional aquatic resource land cover type. In this manner, direct impacts were quantified at a programmatic scale. This approach reasonably estimates the amount of permanent loss of aquatic resources within the Plan Area that would result from implementation of Covered Activities. For example, it is likely that a number of stream channels would be widened and/or deepened within the Plan Area, but the stream channel will remain in its relative position within the landscape. For purposes of the SSHCP impacts analysis, it is assumed that Covered Activities would impact the entire stream, resulting in a permanent loss of stream acres even though this may not be the case. This conservative approach to quantifying impacts to aquatic resources provides the uppermost thresholds for anticipated direct impacts resulting in permanent loss of aquatic resources.

Participation in the SSHCP/ARP is compulsory. Impacts to all aquatic resources within the SSHCP Plan Area would be tracked by the application processes implemented by the Land Use Authority Permittees, and by the monitoring program of the SSHCP/ARP that requires periodic surveys to be performed that are designed to detect conversion of aquatic resources throughout the Plan Area.

4.1.1 Impacts on Abundance and Diversity of Aquatic Resources

Within the Plan Area, of the currently existing 24,255 acres of mapped potentially jurisdictional aquatic resources, there are projected direct impacts to approximately 1,614 acres, leaving approximately 22,641 acres (93%) of aquatic resources remaining in the Plan Area. Of the total

[5] Aquatic resources that are permanently adversely affected by filling, flooding, excavation, or drainage because of the activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody.

amount of potentially jurisdictional aquatic resources, there are 11,343 acres of wetland waters, 5,192 acres of non-wetland waters, and 7,721 acres of riparian (Table 1). As shown in Table 13, of the currently existing 11,343 acres of wetland waters, there are projected direct impacts to approximately 856 acres, leaving approximately 10,487 acres (92%) of wetland waters remaining in the Plan Area. Of the currently existing 5,192 acres of non-wetland waters, there are projected direct impacts to approximately 294 acres, leaving approximately 4,898 acres (94%) of wetland waters remaining in the Plan Area. Of the currently existing 7,721 acres of riparian aquatic resources, there are projected direct impacts to approximately 464 acres, leaving approximately 7,257 acres (94.0%) of riparian aquatic resources remaining in the Plan Area. The watershed with the largest acreage amount of projected impacts to aquatic resources is the Morrison Creek watershed, with a total of 994 acres of impact (43.6% of aquatic resources). Proportionally, the watershed with the largest amount of impacts (61.6%) is the American River watershed; however, the actual acreage of impact is only 56 acres.

Within the Plan Area the land cover types that have the largest acreage of impact is vernal pool (389 acres), followed by Swale (235 acres). See Table 13 for a summary of impacts to aquatic resources types per watershed and Table 14 for a summary of remaining aquatic resources by type per watershed.

4.2 Estimated Impacts to Functions and Services of Aquatic Resources in the Plan Area

The effects of the SSHCP Covered Activities impacts are estimated by projecting the future condition of aquatic resources within the Plan Area, without considering mitigation. The projected future condition is obtained from the results of the Functional Assessment Report (Appendix C), which categorizes the Plan Area's aquatic resources into high, moderate, low, or very low condition.

Table 13
Direct Impacts to Aquatic Resources in the Plan Area by Type (Acres)

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Watershed										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes River*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake-Sac River*	*Snodgrass Slough*	*Upper Cosumnes River*	
Riparian	Mine Tailing Riparian Woodland	R	47.9	40.5	0	0	0	0	127.8	2.0	0	0	218.2
	Mixed Riparian Scrub	R	0	1.6	5.0	4.1	9.9	0	36.5	3.9	0.7	0	61.7
	Mixed Riparian Woodland	R	0	15.4	9.2	17.0	78.4	0.1	54.5	2.7	1	4.9	184.1
Subtotal Riparian			*47.9*	*57.5*	*14.2*	*21.1*	*88.3*	*0.1*	*218.8*	*8.6*	*1.7*	*4.9*	*464*
Wetland Waters	Freshwater Marsh	PEM1	1.4	2.0	7.5	0.7	2.5	0	104.8	0.4	7.2	0.5	127.0
	Seasonal Wetland	PEM2	0	10.1	15.0	4.2	1.4	0	68.0	0	6.5	0.3	105.5
	Swale	R2/R3	0.9	62.3	2.3	2.6	0.9	0	162.7	1.4	1.2	0.1	234.5
	Vernal Pools	PEM2	4.4	33.2	31.1	14.1	9.4	0	283.4	5.3	5.0	3.1	389.1
Subtotal Wetland Waters			*6.7*	*107.6*	*55.9*	*21.6*	*14.2*	*0*	*618.9*	*7.1*	*19.9*	*4*	*856.1*

Table 13
Direct Impacts to Aquatic Resources in the Plan Area by Type (Acres)

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Watershed										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes River*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake-Sac River*	*Snodgrass Slough*	*Upper Cosumnes River*	
Non-Wetland Waters	Open Water	POW	0.5	70.8	2.0	0.1	0.3	0	80.4	0.2	1.1	0	155.3
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0.9	12.3	14.0	6.4	2.5	<0.1	57.4	3.8	18.5	1.1	116.8
	Streams/ Creeks (VPIH) Ephemeral	R4SB	0	2.6	0	0	0	0	19.0	0	0	0	21.6
Subtotal Non-Wetland Waters			*1.4*	*85.7*	*16.0*	*6.5*	*2.8*	*0*	*156.8*	*4*	*19.6*	*1.1*	*293.7*
Subtotal Wetland Waters and Non-Wetland Waters			*8.1*	*193.3*	*71.9*	*28.1*	*17*	*0*	*718.3*	*11.1*	*39.5*	*5.1*	*1,149.8*
Grand Total[1]			**56**	**250.8**	**86.1**	**49.2**	**105.3**	**0.1**	**937.1**	**19.7**	**41.2**	**10**	**1,613.8**

Note: [1] Table may not total precisely due to rounding.
Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

Table 14
Post-Impact Abundance of Aquatic Resources in the Plan Area by Type (Acres)

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Watershed										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes River*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake – Sac River*	*Snodgrass Slough*	*Upper Cosumnes River*	
Riparian	Mine Tailing Riparian Woodland	R	0	0.2	158.3	17.3	0	0	1.6	0	0	245.5	422.9
	Mixed Riparian Scrub	R	0	78.8	53.1	267.7	37.2	2.4	20.7	126.2	527.5	99.7	1,213.2

Table 14
Post-Impact Abundance of Aquatic Resources in the Plan Area by Type (Acres)

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Watershed										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes River*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake – Sac River*	*Snodgrass Slough*	*Upper Cosumnes River*	
	Mixed Riparian Woodland	R	0.4	820.5	252.5	1,859.9	322.3	196.2	102.6	48.0	1,290.6	727.7	5,620.7
Subtotal Riparian			*0.4*	*899.5*	*463.9*	*2,144.9*	*359.5*	*198.6*	*124.9*	*174.2*	*1,818.1*	*1,072.9*	*7,256.8*
Wetland Waters	Freshwater Marsh	PEM1	0.6	36.2	159.7	1,126.2	45.0	20.9	265.2	39.3	1,022.4	111.7	2,827.1
	Seasonal Wetland	PEM2	22.6	118.9	403.5	611.5	115.4	0	38.9	0	775.2	408.6	2,494.6
	Swale	R2/R3	1.9	98.1	425.9	141.6	64.3	0	195.9	0	9.1	80.4	1,017.2
	Vernal Pools	PEM2	2.5	241.1	1,886.0	605.0	193.3	0.1	481.2	0	415.9	321.6	4,146.5
Subtotal Wetland Waters			*27.6*	*494.3*	*2,875.1*	*2,484.3*	*418*	*21*	*981.2*	*39.3*	*2,222.6*	*922.3*	*10,485.4*
Non-Wetland Waters	Open Water	POW	2.2	129.4	295.4	663.0	8.4	3.1	78.4	9.2	719.2	280.2	2,188.5
	Perennial or Intermittent Streams/ Creeks	R2UB/R3 UB	4.7	216.1	402.0	338.6	75.7	67.4	65.4	20.1	1,122.8	348.6	2,661.2
	Streams/ Creeks (VPIH) Ephemeral	R4SB	0	16.1	0	0	0	0	35.6	0	0	0	51.6
Subtotal Non-Wetland Waters			*6.9*	*361.6*	*697.4*	*1,001.6*	*84.1*	*70.5*	*179.4*	*29.3*	*1842*	*628.8*	*4,901.3*
Subtotal Wetland Waters and Non-Wetland Waters			*34.5*	*855.9*	*3,572.5*	*3,485.9*	*502.1*	*91.5*	*1,160.6*	*68.6*	*4,064.6*	*1,551.1*	*15,386.7*
Grand Total[1]			**34.9**	**1,755.4**	**4,036.4**	**5,630.8**	**861.6**	**290.1**	**1,285.5**	**242.8**	**5,882.7**	**2,624.0**	**22,643.5**

Note: [1] Table may not total precisely due to rounding.
Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

4.2.1 Impacted Condition of Aquatic Resources

The landscape-level assessment (FCAM) that was used to describe the existing condition of the aquatic resources was also used to predict the future condition of the resources after Covered Activity impacts have occurred. As with existing condition, the future condition of aquatic resources describes the relative ability of the resources to support various functions and services. The overall quality of remaining aquatic resources (after direct impacts have occurred) was predicted based on the same factors: area of the aquatic resource, HUC-10 watershed, primary adjacent land cover, secondary adjacent land cover, and aquatic resource type. Function scores were assigned for each of these factors, per aquatic resource feature, based upon ability to maintain or improve the following functions: habitat, water quality, and hydrology. The second factor, HUC-10 watershed, was updated based on the predicted future state of each of the watersheds. The results of the analysis provided an overall functional score of very low, low, moderate, or high for each aquatic resource.

Table 15 summarizes acreage and function/condition of aquatic resources (hereinafter simply condition) using FCAM, in the overall Plan Area following impacts and before accounting for compensatory mitigation, and Figure 27 is a graphical depiction of those data, showing how the impacted Plan Area compares to the existing conditions. Compared to the existing conditions, the impacted Plan Area conditions without mitigation show that the amount of high condition resources remains stable (very slight increase of 29 acres). However, the amounts of moderate, low, and very low condition resources all decrease (decreases of 1,266 acres, 297 acres, and 79 acres, respectively). The slight increase in the amount of high condition resources is the result of the shifts in Covered Species occurrences among watersheds resulting from implementation of the SSHCP and the subsequent shift of some of the associated function scores from moderate to high via an improvement to one or more of the attributes (e.g., implementation of setback).

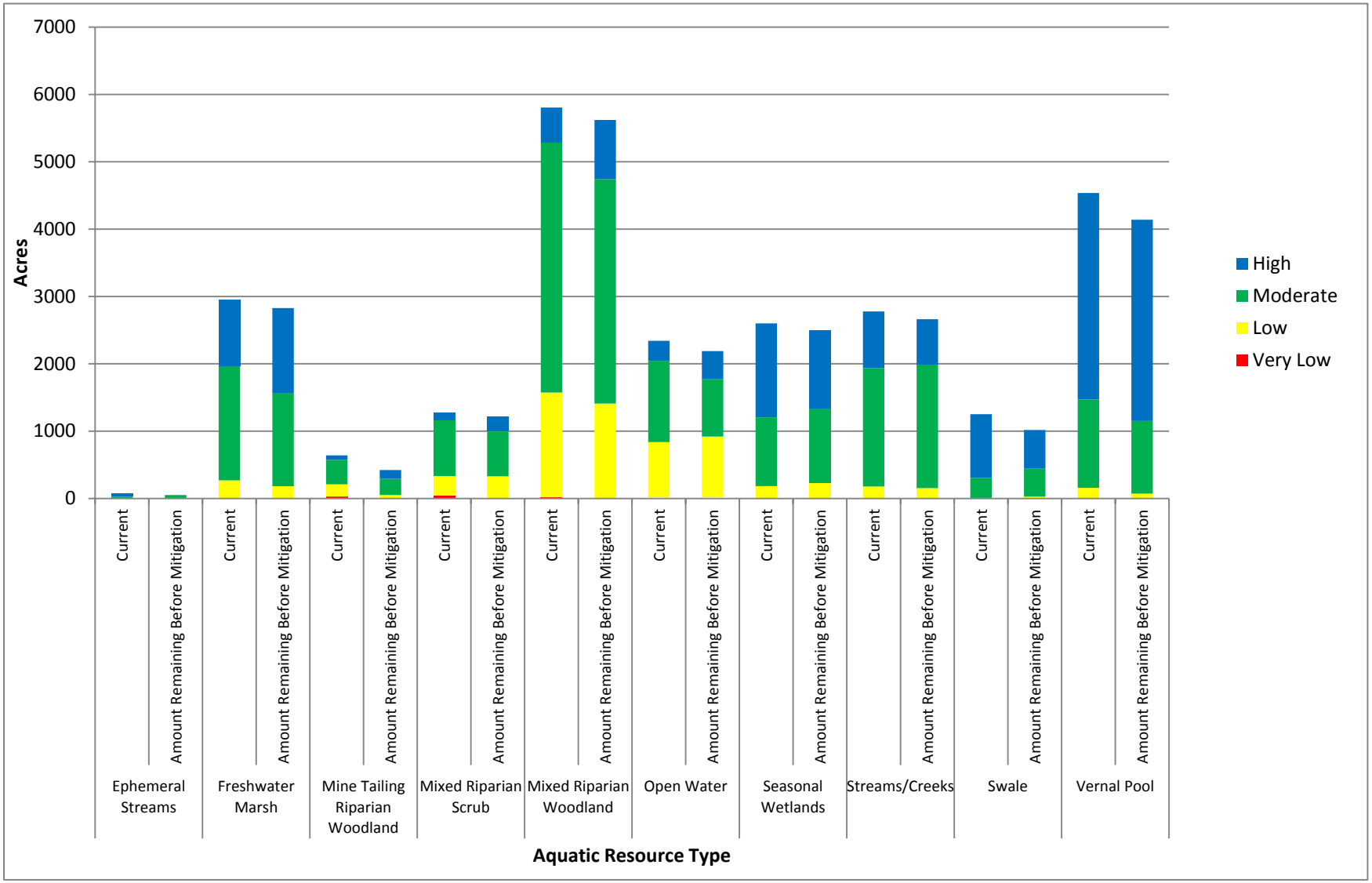
Tables 16 through 25 summarize the condition of aquatic resources in each HUC-10 watershed following impacts and before accounting for compensatory mitigation, and Figures 28 through 37 are graphical depictions, comparing the existing to the impacted watershed conditions. Table 26 summarizes current conditions in the Mather Core Recovery Area and following impacts prior to accounting for compensatory mitigation.

Table 15
Condition of Remaining Aquatic Resources in the Overall Plan Area After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	131.0	241.0	50.9	0	422.9
	Mixed Riparian Scrub	R2/R3	218.3	665.3	324.2	5.4	1,213.2
	Mixed Riparian Woodland	R2/R3	877.7	3,332.7	1,403.5	6.7	5,620.7
		Subtotal Riparian	*1,227.0*	*4,239.0*	*1,778.6*	*12.1*	*7,256.8*
Wetland Waters	Freshwater Marsh	PEM1	1,267.5	1,378.0	181.6	0	2,827.1
	Seasonal Wetland	PEM2	1,162.5	1,107.8	231.8	0	2,502.1
	Swales	R2/R3	575.4	415.6	26.4	0	1,017.3
	Vernal Pools	PEM2	2,988.2	1,078.7	72.3	0	4,139.1
		Subtotal Wetland Waters	*5,993.6*	*3,980.1*	*512.1*	*0*	*10,485.6*
Non-Wetland Waters	Open Water	POW	413.6	855.8	903.6	15.5	2,188.5
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	674.3	1,832.2	154.7	0	2,661.2
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	46.1	5.5	0	51.6
		Subtotal Non-Wetland Waters	*1,087.9*	*2,734.1*	*1,063.8*	*15.5*	*4,901.3*
		Subtotal Wetland Waters and Non-Wetland Waters	*7,081.5*	*6,714.2*	*1,575.9*	*15.5*	*15,386.9*
		Grand Total[1]	**8,308.5**	**10,953.2**	**3,354.5**	**27.6**	**22,643.7**

Note: [1] Table may not total precisely due to rounding.
Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

Figure 27 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Plan Area



The Morrison Creek watershed, in addition to showing the largest decrease in abundance (acreage) of aquatic resources, was also predicted to have the largest decrease in high condition aquatic resources (943 acres), showing a shift in portions of Freshwater Marsh, Swale, and vernal pool resources to moderate condition. The amount of high condition aquatic resources is balanced out throughout the overall Plan Area because of shifts in moderate condition resources to high in other watersheds such as Lower Cosumnes and Upper Cosumnes as a result of changed Covered Species occurrences following SSHCP implementation (see Appendix C, Functional Assessment).

Within the Mather Core Recovery Area, 80% of high condition and moderate condition vernal pools would be avoided. Vernal pools in the Mather Core Recovery Area have recognized ecological importance and those proposed for avoidance were selected based on an assessment of their conservation value using FCAM and the Vernal Wetland Acre/Density Index (VWADI) as described in Section 5.2.1 below. Those vernal pool complexes with the highest conservation value scores received special consideration during the development of the SSHCP Conservation Strategy and the conceptual design of the SSHCP Preserve System.

Table 16
Condition of Remaining Aquatic Resources in the American River Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	0	0	0	0
	Mixed Riparian Woodland	R2/R3	0	0	0.4	0	0.4
Subtotal Riparian			*0*	*0*	*0.4*	*0*	*0.4*
Wetland Waters	Freshwater Marsh	PEM1	0	0.2	0.4	0	0.6
	Seasonal Wetland	PEM2	0	22.6	0	0	22.6
	Swales	R2/R3	0	1.4	0.5	0	1.9
	Vernal Pools	PEM2	0	2.5	<.1	0	2.5
Subtotal Wetland Waters			*0*	*26.7*	*0.9*	*0*	*27.6*
Non-Wetland Waters	Open Water	POW	0	0	2.2	0	2.2
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	1.9	2.9	0	4.7
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*1.9*	*5.1*	*0*	*6.9*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*28.6*	*6*	*0*	*34.5*
Grand Total[1]			**0**	**28.6**	**6.4**	**0**	**34.9**

Note: [1] Table may not total precisely due to rounding.

Figure 28 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the American River Watershed

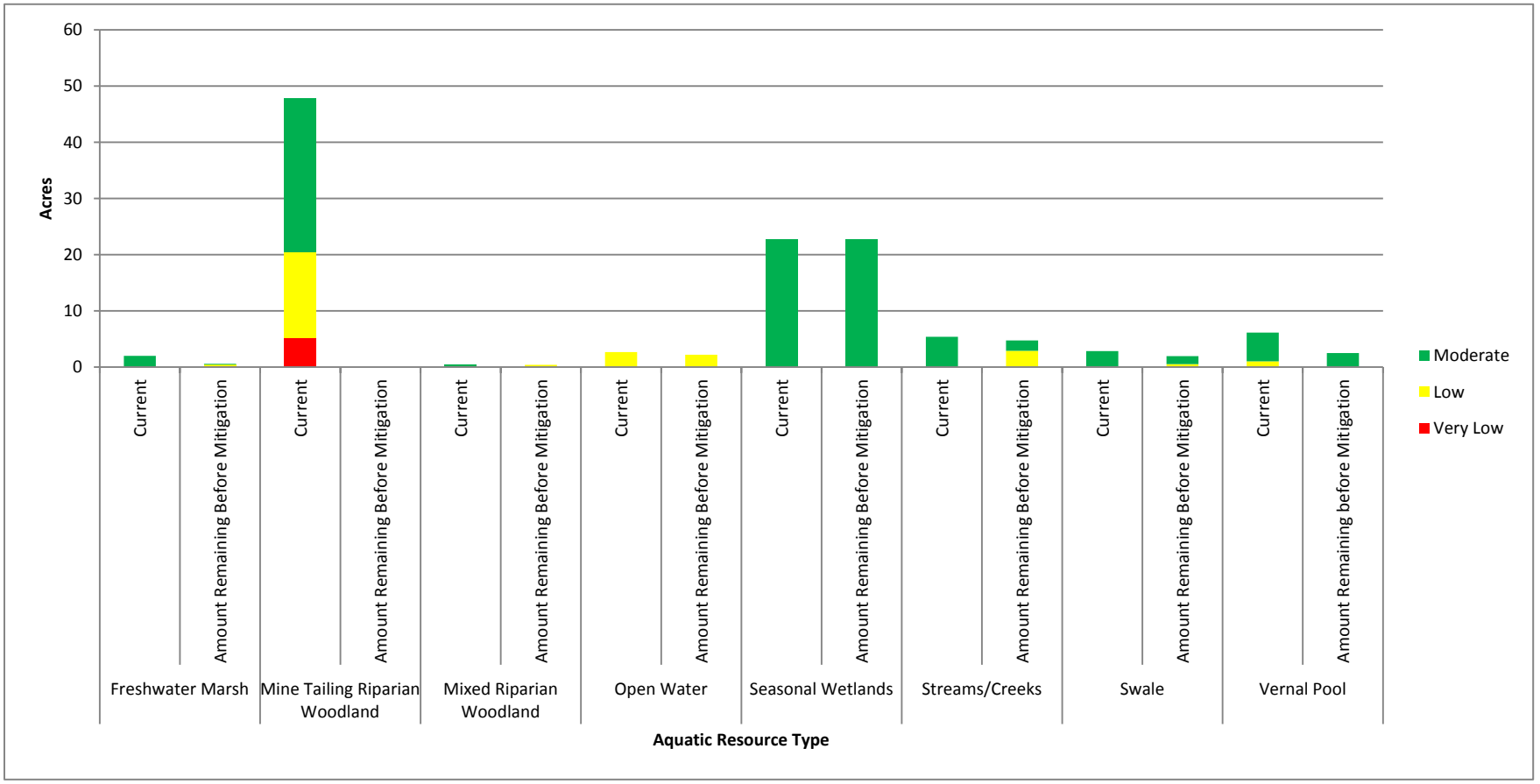


Table 17
Condition of Remaining Aquatic Resources in the Deer Creek Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0.2	<0.1	0	0.2
	Mixed Riparian Scrub	R2/R3	40.3	35.4	3.0	0	78.8
	Mixed Riparian Woodland	R2/R3	106.6	694.6	19.3	0	820.5
Subtotal Riparian			*146.9*	*730.2*	*22.3*	*0*	*899.5*
Wetland Waters	Freshwater Marsh	PEM1	21.9	14.3	0	0	36.2
	Seasonal Wetland	PEM2	13.8	100.1	5.0	0	118.9
	Swale	R2/R3	70.9	26.3	0.9	0	98.1
	Vernal Pools	PEM2	183.6	57.2	0.3	0	241.1
Subtotal Wetland Waters			*290.2*	*197.9*	*6.2*	*0*	*494.3*
Non-Wetland Waters	Open Water	POW	69.4	56.4	3.6		129.4
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	121.5	<0.1	0	216.1
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	15.3	0.8	0	16.1
Subtotal Non-Wetland Waters			*69.4*	*193.2*	*4.4*	*0*	*361.6*
Subtotal Wetland Waters and Non-Wetland Waters			*359.6*	*391.1*	*10.6*	*0*	*855.9*
Grand Total[1]			**506.5**	**1,121.3**	**32.9**	**0**	**1,755.4**

Note: [1] Table may not total precisely due to rounding.

Figure 29 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Deer Creek Watershed

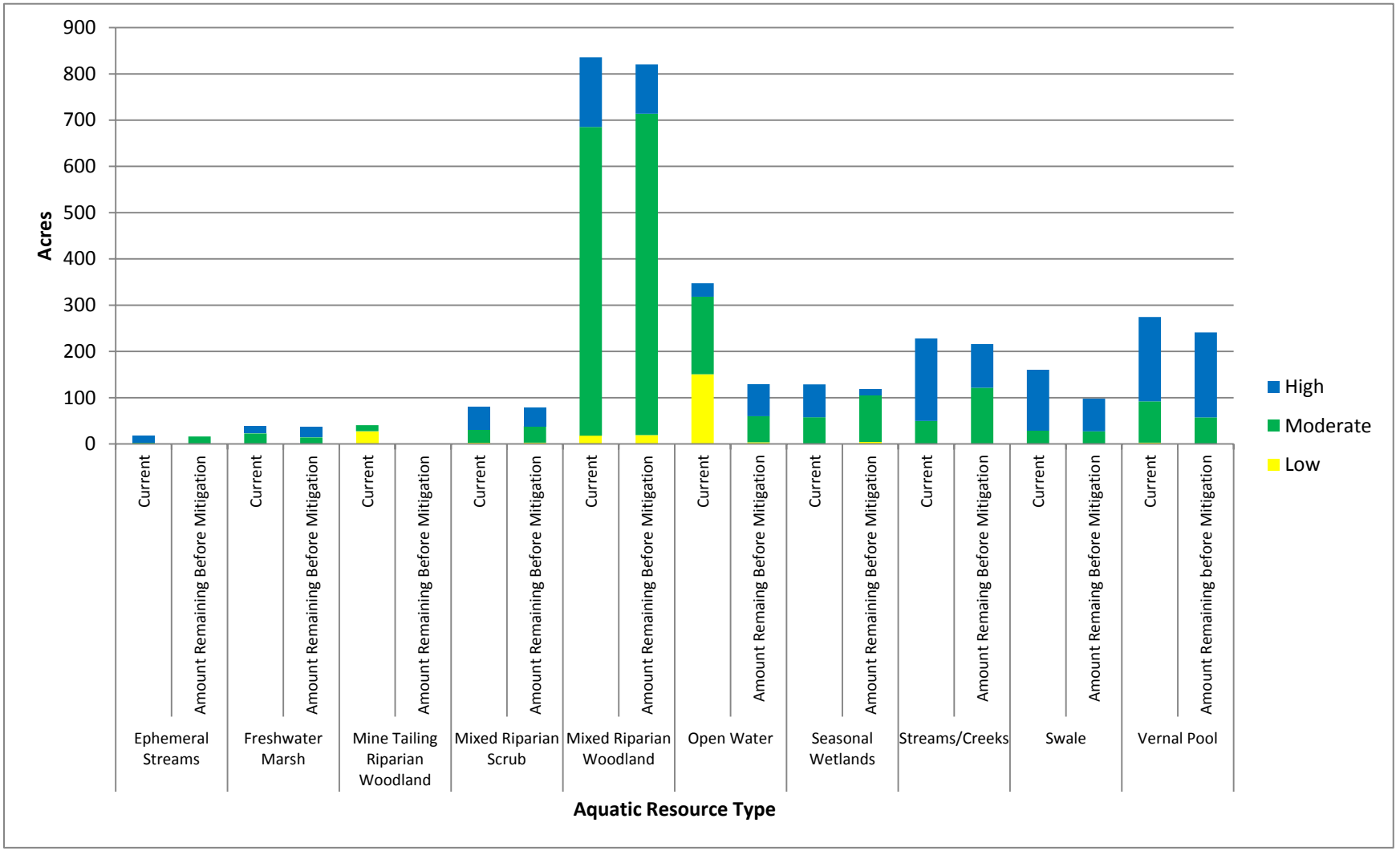


Table 18
Condition of Remaining Aquatic Resources in the Laguna Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	63.8	74.8	19.7	0	158.3
	Mixed Riparian Scrub	R2/R3	5.4	45.6	2.1	0	53.1
	Mixed Riparian Woodland	R2/R3	63.0	179.5	10.0	0	252.5
Subtotal Riparian			*132.2*	*299.9*	*31.8*	*0*	*463.9*
Wetland Waters	Freshwater Marsh	PEM1	139.6	19.6	0.4	0	159.7
	Seasonal Wetland	PEM2	370.8	25.1	14.5	0	410.5
	Swales	R2/R3	312.0	113.7	0.3	0	425.9
	Vernal Pools	PEM2	1,801.3	70.3	7.4	0	1,879.0
Subtotal Wetland Waters			*2,623.7*	*228.7*	*22.6*	*0*	*2,875.1*
Non-Wetland Waters	Open Water	POW	178.8	47.5	69.2	0	295.4
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	232.3	167.6	2.0	0	402.0
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*411.1*	*215.1*	*71.2*	*0*	*697.4*
Subtotal Wetland Waters and Non-Wetland Waters			*3,034.8*	*443.8*	*93.8*	*0*	*3,572.5*
Grand Total[1]			**3,167.0**	**743.7**	**125.6**	**0**	**4,036.4**

Note: [1] Table may not total precisely due to rounding.

Figure 30 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Laguna Watershed

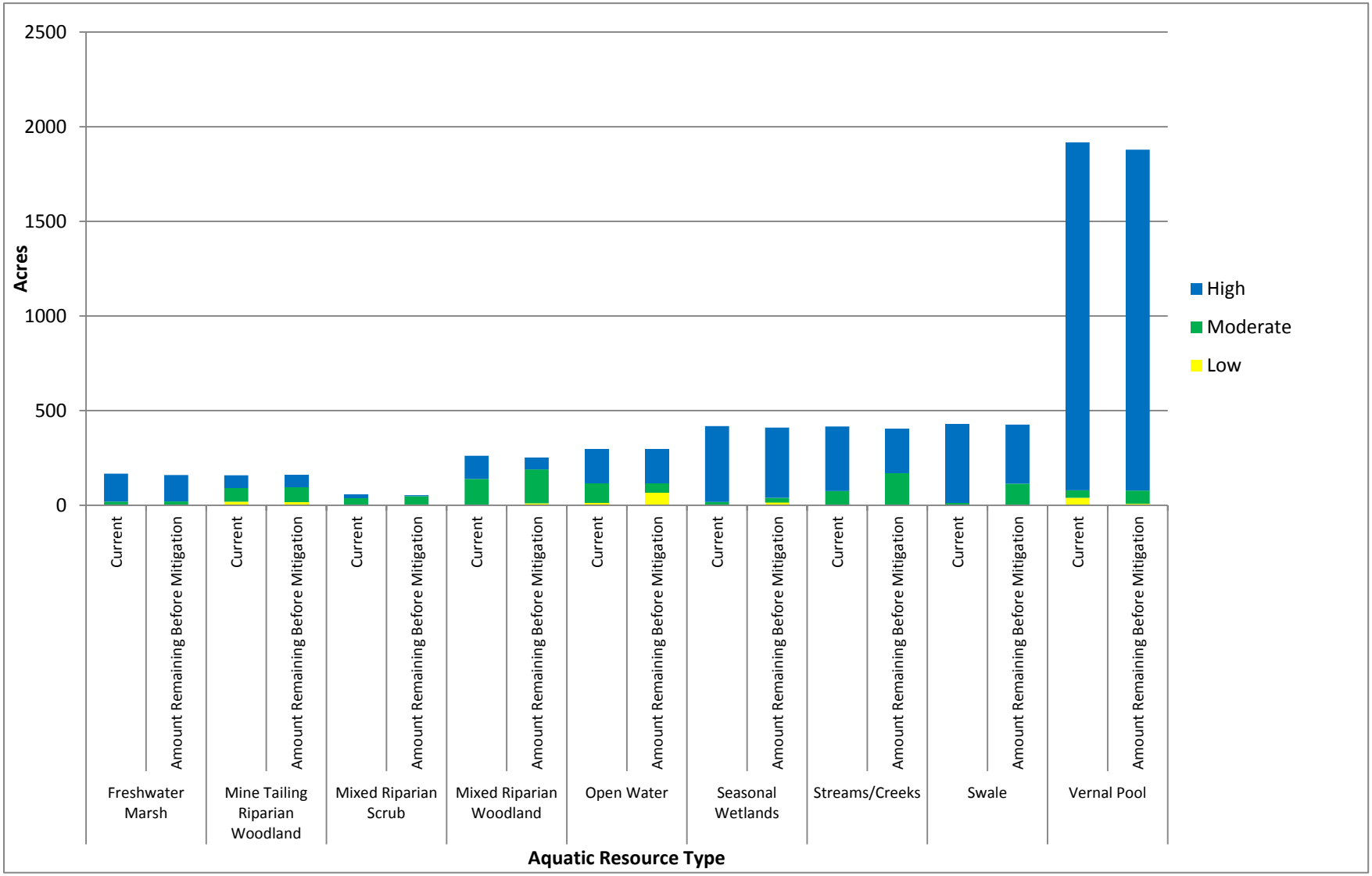


Table 19
Condition of Remaining Aquatic Resources in the Lower Cosumnes Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	17.3	0	0	17.3
	Mixed Riparian Scrub	R2/R3	137.5	122.8	7.4	0	267.7
	Mixed Riparian Woodland	R2/R3	352.6	1,264.0	243.4	0	1,859.9
Subtotal Riparian			*490.1*	*1,404.1*	*250.8*	*0*	*2,144.9*
Wetland Waters	Freshwater Marsh	PEM1	988.0	134.4	3.9	0	1,126.2
	Seasonal Wetland	PEM2	345.9	262.7	3.4	0	612.0
	Swale	R2/R3	99.4	41.0	1.2	0	141.6
	Vernal Pools	PEM2	335.6	230.7	38.1	0	604.5
Subtotal Wetland Waters			*1,768.9*	*668.8*	*46.6*	*0*	*2,484.30*
Non-Wetland Waters	Open Water	POW	31.6	270.5	360.9	0	663.0
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	133.2	203.4	2.0	0	338.6
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*164.8*	*473.9*	*362.9*	*0*	*1,001.6*
Subtotal Wetland Waters and Non-Wetland Waters			*1,933.70*	*1,142.70*	*409.5*	*0*	*3,485.90*
Grand Total[1]			**2,423.8**	**2,546.80**	**660.3**	**0**	**5,630.80**

Note: [1] Table may not total precisely due to rounding.

Figure 31 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Lower Cosumnes Watershed

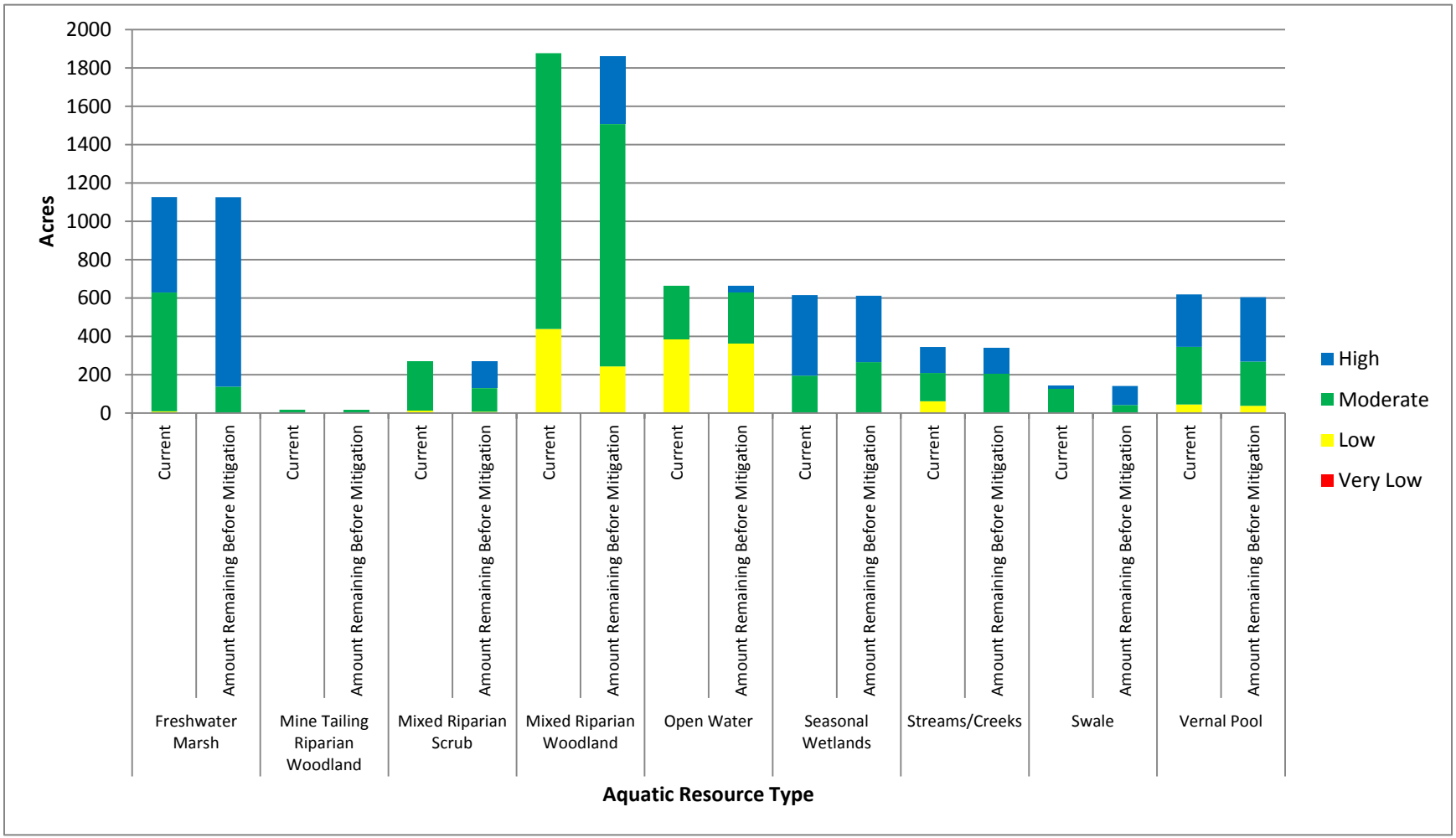


Table 20
Condition of Remaining Aquatic Resources in the Lower Dry Creek Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	31.8	5.4	0	37.2
	Mixed Riparian Woodland	R2/R3	0	269.9	52.3	0	322.3
Subtotal Riparian			*0*	*301.7*	*57.7*	*0*	*359.5*
Wetland Waters	Freshwater Marsh	PEM1	16.4	26.5	2.2	0	45.0
	Seasonal Wetland	PEM2	71.8	39.3	4.3	0	115.4
	Swale	R2/R3	10.8	53.4	<0.1	0	64.3
	Vernal Pools	PEM2	103.0	88.2	2.1	0	193.3
Subtotal Wetland Waters			*202*	*207.4*	*8.6*	*0*	*418*
Non-Wetland Waters	Open Water	POW	0	6.6	1.9	0	8.4
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	16.6	55.9	3.3	0	75.7
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*16.6*	*62.5*	*5.2*	*0*	*84.1*
Subtotal Wetland and Non-Wetland Waters			*218.6*	*269.9*	*13.8*	*0*	*502.1*
Grand Total[1]			**218.6**	**571.6**	**71.5**	**0**	**861.6**

Note: [1] Table may not total precisely due to rounding.

Figure 32 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Lower Dry Creek Watershed

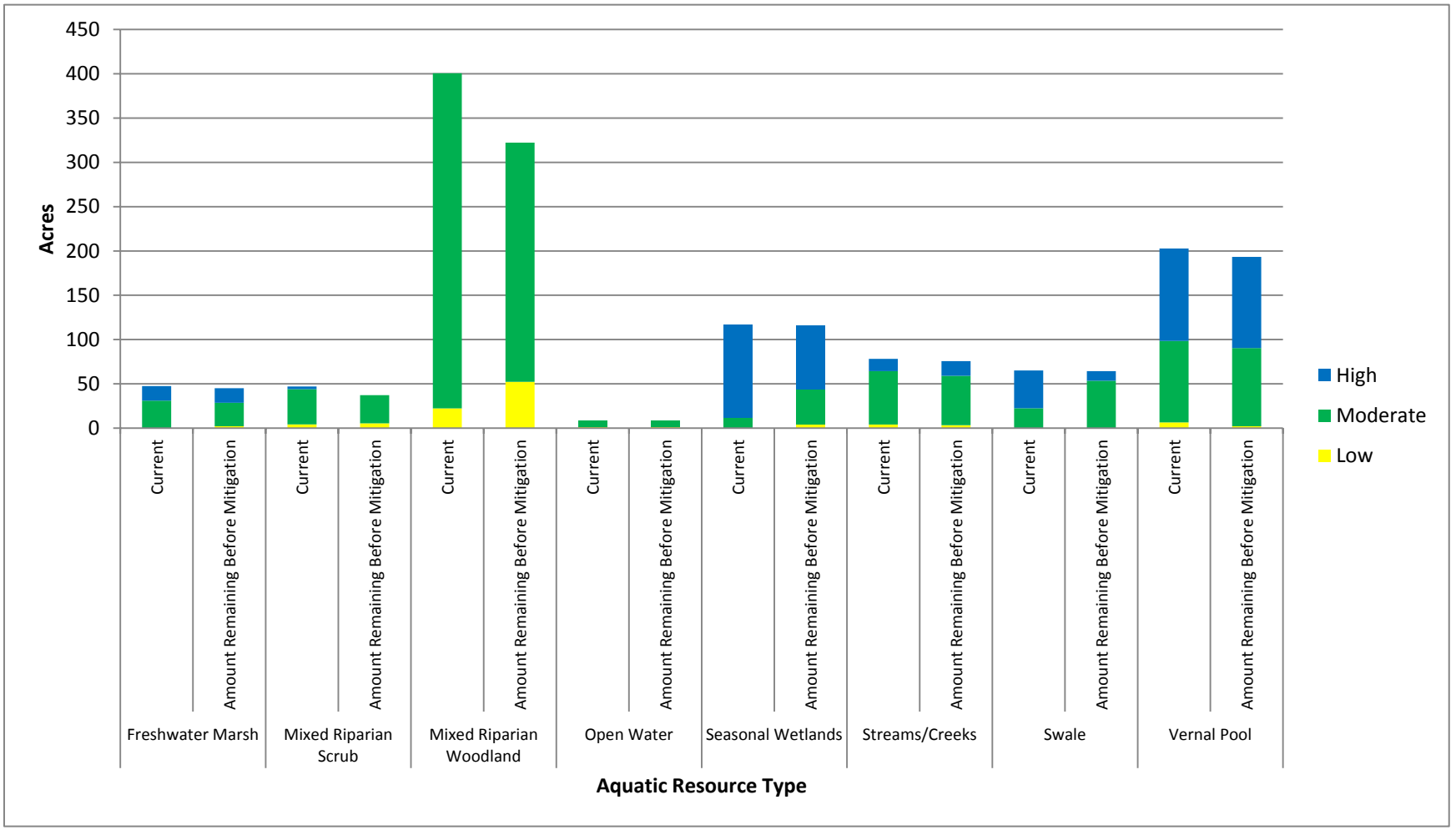


Table 21
Condition of Remaining Aquatic Resources in the Lower Mokelumne River Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	<0.1	2.4	0	2.4
	Mixed Riparian Woodland	R2/R3	0	14.0	182.2	0	196.2
Subtotal Riparian			*0*	*14*	*184.6*	*0*	*198.6*
Wetland Waters	Freshwater Marsh	PEM1	0	20.9	0	0	20.9
	Seasonal Wetland	PEM2	0	0	0	0	0
	Swale	R2/R3	0	0	0	0	0
	Vernal Pools	PEM2	0	0.1	0	0	0.1
Subtotal Wetland Waters			*0*	*21*	*0*	*0*	*21*
Non-Wetland Waters	Open Water	POW	0	0	3.1	0	3.1
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	65.1	2.2	0	67.4
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*65.1*	*5.3*	*0*	*70.5*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*86.1*	*5.3*	*0*	*91.5*
Grand Total[1]			**0**	**100.1**	**189.9**	**0**	**290.1**

Note: [1] Table may not total precisely due to rounding.

Figure 33 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Lower Mokelumne River Watershed

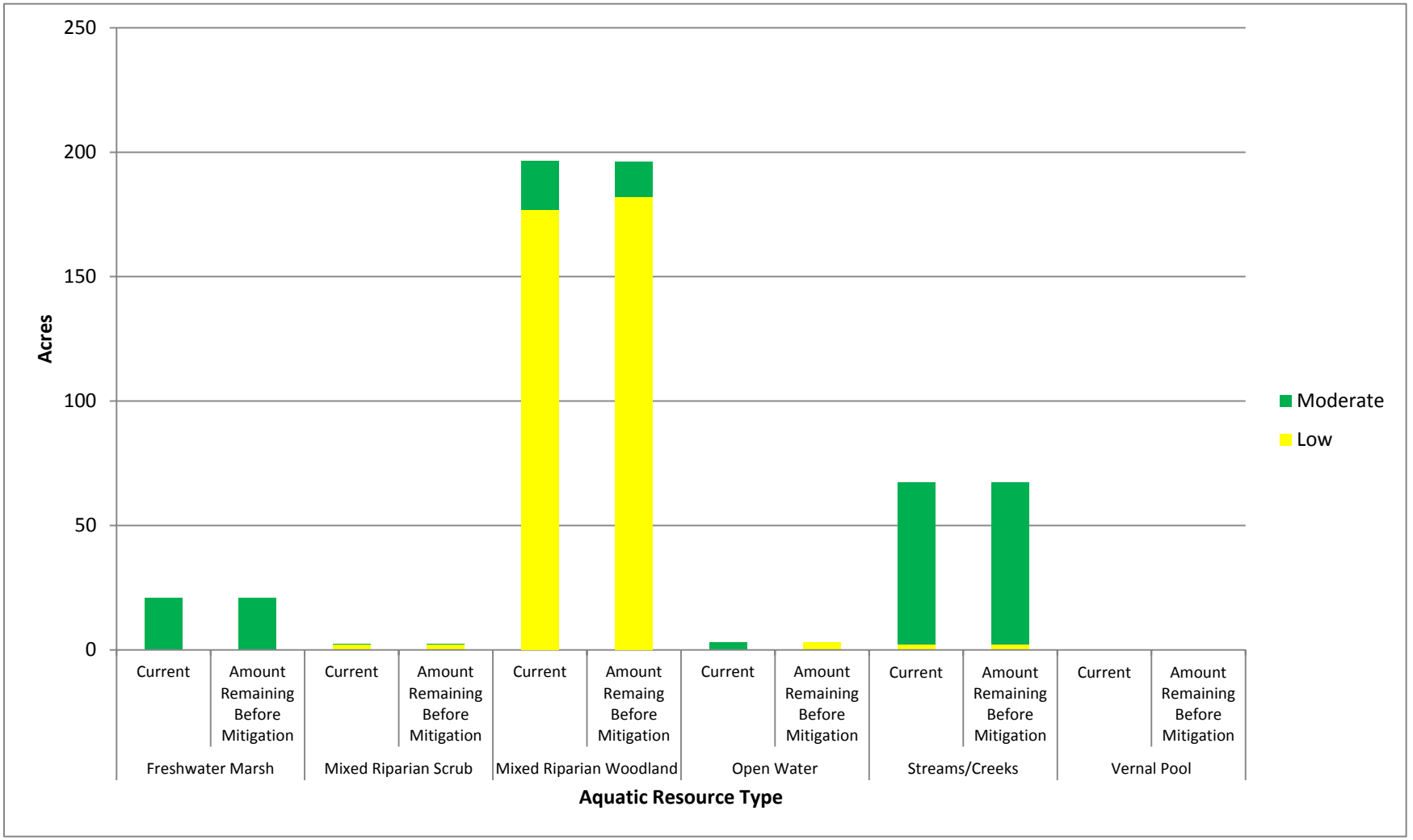


Table 22
Condition of Remaining Aquatic Resources in the Morrison Creek Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	1.6	0	1.6
	Mixed Riparian Scrub	R2/R3	3.2	11.2	6.3	0	20.7
	Mixed Riparian Woodland	R2/R3	0	54.5	48.1	0	102.6
Subtotal Riparian			*3.2*	*65.7*	*56.0*	*0*	*124.9*
Wetland Waters	Freshwater Marsh	PEM1	13.8	228.5	22.8	0	265.2
	Seasonal Wetland	PEM2	0	24.5	14.4	0	38.9
	Swale	R2/R3	16.8	158.5	20.6	0	195.9
	Vernal Pools	PEM2	283.7	183.6	13.9	0	481.2
Subtotal Wetland Waters			*314.3*	*595.1*	*71.7*	*0*	*981.2*
Non-Wetland Waters	Open Water	POW	0	19.4	59.0	0	78.4
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	30.2	35.2	0	65.4
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	30.8	4.7	0	35.6
Subtotal Non-Wetland Waters			*0*	*80.4*	*98.9*	*0*	*179.4*
Subtotal Wetland Waters and Non-Wetland Waters			*314.3*	*675.5*	*170.6*	*0*	*1,160.6*
Grand Total[1]			**317.5**	**741.2**	**226.6**	**0**	**1,285.5**

Note: [1] Table may not total precisely due to rounding.

Figure 34 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Morrison Creek Watershed

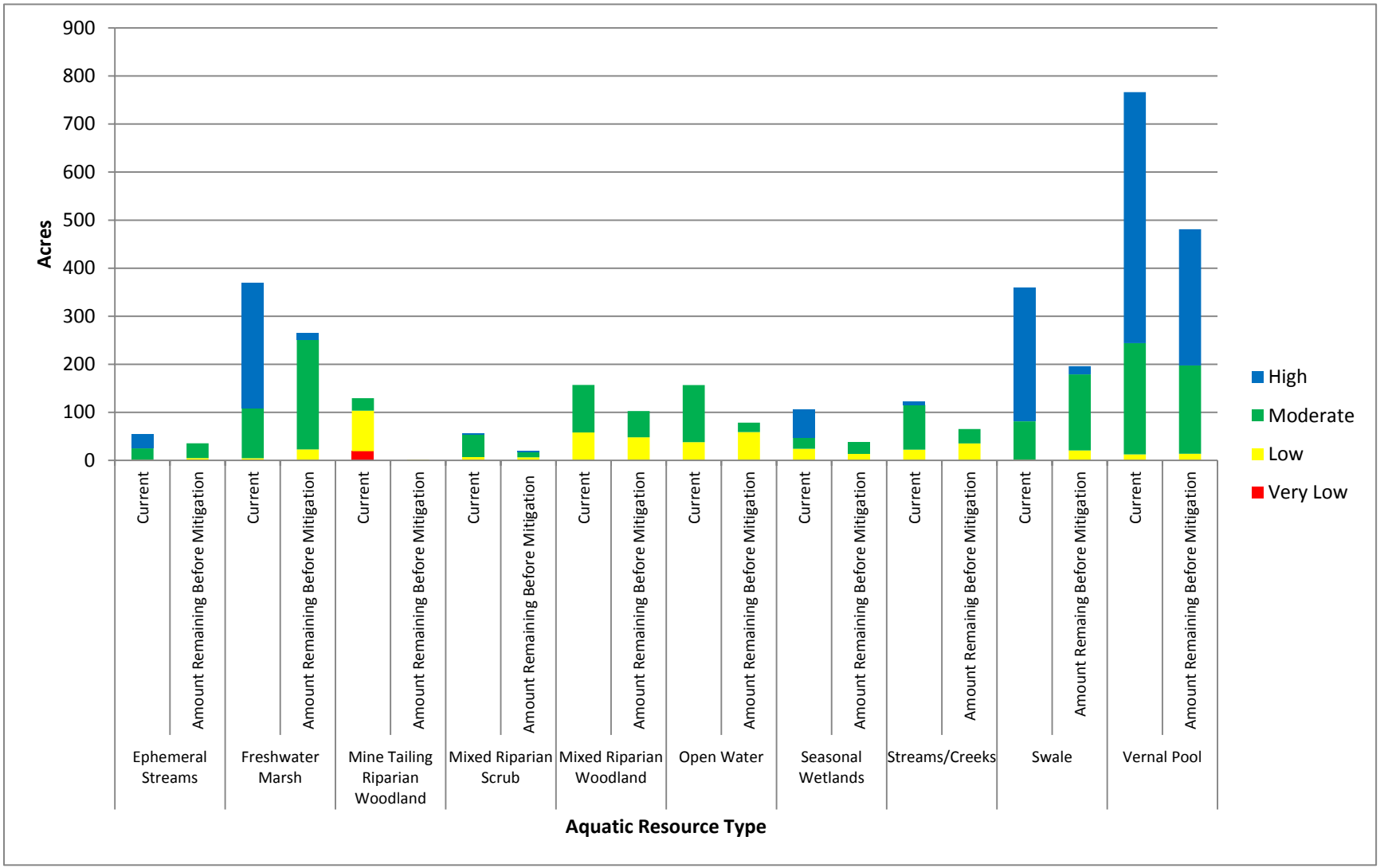


Table 23
Condition of Remaining Aquatic Resources in the Sherman Lake–Sacramento River Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	0	120.8	5.4	126.2
	Mixed Riparian Woodland	R2/R3	0	0	41.2	6.7	48.0
Subtotal Riparian			*0*	*0*	*162.0*	*12.1*	*174.2*
Wetland Waters	Freshwater Marsh	PEM1	0	39.3	0	0	39.3
	Seasonal Wetland	PEM2	0	0	0	0	0
	Swale	R2/R3	0	0	0	0	0
	Vernal Pools	PEM2	0	0	0	0	0
Subtotal Wetland Waters			*0*	*39.3*	*0*	*0*	*39.3*
Non-Wetland Waters	Open Water	POW	0	0	9.2	0	9.2
	Perennial or Intermittent Streams/Creeks	R2UB/R3 UB	0	0.3	19.8	0	20.1
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*0.3*	*29.0*	*0*	*29.3*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*39.6*	*29.0*	*0*	*68.6*
Grand Total[1]			**0**	**39.6**	**191.0**	**12.1**	**242.8**

Note: [1] Table may not total precisely due to rounding.

Figure 35 **Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Sherman Lake–Sacramento River Watershed**

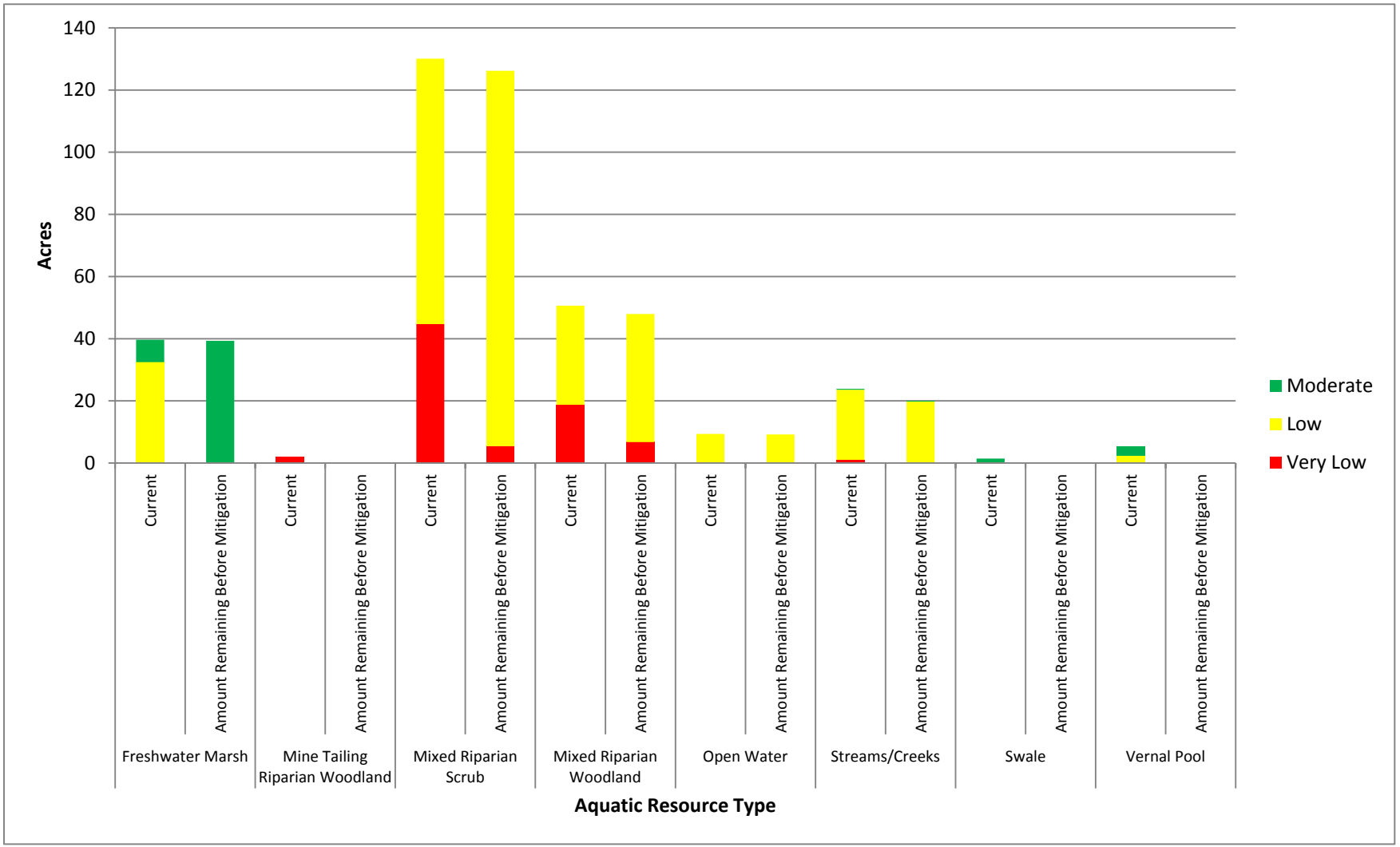


Table 24
Condition of Remaining Aquatic Resources in the Snodgrass Slough Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	350.7	176.9	0	527.5
	Mixed Riparian Woodland	R2/R3	0	488.1	802.5	0	1,290.6
Subtotal Riparian			*0*	*838.8*	*979.4*	*0*	*1818.1*
Wetland Waters	Freshwater Marsh	PEM1	0	871.7	150.7	0	1,022.4
	Seasonal Wetland	PEM2	0	590.8	184.5	0	775.2
	Swale	R2/R3	0	6.6	2.5	0	9.1
	Vernal Pools	PEM2	0	408.9	7.0	0	415.9
Subtotal Wetland Waters			*0*	*1,878.0*	*344.7*	*0*	*2,222.6*
Non-Wetland Waters	Open Water	POW	0	389.9	313.8	15.5	719.2
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	22.1	1,013.8	86.9	0	1,122.8
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	350.7	176.9	0	527.5
Subtotal Non-Wetland Waters			*22.1*	*1,754.4*	*577.6*	*15.5*	*2,369.5*
Subtotal Wetland Waters and Non-Wetland Waters			*22.1*	*3,632.4*	*922.3*	*15.5*	*4,592.1*
Grand Total[1]			**22.1**	**4,471.2**	**1,901.7**	**15.5**	**6,410.2**

Note: [1] Table may not total precisely due to rounding.

Figure 36 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Snodgrass Slough Watershed

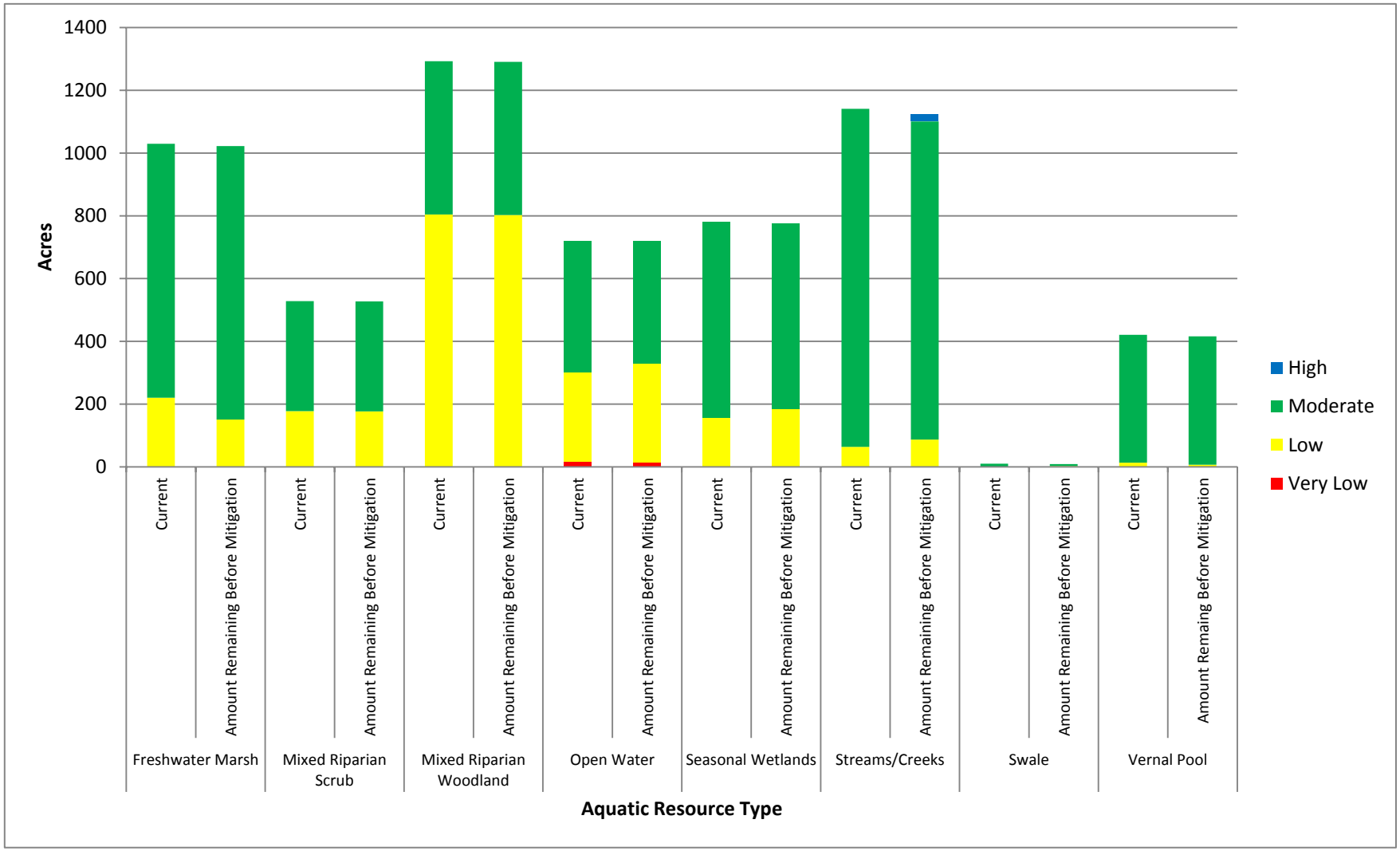


Table 25
Condition of Remaining Aquatic Resources in the Upper Cosumnes Watershed After Impacts and Before Accounting for Compensatory Mitigation

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total (acres)
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	67.2	148.7	29.7	0	245.5
	Mixed Riparian Scrub	R2/R3	31.8	67.9	0	0	99.7
	Mixed Riparian Woodland	R2/R3	355.6	368.1	4.0	0	727.7
Subtotal Riparian			*454.6*	*584.7*	*33.7*	*0*	*1,072.9*
Wetland Waters	Freshwater Marsh	PEM1	87.8	22.6	1.3	0	111.7
	Seasonal Wetland	PEM2	360.2	42.7	5.7	0	408.6
	Swale	R2/R3	65.5	14.6	0.3	0	80.5
	Vernal Pools	PEM2	281.0	37.2	3.4	0	321.6
Subtotal Wetland Waters			*794.5*	*117.1*	*10.7*	*0*	*922.4*
Non-Wetland Waters	Open Water	POW	133.8	65.6	80.7	0	280.2
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	175.6	172.6	0.4	0	348.6
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*309.4*	*238.2*	*81.1*	*0*	*628.8*
Subtotal Wetland Waters and Non-Wetland Waters			*1,103.9*	*355.3*	*91.8*	*0*	*1,551.2*
Grand Total[1]			**1,558.5**	**940.0**	**125.5**	**0**	**2,624.1**

Note: [1] Table may not total precisely due to rounding.

Figure 37 Existing and Post-Impact Watershed Profiles of Aquatic Resources in the Upper Cosumnes Watershed

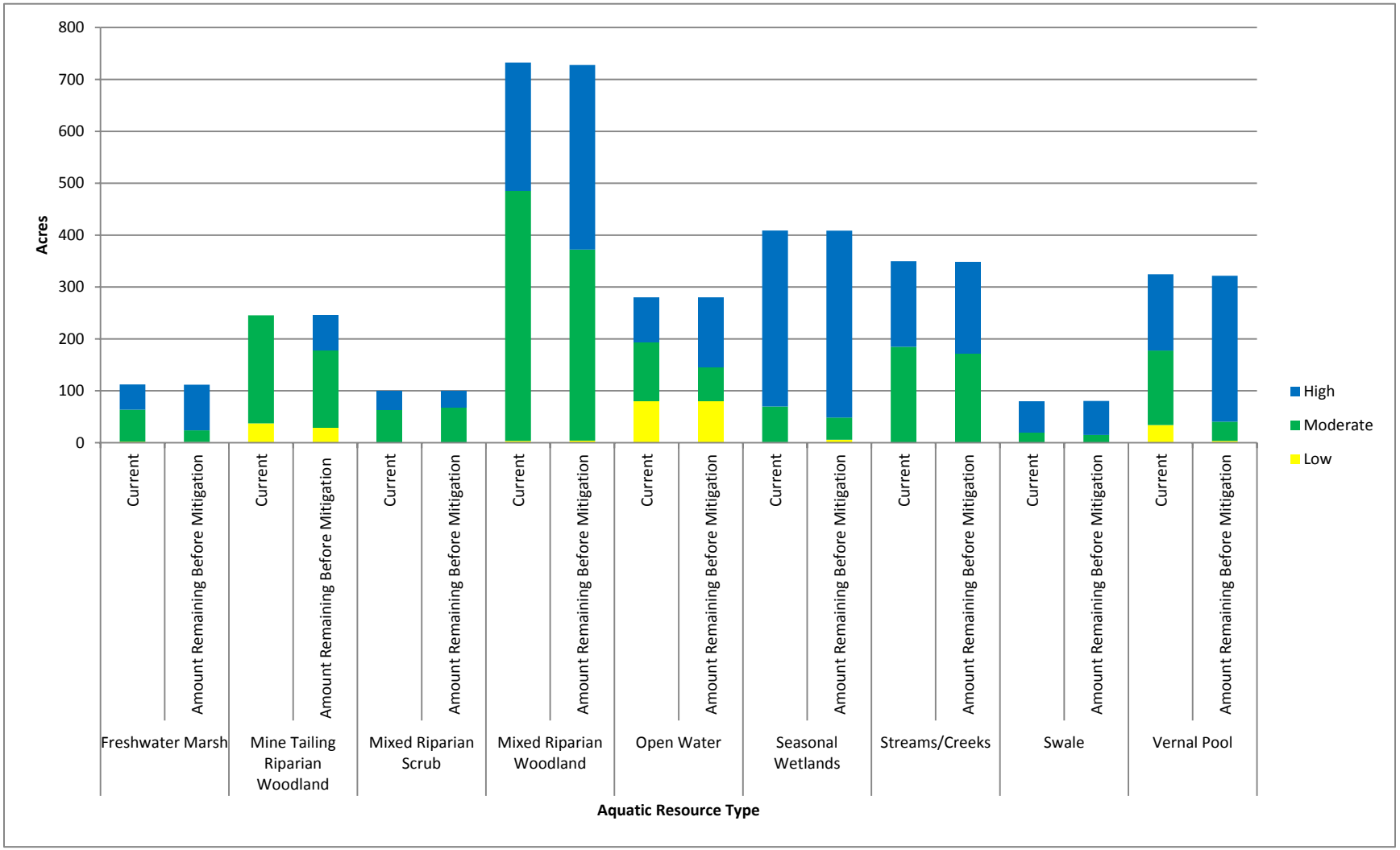


Table 26
Mather Core Recovery Area Existing and Post-Impact Vernal Pool Conditions (Acres)

Condition	High	Moderate	Low	Very Low	Total
Current	525.0	181.4	1.2	0	707.6
Remaining	425.2	144.5	0.5	0	570.1

In summary, the predicted impacts resulting from the SSHCP, prior to considering compensatory mitigation, show an impact on the abundance of aquatic resources. The diversity and condition of the resources largely remain intact, as none of the aquatic resource types are disproportionately impacted within the Plan Area, and the amount of high condition resources remains stable.

5 MITIGATION FRAMEWORK FOR AQUATIC RESOURCES

5.1 Mitigation Overview

The SSHCP and ARP would establish a network of conservation areas in the Plan Area that would preserve sensitive species and their natural communities in perpetuity. Preservation of these natural communities includes many types of waters of the United States and waters of the state, riparian buffer areas, and adjacent upland areas. The SSHCP Conservation Strategy would be an integral part of a more efficient regulatory permitting process implemented over a 50-year period. This more efficient permitting process implements a watershed perspective applied to a regional approach to avoidance, minimization, and compensatory mitigation for impacts to waters of the United States and waters of the state. This efficient permitting process would be different from the conventional permit-by-permit review process because it combines the mandates of the ESA with mandates of Section 404 of the CWA to allow for the formation of a singular, comprehensive state and federal regulatory framework for future projects that implements a more efficient permitting process for better decision-making and greater environmental benefits. It allows the regulated public the ability to comply as a whole and contribute to the overall larger SSHCP Conservation Strategy. It is envisioned that the alternative selected for the SSHCP would provide the greatest amount of avoidance and minimization at a regional level for 404 purposes. This approach would follow a process of landscape-level and project-level AMMs. These AMMs would be monitored during project implementation to assure they provide regional consistency across the Plan Area, and would be instrumental as a supporting basis for the SSHCP and ARP to avoid and minimize impacts to aquatic resources to the greatest extent practicable. It would also direct compensatory mitigation, when required, to be integrated on a watershed basis into a comprehensive system of larger, integrated and connected conservation areas. The SSHCP Conservation Strategy and associated state and federal regulatory framework approach would be superior to the existing permitting framework because it would pursue procedural goals that seek to reduce the likelihood of fragmentation of important landscapes, including aquatic resources, mixed into a matrix of urban development when administered over a 50-year period.

The Section 404(b)(1) Guidelines (40 CFR Part 230) require that all Department of the Army permits subject to Section 404 of the CWA comply with a strict sequencing approach: all appropriate and practical steps to avoid and minimize adverse impacts to waters of the United States must be taken before a permit can be issued by USACE. Additionally, compensatory mitigation for unavoidable impacts may be required to ensure that an activity requiring a CWA Section 404 permit complies with the 404(b)(1) Guidelines. The SSHCP would provide the regulated public access to greater environmental permitting certainty for development projects, while implementing a Conservation Strategy that incorporates a watershed-based approach. This is accomplished by achieving each of the stated SSHCP Biological Goals and Measureable

Objectives and conservation measures, including establishing a network of preserves with high-value resources while still providing for development. Under this strategy, the SSHCP and ARP are intended to protect watershed integrity, provide and maintain natural corridors, produce ample blocks of contiguous habitat, and provide necessary buffers for these natural areas. From a project-level standpoint, avoidance and minimization of impacts to aquatic resources by the regulated public would be consistent, robustly implemented, and would be subject to a comprehensive set of AMMs, including low-impact development (LID), best management practices (BMPs), siting and design requirements, Stream Setbacks, and Preserve Setbacks. All of the Covered Activity AMMs and the other components of the SSHCP Conservation Strategy synergistically combine to ensure maintenance of current functions and services within the Plan Area and provide avoidance and protection of thousands of acres of regulated aquatic resources and important habitats (see Section 5.4 in Chapter 5 of the SSHCP). Furthermore, compensatory mitigation for Covered Activity impacts to aquatic resources authorized under the SSHCP and ARP would be considered by using a watershed approach. The USACE/EPA "Mitigation Rule" requires the use of a watershed approach to the extent appropriate and practicable, stating "The ultimate goal of a watershed approach is to maintain and improve the quality and quantity of aquatic resources within watersheds through strategic selection of compensatory mitigation sites" (33 CFR 332.3[c]). The SSHCP and ARP would be consistent with the Mitigation Rule, by systematically prioritizing compensatory mitigation projects based on anticipated impacts to aquatic resources, considering both watershed- and function-based factors, and pursuant to the type (e.g., mitigation bank) and location preference hierarchy identified in the 2008 Mitigation Rule at 33 CFR 332.3(b)(2) through (b)(6). However, the preference hierarchy may be overridden where appropriate, for instance when the required compensatory mitigation involves larger, more ecologically valuable parcels; is subject to more rigorous scientific and technical analysis, planning, and implementation; involves advanced site identification and planning; and utilizes significant investment of financial resources for sites located to successfully replace lost functions and services, taking into account such watershed-scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources, trends in land use, ecological benefits, compatibility with adjacent land uses; and in general, when practicable, to meet the aforementioned considerations in the same watershed.

5.2 Avoidance and Minimization

5.2.1 Landscape-Scale Avoidance

The Plan Area contains two specific regions: the UDA, where local jurisdictions anticipate urban growth and lands outside the UDA, which includes agricultural land and natural landscapes with natural intact sources of surface and sub-surface water influx and outflow (described in greater detail in Appendix A, Watershed Study for the SSHCP and ARP). The lands outside the UDA already include several large areas of conservation lands (described in Section 7.2.2 of the

SSHCP). Preservation and management requirements inside the UDA would differ from those outside the UDA because the areas adjacent to these Preserves would have very different land uses. However, the ARP (through implementation of the SSHCP by the Plan Permittees) would implement a comprehensive strategy to protect the functions and services of watersheds in the Plan Area. The strategy begins with avoidance and minimization of impacts to aquatic resources at a landscape scale using a watershed-based approach for the overall Plan Area.

The Plan Area aquatic resources avoidance strategy would be built upon AMMs, LID measures, and a framework of existing and proposed preserves and linkages. Implementation of these measures would achieve the SSHCP goals and objectives for vernal pools, maximize protection of intact hydrologic sub-basins, establish stream corridors and setbacks, protect aquatic resources, and connect existing preserves to proposed preserves. The Preserve System would implement avoidance, protection, and ultimately include a vast network of thousands of acres of vernal pool systems, seasonal wetlands, streams, adjacent riparian zones, grasslands and other ecologically important areas where further development of the watershed would not occur.

The vernal pool habitat Conservation Strategy was based in part upon a Vernal Wetland Acre/Density Index (VWADI) (Dittes et al. 2007) that described and classified the vernal pool complexes within the Plan Area (see Section 5.2, Appendix B-1 and Appendix B-2). The VWADI is based on variation in vernal pool acreage and density. Plan Area vernal pools were classified according to the VWADI into five categories of conservation value, with the highest conservation value placed on high-density vernal pool complexes (most wetted acres with densest vernal pool complexes and largest number of pools). Those vernal pool complexes with the highest conservation value scores were considered during the development of the SSHCP Conservation Strategy and the conceptual design of the SSHCP Preserve System described in SSHCP Section 7.5. The VWADI should not be confused with the FCAM described in Appendix C. While both processes were used to help determine which areas within the Plan Area have the highest-quality vernal pool resources, the VWADI was used to inform the SSHCP Conservation Strategy as it relates to the preservation of vernal pool resources primarily for the protection of endangered species. The FCAM was developed to evaluate all aquatic resource classifications, not just vernal pool, and to include measurements of value for habitat, water quality and hydrology. The VWADI and FCAM are independent of one another, but are complementary and both are used to direct conservation actions for vernal pool ecosystem conservation.

The result of SSHCP implementation would be a net gain of aquatic resources functions and services in the Plan Area, which is depicted in the ARP's pre- and post-watershed profiles (see Chapter 6). Implementation of the SSHCP's comprehensive balanced approach to aquatic resource conservation can provide a greater level of landscape- and watershed-scale protection of aquatic resources than is possible via the conventional project-by-project permitting approach under the CWA Sections 404 and 401, and the California Fish and Game Code 1600 programs.

5.2.1.1 Landscape-Scale Avoidance within the UDA Watersheds

Landscape-scale avoidance within the UDA watersheds would be implemented to include protection of wetlands and streams to minimize adverse effects from the construction of new impervious surfaces. Within the UDA, sufficient sub-watershed areas would be protected via a system of AMMs during project design and development, so that natural sources of surface and sub-surface water influx and outflow remain intact, and potential development-related increases in impervious surfaces, runoff, and sources of water pollution are avoided or minimized (e.g., runoff from roads, roofs, paved surfaces, utility pipes, landscaped areas). Landscape-scale avoidance within the UDA watersheds would involve implementation of Stream Setbacks, protection of wetlands adjacent to streams, and LID measures that would be incorporated into urban development project design (as described in the SSHCP in Chapter 5). Implementation of landscape-scale avoidance strategies on 6,941 acres of land within the UDA watersheds would mitigate negative impacts to water quality and surface water runoff that could occur with urban development.

Three HUC-10 sub-watersheds occur within the UDA (Morrison Creek, American River, and Sherman Lake–Sacramento River). For first- and second-order streams[6] that flow through the UDA, a 25-foot setback buffer on either side would be enforced. The primary objective of this 25-foot buffer is to reduce sediment and nutrient inputs from surface flows in urban areas to protect water quality and habitat downstream. Dense urban adjacent land covers provide low habitat potential for Covered Species; however, a minimal buffer would reduce sediment and nutrient inputs, retain some potential for stream restoration, and provide recreational opportunities. For Morrison Creek, Gerber Creek, and Elder Creek, a Stream Setback of 100 feet on either side would be enforced. For preserve linkages that include creeks or streams, avoidance measures would include the creek or stream plus a minimum 300-foot setback on either side of the creek (in accordance with the process outlined in the SSHCP in Chapter 5, Section 5.6). The protective setback from Laguna Creek would be 150 feet wide on either side.

The SSHCP would require a robust strategy of avoidance of aquatic resources for Covered Activity projects proposed in the UDA. Project proponents who seek incidental take coverage under the SSHCP would be required by Land Use Authority Permittees or the Implementing Entity, whoever has jurisdiction over the project, to demonstrate efforts that avoid direct and indirect impacts to mapped aquatic resources pursuant to a Determination of Environmentally Equivalent or Superior Alternative (DEESA) project design requirement (see Section 5.2.2.1). Complete avoidance would be selected, if practicable. Part of the SSHCP stream mitigation policy within the UDA involves comprehensive landscape-scale avoidance of streams. Stream

[6] The SSHCP uses the Strahler stream order system where stream order is based on hierarchy of tributaries.

buffer widths within UDA watersheds were developed to meet adequate stream protection with goals such as: stabilize streambanks with vegetation; reduce erosion by uncontrolled runoff; reduce nutrient, sediments, and other contaminants loads; provide a visually appealing greenbelt; and provide recreational opportunities.

5.2.1.2 Avoidance and Preserve Assembly within Watersheds Outside UDA

The SSHCP Preserve Assembly sets goals that would preserve and link the highest-quality natural land covers, cropland, and irrigated pasture-grassland within the Plan Area (described in detail in the SSHCP in Chapter 7, Section 7.2.2.1), with a Preserve System 36,282 acres in size, and 27,554 acres of which would be located outside the UDA. Avoidance and minimization of aquatic resources would be accomplished through preserve design and assembly, which includes protecting the rarest types and highest-functioning aquatic resources (e.g., vernal pools, streams, certain seasonal wetlands) and implementing inter-preserve connectivity. The SSHCP Preserve System would be designed to protect watershed function, and specifically hydrologic regimes. This preserve design would be important to aquatic resources and water quality and its many existing and potential beneficial uses, and an important determinant of certain aquatic resource-dependent/associated plants and wildlife. It would also be designed to preserve natural upland landscapes associated with streams and wetland features for maintaining aquatic resource dependent/associated species—a strategy of primary importance. Upland landscapes adjacent to aquatic resources provide greater environmental benefits to aquatic functions and services and become another advantage to the overall avoidance and protection package of the SSHCP Conservation Strategy.

5.2.1.3 AMMs at the Landscape Scale

The SSHCP contains numerous requirements for avoidance and minimization of adverse impacts to aquatic resources. At a landscape scale, the SSHCP provides a framework for supporting avoidance and minimization of adverse impacts to aquatic resources in combination with a systematic landscape-level compensatory mitigation strategy. The SSHCP Conservation Strategy and Goal 2 of the associated Biological Goals and Measureable Objectives (SSHCP Chapter 7) describe requirements for implementing Covered Activities under the SSHCP.

The framework of requirements constituting the SSHCP's regional/landscape avoidance strategy include, but are not limited to, the following measures:

- Consistent with the USB and sphere of influence boundaries, directing impacts within the 317,655-acre Plan Area to an approximate 33,497-acre impact area, 32,059 acres of which would be inside the UDA and 1,448 acres of which would be outside the UDA.

The envelope is linked to areas within the UDA and certain pre-defined infrastructure projects outside of the UDA.

- Considering watershed needs within the Plan Area, habitat/biological functions have been found to be of primary importance to protect, while still preserving water quality and hydrology (chemical and physical functions). The SSHCP and ARP include the following components, which result in landscape-level avoidance of 22,502 acres of existing aquatic resources in the Plan Area:
    - Preservation into perpetuity of 15% (3,539 acres) of the Plan Area's existing potentially jurisdictional aquatic resources within the 36,282-acre Preserve System. The areas selected for avoidance under the SSHCP must be those that demonstrate higher habitat functions, per the Conservation Actions included in Table 7-1 in Chapter 7 of the SSHCP. However, most of the aquatic resources with high habitat functions also have high water quality and hydrology functions. Aquatic resources situated within proposed preserves are also afforded extra protection via adjacent natural upland buffers (i.e., the Preserve Setbacks) of a minimum of 50 feet in width (minimum 25 feet each side of the stream) to reduce edge effects. Note that 9,136 acres (38%) of aquatic resources in the Plan Area are already protected in existing preserves, which would become linked together by new preserves established under the SSHCP Conservation Strategy.
    - Of the other 11,419 acres of existing potentially jurisdictional aquatic resources in the Plan Area, approximately 9,827 acres (86%) would *not* be directly impacted by Covered Activities.
- Goal 2 of the SSHCP Conservation Strategy includes a Measureable Objective requiring avoidance of creeks in the UDA (a minimum of 10% avoidance required). However, the Plan would actually avoid 30% of all creek acreage in the UDA.
- Requirement for project proponents to establish Stream Setbacks. Avoided creeks (including ephemeral streams) would have minimum setback requirements based on specific objectives of the overall mitigation strategy (Table 27).

Table 27
Stream Setback Minimum Requirements in the UDA

Stream	Minimum Setback on Each Side (from the Top of Bank Measured in Aerial Perspective)
Laguna Creek	150 feet
Elder Creek	100 feet
Frye Creek	100 feet or as depicted as part of the NewBridge development project hardline Preserve (see Appendix K of the SSHCP)
Gerber Creek	100 feet
Morrison Creek	100 feet

Table 27
Stream Setback Minimum Requirements in the UDA

Stream	Minimum Setback on Each Side (from the Top of Bank Measured in Aerial Perspective)
Central Paseo	100 feet or as depicted as part of the Cordova Hills development project hardline Preserve (Appendix K of the SSHCP)
Sun Creek	100 feet or as depicted as part of the Sun Creek development project hardline Preserve (see Appendix K of the SSHCP)
Avoided 1st and 2nd Order Tributaries to Above Streams	25 feet

- Roadway construction or widening Covered Activities within the Plan Area would be subject to stream avoidance or minimization requirements (see AMMs ROAD-1, STREAM-1, STREAM-2, STREAM-3, STREAM-4, and STREAM-5 in SSHCP Section 5.4).
- The majority (55%) of impacts to vernal pools would occur outside the Mather Core Recovery Area. Vernal pool preservation, re-establishment, and establishment would be heavily weighted toward areas inside the Mather Core Recovery Area and the Cosumnes/Rancho Seco Core Recovery Area. The SSHCP would establish large and interconnected preserves in these Recovery Areas to protect a contiguous network of vernal pool habitat. Existing project-by-project permitting tends to result in a larger number of preserved pools, but ones that are isolated and more vulnerable to edge effects. In this way, the SSHCP would provide superior benefits to a rare aquatic resource as compared to a project-by-project permitting approach.
- On-site project requirements to maintain hydrologic conditions, minimize effects on downstream hydrology through stormwater retention and other measures (LID), mandatory construction monitoring near Covered Species aquatic habitat, and mandatory implementation of erosion control measures during project construction "scale up" such that the overall Plan Area would not experience a net loss of aquatic resources functions and services.
- Compensatory mitigation Covered Activities (re-establishment, establishment, preservation of aquatic resources) would be strategically located within the preserved areas where they would provide maximum functional gain. This would occur programmatically within the Plan Area. This singular approach to compensatory mitigation is better than could be achieved by a project-by-project permitting approach.
- The USACE's General Permit (GP) general conditions and any updates to those conditions would be proposed to require compliance with appropriate SSHCP AMMs and be tailored for protection of the aquatic resources in the Plan Area.

- The Plan Permittees have requested that the USACE develop a GP(s) (RGP/PGP) that would propose a per-project impact thresholds (caps), which in addition to assuring minimal individual and cumulative environmental impacts, would provide incentive for individuals and organizations to avoid aquatic resources in project planning, in order to qualify for using a GP(s) (see Chapter 7).
- The proposed RGP/PGP may also require overall impact threshold caps to limit the overall amount of direct impacts (loss) of aquatic resources during any single 5-year span of the GP(s) so that impacts to aquatic resources can be monitored and adaptive management can be implemented as necessary.
- For impacts within the UDA, caps would be tailored to address protection of streams as they are crucial to implementation of corridors in the SSHCP Preserve System. As such, a minimum of 20% of first and second order tributaries to Elder Creek, Frye Creek, Gerber Creek, Morrison Creek, Paseo Central, and Sun Creek in the UDA would be avoided. Plan-wide, 90% of all streams would be avoided, and outside the UDA, all headwaters would be avoided.

AMMs applied across the entire Plan Area would quicken the permitting process for Covered Activities and would allow the regulated public as a whole to contribute to the implementation of the overall avoidance and minimization of aquatic resources within the development envelope and the formation of a large, connected conservation system. Such outcomes would not be possible under the project-by-project review process.

5.2.2 Project Scale

5.2.2.1 AMMs at the Project Scale

In addition to ensuring avoidance and minimization at a landscape scale, the SSHCP and ARP also require project-scale avoidance and minimization. Goal 2 of the SSHCP Conservation Strategy Biological Goals and Measurable Objectives is to "Maintain or improve physical, chemical and biological functions of aquatic resources within the Plan Area." Each project proposed within the Plan Area would need to conform to the following procedure to ensure that adequate avoidance and minimization requirements have been met.

As Covered Activity projects are proposed within the Plan Area, an assessment of the potential on-site effects of those Covered Activity projects on aquatic resources shall be performed using available information supplied by the SSHCP and ARP, augmented by project-specific mapping provided to and reviewed by the Plan Permittees prior to submittal to the USACE, RWQCB, and CDFW (see Section 10.4.3.3 in Chapter 10 of the SSHCP).

The documentation for the project-scale assessment shall include mapping (which for greatest accuracy in informing project-scale AMMs is suggested to utilize a project's aquatic resources delineation mapping prepared in accordance with the Sacramento District USACE's minimum standards for aquatic resources delineations), and a description of the functions and services of the mapped areas' aquatic resources. Factors to be considered to describe the functions and services include hydrologic regime, flood storage and flood flow modification, nutrient retention and transformation, sediment trapping and transport, toxicant trapping, and maintenance of plant and animal communities. Many of these factors would already have been given consideration, and existing information from the SSHCP and ARP can be utilized and augmented if necessary. The functions and services assessment would focus on the current functions and services being provided, particularly for those areas that should be considered for priority acquisition for the SSHCP Preserve System, as well as those functions that may affect aquatic resource diversity, abundance, and condition; and/or conservation of Covered Species within the SSHCP Preserve System.

For aquatic resources proposed to be impacted, applicable mitigation shall be required by the Plan Permittees, as follows. To ensure that these standards are met, Land Use Authority Permittees or the Implementing Entity, depending on who has jurisdiction over the project, shall require that project proponents develop on-site project alternatives demonstrating efforts that first avoid, and then minimize direct and indirect effects to the aquatic resources mapped pursuant to this section. A complete on-site avoidance alternative shall be selected by the Land Use Authority Permittees or Implementing Entity, depending on who has jurisdiction over the project, and if practicable, while taking into account the SSHCP and ARP Conservation Strategy.

If a complete avoidance alternative is not practicable as determined by the Implementing Entity or Land Use Authority Permittees, depending on who has land use jurisdiction over the project, an alternative that minimizes direct and indirect impacts to aquatic resources and associated functions and services to the greatest extent practicable shall be selected. Those impacts that are unavoidable shall be mitigated (minimized and compensated) such that the lost functions and services are replaced as set forth below under the DEESA.

Determination of Environmentally Equivalent or Superior Alternative

Consistent with the regional Conservation Strategy of the SSHCP, the following is an approach that gives consideration to on-site avoidance and minimization. The guiding principles for the SSHCP Conservation Strategy (Section 7.1 of Chapter 7 of the SSHCP) emphasize establishment of large and interconnected preserves, which is not compatible with the typical approach of on-site avoidance. That existing approach tends to result in many small, isolated aquatic resources that are subject to edge effects and provide reduced habitat value compared to large preserves. If a complete avoidance alternative is not practicable and an alternative is selected as set forth

above, a DEESA shall be made by the Land Use Authority Permittees or the Implementing Entity, depending on who has land use jurisdiction over the project, to ensure replacement of any lost functions and services to aquatic resources. The DEESA shall be submitted with the Project Application and shall include the following information to be supplied by the proponent and reviewed by the Land Use Authority Permittees or the Implementing Entity, depending on who has jurisdiction over the project, for accuracy and consistency with the SSHCP and ARP:

- A defined project area boundary and project area acreage.
- A detailed project description, including an overall project purpose statement, that demonstrates: (1) why an avoidance alternative is not practicable;[7] and (2) that the Covered Activity project minimizes direct and indirect effects to aquatic resources to the greatest extent practicable. This description would include information regarding any aquatic resources on site that are proposed to be avoided. It would also include information regarding any impacted aquatic resources in the context of the regional Conservation Strategy of the SSHCP (e.g., a statement that the project proposal is consistent with the requirements of the SSHCP and any terms and conditions of the SSHCP ITPs).
- Amount (acres and linear feet and cubic yards) of unavoidable impacts (permanent, causing loss of waters, and temporary) to aquatic resources associated with the project, and amount of indirect impacts.
- A detailed description of project design features and mitigation measures that reduce impacts, including but not limited to, impact minimization; on-site first-order stream realignment (as opposed to removal); and SSHCP BMPs, AMMs, and LID AMMs.
- A description and amount of SSHCP-required compensatory mitigation through re-establishment, establishment, and/or preservation. Compensatory mitigation must conform to the SSHCP Conservation Strategy and the minimum mitigation ratios required by the ARP and must be consistent with the USACE/EPA Mitigation Rule (33 CFR Part 332). The primary way development project Covered Activities would accomplish the required mitigation is the purchase of credits from an ILF program that would be used for the Plan Area. (See Section 5.3 for specific compensatory mitigation requirements.)

[7] Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose.

- A finding that demonstrates that although the proposed Covered Activity project would not completely avoid impacts to aquatic resources, with proposed design and compensation measures, the project would be environmentally equivalent or superior to that which would occur under a complete avoidance alternative without these measures, based on one or more of the following factors:
    - Effects on designated Critical Habitat and Core Recovery Areas
    - Effects on the diversity of aquatic resources within the Plan Area
    - Effects on vernal pool and other habitat connectivity and function of the SSHCP Preserve System
    - Effects on the condition of aquatic resources within the Plan Area
    - Effects on the abundance of aquatic resources within the Plan Area
    - Effects on Covered Species.

A written record of DEESAs shall be maintained by the Land Use Authority Permittees or Implementing Entity, depending on who has land use jurisdiction over the project. When a PGP (and/or other type of general permit, e.g., RGP) is verified, a written record of DEESA shall be included in the annual reporting documentation prepared by the Implementing Entity and submitted to the regulatory agencies. If a project is authorized using a LOP or SP, then a written record of DEESA would be provided as part of the application that is submitted to the USACE for review.

In addition to the avoidance and minimization requirements associated with the above DEESA procedure, the SSHCP has a number of other resource protection measures that help avoid and minimize impacts to aquatic resources. These objectives are set forth in the SSHCP Conservation Strategy Measureable Objectives W-1 through W-6 for SSHCP Biological Goal 2, *Maintain or improve physical, chemical, and biological function of aquatic resources within the Plan Area* (Table 7-1 in SSHCP Chapter 7) and the SSHCP AMMs (ARP Table 28 and SSHCP Section 5.4).

An avoidance measure of primary importance to the hydrologic and ecological connectivity of the SSHCP Preserve System is the requirement for establishment of Stream Setbacks, as described in this section of the ARP and in SSHCP Section 5.4. SSHCP Stream setbacks only apply to streams that are within the UDA. Setbacks have not been established for any of the rivers in the Plan Area as they are all located outside of the UDA. Some reaches of the Cosumnes River would be protected via implementation of the SSHCP Conservation Strategy.

A cohesive strategy of Stream Setback avoidance (the landscape adjacent to the aquatic resource) is an added measure of stream protection afforded under the framework of the SSHCP that would not be possible under the conventional review process. Width of specific Stream Setbacks would

be determined by SSHCP AMM STREAM-2. In addition, a 150-foot setback measured from the top of the bank on both sides of the stream would be applied to Laguna Creek within the UDA (minimum 300-foot corridor width). If trails are located within the wildlife corridor, the nearest edge of the trail would be located at least 80 feet from the top of bank. Laguna Creek's setback width is larger, set at 300 feet, because it serves as a buffer to absorb pollutants and as a corridor to preserve and protect habitat for the movement of plants and animals between otherwise separated preserves. A 100-foot setback measured from the top of the bank on either side of the stream channel would be required for the following creeks located within the UDA: Elder Creek, Frye Creek, Gerber Creek, Morrison Creek, Paseo Central, and Sun Creek. Within the UDA, the setback for these creeks would generally protect habitat of plant and animal species, filter sediments and other contaminants and allow for maintenance and restoration of riparian vegetation. While not specifically designed as a wildlife corridor in the same manner as Laguna Creek, these creeks have the potential to function as movement corridors for many native species, and to provide habitat functions within the UDA. In addition to Laguna Creek, Elder Creek, Frye Creek, Gerber Creek, Morrison Creek, Paseo Central, and Sun Creek, a setback width of 25 feet would be required for all first and second order streams that are avoided. These streams are smaller, typically ephemeral but still play a role in overall water quality protection. When an avoided stream reach in the UDA supports riparian vegetation, the setback would be equal to the riparian edge plus 25 feet or the setback defined above, whichever is greater. If trails are located within the Stream Setback, the nearest edge of the trail would be located at least 50 feet from the top of bank. This would protect downstream reaches by reducing loads of sediment and other contaminants.

The limits and uses of the Stream Setback system would be well defined by the Implementing Entity or local Land Use Authority Permittees, depending on who has jurisdiction over the project, during the preservation and urban development process. Stream protection provided by the setback system would preserve and link the highest-quality natural land covers.

Temporary and permanent re-routing of stream channel or activities involving channel widening or deepening as part of the Urban Development Covered Activity would incorporate a suite of AMMs designed to maintain biological, physical, and chemical integrity of streams in the Plan Area. These measures include the utilization of BMPs for construction equipment, bioengineering practices, and actions to maintain overall stream function. These practice details are listed in SSHCP Section 5.4.1, the BMP AMMs, and STREAM-4 and STREAM-5. These measures are more stringent than current standards within the Plan Area.

Table 28
Summary of SSHCP Aquatic Resources Protection

Measure	Description of Measure Applicable to Aquatic Resources	Applicability				Above Existing Requirements?	How General Permit Conditions are Addressed, If Any
		UDA	*Non-UDA*	*HCP*	*ARP*		
SSHCP Conservation Strategy Biological Goals (Table 7-1 of SSHCP)							
SSHCP Goal 2	Maintain or improve physical, chemical, and biological functions of aquatic resources within the Plan Area.	●	●	●	●	Yes	—
SSHCP Conservation Strategy Measurable Objectives (Table 7-1 of SSHCP)							
Objective W1 of Goal 2	Ensure that during implementation of Objective L2 (establishing 11 linkage preserves), the linkages that include creeks or streams will include the creek plus a minimum 300-foot setback on each side of the creek, in accordance with the process outlined in Section 5.6.	●	●	●	●	Yes	Addresses OGC-5.
Objective W2 of Goal 2	Covered Activities shall implement stream setback requirements in the UDA for creeks and streams as described in Section 5.6.	●		●	●	Yes	Addresses OGC-5.
Objective W3 of Goal 2	Covered Activities shall implement the following, as outlined in Section 5.4.2: Design AMMs (Low-Impact Development (LID) and ROAD Measures) Ground disturbance AMMs (Best Management Practices (BMPs) and ROAD Measures)	●	●	●	●	No (County/USACE)	Addresses RGC-12 and NWP-12
Objective W4 of Goal 2	Ensure that aquatic resources are preserved and managed during preserve assembly (see Objectives VP1, VG1, VG2, VP3, SW1, FWM1, ES1, SC1, OW1, RIP1, and RIP3).	●	●	●	●	Yes	—
Objective W5 of Goal 2	Ensure that aquatic resources are established or re-established during preserve assembly (see Objectives VP2, SW2, FWM2, OW2, RIP2, and RIP4).	●	●	●	●	Yes	—
Objective W6 of Goal 2	Avoid a minimum of 10% of the SSHCP land cover type Streams/Creeks (Invertebrate Habitat) in the UDA.	●		●	●	Yes	Addresses OGC-5.
SSHCP AMMs for Covered Activities (Section 5.4 of SSHCP)							
LID-1: Stormwater Quality	Incorporate stormwater management into site designs to satisfy requirements of the Stormwater Quality Design Manual for the Sacramento and South Placer Regions.	●	●	●	●	No (County/RWQCB)	—
LID-2: Groundwater Recharge	When siting preserves, consider locations that are also suitable for groundwater recharge.	●		●	●	No (County)	—
LID-3: Natural Site Features	Preserve and use natural site features (e.g., creeks, streams) to retain existing hydrologic patterns and retain Covered Species habitat.	●	●	●	●	No (County)	—
STREAM-1: Laguna Creek Wildlife Corridor	150-foot setback from top of bank along Laguna Creek within the UDA.	●		●	●	Yes	—
STREAM-2: UDA Stream Setbacks	100-foot setbacks from top of bank along Elder Creek, Frye Creek, Gerber Creek, Morrison Creek, Paseo Central, Sun Creek.	●		●	●	Yes	—
STREAM-3: Minor Tributaries to UDA Streams	Apply 12.5-foot setback from each side of top of bank along avoided first- and second-order tributaries to Elder Creek, Frye Creek, Gerber Creek, Morrison Creek, Paseo Central, Sun Creek, and Laguna Creek.	●		●	●	Yes	—
STREAM-4: Minimize Effects from Temporary Channel Re-Routing	When diverting water from a stream channel via coffer dams or other means, minimize impacts to existing habitat through specific design and construction best management practices.	●	●	●	●	Yes	—
STREAM-5: Design for Stream Channel Re-Routing, Widening or Deepening	When altering a stream channel, incorporate design features that re-establish natural conditions (hydrology, surface flow, substrate, vegetation, etc.).	●	●	●	●	Yes	—
BMP-1: Construction Fencing	Temporarily stake out and identify all aquatic resources and setback areas between development and protected areas as non-disturbance areas during construction.	●	●	●	●	No (County/USACE)	Addresses RGC-12
BMP-2: Erosion Control	Install acceptable erosion control barriers to protect aquatic resources from any Covered Activities that may cause erosion.	●	●	●	●	No (County/USACE)	Addresses NWP-12
BMP-3: Equipment Storage and Fueling	Site equipment storage, fueling, and staging areas avoid and minimize discharge into aquatic resources.	●	●	●	●	No (County)	—

Table 28
Summary of SSHCP Aquatic Resources Protection

Measure	Description of Measure Applicable to Aquatic Resources	Applicability				Above Existing	How General Permit Conditions are Addressed, If Any
BMP-4: Erodible Materials	Avoid deposition of erodible materials in waterways during construction or maintenance (e.g., cleaning culverts, subdrains, roadsides, or other road/flood control facility). Do not stockpile brush, loose soils, or other debris material within stream channels or on adjacent banks. Dispose of materials so that they cannot enter an aquatic resource. If water and sludge must be pumped from a subdrain or other structure, convey the material to a settling basin to prevent sediment from entering a waterway.	●	●	●	●	No (County/USACE)	Addresses NWP-12
BMP-5: Dust Control	Minimize aerial drift of sediments and airborne pollutants into aquatic resources.	●	●	●	●	No (County)	—
BMP-6: Construction Lighting	Not relevant to aquatic resources.	●	●	●		No (County)	—
BMP-7: Biological Monitor	Construction monitoring by qualified biologist to ensure compliance with BMPs.	●	●	●	●	No (County)	—
BMP-8: Training of Construction Staff	Training of construction staff to avoid aquatic resources.	●	●	●	●	No (County)	—
BMP-9: Soil Compaction	Treat all temporarily disturbed areas following construction to remove compaction and restore infiltration capacity, soil chemistry, and hydrologic characteristics similar to natural conditions.	●	●	●	●	No (County)	Addresses NWP-11
BMP-10: Revegetation	Cover and revegetate repaired surfaces of earthen flood-control channels, except in cases where soil would be expected to erode rapidly, such as during the rainy season or in channels with hardened bank.	●	●	●	●	No (County/USACE)	Addresses NWP-12 and NWP-13
EDGE-1: Compatible Land Uses	Site parkways, detention basins, and designated open space adjacent to setbacks and preserve/linkage boundaries to provide storage of stormwater flows and additional buffering.	●		●	●	Yes	—
EDGE-2: Single-Loaded Streets	Not relevant to aquatic resources.	●		●		Yes	—
EDGE-3: Preserve Setbacks	Reduce changes to surface hydrology and perched aquifer supporting vernal pools, and other types of disturbance from adjacent development on preserves, including aquatic resources.	●		●	●	Yes	—
EDGE-4: Locate Stormwater Control Outside Preserves	Stormwater flows must be directed away from preserves and preserve setbacks, and directed into stormwater control facilities inside the development.	●		●	●	Yes	—
EDGE-5: Stormwater Control in Preserve Setbacks	Design bioretention swales and other methods to prevent stormwater flows into preserves/linkages with aquatic resources.	●	●	●	●	Yes	—
EDGE-6: Detention Basins in Linkage Preserves	Detention basins within Linkage Preserves designed and constructed so as not to impact the duripan or hardpan. Basins would capture storm flows and summer runoff and discharge to stormwater facilities or bio-swales and through percolation and discharge to the perched aquifer.	●		●	●	Yes	—
EDGE-7: Hardpan/ Duripan Protection	Minimize indirect impacts to aquatic resources by limiting disruption of the soil duripan.	●	●	●	●	Yes	—
EDGE-8: Outdoor Lighting	Not relevant to aquatic resources.	●	●	●		Yes	—
EDGE-9: Livestock Access to Preserves	Design preserve access in such a way that livestock used for vegetation management don't damage aquatic resources.	●	●	●	●	Yes	—
EDGE-10: Prevent Invasive Species Spread	Maintain areas near Preserves to prevent spread of invasive non-native species that could reduce aquatic habitat function.	●	●	●	●	Yes	—
ROAD-1: Road Project Location	Site roads to minimize impacts on aquatic resources.	●	●	●	●	Yes	—
ROAD-2: Wildlife Crossing Structures	Design of culverts would be increased in diameter to allow for movement of wildlife; would also allow for increased flood flows.	●	●	●	●	Yes	Addresses NWP-3
ROAD-3: Roadside Pesticide Use	Use herbicides and pesticides only when necessary (e.g., to control invasive organisms that threaten covered species or their habitats). Application in strict compliance with label requirements and state and federal regulations, and only when weather conditions minimize drift and impacts on non- target sites.	●	●	●	●	Yes	—

Table 28
Summary of SSHCP Aquatic Resources Protection

Measure	Description of Measure Applicable to Aquatic Resources	Applicability				Above Existing	How General Permit Conditions are Addressed, If Any
NATURE TRAIL-1: Trail Plan	Nature Trails would be designed and sited to avoid impacts to aquatic resources.	●		●	●	Yes	—
NATURE TRAIL-2: Trail Protection of Duripan	Nature Trails would not interfere with the perched aquifer supporting the existing hydrologic regime of the vernal pool-grassland, and would not interfere with existing pool hydrology.	●		●	●	Yes	—
NATURE TRAIL-3: Trail Location	Nature Trails would be located away from sensitive aquatic resources.	●		●	●	Yes	—
NATURE TRAIL-4: Biological Studies Prior to Trail Design	Studies (e.g., wetland delineations) prior to trail design to identify sensitive aquatic resources that must be avoided.	●		●	●	Yes	—
NATURE TRAIL-5: Monitoring of Trail Impacts	Use of Nature Trails would be discontinued if monitoring indicates aquatic resources are being adversely impacted.	●		●	●	Yes	—
RE-ESTABLISHMENT/ ESTABLISHMENT-1: Vernal Pool	Created vernal pools would be designed to replicate historical density and range of vernal pool sizes, and must not impact the hydrology of existing vernal pools.	●	●	●	●	Yes	—
RE-ESTABLISHMENT/ ESTABLISHMENT-2: Vernal Pool Inocula Bank)	A vernal pool inocula bank would be established that stores soils removed from impacted vernal pools; these soils would be used when re-establishing/establishing vernal pools to maximize colonization by native vernal pool plants and invertebrates.	●	●	●	●	Yes	—
UTILITY-1: Avian Collision Avoidance	Not relevant to aquatic resources.	●	●	●		Yes	—
UTILITY-2: Utility Maintenance on Preserves	Avoid creating new disturbance to aquatic resources when accessing utilities for maintenance.	●	●	●	●	Yes	—
UTILITY-3: Trenchless Construction Methods	Avoidance of direct impacts to surface waters and indirect impacts to aquatic resources on existing or conceptual preserves by limiting disruption of the soil duripan.	●	●	●	●	Yes	—
UTILITY-4: Siting of Entry and Exit Location	Entry and exit locations for the trenchless construction method would be sited to avoid impacts to vernal pools and riparian woodland.	●	●	●	●	Yes	—
LEVEE-1: Preparation of Hydrologic Analysis	Prior to approving a draft Preserve management plan that (1) includes modifying or breaching an existing levee, or (2) would place a potential impedance to high-water event flood-flows on the water side of an existing levee (including new riparian vegetation plantings, or other new preserve facilities), a hydrologic analysis would be conducted. The Preserve activity would only be implemented if the hydrologic analysis concludes that the activity would not result in a substantial increase in flood stage elevations or flood risk on lands outside the Preserve.	●	●	●	●	Yes	NWP-10
2012 Nationwide Permit General Conditions							
NWP-2	Avoid activities in spawning areas during spawning seasons.	●	●	●	●	No (USACE/NMFS)	—
NWP-3	All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of indigenous aquatic species.	●	●	●	●	No (USACE)	Addressed by ROAD-2: UDA Wildlife Crossing Structures
NWP-4	Avoid activities in waters of the United States that serve as breeding areas for migratory birds to the maximum extent practicable.	●	●	●	●	No (MBTA)	Added to SSHCP Chapter 10, Project Application Process
NWP-5	Avoid shellfish populations (Not Applicable)					—	—
NWP-6	No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts.	●	●	●	●	No (County/USACE)	Addressed by BMP-4: Erodible Materials and also added to SSHCP Chapter 10, Project Application Process.
NWP-7	Avoid activity near a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-8	Minimize adverse effects from impoundments.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-9	Maintain the pre-construction course, condition, capacity, and location of open waters for each activity, including stream channelization and stormwater management activities.	●	●	●	●	No (USACE/CDFW)	Added to SSHCP Chapter 10, Project Application Process

Table 28
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Measure	Description of Measure Applicable to Aquatic Resources	Applicability				Above Existing	How General Permit Conditions are Addressed, If Any
NWP-10	Comply with applicable FEMA-approved state or local floodplain management requirements.	●	●	●	●	No (USACE/FEMA/ County)	LEVEE-1, Added to SSHCP Chapter 10, Project Application Process
NWP-11	Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-12	Use and maintain appropriate soil erosion and sediment controls during construction, and stabilize as early as practicable all exposed soil and other fills, as well as any work below the ordinary high-water mark. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.	●	●	●	●	No (County/USACE)	Addressed by BMP-2: Erosion Controls, BMP-4: Erodible Materials, BMP-10: Revegetation
NWP-13	Remove all temporary fills and return affected areas to pre-construction elevations. The affected areas must be revegetated, as appropriate.	●	●	●	●	No (County/USACE)	Addressed by BMP-4: Erodible Materials, BMP-10: Revegetation
NWP-14	Any authorized structure or fill shall be properly maintained.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-15	The activity must be a single and complete project. The same permit cannot be used more than once for the same single and complete project.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-16	No activities in Wild and Scenic Rivers or in a river under study for possible inclusion.	●	●	●	●	No (USACE, California Resources Agency, others)	Added to SSHCP Chapter 10, Project Application Process
NWP-17	No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-18	Compliance with the Endangered Species Act.	●	●	●	●	No (USFWS)	Inherent to an SSHCP
NWP-19	Compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Projection Act.	●	●	●	●	No (MBTA/USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-20	Compliance with Section 106 of the National Historic Preservation Act.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-21	Required response to the discovery of unknown historic or archeological remains.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-22	Requirements related to Critical Resource Waters (Not Applicable)					—	—
NWP-23	Description of project mitigation (avoidance, minimization, compensation). Evidence of an appropriate in-lieu fee.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-24	Demonstrate that all impoundment structures are safely designed.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-25	Requirement for Section 401 Water Quality Certification.	●	●	●	●	No (USACE/RWQCB)	Added to SSHCP Chapter 10, Project Application Process
NWP-26	Coastal Zone Management Zone consistency (Not Applicable)					—	—
NWP-27	Comply with any Regional Conditions (see below) or Specific Conditions added by the USACE or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification.	●	●	●	●	No (USACE/RWQCB)	Added to SSHCP Chapter 10, Project Application Process
NWP-28	Use of more than one permit for a single and complete project is prohibited.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-29	Requirements associated with transferring the permit verification if the permittee sells the property associated with the permit. Requirements for the contents of a letter from the permittee along with transference of the permit verification.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-30	Provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
NWP-31	Pre-Construction Notification (Not Applicable)					—	—
Sacramento District Regional General Conditions to the 2012 Nationwide Permits							
RGC-1	Include with PCN demonstration of compliance with all General and Regional Conditions. (Not Applicable)					—	Not Applicable
RGC-2	Pre-Construction Notification (Not Applicable)					—	Not Applicable

Table 28
Summary of SSHCP Aquatic Resources Protection

Measure	Description of Measure Applicable to Aquatic Resources	Applicability				Above Existing	How General Permit Conditions are Addressed, If Any
RGC-3	Record NWP Permit verification with Registrar of Deeds or other appropriate official. (Not Applicable)					—	Not Applicable
RGC-4	Preserve all avoided waters of the United States in legally protected preserves and maintain in perpetuity.	•	•	•	•	No (USACE)	Inherent to the SSHCP, also added to SSHCP Chapter 10, Project Application Process
RGC-5	For all activities resulting in temporary fill in waters of the United States a) Use fill materials consisting of cleaned and washed gravel; b) Clearly delineate the existing ground elevation of waters temporarily filled during construction; c) Remove all temporary fill within 30 days of completion of construction activities.	•	•	•	•	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
RGC-6	Apply the following to all road crossings: a) for all activities in waters of the United States that are suitable habitat for federally listed fish species, road crossings must not hinder passage or spawning of fish; b) road crossings shall be designed to ensure that no more than minor impacts would occur to fish and wildlife passage or expected high flows; no construction activities within standing or flowing waters; d) bank stabilization for road crossings must comply with Regional Condition 19. In no case shall stream crossings result in a reduction in the pre-construction bankfull width or depth of perennial streams or negatively alter the flood control capacity of perennial streams.	•	•	•	•	No (USACE)	Addressed by ROAD-2: UDA Wildlife Crossing Structures
RGC-7	Lead federal agency shall provide all relevant documentation to the USACE demonstrating any previous consultation efforts, as it pertains to the USACE Regulatory permit area (for Section 7 and EFH compliance) and the USACE Regulatory area of potential effect (APE) (for Section 106 compliance).	•	•	•	•	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
RGC-8	Additional documentation required for NWPs that require Pre-Construction Notification (Not Applicable).					—	Not Applicable
RGC-9	For permittee responsible mitigation, develop and submit to the USACE for review and approval, a final comprehensive mitigation and monitoring plan for all permittees responsible mitigation prior to commencement of construction activities within waters of the United States.	•	•	•	•	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
RGC-10	The permittee shall complete the construction of any compensatory mitigation required by special condition(s) of the NWP verification before or concurrent with commencement of construction of the authorized activity,	•	•	•	•	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
RGC-11	The permittee is responsible for all authorized work.	•	•	•	•	No (USACE)	Already addressed in SSHCP Implementation Chapter and built into the SSHCP
RGC-12	Requirements to clearly identify the limits of disturbance in the field.	•	•	•	•	No (County/USACE)	Addressed by BMP-1: Construction Fencing
RGC-13	When a Pre-Construction Notification is required, the permittee shall notify the appropriate district office of the start date for the authorized work within 10 days prior to initiation of construction activities. (Not Applicable)					—	Not Applicable
RGC-14	Requirement to allow Corps representatives to inspect the project site.	•	•	•	•	No (USACE)	Added to HCP Chapter 10, Project Application Process
RGC-15	Revocation of NWPs for activities located in the Mather Core Recovery Area that may affect vernal pools. (Not Applicable)					—	Not Applicable
RGC-16	Revocation of NWPs for activities located in the Primary or Secondary Zone of the Legal Delta. (Not Applicable)					—	Not Applicable
RGC-17	For all activities within the Secondary Zone of the Legal Delta, the permittee shall conduct compensatory mitigation for unavoidable impacts within the Secondary Zone of the Legal Delta. (Not Applicable)					—	Not Applicable
RGC-18	Requirements for construction of utility lines under NWP 12. (Not Applicable)					—	Not Applicable
RGC-19	Requirements for bank stabilization activities under NWP 13 and 14. (Not Applicable)					—	Not Applicable

Table 28
Summary of SSHCP Aquatic Resources Protection

Measure	Description of Measure Applicable to Aquatic Resources	Applicability				Above Existing	How General Permit Conditions are Addressed, If Any
RGC-20	Requirements for Pre-Construction Notification under NWP 23. (Not Applicable)					—	Not Applicable
RGC-21	Requirements for Pre-Construction Notification under NWP 27. (Not Applicable)					—	Not Applicable
RGC-22	Restrictions on channelization or relocation of intermittent or perennial drainages under NWPs 29 and 39. (Not Applicable)					—	Not Applicable
RGC-23	Requests to waive linear foot limitations for intermittent and ephemeral streams under NWPs 1, 13, 29, 39, 40, 42, 43, 44, 50, 51, or 52. (Not Applicable)					—	Not Applicable
RGC-24	Requirements for upland vegetated buffers under NWPs 29, 39, 40, 42, and 43. (Not Applicable)					—	Not Applicable
RGC-25	Under NWP 46, the discharge shall not cause the loss of greater than 0.5 acre of waters of the United States or the loss of more than 300 linear feet of ditch, unless specifically waived in writing by the USACE. (Not Applicable)					—	Not Applicable
RGC-26	All NWPs except 3, 6, 20, 27, 32, and 38 are revoked for activities in histosols, fens, bogs and peatlands and in wetlands contiguous with fens. (Not Applicable)					—	Not Applicable
Other General Conditions							
OGC-1	The PGP expiration date.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-2	Plan Permittees shall require that project applicants develop on-site project alternatives demonstrating efforts that first avoid, and then minimize direct and indirect effects to the aquatic resources mapped pursuant to this section and shall review these alternatives with the Plan Permittee. A complete on-site avoidance alternative shall be selected, if practicable, while taking into account the regional alternatives analysis completed through the SSHCP and ARP.	●	●	●	●	No (USACE)	SSHCP Chapter 12 addresses to some extent, but is also added to Project Application Process (Chapter 10)
OGC-3	Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity, as well as the location of delineated waters of the United States on the site.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-4	Numbered and dated pre-project color photographs.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-5	Linear foot impact limitations to particular streams.	●	●	●	●	No (USACE)	Derived from new Goal 2 Objective W-6.
OGC-6	Dewatering plan, if applicable.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process, but requirements are specified for Covered Species.
OGC-7	Proposed construction schedule.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-8	Any other information pertinent to the stream channel or wash involved.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-9	A list of all other permits and authorizations as required by law, ordinance, or regulation.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-10	Acreage and linear foot impacts triggering an LOP or SP with the USACE.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-11	Requirements for as-built drawings post-construction.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-12	Requirement for a Department of the Army Standard Permit where the District Engineer determines impacts to aquatic resources may be more than minimal, individually or cumulatively, as a result of the proposed work.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-13	Annual inspections to ensure activities authorized under this permit do not result in more than minimal impacts to waters of the United States.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process
OGC-14	No activity is authorized under this permit which is not in conformance with the SSHCP.	●	●	●	●	No (USACE)	Added to SSHCP Chapter 10, Project Application Process

5.3 Compensatory Mitigation

The central goal of compensatory mitigation for Covered Activities authorized under the SSHCP permitting framework is to maintain and improve the aquatic resources diversity, abundance, condition, and ecological connectivity across the Plan Area's differing landscape and geomorphic settings. A comprehensive preserve system would be assembled thorough protocols, described in detail in Appendix D, and outlined in 33 CFR Part 325 Sections 332.4(c)(2) through (c)(14) of the USACE's Mitigation Rule.

All Covered Activity projects proposed under the SSHCP and ARP would conform to a systematic mitigation strategy that includes the avoidance and minimization requirements of the previous subsections as well as the comprehensive compensatory mitigation strategy. Table 13 summarizes the potential maximum impacts. These potential impacts to aquatic resources over the 50-year term of the SSHCP (1,613 acres including 262 linear miles of non-wetland waters) would be compensated through the following: re-establishment/establishment of 1,613 acres of aquatic resources including re-establishment/establishment of 262 linear miles or 294 acres of non-wetland waters[8], 855 acres of wetland waters, and 464 acres of riparian habitat . Riparian establishment or re-establishment would occur that would be CDFW jurisdictional and may also be CWA 404/401 jurisdictional; and 2,248 acres of aquatic resources would be preserved.

A key component of the SSHCP's Conservation Strategy is the SSHCP Preserve System that would establish a network to systematically protect natural areas inside and outside of the UDA. Approximately 36,282 acres of new SSHCP Preserve lands would be established within the Plan Area by the end of the 50-year SSHCP. This is approximately 11% of the overall Plan Area. When considered together with the existing preserved lands in the Plan Area, the total amount of preserved land would total 99,030 acres, or 31.0%, of the Plan Area. The SSHCP Conservation Strategy is based on guiding principles of conservation biology and landscape ecology with goals and objectives to: minimize habitat fragmentation by forming large preserves and maintaining habitat linkages between preserves, protect watersheds and their ecosystem functions through sub-watershed preservation and conservation of streams and associated water quality, preserve irreplaceable and threatened resources, minimize indirect edge effects, utilize setbacks, and maintain Plan Area land cover heterogeneity within preserves. The SSHCP and ARP's proposed aquatic resources preservation would occur within the conceptual SSHCP Preserve System. All preservation would meet the standards and requirements of the Mitigation Rule (33 CFR 332.3[h]).

[8] The 262 linear miles on non-wetland waters includes Streams/Creeks (Intermittent and Perennial) and Streams/Creeks VPIH (Ephemeral). The 262 linear miles equates to 294 acres.

Compensatory mitigation in the form of aquatic resource re-establishment and establishment would also be placed within the SSHCP Preserve System. The Re-establishment and Establishment Guidelines (Appendix D) describe protocols for restoring and establishing aquatic resources within the Plan Area. These guidelines provide the outline, (consistent with SPD's 2015 Regional Compensatory Mitigation and Monitoring Guidelines), for how compensatory mitigation projects would be planned, designed, implemented, and managed such that the projects would be viable into perpetuity and would adequately compensate for unavoidable impacts to aquatic resources. In order to determine the re-establishment and establishment potential in the Plan Area and in each watershed, the SSHCP Permittees took an inventory available land suitable for re-establishment and/or establishment in order to maximize the amount of mitigation replaced within the watershed. This inventory was based upon the future state of the Plan Area, accounting for impacts from SSHCP Covered Activities.

Costs for the aquatic resources compensatory mitigation projects would be covered through the Covered Activity project mitigation fees collected under the SSHCP. Fees under the SSHCP are set at levels that fully offset the cost of compensating for the unavoidable impacts to aquatic resources. The SSHCP includes a fee structure that is distinguished by land cover type. This approach accounts for variations in costs associated with the particular requirements for each land cover type. Each new project would pay fees based on the land cover types affected by the development project and the fee schedule. The SSHCP fees were estimated on a per-acre-of-development basis, i.e., the fee represents the payment required to compensate for 1 acre of development of that land cover type. Re-establishment and establishment costs were estimated by taking into account costs associated with site reconnaissance, soil testing, engineering and preparation of construction drawings and specifications, land acquisition, staking, earthwork, plant and seed procurement, planting/seeding, and installation of irrigation system. Additionally, re-establishment and establishment projects must also account for costs associated with short-term monitoring and maintenance (5 to 10 years after projects are in the ground), as well as less intensive monitoring and management in perpetuity. Contingency costs were also accounted for in the fee calculations. Chapter 12 of the SSHCP describes the funding calculations and funding program.

Fees collected for compensatory mitigation would be routed to a proposed ILF program that is consistent with the federal Mitigation Rule (33 CFR Part 332) so that project proponents can satisfy their obligations under Section 404 of the CWA and the SSHCP. See Section 5.3.2.

Another key component of the SSHCP Conservation Strategy is the Jump-Start and Stay-Ahead provisions (described in detail in the SSHCP in Chapter 9, Section 9.5.5). These provisions require impacts to be mitigated in advance of Covered Activity project implementation, and ensure that Preserve System assembly would keep pace with development and make steady progress towards assembling the entire SSHCP Preserve System.

To satisfy this requirement, the Implementing Entity[9] would, prior to implementation of SSHCP Covered Activities, protect SSHCP land cover types and Covered Species habitat in advance of impacts—the "Jump-Start" provision (described in the SSHCP in Chapter 9, Section 9.5.5.2). The Jump-Start provision would ensure that there is enough Preserve area and habitat benefits are provided to fully offset the initial habitat loss and species take expected when the Plan is first implemented. The Jump-Start provision applies to all SSHCP land cover types (Table 29).

Table 29
Jump-Start Provision Acreage Requirements (at Permit Issuance)

Land Cover Grouping	Total Acres of Required Preservation by Land Cover Grouping[a]	Initial Acreage Required (before Permit Issuance) to Meet Jump-Start Provision (i.e., 5% of Required Preservation)
Valley Grassland	22,014	1,100[b]
Vernal Pool	966	48
Other Vernal Pool Invertebrate Wetland Habitat[c]	304	15
Other Wetland[d]	504	25
Agricultural	9,696	484
Riparian	964	48
Oak Woodland	47	2

Notes:
[a] Based on the sum of required preservation for each land cover type (refer to SSHCP Table 7-2) that is composed by the land cover grouping.
[b] This 1,100 acres must be preserved within the Vernal Pool Ecosystem (Chapter 3, Section 3.2.3, of SSHCP).
[c] Includes all Swale and Stream/Creek (VPIH) habitat that is considered invertebrate habitat.
[d] Includes Seasonal Wetland, Freshwater Marsh, Stream/Creek, and Open Water.

Over the term of the permit, the Implementing Entity would maintain a "cushion" of mitigation that is established in advance of impacts—the "Stay-Ahead" provision (described in the SSHCP in Chapter 9, Section 9.5.5.3). The stay-ahead provision requires that the Implementing Entity maintain enough Preserve land to be at least 2% ahead of the remaining preservation required for each SSHCP land cover grouping by the SSHCP Conservation Strategy at all times. This means that each project proposing to use the SSHCP must be checked against the stay-ahead provision prior to issuing ITPs to ensure that the project does not result in stay-ahead preserve land dropping below the 2% threshold. The Stay-Ahead provision would avoid temporal impacts to Covered Species that occur when mitigation is delayed from the time that impacts occur to when the associated mitigation benefits are available to the species (e.g., environmental benefits resulting from preserve management, habitat enhancement, and habitat re-establishment activities).

[9] The Implementing Entity is the body that is responsible for implementation of a permitted HCP. The SSHCP Implementing Entity consists of a Governing Board, Implementation Commission, and various committees and staff who oversee management and administration of the Plan.

Under the Jump-Start and Stay-Ahead provisions, compensatory mitigation for project proposals would exist ahead of impacts, thus eliminating the temporal loss factor of consideration under the federal Mitigation Rule. This would ensure consistency with USACE and RWQCB guidelines pursuant to Sections 404 and 401 of the CWA, and would satisfy California Fish and Game Code Section 2081(b), which requires impacts to state-listed species to be mitigated in advance of the impacts. It would also satisfy requirements under the federal ESA.

The purpose of the compensatory mitigation strategy proposed under the SSHCP and ARP is to implement a systematic mitigation strategy that individual Covered Activity projects can conform and contribute to as a means to offset unavoidable impacts to aquatic resources. It is a strategy that integrates the compliance procedures of several federal and state resource agencies to provide a long-term vision for environmental protection and monitoring, which enables greater environmental benefits and greater efficiency and certainty in environmental permitting for Plan Permittees and project proponents that implement Covered Activities under the jurisdiction of a Land Use Authority Permittee or the Implementing Entity. It is a strategy that benefits from the opportunities provided by regional conservation planning, offering a vision that is more challenging to achieve in a project-by-project review setting.

5.3.1 Compensatory Mitigation Requirements

5.3.1.1 Impact Threshold Measures

Under the SSHCP and ARP, there would be no minimum threshold of proposed acreage loss of aquatic resources for compensatory mitigation to be required. That is, all permanent loss of aquatic resources incurred by a project would require compensatory mitigation[10]. This is in contrast to the USACE's discretion to waive the compensatory mitigation requirement for loss of waters of the United States less than one-tenth of an acre (General Condition 23 of the 2012 Nationwide Permits).

5.3.1.2 Compensatory Mitigation Ratios

The compensatory mitigation ratios listed in the ARP are based upon a landscape-level assessment of the diversity, abundance, and condition of all aquatic resources types that occur in the Plan Area. The compensatory mitigation ratios listed in Table 30 represent the amount of compensatory mitigation required to maintain or improve the physical, chemical, and biological functions of aquatic resources within the Plan Area (as outlined in the SSHCP in the Biological Goals and Measureable Objectives in Table 7-1) when such impacts to aquatic resources are

[10] As discussed in Section 4.1, it is assumed that all impacts are permanent and would result in the loss of aquatic resources.

unavoidable. The compensatory mitigation ratios are also designed to be consistent with USACE's Mitigation Rule and to consider the factors used for determining compensatory mitigation requirements as required for processing Department of the Army permits under Section 404 of the CWA (USACE South Pacific Division Regulatory Program Standard Operating Procedure for Determination of Mitigation Ratios [Mitigation Ratios Procedure]).

Table 30 describes compensatory mitigation ratios provided by the SSHCP Conservation Strategy for each aquatic resource type that would be impacted by Covered Activities within the Plan Area. All ratios are in terms of (combined) re-establishment/establishment/preservation to impact. Vernal pools, mixed riparian scrub, and mixed riparian woodland would be mitigated at a ratio of at least 3:1, where a minimum 1:1 of that mitigation is provided by re-establishment or establishment. For all other aquatic resource land cover types (mine tailing riparian woodland, seasonal wetland, freshwater marsh, swale, streams/creeks [VPIH], open water, and streams/creeks) compensatory mitigation would occur at a ratio of at least 2:1, where again, a minimum ratio of 1:1 is accomplished by re-establishment or establishment. The final column of Table 30 lists the actual amount of each land cover type projected to be provided by the SSHCP. For certain land cover types, such as vernal pools, the projected amounts exceed the required amounts.

Table 30
Compensatory Mitigation Ratios

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Direct Impacts *Acres*	Required Re-establishment/ Establishment + Preservation Ratios	Required Re-estab/ Estab/ Preserve (acres)	Projected Amounts (acres)
Riparian	Mine Tailing Riparian Woodland	R2/R3	218	2:1 (min re-estab/estab 1:1)[a]	0 [a]	0 (0 re-estab/estab)[a]
	Mixed Riparian Scrub and Mixed Riparian Woodland	R2/R3	246	3:1 (min re-estab/estab 1:1)	1,174 [a]	1,174 total (464 re-estab/estab)[a]
Subtotal Riparian			*464*	-	*1,174*	*1,765 (464 re-estab/estab)*
Wetland Waters	Freshwater Marsh	PEM2	127	2:1 (min re-estab/estab 1:1)	254	254 total (127 re-estab/estab)
	Seasonal Wetland	PEM2	105	2:1 (min re-estab/estab 1:1)	210	210 total (105 re-estab/estab)
	Swales	PEM2	234	2:1 (min re-estab/estab 1:1)	468	468 total (234 re-estab/estab)
	Vernal Pools	PEM2	389	3:1 (min re-estab/estab 1:1)	1,167	1,167 total (389 re-estab/estab)
Subtotal Wetland Waters			*855*	-	*2,099*	*2,099 total (855 re-estab/estab)*
Non-Wetland	Open Water	POW	155	2:1 (min re-estab/estab 1:1)	310	310 total (155 re-estab/estab)

Table 30
Compensatory Mitigation Ratios

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Direct Impacts *Acres*	Required Re-establishment/ Establishment + Preservation Ratios	Required Re-estab/ Estab/ Preserve (acres)	Projected Amounts (acres)
Waters	Streams/Creeks (Intermittent and Perennial)	R2UB/R3UB	117	2:1 (min restor 1:1 linear foot)	234	234 total (117 restor)
	Streams/Creeks VPIH (Ephemeral)	R4SB	22	2:1 (min restor 1:1 linear foot)	44	44 total (22 restor)
Subtotal Non-Wetland Waters			*294*	—	*588*	*588*
Subtotal Wetland Waters and Non-Wetland Waters			*1,149*	—	*2,687*	*2,687*
Total[b]			**1,613**	**—**	**3,861**	**4,452**

Notes:

[a] Mine Tailing Riparian Woodland will be mitigated by preserving and re-establishing or establishing Mixed Riparian Scrub or Mixed Riparian Woodland.

[b] Table may not total precisely due to rounding.

Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

The ARP compensatory mitigation ratios are based upon factors consistent with the federal mitigation rule. The ARP compensatory mitigation ratios utilize the FCAM that was developed for the Plan Area that is aquatic resource-based, standardized, and comparable from site to site (the Functional Assessment for the SSHCP and ARP is described in detail in Appendix C). The FCAM can be implemented to determine a before-after-mitigation-impact procedure to assess aquatic resource functional gain. Compensatory mitigation ratios described in the ARP also take into consideration mitigation site location, enhancement or preservation of an aquatic resource that doesn't result in a net gain in aquatic resource area, aquatic resource type conversion need from a watershed perspective, risk and uncertainty, and temporal loss of aquatic resource functions (as described in Appendix C). The purpose of the ARP compensatory mitigation ratios strategy is to proactively offset unavoidable impacts to aquatic resources and maintain or improve physical, chemical, and biological functions of aquatic resources within the Plan Area.

As previously mentioned, two key components of the SSHCP Conservation Strategy are the Jump-Start and Stay-Ahead provisions (described in detail in the SSHCP in Chapter 9, Section 9.5.5). These components of the SSHCP Conservation Strategy were developed to address the temporal loss consideration described in the Mitigation Ratios Procedure. Jump-Start and Stay-Ahead provisions require impacts to be mitigated in advance of Covered Activity project implementation and ensure that SSHCP Preserve System assembly would

keep pace with urban development and make steady progress towards assembling the entire conceptual SSHCP Preserve System (see SSHCP Section 7.5). Implementation of these provisions would ensure that lost aquatic resource functions are replaced ahead of Covered Activity project impacts, avoiding temporal loss.

5.3.1.3 Monitoring and Management

Aquatic resources within the Plan Area would be monitored throughout SSHCP implementation as part of the SSHCP Monitoring Program and SSHCP Preserve System Management Program, which would be implemented to ensure that the requirements of the SSHCP and ARP are being met. The purposes of these programs are to ensure compliance with all elements of the SSHCP and associated permits (compliance monitoring) and to evaluate the beneficial effects of the SSHCP Conservation Strategy (mitigation program) to make sure all SSHCP goals and objectives are being met (effectiveness monitoring). Compliance monitoring would focus on ensuring all actions implemented under the SSHCP and ARP are in compliance with all requirements of their associated permits and that impacts do not exceed the amounts authorized under the permits. Effectiveness monitoring would focus on ensuring mitigation (i.e., required avoidance, minimization, and compensatory mitigation) carried out under the SSHCP and ARP is achieving the SSHCP's goals and objectives, such as ensuring the overall aquatic resource abundance, diversity, and condition of the Plan Area is maintained or improved in perpetuity. The Plan Permittees are collectively responsible for conducting all the required monitoring and reporting under the SSHCP and ARP. Annual monitoring reports from the Plan Permittees would be consolidated through the Implementing Entity, who would serve as the main point of contact.

A fully developed monitoring program would be finalized within 1 year of permit issuance with input and coordination among the SSHCP Implementing Entity, Land Use Authority Permittees, the regulatory and Wildlife Agencies, and a Technical Advisory Committee (TAC). Chapter 8 of the SSHCP describes the programmatic approach and monitoring questions that would be addressed by the SSHCP monitoring program. It is envisioned that monitoring of aquatic resources would be best achieved by implementing the California Wetland and Riparian Area Monitoring Plan (WRAMP) framework (CWMW 2010).

The WRAMP framework is commonly used to assess the compliance and effectiveness of development projects affecting aquatic resources. The WRAMP framework is suited to natural resources monitoring in general, including terrestrial wildlife and habitat, but has primarily been focused on aquatic resources. The WRAMP framework uses standardized mapping and assessment methods that combine to provide a comprehensive assessment of aquatic resource abundance, diversity, and condition within a watershed context.

Assessments are conducted at three levels, as described by the EPA's three-level data classification system:

1. **Level 1 – Landscape Assessment**

   Uses GIS, remote sensing data, and field surveys to inventory aquatic resources at a planning level. The data layers used to create the SSHCP's land cover maps are an example of Level 1 data.

2. **Level 2 – Rapid Assessment**

   Uses visible field diagnostics, semi-quantitative rapid assessment methods, and existing data to assess conditions. The California Rapid Assessment Method (CRAM) is an example of a Level 2 assessment method.

3. **Level 3 – Intensive Site Assessment**

   Provides quantitative field data to give more precise answers to management questions. Examples of a Level 3 assessment include intensive bioassessment sampling (e.g., benthic macroinvertebrates or algae), protocol-level or otherwise systematic surveys for Covered Species, and collecting biological and abiotic data such as plant species abundance or percent cover.

The monitoring requirements for aquatic resources in the Plan Area are a subset of the requirements of the SSHCP and are tied to the Biological Goals and Measureable Objectives of Chapter 7 of the SSHCP. Tables 31 through 33 are derived from Tables 8-1 through 8-4 in Chapter 8 of the SSHCP, and they summarize the measurable objectives to be achieved, the monitoring questions associated with each measurable objective, and the potential monitoring approach (Level 1, 2, or 3) for each question.

Table 31
Compliance Monitoring

Related Objectives or SSHCP Commitment (from SSHCP Chapter 7)	Monitoring Question	Compliance Monitoring Approach
The SSHCP requests take of land cover types (impacts to aquatic resources)	How many acres of land cover types have been impacted by Covered Activities?	Map impacted areas and quantify area of disturbance. Input impacts into tools such as the Project Tracking System in EcoAtlas. Ensure that impacts do not exceed amount authorized. (Level 1)
Objectives VPP1, VPP2, VPP3, VPP4, VPP5, VPP6, VPP7.	Are plant Covered Species populations being protected within Preserves?	Conduct assessment of take and preservation and protection of covered plant species to ensure preservation amounts are keeping up with impact amounts for vernal pools. (Level 1)

Table 31
Compliance Monitoring

Related Objectives or SSHCP Commitment (from SSHCP Chapter 7)	Monitoring Question	Compliance Monitoring Approach
Objectives L1, L2, W4, W5, VPG1, VP1, VP3, SW1, FWM1, ES1, SC1, OW1, RIP1, RIP3, VG1, BOW1, AG1.	Are SSHCP land cover acquisition goals being met in the Preserve System, including acquisition of linkages to existing Preserves?	Mapping of acquired Preserve lands using aerial surveys and GIS and verification that landscape-scale Preserve selection criteria for land cover types have been met. (Level 1)
Objectives W1, W2.	Are the vernal pool land covers and the Creeks/Stream land covers being adequately protected from adjacent Covered Activities? Does each proposed project design include appropriate setbacks for creeks and streams? Are requisite Stream Setbacks and Preserve being established?	During project design review, compare design against checklist that includes setbacks (Level 1). Map the preserves, corridors, and habitats of concern using aerial surveys and GIS mapping (with particular attention to buffer widths from vernal pools, streams, and creeks). Compare GIS mapping against conditions of approval. (Level 1)
Objectives VPI1, VPI2, VPI3, VPI4, CTS2, WS1, WPT1, GGS1, CH1, CH2, TB1, TB2, TB3, TB4, BO1, BO2, FH1, SH1, SH2, SH3, NH1, NH2, NH3, WK1, WK2, WK3, WK4, GS1, GS2, LS1, LS2, , WR1, WR2, WR3, WR4, AB1, AB2.	Are preserved, re-established, or established aquatic resources being adequately maintained/managed for the benefit of Covered Species?	SSHCP Annual Reports submitted by Implementing Entity, with field verification by Implementing Entity or designee. (Level 2)
Objectives VP2, SW2, RIP2, RIP4, OW2, FWM2.	Do established or re-established aquatic resources meet success criteria (performance standards)?	Monitor aquatic habitat success criteria as defined by permit conditions (Level 2).
Objectives RIP 2, RIP4	Does re-established or established riparian habitat meet success criteria (performance standards)?	Monitor success criteria as defined by permit conditions (Level 2).
Objective W3.	Were the appropriate AMMs always implemented? Is each AMM being implemented according to requirements described in Chapter 5 of the SSHCP?	Design review and comparison with checklist of AMMs. Field verification by permit compliance staff of relevant jurisdiction. (Level 2)
Objective W4, W5	Are preserved, re-established, or established aquatic resources acreage goals/requirements being met?	SSHCP Annual Reports submitted by Implementing Entity, specifying locations and amounts of compensatory mitigation implemented. (Level 1)
Objective W4, W5	Are preserved, re-established, or established aquatic resources functional/condition performance standards being met?	SSHCP Annual Reports submitted by Implementing Entity, with field verification by Implementing Entity or designee. (Level 2)
Objective CTS1.	Is the required number of occupied breeding ponds within designated Critical Habitat for California tiger salamander (*Ambystoma californiense*) being protected?	Conduct survey for occupied California tiger salamander breeding ponds and map results. Field verification of pond preservation and comparison against maps. (Level 3)

Table 32
AMM Compliance Monitoring

AMM	Monitoring Questions	Compliance Monitoring Approach
LID-1 (Stormwater Quality):	Are projects incorporating appropriate stormwater management into designs to satisfy the requirements outlined in the Stormwater Quality Design Manual for the Sacramento and South Placer Regions?	Design review by Land Use Authority Permittee or Implementing Entity.
LID-2 (Groundwater Recharge):	Has the proponent identified areas in the project site that could be appropriate for groundwater recharge? Has the drainage design incorporated groundwater recharge?	Design review by Land Use Authority Permittee or Implementing Entity.
LID-3 (Natural Site Features):	Has the proponent identified important natural site features within the project site? Has the project design avoided or preserved these natural site features?	Design review by Land Use Authority Permittee or Implementing Entity.
RE-ESTABLISHMENT/ ESTABLISHMENT-1 (Vernal Pool)	Are entities conducting vernal pool re-establishment/establishment on SSHCP Preserves following the guidelines identified in the AMM?	Implementing Entity review of vernal pool re-establishment/establishment plans. Field verification by Implementing Entity of vernal pool conditions and consistency with stated guidelines and plans. (Level 1 and Level 2)
RE-ESTABLISHMENT/ ESTABLISHMENT-2 (Vernal Pool Inocula Bank)	Are soils from converted vernal pools being excavated and stored using the appropriate protocols? Are inocula placed in re-established or established pools being sourced from the appropriate geologic formation and soil type?	Land Use Authority Permittee review of plans for projects converting vernal pools to ensure that they clearly state the disposition of vernal pool soils. Implementing Entity coordination with entities re-establishing or establishing vernal pools on preserves to ensure that inocula are correct. (Level 2)
STREAM-1 (Laguna Creek Wildlife Corridor)	Are proponents establishing the appropriate setback on Laguna Creek? Are trails being placed in the correct location within the setbacks?	Review of project plans by Land Use Authority or Implementing Entity to confirm that Stream Setbacks are designed according to requirements, including locations of trails. Field verification by Land Use Authority Permittee or Implementing Entity to confirm that Stream Setbacks are correctly established. (Level 1 and Level 2)
STREAM-2 (UDA Stream Setbacks)	Are proponents establishing appropriate setbacks on Elder Creek, Frye Creek, Gerber Creek, Morrison Creek, Paseo Central, and Sun Creek? Are trails being placed in the correct location within the setbacks?	Review of project plans by Land Use Authority Permittee or Implementing Entity to confirm that Stream Setbacks are designed according to requirements, including locations of trails. Field verification by Land Use Authority Permittee or Implementing Entity to confirm that Stream Setbacks are correctly established. (Level 1 and Level 2)

Table 32
AMM Compliance Monitoring

AMM	Monitoring Questions	Compliance Monitoring Approach
STREAM-3 (Minor Tributaries to UDA Streams)	Are proponents establishing appropriate setbacks on first and second order tributaries that are credited as avoided? Are trails being placed in the setbacks?	Review of project plans by Land Use Authority Permittee or Implementing Entity to confirm that Stream Setbacks are designed according to requirements, including locations of trails. Field verification by Land Use Authority Permittee or Implementing Entity to confirm that Stream Setbacks are correctly established. (Level 1 and Level 2)
STREAM-4 (Minimize Effects from Temporary Channel Re-routing)	If stream channels are being re-routed during construction, are the measures identified in the AMM being implemented to avoid hydrologic impacts?	Local Land Use Authority Permittee or Implementing Entity review of plans for temporary stream channel re-routing. Periodic inspection of the project site by Land Use Authority Permittee Permit Compliance staff or the Implementing Entity to confirm required measures are being implemented and maintained.(Level 1 and Level 2)
STREAM-5 (Design for Stream Channel Re-Routing, Widening, or Deepening)	Do designs for stream channel re-routing, widening, or deepening include the considerations outlined in the AMM?	Local Land Use Authority Permittee or Implementing Entity review of plans for stream channel re-routing. Local Land Use Authority Permittee or Implementing Entity field verification of project implementation. (Level 1 and Level 2)

Table 33
Effectiveness Monitoring

Related Objectives	Preserve Monitoring Question	Effectiveness Monitoring Approach
Objectives W4, W5	Are aquatic resources abundance, diversity, and condition being maintained or improved within the Plan Area as the SSHCP is implemented?	Monitor and track overall aquatic resource abundance and diversity annually over the life of the SSHCP (Level 1). Implement random or probabilistic sampling design throughout Plan Area at recommended intervals over the life of the SSHCP to track trends in condition; likely incorporating CRAM (Level 2).
Objectives VPI1, VPI2, VPI3, VPI4	What vernal pool invertebrate species are occupying preserved vernal pools?	Statistically valid status and trends sampling of all preserved pools in permanent and impermanent plots, conducted annually for the first 10 years after vernal pool preservation (Level 3).

Table 33
Effectiveness Monitoring

Related Objectives	Preserve Monitoring Question	Effectiveness Monitoring Approach
Objectives CTS2, WS1, WPT1, GGS1, CH1, TB1, TB2, TB3, TB5, FH1, SH1, SH2, SH3, NH1, NH2, WK1, WK2, GS1, GS2, LS1, LS2, BO1, BO2, WR1, WR2, AB1	Are Covered Species using preserved modeled-habitat? Is there a positive correlation between preserved nesting/roosting/foraging sites?	Conduct presence/absence surveys at appropriate timing for each Covered Species within preserved, established, or re-established habitat (Level 2).
Objectives VPI1, VPI2, VPI3, VPI4, CTS2, WS1, WPT1, GGS1, CH1, CH2, TB1, TB2, TB3, TB4, BO1, BO2, FH1, SH1, SH2, SH3, NH1, NH2, NH3, WK1, WK2, WK3, WK4, GS1, GS2, LS1, LS2, WR1, WR2, WR3, WR4, AB1, AB2	Is preserved, re-established, or established habitat being adequately maintained/managed for the benefit of Covered Species?	Annual SSHCP reports submitted by Implementing Entity, with field verification by Implementing Entity or designee (Level 2).
Objectives WS2, WPT2, GGS2, CH2, TB4, TB6, BO1, BO2, SH4, NH3, WK3, WK4, GS3, GS4, LS3, WR3, WR4, AB2	Are Covered Species occupying re-established or established habitat?	Compliance monitoring reports submitted annually by Implementing Entity. Field verification by Implementing Entity or designee. Presence/absence surveys at appropriate timing for each species (Level 2).
Objective HAB2	Are the physical conditions on the Preserves meeting the breeding feeding or sheltering needs of all Covered Species?	Rapid monitoring (CRAM or similar) for subset of Preserves, on at least an annual basis, compared against reference sites (Level 2).
Objective HAB4	Where are non-native weeds occurring in the Preserve System, and what species? Are they being eradicated in a timely fashion? Are the monitoring and management methods being updated to account for changed conditions?	Weed assessment and mapping within the Preserves on at least an annual basis, with other opportunistic assessment. Annual reporting of weed eradication efforts. TAC review of the SSHCP Conservation Strategy every 5 years (Level 2).
Objective HAB7	What is the biomass of vegetation within vernal pool-grassland, valley grassland, blue oak savanna, and other grasslands?	Annually monitor using residual dry matter (RDM) or another rapid monitoring technique at the end of the growing season; use a consistent time each year (Level 2).
Objective RIP5	What is the depth to groundwater within Preserves and how is it changing?	Annually measure depth to water table on Preserve parcels with existing wells (Level 2).
Objective GGS3	What is the hydrologic condition along Badger Creek? How much supplemental water would be required to maintain baseline conditions during summer? Is supplemental water maintaining appropriate hydrologic conditions in perpetuity?	Conduct hydrologic study for Badger Creek. Review hydrologic conditions every 5 years to ensure continued habitat suitability for giant garter snake (*Thamnophis gigas*) (Level 3). Annually review aerial imagery of Badger Creek to observe the ratio of open water and emergent vegetation (Level 1).

In order to properly manage the suite of monitoring data that would be collected for the SSHCP and ARP, the Implementing Entity would establish a GIS-linked database for use in compliance

monitoring, effectiveness monitoring, adaptive management, and annual reporting requirements. To the extent feasible, the database would be linked with other statewide or regional data repositories, such as the Regional Data Center of the California Environmental Data Exchange Network (CEDEN) and the California EcoAtlas Information System. The California EcoAtlas provides free public access to information about the quantity and quality of California wetlands. EcoAtlas enables integration of information to provide landscape context for consideration of wetland extent and condition.

The Implementing Entity would prepare annual reports summarizing the previous year's Covered Activities and provide a summary of all activities that have been implemented since SSHCP issuance, including all preserve monitoring results. Final reports are due to the regulatory agencies by January 31 following the end of the previous year's reporting cycle, which runs from October 1 to September 30.

5.3.2 Development of an ILF Program to Fulfill Compensatory Mitigation Requirements

The SSHCP Plan Permittees recognize the importance of a successful compensatory mitigation strategy accomplished in a timely fashion and nested in the overall conservation plan of the SSHCP. The Jump-Start and Stay-Ahead Provision (described in detail in the SSHCP in Chapter 9, Section 9.5.5) was developed to offset the potential for temporal loss of aquatic resources diversity, abundance, and condition at a sub-watershed landscape level in the Plan Area. Under this provision, the Plan Permittees would implement the compensatory mitigation requirement (pursuant to standards set forth in the 2008 federal Mitigation Rule [33 CFR Part 332]) prior to the authorized project impacts (the "Jump Start" portion of the provision). The Plan Permittees would use the "stay ahead" provisions required by the SSHCP in satisfying compensatory mitigation needs of Covered Activity projects. Thus, the importance of the "Jump-Start and Stay-Ahead" Provision is that compensatory mitigation acreage would always be ahead of impacted acreage (as opposed to similar stay-ahead programs that are based on "rough proportionality" and can actually fall behind from an acre-to-acre standpoint).

To meet the requirements of the 2008 federal Mitigation Rule (33 CFR Part 332), the Plan Permittees anticipate development of their own ILF program. The Plan Permittees would submit an ILF program proposal to the USACE (and Interagency Review Team) for review and subsequent approval by the USACE's District Engineer. The ILF would have technical consistency with the proposed restoration/creation approaches contained in Appendix D of this document. Because of the robust Jump-Start and Stay-Ahead Provision described above, a common challenge approached in many ILFs, temporal loss, is not anticipated to be an issue with the SSHCP's proposed ILF program.

The Plan Area is within the service area of several existing mitigation banks with credit availability, which may be a viable option to allow early implementation of the SSHCP compensatory mitigation strategy. Compensatory mitigation carried out via purchase of mitigation bank credits is preferred in the hierarchy set forth by the federal mitigation rule to offset impacts for authorized impacts to waters of the United States. However, an ILF program may override the USACE's mitigation bank preference when credits become available for ecologically valuable parcels identified in advance and based upon the rigorous scientific and technical analysis as part of a project-specific ILF planning framework. ILF programs can achieve important ecological and societal benefits by focusing primarily on watershed needs and by siting multiple compensatory mitigation projects in strategic locations of a watershed to meet specific needs and goals. It is for these reasons Plan Permittees believe an ILF program would best suit the long-term compensatory mitigation needs of the SSHCP regulatory framework.

6 AQUATIC RESOURCES PROFILE POST-MITIGATION

As was summarized for existing conditions (Chapter 3) and conditions post-impact without mitigation (Chapter 4), the final status of aquatic resources within the Plan Area (following impacts and mitigation) is summarized here in terms of the aquatic resources' resulting diversity, abundance, and condition. Diversity is again described in terms of the variety of aquatic resources by land cover type (common name) and Cowardin class that would remain following impacts and mitigation. Abundance is described in terms of acreage of each aquatic resource type within the Plan Area and per watershed (at the HUC-10 level) that would exist following impacts and mitigation. Condition is described using a landscape-level functional assessment to determine the relative capacity of the aquatic resources to perform various functions and services related to hydrology, water quality, and habitat.

6.1 Aquatic Resources Abundance and Diversity After Impacts and Mitigation

Within the Plan Area, of the currently existing 24,256 acres of mapped potentially jurisdictional aquatic resources, there are projected impacts to approximately 1,613 acres. However, following implementation of the SSHCP's compensatory mitigation strategy, all impacted acreage of aquatic resources would be replaced, resulting in no net loss of acres of aquatic resources (i.e., no impact on abundance). Furthermore, there would not be a disproportionate loss of any particular aquatic resource type, so aquatic resources diversity would also be maintained. The only aquatic resource types that show moderate decreases in abundance are Mine Tailing Riparian Woodlands and Open Water, both of which consist largely of unnatural or man-made features. As the intent of the SSHCP compensatory mitigation program is to establish and/or re-establish natural, high-quality aquatic resources, all of the required mitigation acreage to offset losses of Mine Tailing Riparian Woodlands is shifted to either Mixed Riparian Scrub or Mixed Riparian Woodland; and some of the required mitigation acreage to offset losses of Open Water is shifted to either Freshwater Marsh or Seasonal Wetlands.

See Table 34 for a summary of future aquatic resources abundance by type (diversity) per watershed.

Table 34
Future Abundance (Acres) of Aquatic Resources in the Plan Area, by Aquatic Resource Type

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Watershed (acres)										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes River*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake – Sac River*	*Snodgrass Slough*	*Upper Cosumnes River*	
Riparian	Mine Tailing Riparian Woodland	R	0	0.2	158.3	17.3	0	0	1.6	0	0	245.5	422.9
	Mixed Riparian Scrub	R	0	80.4	58.1	290.0	47.1	2.4	20.7	130.1	546.4	99.7	1,274.9
	Mixed Riparian Woodland	R	0.4	959.5	261.7	1,908.9	400.6	196.4	102.6	52.7	1,324.5	815.7	6,023.0
Subtotal Riparian			*0.4*	*1,040.1*	*478.1*	*2,216.2*	*447.7*	*198.8*	*124.9*	*182.8*	*1,870.9*	*1,160.9*	*7,720.8*
Wetland Waters	Freshwater Marsh	PEM1	2.0	38.3	167.2	1,194.5	47.5	20.9	315.2	39.7	1,097.2	112.3	3,034.5
	Seasonal Wetland	PEM2	22.6	199.7	444.5	616.3	134.0	<0.0	38.9	0.2	799.9	427.0	2,189.0
	Swales	R2/R3	2.9	160.4	518.0	144.2	141.0	0	225.9	1.4	10.3	80.6	1,284.7
	Vernal Pools	PEM2	6.9	274.3	2,026.7	618.6	319.4	0.1	531.2	5.3	420.9	324.7	4,528.2
Subtotal Wetland Waters			*34.4*	*672.7*	*3,156.4*	*2,573.6*	*641.9*	*21.0*	*1,111.2*	*46.6*	*2,328.3*	*944.6*	*11,036.4*

Table 34
Future Abundance (Acres) of Aquatic Resources in the Plan Area, by Aquatic Resource Type

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Watershed (acres)										Total
			American River	*Deer Creek*	*Laguna*	*Lower Cosumnes River*	*Lower Dry Creek*	*Lower Mokelumne*	*Morrison Creek*	*Sherman Lake – Sac River*	*Snodgrass Slough*	*Upper Cosumnes River*	
Non-Wetland Waters	Open Water	POW	2.7	129.4	295.4	663.0	8.4	3.1	78.4	9.	719.2	280.2	2,189.0
	Perennial or Intermittent Streams/ Creeks	R2UB/ R3UB	5.6	228.3	416.3	345.0	92.5	67.4	65.4	23.9	1,155.7	362.0	2,762.9
	Streams/ Creeks (VPIH) Ephemeral	R4SB	0	18.7	0	0	0	0	35.6	0	0	0	54.2
Subtotal Non-Wetland Waters			*8.3*	*376.4*	*711.7*	*1,008.0*	*1,00.9*	*70.5*	*179.4*	*32.9*	*1,874.9*	*642.2*	*5,006.1*
Subtotal Wetland Waters and Non-Wetland Waters			*42.7*	*1,049.1*	*3,868.1*	*3,581.6*	*641.9*	*91.5*	*1,290.6*	*79.5*	*4,203.2*	*1,586.8*	*16,042.5*
Grand Total[1]			**43.1**	**2,089.2**	**4,346.2**	**5,797.8**	**1,089.6**	**290.3**	**1,415.5**	**262.3**	**6,074.1**	**2,747.7**	**23,763.3**

Note: [1.] Table may not total precisely due to rounding.
Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

6.2 Estimated Future Condition of Aquatic Resources in the Plan Area

The effects of implementation of the SSHCP on the condition of aquatic resources are estimated by projecting the future condition of aquatic resources within the Plan Area, including consideration of mitigation as prescribed by the SSHCP. The projected future condition is obtained from the results of the Functional Assessment Report (Appendix C), which categorizes the Plan Area's aquatic resources into high, moderate, low, or very low condition.

6.2.1 Future Condition of Aquatic Resources

The landscape-level assessment that was used to describe the existing aquatic resource conditions (Chapter 3) and conditions with projected impacts (Chapter 4) was also used to predict the future condition of the aquatic resources accounting for both impacts and mitigation. The overall quality of future aquatic resources was predicted based on the same factors: area of the aquatic resource, HUC-10 watershed, primary adjacent land cover, secondary adjacent land cover, and aquatic resource type. Function scores were assigned for each of these factors, per aquatic resource feature, based upon ability to maintain or improve the following functions: habitat, water quality, and hydrology. The second factor, HUC-10 watershed, was updated based on the predicted future state of each of the watersheds, with the same scoring measures as were used for the impact-only conditions (see Chapter 4). The results of the analysis provided an overall functional score of very low, low, moderate, or high for each aquatic resource.

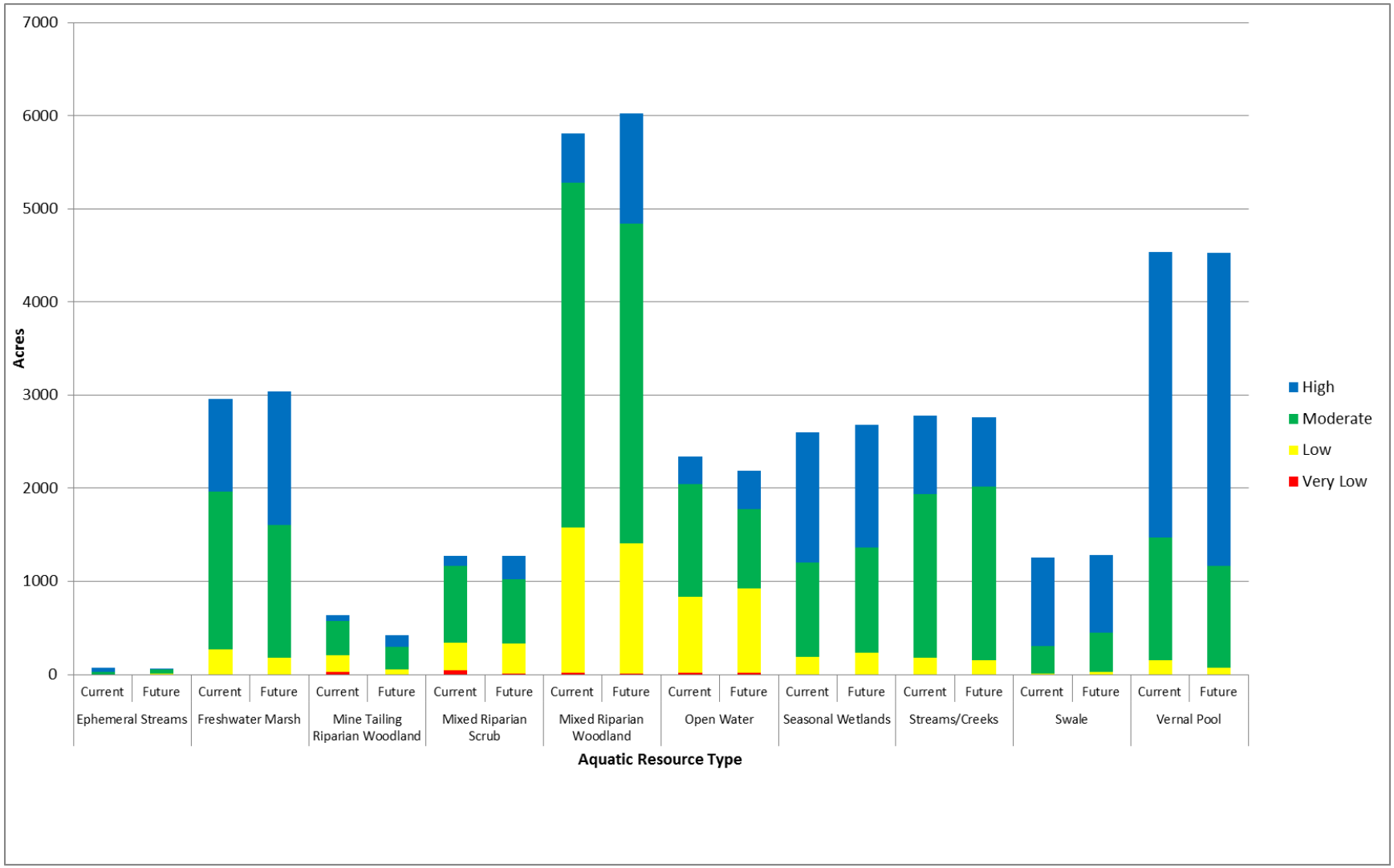
Table 35 summarizes the future condition of aquatic resources in the overall Plan Area following implementation of the SSHCP, including the mitigation program, and Figure 38 is a graphical depiction of those data, showing how the future Plan Area compares to the existing conditions. Compared to the existing conditions, the future Plan Area conditions show that the amount of high condition resources would increase (increase of 1,391 acres) as a result of the strategic and coordinated approach to mitigation implementation. This means that the future state of aquatic resources in the Plan Area would benefit from implementation of the SSHCP, as the established and re-established aquatic resources would be appropriately sited as required by Conservation Actions in Table 7-1, such that the overall conditions of Plan Area aquatic resources would be improved.

Table 35
Future Condition of Aquatic Resources in the Overall Plan Area

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	131.0	241.0	50.9	0	422.9
	Mixed Riparian Scrub	R2/R3	257.1	688.1	324.2	5.4	1,274.9
	Mixed Riparian Woodland	R2/R3	1,178.62	3,434.15	1,403.50	6.73	6,023.0
		Subtotal Riparian	*1,566.7*	*4,363.3*	*1,778.6*	*12.1*	*7,720.8*
Wetland Waters	Freshwater Marsh	PEM1	1,425.3	1,427.6	181.6	0	3,034.5
	Seasonal Wetland	PEM2	1,318.7	1,132.6	231.8	0	2,683.1
	Swales	R2/R3	839.2	419.1	26.4	0	1,284.7
	Vernal Pools	PEM2	3,362.52	1,093.38	72.26	0	4,528.1
		Subtotal Wetland Waters	*6,945.7*	*4,072.7*	*512.1*	*0*	*11,530.5*
Non-Wetland Waters	Open Water	POW	413.6	856.3	903.6	15.5	2,189.0
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	742.0	1,866.1	154.7	0	2,762.9
	Streams/Creeks (VPIH) Ephemeral	R4SB	2.6	46.1	5.5	0	54.2
		Subtotal Non-Wetland Waters	*1,158.2*	*2,768.5*	*1,063.8*	*15.5*	*5,006.1*
		Subtotal Wetland Waters and Non-Wetland Waters	*8,103.9*	*6,841.2*	*1,575.9*	*15.5*	*16,536.6*
		Grand Total[1]	**9,670.6**	**1,1204.4**	**3,354.4**	**27.6**	**24,257.3**

Note: 1. Table may not total precisely due to rounding.
Acreage totals in the ARP may not match precisely with acreage totals in the SSHCP. Factors that may result in differences between acreage figures in the ARP as compared to the SSHCP include: 1) The ARP only considers direct impacts where the SSHCP considers both direct and indirect impacts; 2) The ARP only includes jurisdictional wetlands for some land cover types where the SSHCP includes all wetlands; and 3) Slightly different Geographical Information System processes that result in small differences in totals.

Figure 38 Existing and Future Watershed Profiles of Aquatic Resources in the Plan Area



Tables 36 through 45 summarize the future condition of aquatic resources in each HUC-10 watershed following implementation of the SSHCP and Figures 39 through 48 are graphical depictions, comparing the existing to the future watershed conditions.

The watersheds with the largest amounts of impacts are the American River, Morrison Creek, and Sherman Lake–Sacramento River watersheds. Following SSHCP implementation of the prescribed mitigation program, the American River watershed would retain approximately the same amounts of aquatic resources, with only a loss of mine tailing riparian woodland. Mine tailing riparian woodland mitigation acreages would be compensated for in the form of mixed riparian woodland or mixed riparian scrub in watersheds outside the UDA, primarily within, but not limited to, the adjacent Deer Creek and Upper Cosumnes watersheds. Re-establishment and establishment requirements for all other aquatic resource types in the American River watershed would occur within the portion of its watershed that is outside the UDA. Despite the American River watershed having the largest proportion of expected impacts, aquatic resource abundance and diversity would be maintained and remain stable.

The Morrison Creek watershed in its future state would have an overall decrease in abundance of aquatic resources, as it would experience the largest amount of development within the UDA portion of the Plan Area. An inventory was taken of available land suitable for re-establishment and/or establishment within the Morrison Creek watershed in order to maximize the amount of mitigation replaced within watershed. This inventory identified approximately 50 acres of vernal pool, 30 acres of swale, and 50 acres of freshwater marsh re-establishment/establishment that is ecologically feasible within the Morrison Creek watershed. Remaining requirements for aquatic resource impacts within the watershed would be mitigated for in-kind within other adjacent watersheds. There would be a hierarchy of preference such that mitigation would be exhausted within the Morrison Creek watershed first. Mitigation would occur closest to the impact sites before exploring mitigation farther away.

The Sherman Lake–Sacramento River watershed in its future state would maintain the same aquatic resource abundance and diversity and would have a slight increase in condition. Re-establishment and/or establishment types of compensatory mitigation would occur within the portion of the watershed that is outside the UDA for all aquatic resource types.

The Deer Creek, Lower Cosumnes, Lower Dry Creek, and Upper Cosumnes watersheds in their future states all show increases in aquatic resource condition, resulting from the properly targeted preservation and compensatory mitigation strategy implemented through the SSHCP.

Table 36
Future Condition of Aquatic Resources in the American River Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	0	0	0	0
	Mixed Riparian Woodland	R2/R3	0	0	0.4	0	0.4
Subtotal Riparian			*0*	*0*	*0.4*	*0*	*0.4*
Wetland Waters	Freshwater Marsh	PEM1	0	1.6	0.4	0	2.0
	Seasonal Wetland	PEM2	0	22.6	0	0	22.6
	Swale	R2/R3	0	2.4	0.5	0	2.9
	Vernal Pools	PEM2	0	6.9	<0.1	0	6.9
Subtotal Wetland Waters			*0*	*33.5*	*0.9*	*0*	*34.4*
Non-Wetland Waters	Open Water	POW	0	0.48	2.17	0	2.65
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	2.72	2.88	0	5.60
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*3.2*	*5.1*	*0*	*8.3*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*36.7*	*6.0*	*0.0*	*42.7*
Grand Total[1]			**0**	**36.7**	**6.4**	**0**	**43.1**

Note: 1. Table may not total precisely due to rounding.

Figure 39 Existing and Future Watershed Profiles of Aquatic Resources in the American River Watershed

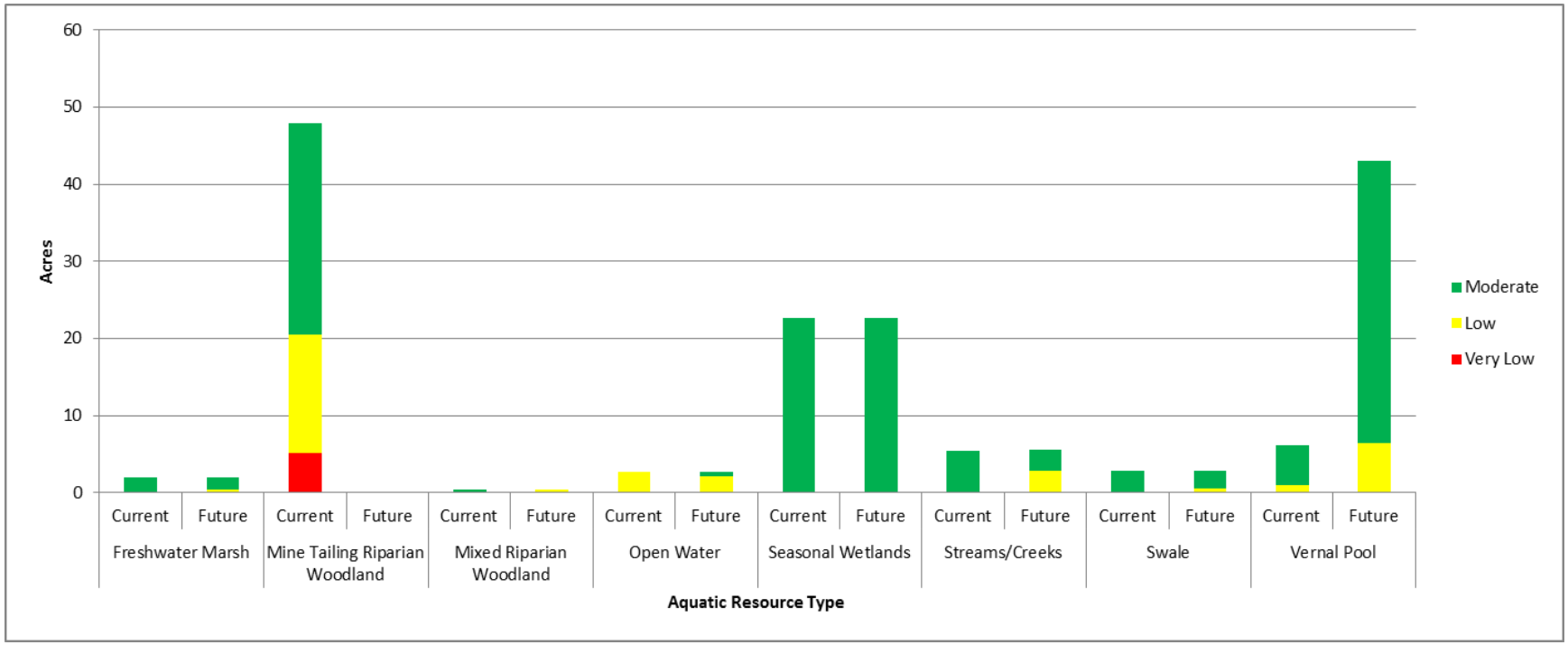


Table 37
Future Condition of Aquatic Resources in the Deer Creek Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0.20	<0.1	0	0.2
	Mixed Riparian Scrub	R2/R3	42.0	35.4	3.0	0	80.4
	Mixed Riparian Woodland	R2/R3	245.9	694.6	19.3	0	959.5
Subtotal Riparian			*287.9*	*730.2*	*22.3*	*0*	*1,040.1*
Wetland Waters	Freshwater Marsh	PEM1	24.0	14.3	0	0	38.3
	Seasonal Wetland	PEM2	94.6	100.1	5.0	0	199.7
	Swale	R2/R3	133.2	26.3	0.9	0	160.4
	Vernal Pools	PEM2	216.9	57.2	0.3	0	274.3
Subtotal Wetland Waters			*468.7*	*197.9*	*6.2*	*0*	*672.7*
Non-Wetland Waters	Open Water	POW	69.4	56.4	3.6	0	129.4
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	106.8	121.5	<0.1	0	228.3
	Streams/Creeks (VPIH) Ephemeral	R4SB	2.6	15.3	0.8	0	18.7
Subtotal Non-Wetland Waters			*178.8*	*193.2*	*4.4*	*0*	*376.4*
Subtotal Wetland Waters and Non-Wetland Waters			*647.5*	*391.1*	*10.6*	*0*	*1,049.10*
Grand Total[1]			**935.4**	**1,121.3**	**32.9**	**0**	**2,089.2**

Note: [1.] Table may not total precisely due to rounding.

Figure 40 Existing and Future Watershed Profiles of Aquatic Resources in the Deer Creek Watershed

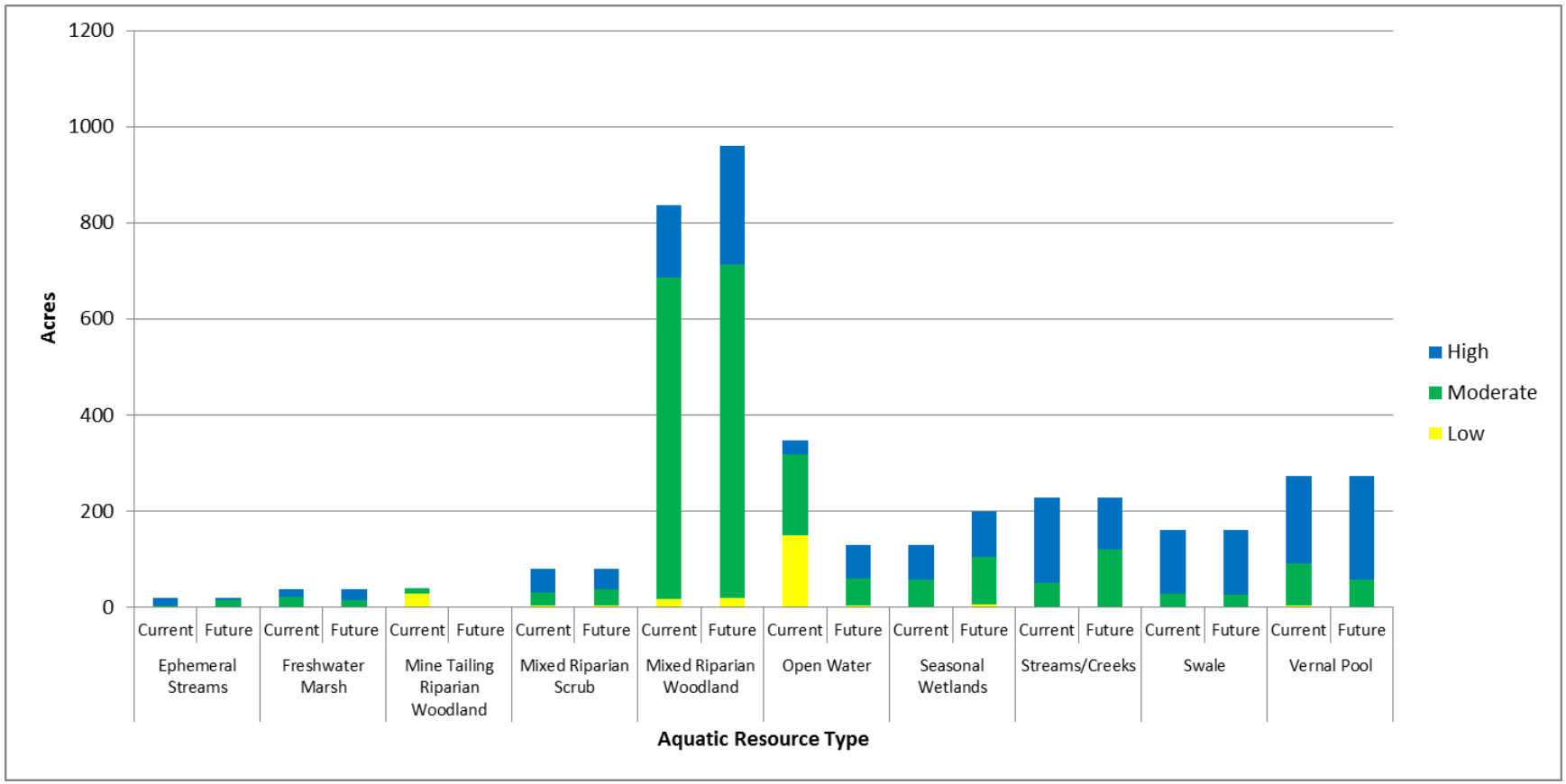


Table 38
Future Condition of Aquatic Resources in the Laguna Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	63.8	74.8	19.7	0	158.3
	Mixed Riparian Scrub	R2/R3	10.4	45.6	2.1	0	58.1
	Mixed Riparian Woodland	R2/R3	72.2	179.5	10.0	0	261.7
Subtotal Riparian			*146.4*	*299.9*	*31.8*	*0*	*478.1*
Wetland Waters	Freshwater Marsh	PEM1	147.1	19.6	0.4	0	167.2
	Seasonal Wetland	PEM2	404.8	25.1	14.5	0	444.5
	Swale	R2/R3	404.1	113.7	0.3	0	518.0
	Vernal Pools	PEM2	1,949.0	70.3	7.4	0	2,026.7
Subtotal Wetland Waters			*2,905.0*	*228.7*	*22.6*	*0*	*3,156.4*
Non-Wetland Waters	Open Water	POW	178.8	47.5	69.2	0	295.4
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	246.6	167.6	2.0	0	416.3
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*425.4*	*215.1*	*71.2*	*0*	*711.7*
Subtotal Wetland Waters and Non-Wetland Waters			*3,330.4*	*443.8*	*93.8*	*0*	*3,868.1*
Grand Total[1]			**3,476.8**	**743.7**	**125.6**	**0**	**4,346.2**

Note: 1. Table may not total precisely due to rounding.

Figure 41 Existing and Future Watershed Profiles of Aquatic Resources in the Laguna Watershed

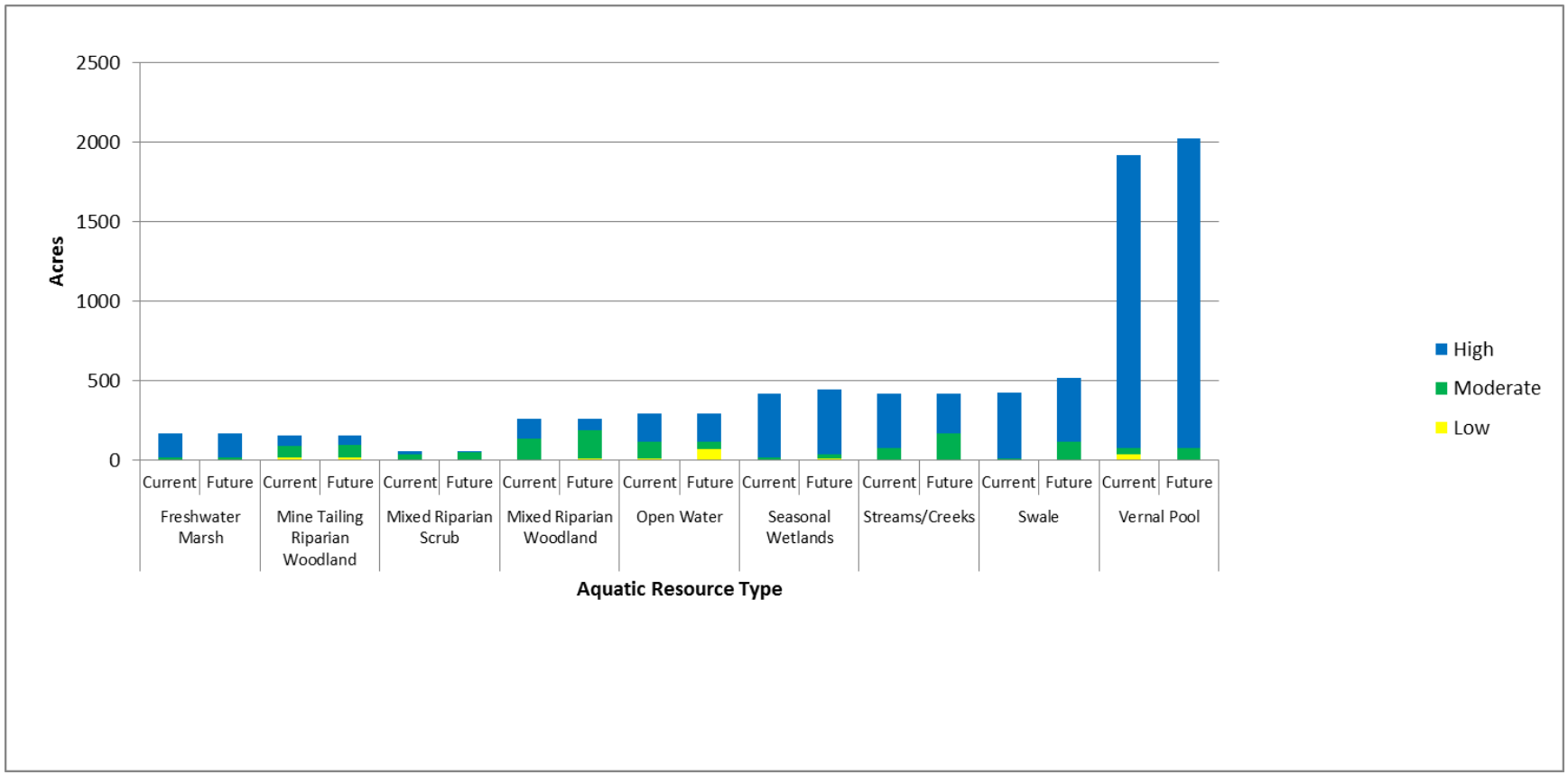


Table 39
Future Condition of Aquatic Resources in the Lower Cosumnes Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	17.3	0	0	17.3
	Mixed Riparian Scrub	R2/R3	159.8	122.8	7.4	0	290.0
	Mixed Riparian Woodland	R2/R3	401.5	1,264.0	243.4	0	1,908.9
		Subtotal Riparian	*561.3*	*1,404.1*	*250.8*	*0*	*2,216.2*
Wetland Waters	Freshwater Marsh	PEM1	1,056.2	134.4	3.9	0	1,194.5
	Seasonal Wetland	PEM2	350.2	262.7	3.4	0	616.3
	Swale	R2/R3	102.0	41.0	1.2	0	144.2
	Vernal Pools	PEM2	349.8	230.7	38.1	0	618.6
		Subtotal Wetland Waters	*1,858.2*	*668.8*	*46.6*	*0*	*2,573.60*
Non-Wetland Waters	Open Water	POW	31.6	270.4	360.9	0	663.0
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	139.6	203.4	2.0	0	345.0
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
		Subtotal Non-Wetland Waters	*171.2*	*473.8*	*362.9*	*0*	*1,008.0*
		Subtotal Wetland Waters and Non-Wetland Waters	*2,029.4*	*1,142.6*	*409.5*	*0*	*3,581.6*
		Grand Total[1]	**2,590.7**	**2,546.7**	**660.3**	**0**	**5,797.8**

Note: 1. Table may not total precisely due to rounding.

Figure 42 Existing and Future Watershed Profiles of Aquatic Resources in the Lower Cosumnes Watershed

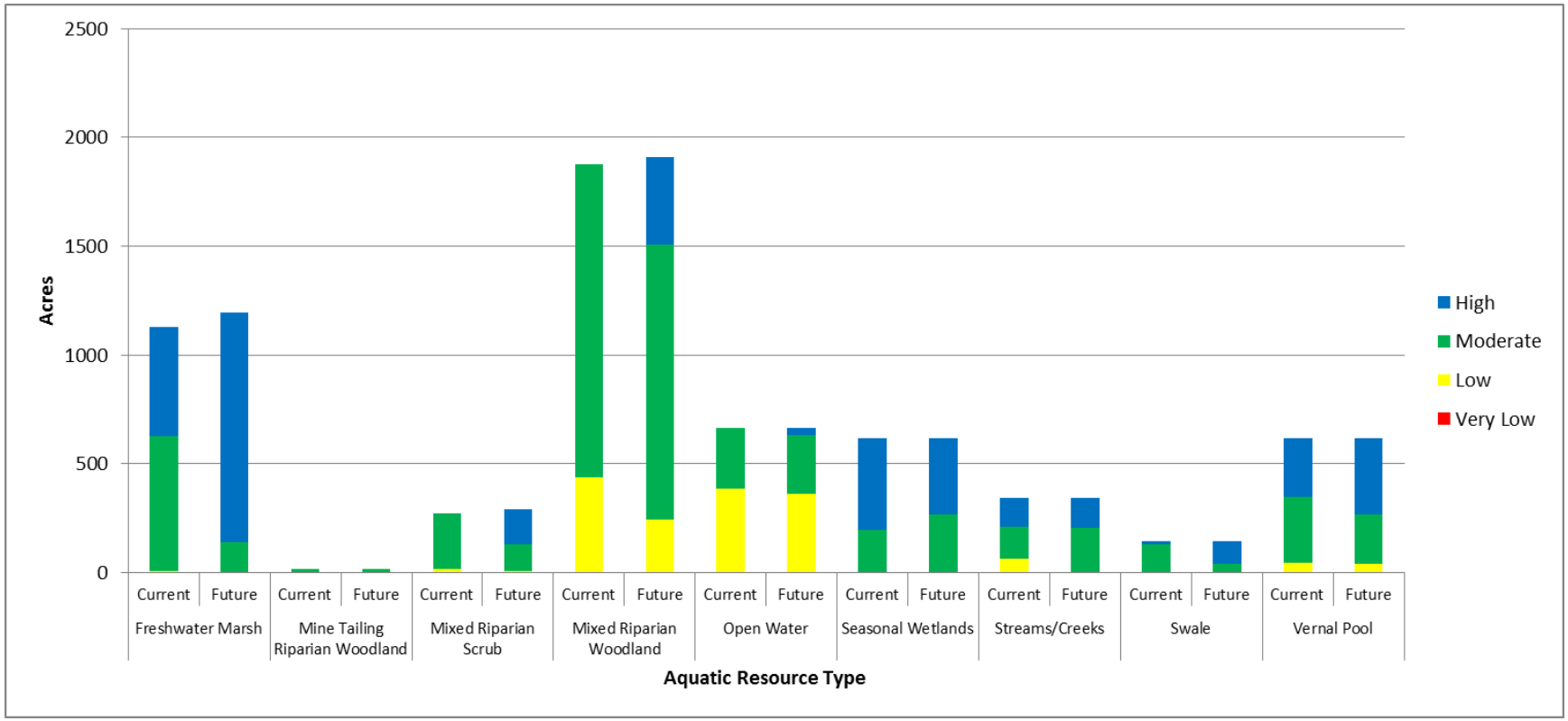


Table 40
Future Condition of Aquatic Resources in the Lower Dry Creek Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	9.9	31.8	5.4	0	47.1
	Mixed Riparian Woodland	R2/R3	15.7	332.6	52.3	0	400.6
Subtotal Riparian			*25.6*	*364.4*	*57.7*	*0*	*447.7*
Wetland Waters	Freshwater Marsh	PEM1	18.8	26.5	2.2	0	47.5
	Seasonal Wetland	PEM2	90.4	39.3	4.3	0	134.0
	Swale	R2/R3	87.5	53.4	<0.1	0	141.0
	Vernal Pools	PEM2	229.1	88.2	2.1	0	319.4
Subtotal Wetland Waters			*425.8*	*207.4*	*8.6*	*0*	*641.9*
Non-Wetland Waters	Open Water	POW	0	6.57	1.86	0	8.43
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	33.4	55.9	3.3	0	92.5
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*33.4*	*62.5*	*5.2*	*0*	*100.93*
Subtotal Wetland Waters and Non-Wetland Waters			*459.2*	*269.9*	*13.8*	*0*	*742.8*
Grand Total[1]			**484.8**	**634.3**	**71.5**	**0**	**1,190.5**

Note: [1.] Table may not total precisely due to rounding.

Figure 43 Existing and Future Watershed Profiles of Aquatic Resources in the Lower Dry Creek Watershed

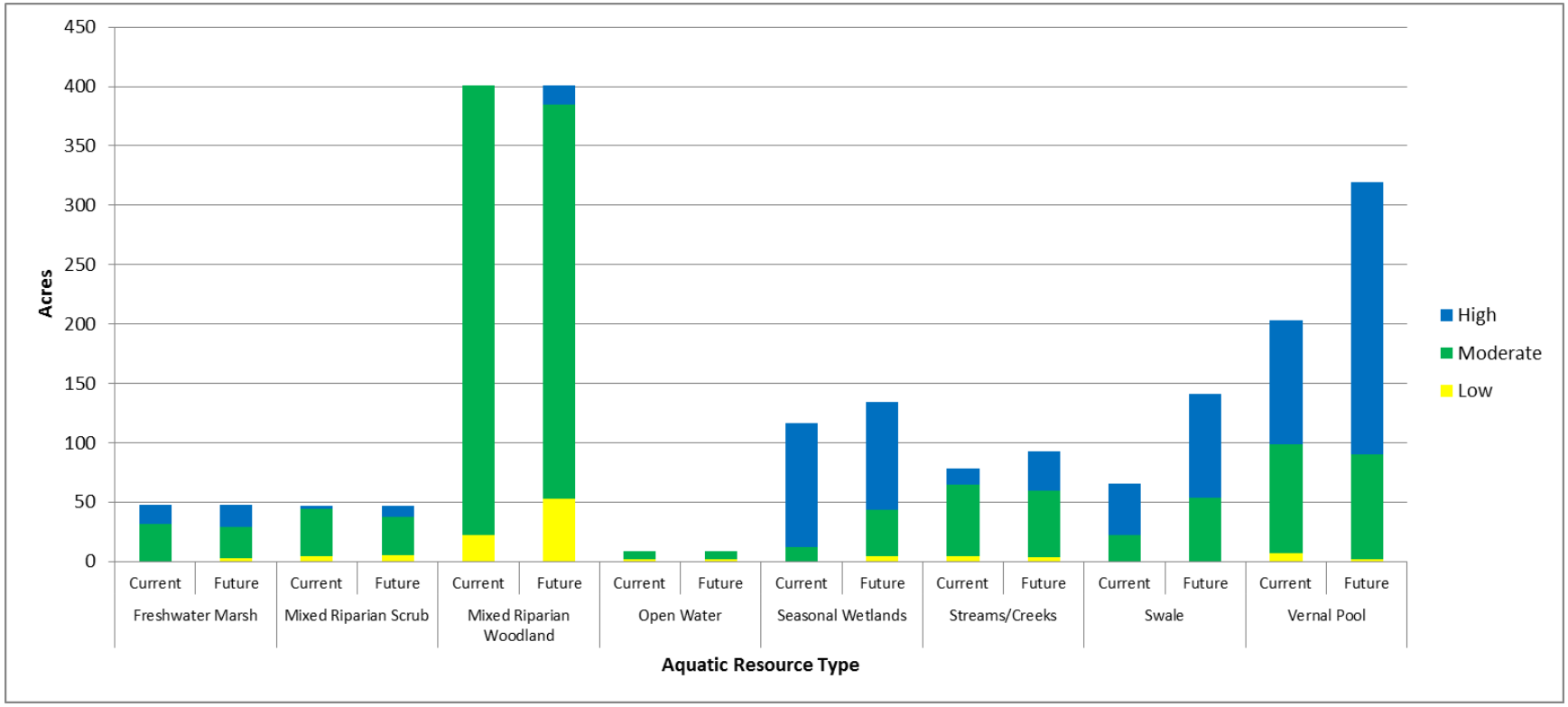


Table 41
Future Condition of Aquatic Resources in the Lower Mokelumne River Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	0.02	2.4	0	2.4
	Mixed Riparian Woodland	R2/R3	0	14.1	182.2	0	196.4
Subtotal Wetland Riparian			*0*	*14.1*	*184.6*	*0*	*198.8*
Wetland Waters	Freshwater Marsh	PEM1	0	20.9	0	0	20.9
	Seasonal Wetland	PEM2	0	0.01	0	0	0.01
	Swale	R2/R3	0	0	0	0	0
	Vernal Pools	PEM2	0	0.1	0	0	0.1
Subtotal Wetland Waters			*0*	*21.0*	*0*	*0*	*21.0*
Non-Wetland Waters	Open Water	POW	0	0	3.1	0	3.1
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	65.1	2.2	0	67.4
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*65.1*	*5.3*	*0*	*70.5*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*86.1*	*5.3*	*0*	*91.5*
Grand Total[1]			**0**	**100.2**	**189.9**	**0**	**290.3**

Note: 1. Table may not total precisely due to rounding.

Figure 44 Existing and Future Watershed Profiles of Aquatic Resources in the Lower Mokelumne Watershed

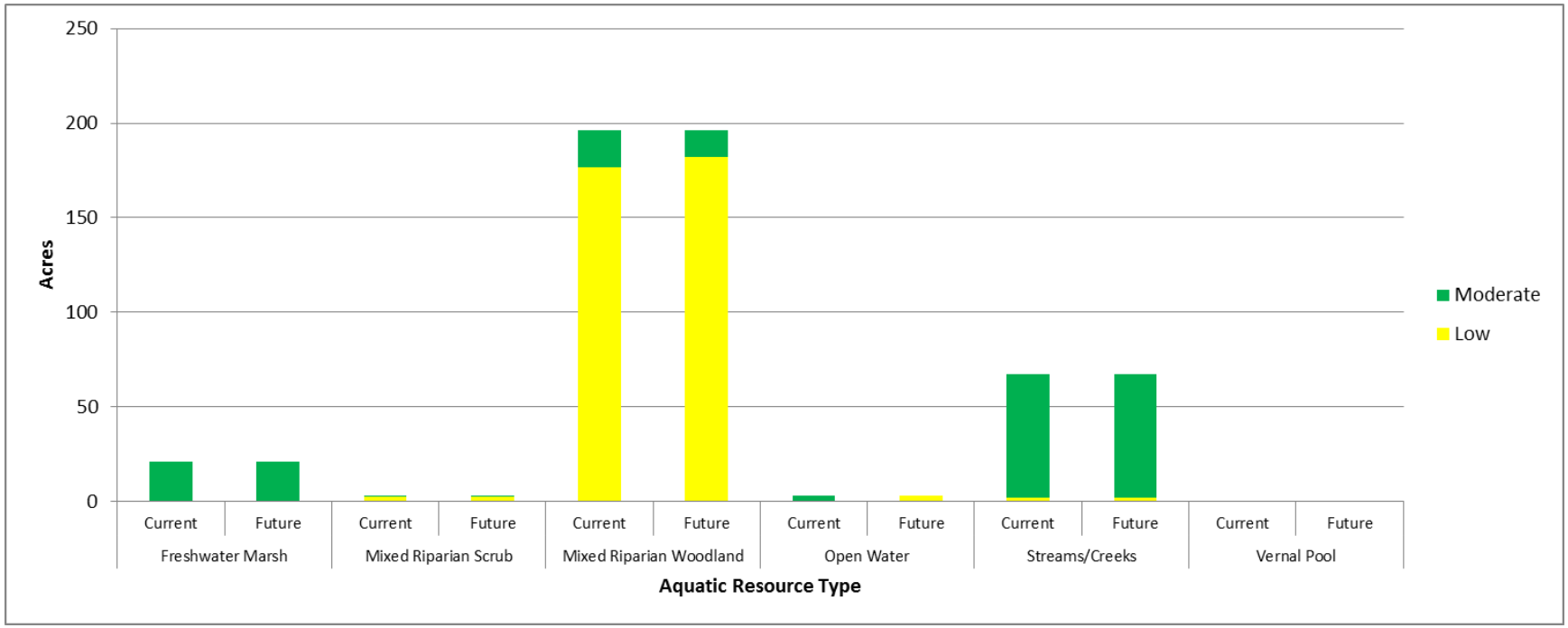


Table 42
Future Condition of Aquatic Resources in the Morrison Creek Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	1.61	0	1.61
	Mixed Riparian Scrub	R2/R3	3.2	11.2	6.3	0	20.7
	Mixed Riparian Woodland	R2/R3	0	54.5	48.1	0	102.6
Subtotal Riparian			*3.2*	*65.7*	*56.0*	*0*	*124.9*
Wetland Waters	Freshwater Marsh	PEM1	63.8	228.5	22.8	0	315.2
	Seasonal Wetland	PEM2	0	24.5	14.4	0	38.9
	Swale	R2/R3	46.8	158.5	20.6	0	225.9
	Vernal Pools	PEM2	333.7	183.6	13.9	0	531.2
Subtotal Wetland Waters			*444.3*	*595.1*	*71.7*	*0*	*1,111.2*
Non-Wetland Waters	Open Water	POW	0	19.4	59.0	0	78.4
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	30.2	35.2	0	65.4
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	30.8	4.7	0	35.6
Subtotal Non-Wetland Waters			*0*	*80.4*	*98.9*	*0*	*179.4*
Subtotal Wetland Waters and Non-Wetland Waters			*444.3*	*675.5*	*170.6*	*0*	*1,290.6*
Grand Total[1]			**447.5**	**741.2**	**226.6**	**0**	**1,415.5**

Note: 1. Table may not total precisely due to rounding.

Figure 45 Existing and Future Watershed Profiles of Aquatic Resources in the Morrison Creek Watershed

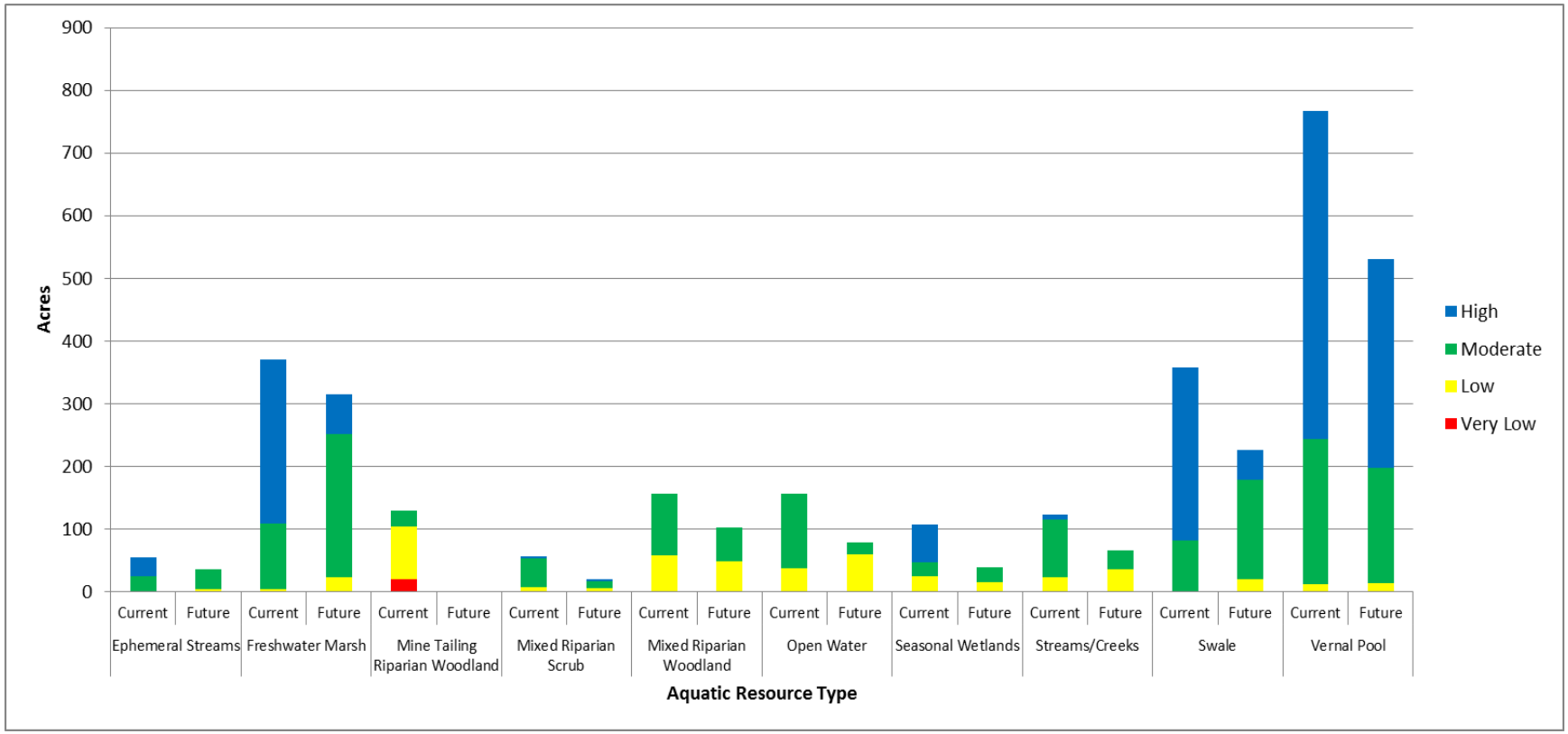


Table 43
Future Condition of Aquatic Resources in the Sherman Lake–Sacramento River Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	3.9	120.8	5.4	130.1
	Mixed Riparian Woodland	R2/R3	0	4.7	41.2	6.7	52.7
Subtotal Riparian			*0*	*8.6*	*162.0*	*12.1*	*182.8*
Wetland Waters	Freshwater Marsh	PEM1	0	39.7	0	0	39.7
	Seasonal Wetland	PEM2	0	0.2	0	0	0.2
	Swale	R2/R3	0	1.4	0	0	1.4
	Vernal Pools	PEM2	0	5.3	0	0	5.3
Subtotal Wetland Waters			*0*	*46.6*	*0*	*0*	*46.6*
Non-Wetland Waters	Open Water	POW	0	0	9.2	0	9.2
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	0	4.1	19.8	0	23.9
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*0*	*4.1*	*29.0*	*0*	*33.1*
Subtotal Wetland Waters and Non-Wetland Waters			*0*	*50.7*	*29*	*0*	*79.7*
Grand Total[1]			**0**	**59.3**	**191.0**	**12.1**	**262.5**

Note: 1. Table may not total precisely due to rounding.

Figure 46 Existing and Future Watershed Profiles of Aquatic Resources in the Sherman Lake–Sacramento River Watershed

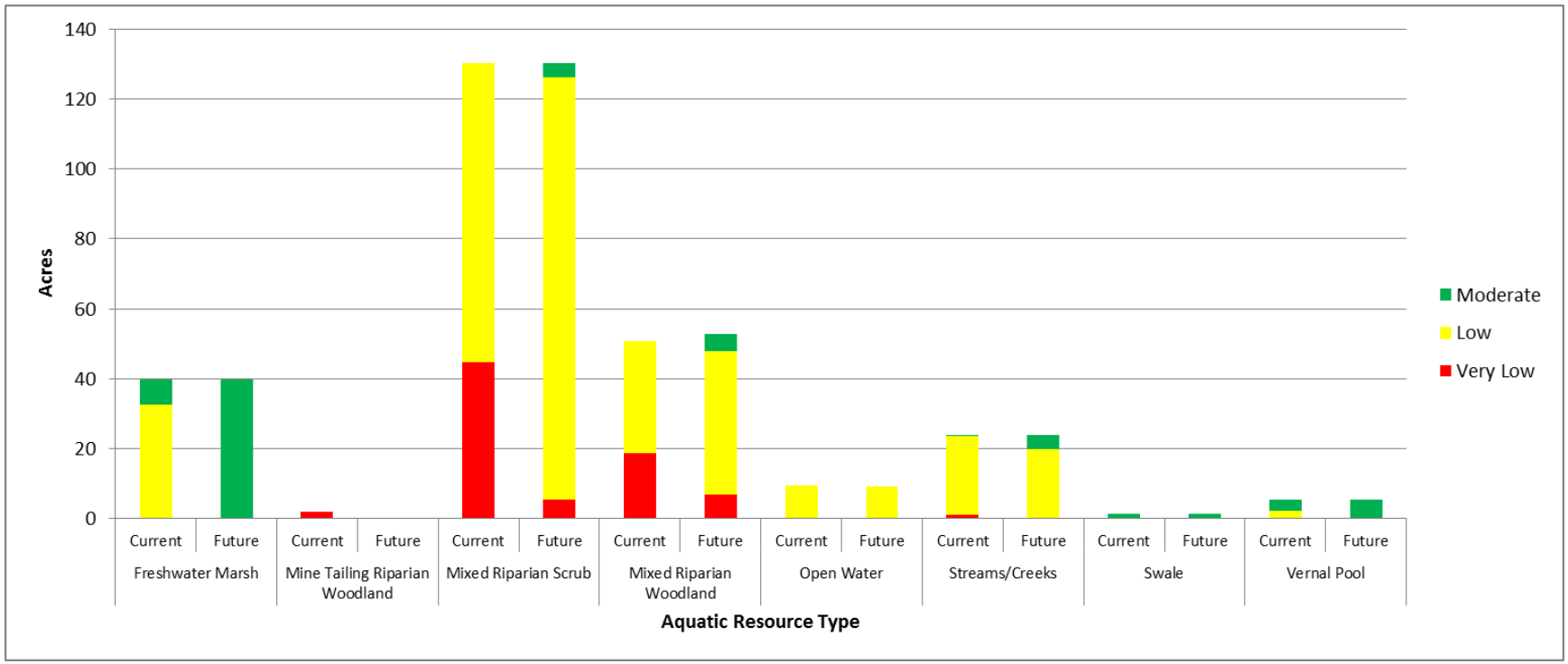


Table 44
Future Condition of Aquatic Resources in the Snodgrass Slough Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	0	0	0	0	0
	Mixed Riparian Scrub	R2/R3	0	369.6	176.9	0	546.4
	Mixed Riparian Woodland	R2/R3	0	522.0	802.5	0	1,324.5
Subtotal Riparian			*0*	*891.6*	*979.4*	*0*	*1,870.9*
Wetland Waters	Freshwater Marsh	PEM1	27.0	919.5	150.7	0	1,097.2
	Seasonal Wetland	PEM2	0	615.4	184.5	0	799.9
	Swale	R2/R3	0	7.8	2.5	0	10.3
	Vernal Pools	PEM2	0	413.9	7.0	0	420.9
Subtotal Wetland Waters			*27.0*	*1,956.6*	*344.7*	*0*	*2,328.3*
Non-Wetland Waters	Open Water	POW	0	389.9	313.8	15.5	719.2
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	25.7	1,043.0	86.9	0	1,155.7
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
Subtotal Non-Wetland Waters			*25.7*	*1,432.9*	*400.7*	*15.5*	*1,874.9*
Subtotal Wetland Waters and Non-Wetland Waters			*52.7*	*3,389.5*	*745.4*	*15.5*	*4,203.2*
Grand Total[1]			**52.7**	**4,281.1**	**1,724.8**	**15.5**	**6,074.1**

Note: 1. Table may not total precisely due to rounding.

Figure 47 Existing and Future Watershed Profiles of Aquatic Resources in the Snodgrass Slough Watershed

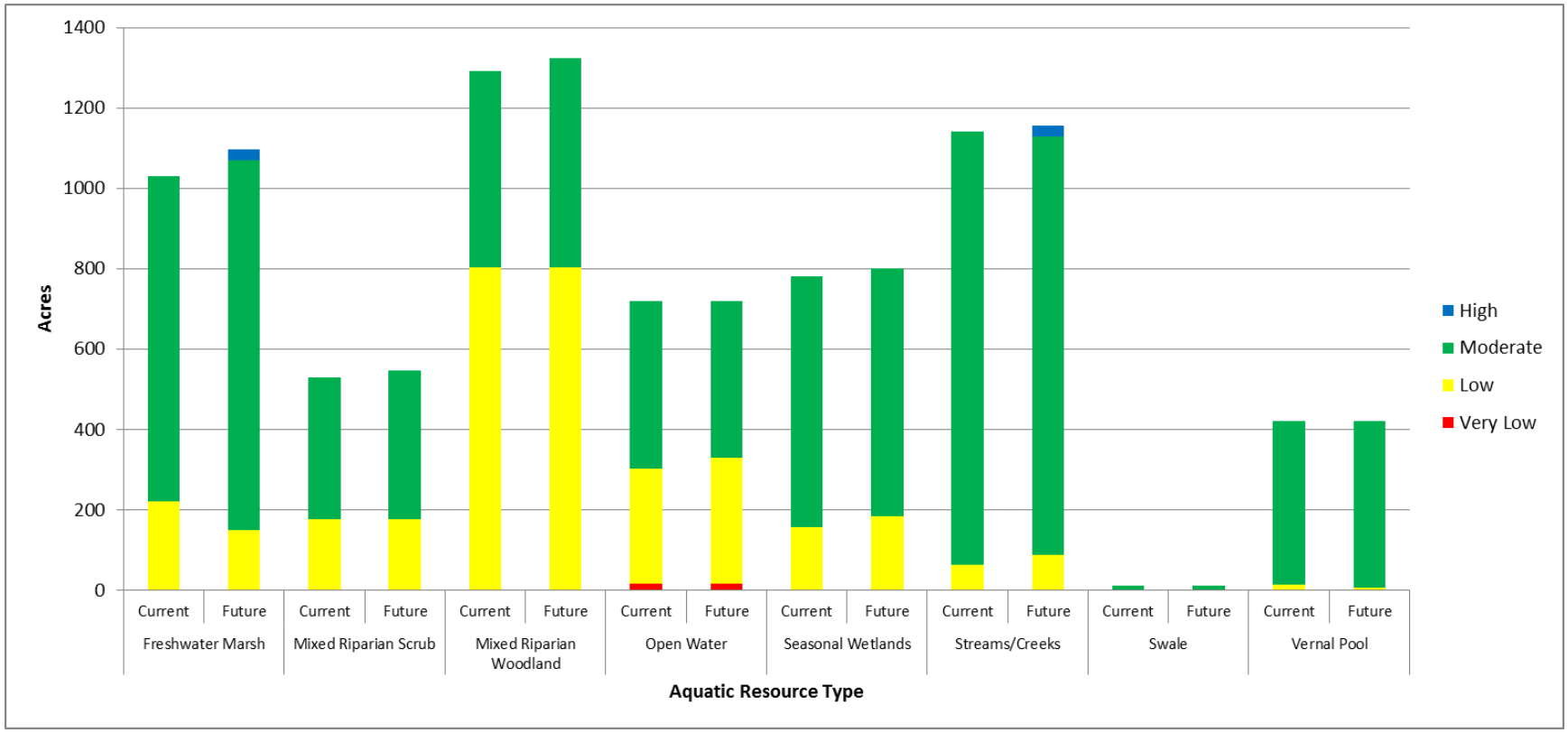
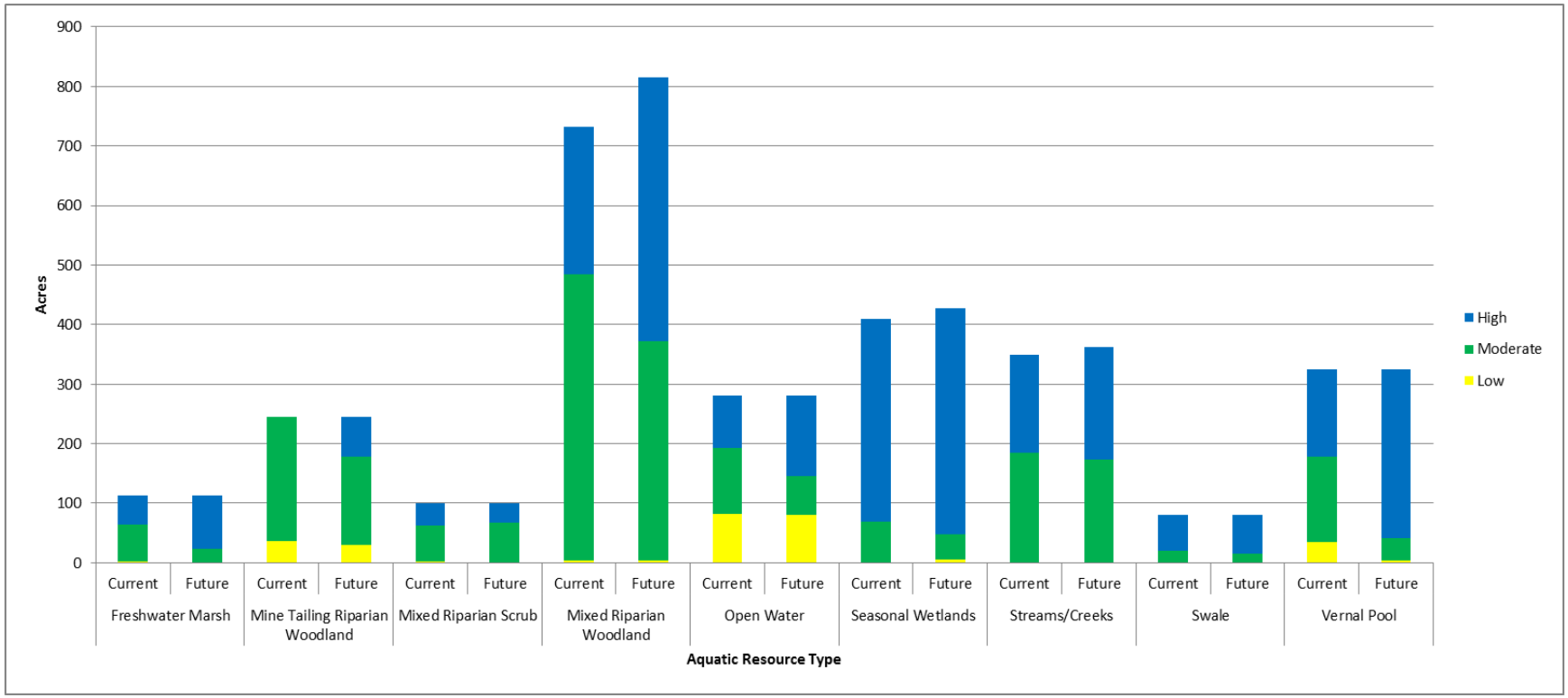


Table 45
Future Condition of Aquatic Resources in the Upper Cosumnes Watershed

Wetland or Non-Wetland Waters	SSHCP Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres	*Acres*	*Acres*	*Acres*	
Riparian	Mine Tailing Riparian Woodland	R2/R3	67.2	148.7	29.7	0	245.5
	Mixed Riparian Scrub	R2/R3	31.8	67.9	0	0	99.7
	Mixed Riparian Woodland	R2/R3	443.6	368.1	4.0	0	815.7
		Subtotal Riparian	*542.6*	*584.7*	*33.7*	*0*	*1,160.9*
Wetland Waters	Freshwater Marsh	PEM1	88.4	22.6	1.3	0	112.3
	Seasonal Wetland	PEM2	378.7	42.7	5.7	0	427.0
	Swale	R2/R3	65.7	14.6	0.3	0	80.6
	Vernal Pools	PEM2	284.1	37.2	3.4	0	324.7
		Subtotal Wetland Waters	*816.9*	*117.1*	*10.7*	*0*	*944.6*
Non-Wetland Waters	Open Water	POW	133.8	65.6	80.7	0	280.2
	Perennial or Intermittent Streams/Creeks	R2UB/R3UB	190.0	172.6	0.4	0	362.9
	Streams/Creeks (VPIH) Ephemeral	R4SB	0	0	0	0	0
		Subtotal Non-Wetland Waters	*323.8*	*238.2*	*81.1*	*0*	*643.1*
		Subtotal Wetland Waters and Non-Wetland Waters	*1,140.7*	*355.3*	*91.8*	*0*	*1,587.70*
		Grand Total[1]	**1,683.3**	**940.0**	**125.5**	**0**	**2,748.6**

Note: 1. Table may not total precisely due to rounding.

Figure 48 Existing and Future Watershed Profiles of Aquatic Resources in the Upper Cosumnes Watershed



In summary, the predicted future watershed profiles resulting from implementation of the SSHCP demonstrate aquatic resource abundance, diversity, and condition within the Plan Area would be maintained or improved. There would not be a net loss of aquatic resources in terms of acreage, aquatic resource diversity would be maintained, and the amount of high-condition resources within the Plan Area would be increased.

7 LOCAL AQUATIC RESOURCES IMPACT PERMIT APPLICATION PROCESS

7.1 Introduction

This section explains the local jurisdictions' Aquatic Resource Impact (ARI) Permit process and provides an overview of how Land Use Authority Permittees will issue ARI Permits to third-party project proponents under the ARP. This section also describes the permit application process for Plan Permittees, an explanation of specific requirements that must be satisfied by a project proponent prior to obtaining a permit, and in-lieu fee and land dedication requirements.

7.2 Submittal of Aquatic Resources Impact Permit Applications

7.2.1 Aquatic Resources Impact Permit Applications for Third-Party Project Proponents

Third-party project proponents are private project applicants that are seeking ministerial[11] or discretionary[12] permits from a Land Use Authority Permittee. Third-party project proponents shall submit their ARI Permit Application Package, the contents of which are described in Section 7.4.2, to the Land Use Authority Permittee with land use jurisdiction over their proposed project. Only the Land Use Authority Permittee with land use jurisdiction over a proposed project may issue ARI Permits to that project. For example, a project proposed by a third-party project proponent within the city limits of Rancho Cordova may only obtain an ARI Permit through the City of Rancho Cordova. The Land Use Authority Permittee will review the ARI Permit Application for consistency with all of the requirements that are described in this section and will provide the Implementing Entity, USACE, and RWQCB with a copy for tracking purposes.

Land Use Authority Permittees issue land use approval permits for a wide range of projects. Project applicants typically approach the information desk of the local jurisdiction (Land Use Authority Permittee) to inquire about land use approval permit requirements for their activity and the Land Use Authority Permittee will direct the customer to prepare the appropriate application. The Land Use Authority Permittee will review all local permitting applications to determine whether an activity will result in impacts to aquatic resources. If an activity would result in impacts to aquatic resources and

[11] A ministerial permit is a permit that requires little to no judgment on behalf of the Land Use Authority Permittee. An example of a ministerial permit is a building permit where as long as a parcel is zoned to allow the building of a structure the applicant only needs to follow building codes to construct their project.

[12] A discretionary permit is a permit that requires the use of judgement by a Land Use Authority Permittee before the permit can be issued. An example of a discretionary permit is a permit for a general plan amendment.

is otherwise not exempt, as defined by local aquatic resource protection ordinances, the applicant will be required to complete and submit an ARI Permit Application Package.

Potential CEQA Review

Many private third-party project proponent Covered Activities will require a land use approval and be subject to the California Environmental Quality Act (CEQA). For such activities, review of ARI Permit Applications should generally be undertaken concurrently with the CEQA environmental review. To facilitate this approach, the Land Use Authority Permittee should generally request that third-party project proponents submit an ARI Permit Application Package as part of the land use approval application and CEQA process.

There are many benefits to preparing the ARI Permit Application Package early in the planning process. First, submitting an ARI Permit Application Package during the land use approval/CEQA process will illustrate the various requirements required of the proposed project, and provide time for the project proponent to change the project description or to identify alternatives for CEQA analysis. Second, it will enable the CEQA document to refer to the project-specific requirements as identified in the ARI Permit Application. Finally, it will enable the local jurisdiction to provide early review of the ARI Permit Application for completeness. Based on a review of this initial information and a determination of ARI Permit requirements, the Land Use Authority Permittee can establish conditions of approval specifying ARI Permit conditions and fee requirements.

Each Land Use Authority Permittee is responsible for ensuring that an activity, upon issuance of an ARI Permit, fully complies with the terms of the permit.

7.2.2 Pre-Application Procedures

Prior to submitting an ARI Permit Application Package, third-party project proponents are encouraged to meet with the appropriate Land Use Authority Permittee. The purpose of the pre-submittal meeting is to allow the Land Use Authority Permittees to explain what information must be assembled for a specific project in support of the ARI Permit Application.

Pre-application meetings are also recommended to discuss AMMs and to determine if an applicant is proposing or is required to provide land dedication to offset all or a portion of their mitigation. Land dedications must be designed so that they comply with SSHCP/ARP AMMs as described in Chapter 5 of the SSHCP. Meeting early in the application process to discuss these criteria is strongly recommended to avoid delays in project approvals should land dedications not meet the criteria set forth in the SSHCP/ARP. A Land Use Authority Permittee may require a fee for these pre-submittal meetings and/or pre-submitted project proposal review.

7.2.3 Aquatic Resources Impact Permit Applications for Local Land Use Authority Permittees

Each local Land Use Authority Permittee that is participating in the SSHCP will adopt an aquatic resources protection ordinance requiring that permits be obtained by any party that is impacting aquatic resources within the SSHCP Plan Area. As such, all Land Use Authority Permittees are also required to comply with local aquatic resources protection ordinances and will complete an ARI Permit Application Package following the permit application process explained in Section 7.4. Each Land Use Authority Permittee will need to establish an internal process for ensuring that their projects are in compliance with the wetland protection ordinance. Because each Land Use Authority Permittee conducts project design and review independently, a single process that must be followed by all Land Use Authority Permittees will not be provided here. The completed ARI Permit Application Package will be submitted to the SSHCP Implementing Entity, USACE, and the RWQCB so that the project can be tracked for compliance monitoring purposes.

7.2.4 Aquatic Resource Impact Permit Applications for Permittees who are not Local Land Use Authorities

If a non-land-use-authority permittee (e.g., Capitol Southeast Connector JPA or SCWA) qualifies for the PGP and local Aquatic Resource Permit, it must apply to the Implementing Entity for a local Aquatic Resource Permit, under the authority of the Implementing Entity's Aquatic Resources Protection Ordinance.

7.3 Master Plan Consistency with Aquatic Resources Impact Permits

Due to the large area that a master plan[13] encompasses, third-party project proponents initiating master plans are required to consult with their respective Land Use Authority Permittee about compliance with aquatic resources protection ordinances early in the master plan process. Ensuring that the master plan complies with the provisions of an aquatic resources protection ordinance will reduce the likelihood of project delays. Master plans must be designed to comply with the requirements of the aquatic resources protection ordinance.

Early consultation with the Land Use Authority Permittee will:

- Ensure that all required AMMs are addressed by the master plan.

[13] A master plan is a document that broadly defines land use, circulation, and infrastructure for a specific area (Master Plan Area) and includes implementation measures that guide how development within the Master Plan Area will occur. The requirements for master plans can be fulfilled by a variety of planning tools, including specific plans, comprehensive plans, special planning areas, or any combination thereof.

- Ensure that on-site avoidance areas and Preserves are planned in appropriate locations to satisfy aquatic resources protection ordinance requirements.

7.4 Aquatic Resources Impact Permit Application Processing

An applicant will submit an ARI Permit Application Package for review and approval by the Land Use Authority Permittee following the process described in this section.

7.4.1 Timing of Aquatic Resources Impact Permit Application Submittal

All applicants needing to obtain an ARI Permit must do so prior to any ground-disturbing activity; however, they can also obtain an ARI Permit earlier by the following means:

a. In conjunction with any Plan Permittee discretionary review;

b. For ministerial projects, prior to the issuance of any building or grading permit; or

c. In the absence of building or grading permits, prior to the Covered Activity being performed.

7.4.2 Components of the Aquatic Resources Impact Permit Application Package

Applicants must include the data, documentation, and/or exhibits as described in this section as part of the ARI Permit Application package. Land Use Authority Permittees designate, and may amend, the form and timing in which the following information must be provided; however, each Land Use Authority Permittee's ARI Permit Application Package must include each of the application components described herein. Land Use Authority Permittees may charge a fee to recover costs associated with review and processing of the ARI Permit Application. Applicants are responsible for the costs associated with preparation of the ARI Permit Application, including surveys. Forms for the ARI Permit Application Package will be made available by the Land Use Authority Permittees. The ARI Permit Application includes the components specified in the following subsections.

7.4.2.1 Applicant Information

This part of the application should include the applicant's name and contact information, property owner's name and contact information, and names and contact information for any consultants preparing materials in support of the ARI Permit Application.

7.4.2.2 Project Description and Map

The project description must include a written description of the location of the project site, including Assessor's Parcel Number(s), as well as a written description of all activities proposed within the project site. The written description must include the following:

- Timing of construction activity;
- Type of equipment used;
- Type of fill material and cubic yards, square feet, acreage, and where appropriate linear feet of each type of fill;
- Type and location of permanent and/or temporary impacts to aquatic resources.

The application must also include a site plan illustrating the exact location of the project site overlaid on an aerial photograph at a scale no smaller than 1 inch equals 100 feet (a scaling ratio of 1:1200) showing the location, width, depth, and length of all existing and proposed activities, including structures, roads, stormwater facilities, sewage treatment, installations, stockpiling areas, borrow sites and location of avoidance areas or on-site Preserves, if applicable, within the project site.

7.4.2.3 Aquatic Resources Delineation

"Aquatic resources delineation" means identifying the amount and boundaries of aquatic resources as defined in Section 3 of this document, including wetlands. A Land Use Authority Jurisdiction shall determine the probable existence of aquatic resources on the property involved in a development permit application. If aquatic resources are believed to exist on a property, the project applicant must prepare an aquatic resources delineation. All aquatic resources delineations shall be performed in accordance with the minimum standards set forth by the Sacramento District USACE and State Water Quality Control Board at the time of the delineation. All aquatic resources delineations shall be verified by the USACE. Aquatic resource delineations must be prepared by an individual or firm qualified to prepare them. All maps will be prepared using GIS technology and all shapefiles will be provided to the Land Use Authority Permittee for tracking purposes. When a USACE-verified and valid (i.e., non-expired) delineation for a project site already exists, that delineation can be used. Waters[14] (including wetlands) found to be present on site must be classified using the nomenclature system developed for the SSHCP (see SSHCP Appendix E).

[14] As defined in 33 CFR 328 or 40 CFR 230.2(s).

7.4.2.4 Determination of Environmentally Equivalent or Superior Alternative

As described in greater detail in Section 5.2.2.1, if a complete avoidance alternative is not practicable, a DEESA will be prepared to ensure replacement of any lost functions and services to aquatic resources. The DEESA shall include the following information:

- A defined project area boundary and project area acreage.
- A detailed project description, including an overall project purpose statement, that demonstrates: (1) why an avoidance alternative is not practicable;[15] and (2) that the Covered Activity project minimizes direct and indirect effects to aquatic resources to the greatest extent practicable. This description would include information regarding any aquatic resources on site that are proposed to be avoided. It would also include information regarding any impacted aquatic resources in the context of the regional Conservation Strategy of the SSHCP (e.g., a statement that the project proposal is consistent with the requirements of the SSHCP and any terms and conditions of the SSHCP ITPs).
- Amount (acres and linear feet and cubic yards) of unavoidable impacts (permanent, causing loss of waters, and temporary) to aquatic resources associated with the project, and amount of indirect impacts.
- A detailed description of project design features and mitigation measures that reduce impacts, including, but not limited to, impact minimization; on-site first-order stream realignment (as opposed to removal); and SSHCP BMPs, AMMs, and LID AMMs.
- A description and amount of SSHCP-required compensatory mitigation through re-establishment, establishment, and/or preservation. Compensatory mitigation must conform to the SSHCP Conservation Strategy and the minimum mitigation ratios required by the ARP and must be consistent with the USACE/EPA Mitigation Rule (33 CFR Part 332). The primary way development project activities would accomplish the required mitigation is the purchase of credits from an ILF program that would be used for the SSHCP Plan Area. (See Section 5.3 for specific compensatory mitigation requirements.)
- Demonstration that, although the proposed Covered Activity project would not completely avoid impacts to aquatic resources, with proposed design and compensation measures, the project would be environmentally equivalent or superior to that which would occur under a complete avoidance alternative without these measures, based on one or more of the following factors:
    - Effects on designated Critical Habitat and Core Recovery Areas

[15] Practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purpose.

- Effects on the diversity of aquatic resources within the Plan Area
- Effects on vernal pool and other habitat connectivity and function of the SSHCP Preserve System
- Effects on the condition of aquatic resources within the Plan Area
- Effects on the abundance of aquatic resources within the Plan Area
- Effects on Covered Species.

7.4.2.5 Proposed Compensatory Mitigation Plan

A proposed compensatory mitigation plan shall be included that explains how the project applicant will compensate for permanent and temporary impacts to aquatic resources that will occur, after efforts to avoid and minimize have been exhausted. There are three accepted methods for meeting compensatory mitigation requirements: (1) payment into an ILF program approved by the USACE and that contains the impact site within its service area, (2) payment into a mitigation bank approved by the USACE and that contains the impact site within its service area, and/or (3) a permittee-responsible compensatory mitigation plan pursuant to local Land Use Jurisdiction Permittee ordinances that is in compliance with the Mitigation Rule. If all or part of the applicant's compensatory mitigation obligation will be satisfied via an ILF fund or through purchase of credits at a mitigation bank, the name and contact information for the ILF fund or the mitigation bank must be provided.

If an applicant is proposing permittee-responsible compensatory mitigation, the Implementing Entity must determine whether the proposed permittee-responsible compensatory mitigation is consistent with SSHCP AMMs described in SSHCP Chapter 5, Section 5.4, Conditions on Covered Activities, and with the biological goals and objectives described in Chapter 7 of the SSHCP (Table 7-1, Biological Goals, Measureable Objectives, and Conservation Actions). It should be noted that the SSHCP has fairly strict criteria that must be adhered to when siting Preserves, and it is possible that a site proposed for permittee-responsible compensatory mitigation will not meet the criteria for an SSHCP Preserve. If it is determined that permittee-responsible compensatory mitigation is not consistent with the requirements of the SSHCP, the applicant may wish to work with the Implementing Entity to find alternative sites that will support the SSHCP Conservation Strategy.

An applicant must provide the following information in support of permittee-responsible compensatory mitigation:

The compensatory mitigation plan consists of two parts: baseline information for the site and a conceptual compensatory mitigation plan. If off-site aquatic resource compensatory mitigation is proposed, baseline information for both the project site and mitigation site is required.

Baseline information shall include:

- Aquatic resources delineation as described pursuant to local aquatic resources protection ordinances;
- Description and maps of land cover types and vegetative conditions at the site;
- Description and maps of hydrological conditions at the site;
- Description of soil conditions at the site based on an on-site analysis and available soils information from online or published sources such as the Natural Resources Conservation Service's soils maps;
- A topographic map of the site; and
- A functional assessment or condition of the existing aquatic resources.

The contents of the compensatory mitigation plan shall be consistent with the USACE's Regional Compensatory Mitigation and Monitoring Guidelines for the South Pacific Division (2015), Appendix D, and include:

- Title page;
- Contributor page;
- Distribution page;
- Table of contents;
- Brief description of proposed compensatory mitigation project and proposed source of compensatory mitigation;
- Determination of goals and objectives of the proposed project. Specific criteria shall be provided for evaluating whether or not the goals and objectives of the compensatory mitigation project are being met. Such criteria may include water quality standards, survival rates of planted vegetation, species abundance and diversity targets, habitat diversity indices, or other ecological, geological, or hydrological criteria;
- A description of all permanent and temporary impacts (acreage and linear feet) that require compensatory mitigation pursuant to local aquatic resources protection ordinances;
- Description of site selection criteria such as watershed overview, landscape setting and position, and site-specific information, including consistency with the site selection guidance provided in the ARP (Appendix D);
- Other baseline information, such as a map showing locations of permanent and/or temporary impact and compensatory mitigation sites; map showing proposed preserves and setbacks; delineation of aquatic resources; functional/condition assessment, if

appropriate; species of concern (federal and/or state); cultural resources; existing and planned land uses within and surrounding the proposed compensatory mitigation sites(s); existing site topography/elevations; aerial photos, land uses, site changes (deep ripping, impoundments, channel straightening or realignment); interviews with adjacent landowners, ranchers, land managers regarding locations of seeps, observations of flood events, trespassing/vandalism, opportunities for education and outreach.

- Written specifications for the compensatory mitigation project shall be provided. The specifications shall include the proposed construction sequence; grading and excavation details; water and nutrient requirements for planting; specification of substrate stockpiling techniques; and planting instructions, as appropriate. These written specifications shall be accompanied by detailed site diagrams, scaled cross-sectional drawings, topographic maps showing slope percentage and final grade elevations, and any other drawings appropriate to show construction techniques or anticipated final outcome;
- Discussion and map of plant material to be planted and planting densities;
- Preliminary drainage plan identifying location of proposed drainage facilities, including detention structures and water quality features (e.g., swales);
- Discussion of water sources for all aquatic resources on the site;
- Project schedule;
- A monitoring and management program to measure the success of the compensatory mitigation project pursuant to local aquatic resources protection ordnances. The monitoring and management program must include the following:
    - The compensatory mitigation project shall be monitored for a period necessary to determine if the project is meeting its performance standards, and to determine if measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. Compensatory mitigation projects are required to have a minimum monitoring period of 5 years. For aquatic resources with slow development rates (e.g., vernal pools and riparian habitats) a monitoring period of more than 5 years is required. Monitoring periods may be extended if performance standards are not being met. Before determining success, there should be at least two consecutive annual monitoring reports where all the performance standards are met without human intervention (e.g., artificial irrigation).
    - Monitoring shall be designed to measure the performance standards outlined in the compensatory mitigation plan.
    - A monitoring protocol shall be included outlining how the monitoring data will be evaluated by agencies that are tracking the progress of the project.

- Monitoring reports shall be submitted annually, or on a pre-arranged alternate schedule, for the duration of the monitoring period.
- Monitoring reports shall analyze the results of monitoring, documenting milestones, successes, problems, and recommendations for corrective and/or contingency actions to ensure success of the compensatory mitigation project.

- A contingency plan that identifies potential courses of action, and any corrective measures to be taken when monitoring or evaluation indicates project performance standards are not being met.
- A monitoring and management program to measure and maintain the long-term sustainability of the compensatory mitigation project in perpetuity. Monitoring and management programs shall be consistent with established practices of the SSHCP and ARP and information collected in a manner that allows for seamless integration into the SSHCP database.

7.4.2.6 Financial Assurances for Permittee-Responsible Compensatory Mitigation

A project applicant proposing permittee-responsible compensatory mitigation shall submit itemized cost estimates showing required financial assurances pursuant to local aquatic resources protection ordinances, including cost estimates associated with performance and maintenance assurances.

7.4.2.7 Description of How the Project Complies with SSHCP Avoidance and Minimization Measures

Project applicants using the SSHCP must document how the proposed project will comply with SSHCP AMMs described in SSHCP Chapter 5, Section 5.4. See the SSHCP AMMs worksheet attached to the SSHCP permit application package.

7.5 Review for Completeness

The Land Use Authority Permittee will compare the ARI Permit Application Package against a Project Review Checklist, to confirm that all requirements have been met, including requirements such as setbacks and other AMMs. The Land Use Authority Permittee's review process may be subject to the processing time and requirements of the Permit Streamlining Act (Government Code Section 65920 et seq.). For most projects, the Land Use Authority Permittee will review the ARI Permit Application Package for completeness within 30 days of receipt of a complete ARI Permit Application package. The Land Use Authority Permittee or Implementing Entity may extend the review period for large or potentially complex projects up to an additional

30 days by providing written notice to the applicant. The Land Use Authority Permittee may continue to extend the review period after written notice until the Land Use Authority Permittee deems that a SSHCP permit application package is complete.

The Land Use Authority Permittee is also authorized to close ARI Permit Applications when they determine that the applicant has failed to provide requested information within a reasonable period. In such an event, the Land Use Authority Permittee shall provide written notice that the ARI Permit Application will be closed within 30 days unless all required materials are submitted.

7.6 Assessment of Impacts

After a complete ARI Permit Application has been submitted, the involved Land Use Authority Permittee shall prepare an assessment of aquatic resource cover type impacts that would result from the project.

7.6.1 Method for Calculating Impacted Acreage

The Land Use Authority Permittee or Implementing Entity will prepare an impact assessment that identifies the location and amount of each aquatic resource cover type that will be directly impacted as a result of implementing an activity. Permanent losses of aquatic resources will be calculated by overlaying the map generated to identify project impacts onto the wetlands delineation. If any portion of a wetland land cover type is impacted, then the entire feature is considered to be directly impacted. The impact assessment will include both a map depicting the area of impact and table(s) quantifying the acres of impact to each land cover type. The results will be used to determine the required mitigation to offset impacts.

7.6.2 Appealing the Impact Assessment

An applicant has the right to appeal the impacts assessment made by a Land Use Authority Permittee. Written objections must be filed with the Land Use Authority Permittee within 30 calendar days of receiving the initial impact assessment, and must be accompanied by data supporting the appeal, such as surveys, aerial photos, maps, or resource agency-verified delineations. The Land Use Authority Permittee has 30 calendar days from the receipt of the appeal to respond. Disagreements that cannot be resolved between the Land Use Authority Permittee staff and applicants will be decided by the Land Use Authority Permittee's governing Board or Council.

7.7 State and Federal Agency Review

While an ARI Permit is required as a condition of local Aquatic Resource Protection Ordnances, the ARI Permit Application is also used to satisfy state and federal aquatic resource permitting requirements.

Programmatic General Permit

As discussed below in Section 8, a project that does not exceed 2 acres of loss of waters, and/or more than 500 linear feet of perennial, intermittent, or third or higher order ephemeral streams, unless this linear foot limit is waived in writing by the USACE, can use a Programmatic General Permit to satisfy state and federal aquatic resource permitting requirements. The ARI Permit Application has been designed to provide all of the information necessary to process a Programmatic General Permit. Because the local Land Use Authority Permittees are authorized to issue Programmatic General Permits on behalf of the USACE and the RWQCB, no further state or federal resource agency review of the application is required.

Letter of Permission and Standard Permits

Projects that exceed the aquatic resource impact thresholds set for the Programmatic General Permit will be required to seek either a Letter of Permission or a Standard Permit from the USACE as explained in further detail in Section 8 below. Similarly to the Programmatic General Permit the ARI Permit Application has been designed to provide all of the information necessary to process a Letter of Permission or Standard Permit. Unlike the Programmatic General Permit, a Letter of Permission or a Standard Permit cannot be issued by the Land Use Authority Permittees. All ARI Permit Applications completed for projects that exceed the Programmatic General Permit threshold will be submitted to the USACE and RWQCB for review and issuance of either a Letter of Permission or Standard Permit depending on the size of impacts to aquatic resources.

7.8 Fees

Once a project receives a draft compliance determination letter, the Land Use Authority Permittee will calculate fees based on the project impacts. Once impacts are calculated, they must be reported to the SSHCP Implementing Entity, if the project applicant is using the SSHCP to satisfy mitigation obligation, so they can be tracked for compliance with the Plan's stay-ahead provision (see Chapter 9 of the SSHCP). Fees are subject to automatic adjustments to allow for fluctuating land values and other mitigation-related costs. Annual adjustments will be made on or before March 15 of each calendar year, and other adjustments may be made during periodic audits. Table 12-5, Development Fees Used in the SSHCP Economic Model, in SSHCP Chapter 12 sets forth the initial SSHCP development fee structure.

7.8.1 SSHCP Development Fees

SSHCP Development Fee Payment Timing

Mitigation for project impacts, whether through payment of the SSHCP development fee, use of conservation or mitigation bank credits, or by permittee-responsible compensatory mitigation, must occur prior to land disturbance. For master planned projects, an applicant can choose to pay

fees for a unit of land to be impacted (a phase or portion of a larger project) rather than paying fees for the full project area at one time. Project proponents that pay fees in advance of issuance of local Land Use Authority permits are subject to provisions of the "catch-up fee ordinance" as described in Chapter 9 of the SSHCP. This ordinance states that if a project proponent pays fees prior to issuance of a permit and fees increase before the permit is issued, the project proponent will pay the difference between what was originally paid and the amount of the fee increase. Fee payments are final and nonrefundable and remove any need for land dedication in lieu of fees.

8 AQUATIC PERMITTING PROGRAM

This section describes how the local permitting program contained in the ARP complements and combines with an anticipated federal and state permitting strategy to provide a comprehensive permit program for the Plan Area. Numerous federal and state regulatory agencies (USACE, RWQCB, and CDFW) have aquatic resources permitting authority over Covered Activities within the Plan Area. The SSHCP and ARP's local permitting program and comprehensive, long-term watershed approach is designed to enable these regulatory agencies to shorten permitting timelines and improve the protection and management of aquatic resources in the Plan Area.

Since many species covered under the SSHCP are closely associated with aquatic resources, state and federal aquatic resources regulatory programs can use the SSHCP framework to develop more efficient permitting processes for SSHCP Covered Activities. In comparison to building upon the ARP's framework and local permitting program, the project-by-project application review currently employed within the Plan Area does not provide as comprehensive an ability for the regulatory agencies to evaluate aquatic resources impacts and compensatory mitigation at a watershed scale.

The SSHCP and ARP are expected to provide the opportunity to increase permitting efficiency, inclusive of the development of the USACE's CWA Section 404 permitting strategy, which could include multiple permit instruments and/or processes, including a GP(s), an LOP, and an abbreviated SP process. The USACE is a cooperating agency on the USFWS' Environmental Impact Statement (EIS) under NEPA being developed for the SSHCP. The USACE anticipates using the EIS as a programmatic document and would incorporate analysis from it to the maximum extent possible to address compliance with NEPA associated with CWA Section 404 permitting for future SSHCP Covered Activities.

Parallel to the USACE's permitting strategy, the RWQCB and CDFW have opportunities to increase the efficiency of their permitting processes, while improving the protection and management of aquatic resources in the Plan Area. The RWQCB could issue a programmatic CWA Section 401 Water Quality Certification (WQC) for the USACE's GP(s), and adopt a

more efficient WQC approach for projects associated with USACE's LOP and SP processes. The RWQCB could also adopt a more efficient Waste Discharge Requirement (WDR) approach for waters of the state. The CDFW could issue a Master LSA or Long-Term LSA for activities and adopt a more efficient individual SAA process. The RWQCB and CDFW are cooperating agencies on the Environmental Impact Report (EIR) under CEQA being developed for the SSHCP, and therefore would be able to use the EIR as a programmatic document, and incorporate analysis from it to address compliance with CEQA associated with future SSHCP Covered Activities.

Final decisions on permit strategies and instruments would be made by the USACE Sacramento District, RWQCB, and CDFW. As such, the anticipated vision described in this document is preliminary, but has been reviewed in concert with the various agencies and articulates what is a representative, common outlook.

8.1 General Permit Approach

8.1.1 USACE 404 General Permit and the Local Permit Program

The USACE issues GPs for activities with no more than minimal individual and cumulative impacts on the aquatic environment. GPs are issued on a nationwide, regional, and programmatic basis. PGPs are based on a local or state program that protects aquatic resources. The SSHCP Plan Permittees are seeking a PGP from the USACE for SSHCP Covered Activities within the Plan Area.

8.1.1.1 CWA Section 404 General Permit Overview

If a PGP approach is adopted by the USACE, the PGP would be established for SSHCP Covered Activities with minimal individual and cumulative environmental impacts. The PGP would be premised on the SSHCP, ARP and Aquatic Resources Protection Ordinances that would be adopted by the County of Sacramento, the Cities of Galt and Rancho Cordova and the Implementing Entity. The ordinances would provide the legal structure for the Land Use Authority Permittees and Implementing Entity to implement the local aquatic program. Each proponent proposing to verify a project under the PGP would then submit an application to the Land Use Authority Permittees or Implementing Entity, depending on who has jurisdiction over the project, to discharge dredged or fill material into waters of the United States and waters of the state, and would receive verification from the Land Use Authority Permittees or Implementing Entity for qualified Covered Activities. It would be the Land Use Authority Permittees' or Implementing Entity's responsibility to determine consistency with the SSHCP, the ARP, and the aquatic resources ordinance, depending on who has jurisdiction over the project. The Land Use Authority Permittees and Implementing Entity would submit reports to the USACE at regular intervals for Covered Activity projects approved under the PGP. The PGP would be valid for a period of 5 years, with the potential for reauthorization by the

USACE if the program is in compliance with all requirements of the SSHCP, ARP, and PGP. The USACE also has the ability to suspend or revoke GPs (either PGPs or RGPs) in accordance with 33 CFR 325.7 in response to compliance issues and/or a determination that use of the GPs has exceeded minimal individual and cumulative adverse impacts to waters of the United States.

An alternative (or, potentially future addition) to the PGP approach is the establishment of an RGP for SSHCP Covered Activities. Like a PGP, a RGP would only authorize activities substantially similar in nature with minimal individual and cumulative environmental impacts. The main difference between a PGP and RGP is that a PGP is founded upon an existing program (federal, state or local) and is designed to avoid duplication with that program(s). As envisioned in the context of the ARP, this is anticipated to involve the USACE's issuance of a PGP for use by the Land Use Authority Permittees and Implementing Entity in verifying its use to authorize a project. The USACE also has discretion to issue a PGP that provides that the USACE review and verify authorizations for certain activities or levels of activity, should it be necessary to ensure a PGP meets the standard of minimal individual and cumulative environmental impacts. Under an RGP each project proponent proposing to authorize a project via the RGP would submit a request for verification to the appropriate SSHCP Land Use Authority Permittees or Implementing Entity, who would act as a "clearinghouse" for the permit applications by conducting the initial screening process to verify project consistency with the SSHCP and ARP. The project applications would then be submitted to the USACE, who would review the application requests under the RGP to determine compliance and make permit decisions. The USACE also has the discretion to specify types and/or levels of activities under a RGP that are "non-notifying," such that no pre- or post-project notification or reporting would be necessary between the project proponent and/or SSHCP "clearinghouse" and the USACE. The RGP would be valid for a period of 5 years, with the potential for reauthorization by the USACE if the program is in compliance with all requirements of the SSHCP, ARP, and terms and conditions of the RGP. The USACE also has the ability to suspend or revoke GPs (either PGPs or RGPs) in response to compliance issues and/or a determination that use of the GPs has exceeded minimal individual and cumulative adverse impacts to waters of the United States.

Under either permitting approach, application for use of these GPs is voluntary. Covered Activity projects that would discharge dredged or fill material into waters of the United States and meet the terms and conditions of the USACE GP(s) are eligible, but not obligated, to apply for verification under the GP(s).

8.1.1.2 General Permit Proposal and Basis for General Permit Acreage Threshold

The SSHCP Plan Permittees are developing a local aquatic resources program that they anticipate would support the USACE's issuance of a PGP for discharge of dredged or fill material into waters of the United States that would cause no more than minimal individual and cumulative

environmental impacts. This section is written to express how the SSHCP Plan Permittees would envision a proposed PGP, whose final terms and conditions would be determined by the USACE. To qualify for use of the PGP, the loss of waters of the United States, including wetland waters of the United States, resulting from a single and complete Covered Activity project is envisioned by the SSHCP Plan Permittees to not exceed 2 acres of loss of waters, and/or more than 500 linear feet of perennial, intermittent, or third or higher order ephemeral streams, unless this linear foot limit is waived in writing by the USACE.

In addition to a specific acreage limit of loss of waters for any given single project, the SSHCP PGP overall impact amounts would be "capped" over a 5-year implementation term. This Plan Area-wide impact acreage cap would be set at 155 acres of loss of wetlands within the Plan Area per 5-year term of the PGP. Assuming the PGP is reauthorized at 5-year intervals by the USACE, this cap would be repeated approximately nine times between the time of the SSHCP's approval and the end of its 50-year term.

The SSHCP Covered Activities fall into eight general categories:

- Urban Development in the UDA
- Mining in the UDA
- Rural Transportation Projects
- Recycled Water Projects
- Covered Activities in Preserve Setbacks in the UDA
- Covered Activities in Stream Setbacks in the UDA
- SSHCP Preserve System Covered Activities
- Covered Activities in the Laguna Creek Wildlife Corridor of the Preserve System.

Covered Activities allowed under each of the above-listed categories are described in detail in the SSHCP in Section 5.2.

As described above, to qualify for use of the SSHCP PGP, the proposed loss of waters of the United States resulting from a single and complete Covered Activity project could not exceed a total of 2 acres and/or 500 linear feet of perennial, intermittent, or third or higher order ephemeral streams, unless this linear foot limit is waived in writing by the USACE. The per-project acreage threshold of the SSHCP PGP is a higher acreage amount than the typical 0.5-acre threshold of the USACE's Nationwide Permit Program.

The following projects and activities are envisioned by the SSHCP Plan Permittees to not be eligible for authorization under the anticipated SSHCP PGP because they are not covered by the

SSHCP Permits:[16] agricultural projects; agricultural-residential development outside the UDA; trail systems outside the UDA; airport operations and expansion outside the UDA; rural infrastructure that is not identified as a Covered Activity; landfills, mining outside the UDA; oil and gas extraction or production; projects related to the Cosumnes River; projects that have received state and/or federal (as applicable) aquatic resource permits in advance of the official implementation date of the SSHCP; existing or proposed preserves not under SSHCP Management; establishment, of new and management and operation of existing mitigation and conservation banks; pesticide use; dam construction or removal; water diversion; wind energy; power lines outside the UDA; and emergency, safety, and police services. Covered Activities that do not require a development, grading, building, or other construction permit are eligible, but not obligated, to be authorized under the SSHCP PGP.

8.1.2 Section 401 CWA Water Quality Certification, State Board General Order

The SSHCP Plan Permittees are seeking a programmatic Section 401 CWA Water Quality Certification from the RWQCB. As with the proposed USACE General Permit (described above in Section 7.1.1.2), the programmatic 401 Certification would authorize SSHCP activities that cause no more than minimal individual and cumulative adverse impacts to aquatic resources within the Plan Area. Covered Activities authorized under the programmatic 401 Certification would need to satisfy the RWQCB's water quality anti-degradation policy by demonstrating that maintenance of water quality standards are being satisfied in the Plan Area. This would be accomplished when a project enters the SSHCP permitting framework. The local implementing agency would vet local Covered Activities with a review process that would assure all measures required under the SSHCP permitting framework for wildlife and water quality are met before submittal to the RWQCB for final review and approval. The programmatic 401 Certification would satisfy the Report of Waste Discharge requirements for Porter-Cologne.

The more efficient 401 Certification process would be attractive to project proponents because it would save time and costs associated when compared to the standard permitting process. From a regulatory standpoint, it would allow greater environmental benefits to accrue from project impacts considered from a watershed perspective.

8.1.3 California Fish and Game Code/Section 1600 MSAA

For projects that are initiated by a local Land Use Authority Permittee (Sacramento County, the City of Rancho Cordova, or the City of Galt) that need to notify CDFW pursuant to Section 1600 of the California Fish and Game Code, CDFW would enter into an MSAA)or a Long-Term

[16] For a complete description of activities and actions not covered by the SSHCP permits, please see Section 5.3 of the SSHCP.

Streambed Alteration Agreement (LTLSA). The aforementioned type permit vehicle (be it a CDFW MSAA or an LTLSA) would be valid for 12 years and would be eligible for a one-time extension for a maximum period of 17 years. For the amount of time remaining under the 50-year SSHCP following the expiration of the first MSAA or LTLSA and its extension, Sacramento County, the City of Rancho Cordova, or the City of Galt would enter into a new agreement that would build upon the first agreement for municipal projects.

For all other Covered Activity projects, CDFW would streamline the process to authorize activities under Section 1602 of the California Fish and Game Code that affect the bed and bank of streams, ponds, and lakes in the Plan Area with implementation of the ARP. The ARP and SSHCP address all impacts and the conservation of streams and riparian habitat and other water bodies regulated by CDFW.

In the streamlined process, the local Land Use Authority Permittees or Implementing Entity, whoever has jurisdiction, may act as a "clearinghouse" for the notification forms and would conduct an initial screening process to verify the project's consistency with the SSHCP, ARP, and the aquatic resources protection ordinances. The local Land Use Authority Permittees or Implementing Entity may then submit the notification forms to CDFW on behalf of the project proponent. Prior to processing an LSA Notification, CDFW must collect the fee for each LSA Notification submitted by the individual project proponent. CDFW is solely responsible for determining whether an LSA Agreement is required.

Ultimately, for land development Covered Activities that conform with the SSHCP permitting framework, the CDFW would enable a MSAA or LTLSA to increase the efficiency of their permitting process and benefit the County and Cities, and the JPA collectively.

8.2 CWA Section 404 Permitting for Projects Ineligible for General Permits

8.2.1 CWA Section 404 Individual Permits

Similar to the discussion above regarding an anticipated PGP, based on working with the USACE in the development of the SSHCP and ARP, the SSHCP Plan Permittees anticipate that the USACE would develop programmatic approaches to processing individual CWA 404 permits for the relatively small amount of SSHCP Covered Activity projects proposed to impact waters of the U.S. that would not fit under the terms and conditions of the PGP. The final determinations and related terms and conditions of these anticipated permit processes is at the discretion of the USACE. Project proponents with development Covered Activity projects located in the development envelope of the Plan Area that do not meet eligibility requirements under the PGP would be able to apply for CWA Section 404 authorization under an "abbreviated" individual permit (IP)

process, encompassing two kinds of IPs: SPs and LOPs. For projects proposing to permanently impact more than 2 acres but not more than 10 acres of Waters of the United States, and/or more than 700 linear feet of perennial, intermittent, or third or higher-order ephemeral streams (unless this linear-foot limit is waived in writing by the USACE), a LOP procedure for Covered Activities in the Plan Area is envisioned (see Section 7.2.1.1). For projects proposing to permanently impact more than 10 acres of waters of the United States and/or 700 linear feet of perennial, intermittent, or third or higher-order ephemeral streams, an "abbreviated" SP procedure for Covered Activities in the Plan Area is envisioned (see Section 7.2.1.2). To use either of these IP procedures, the project proponent would need to document compliance with the requirements of the SSHCP and ARP regulatory permitting framework in the project proposal. The SSHCP and ARP requirements would incorporate compliance with on-site avoidance, minimization, and compensatory mitigation as prescribed under the Plan Area regional assessment of existing aquatic resources diversity, abundance, and condition; impacts proposed upon those resources; and benefits accrued from the SSHCP and ARP AMMs and Conservation Strategy. The envisioned IP processes would be attractive to project proponents because it seeks to largely fulfill in advance the requirements of a separate off-site alternatives analysis, project-by-project assessment of compliance with the USACE's assessment of the Least Environmentally Damaging Practicable Alternative (LEDPA) requirements, and/or, in the case of SPs, alleviate the necessity of preparing a rigorous off-site alternatives analysis. In addition, the IP processes would save time and costs associated when compared to the USACE's typical permitting process through greater permit process certainty.

8.2.1.1 CWA Section 404 LOP

For moderate-scale development Covered Activity projects proposed under the SSHCP regulatory permitting framework that do not meet the eligibility requirements of the proposed SSHCP PGP, and have more than minimal impacts to aquatic resources but less than significant impacts on the human environment under NEPA, the Plan Permittees' understanding is that the USACE anticipates developing an abbreviated procedure for issuing LOPs under CWA 404. LOPs are a type of individual permit issued through abbreviated processing procedures, which includes coordination with federal and state wildlife agencies and a public interest evaluation, but without the publishing of an individual public notice (33 CFR 325.2(e)).

The envisioned LOP procedure would authorize the discharge of dredged or fill material into waters of the United States pursuant to Section 404 of the CWA for SSHCP Covered Activity projects. To qualify for use of the LOP, the loss of waters of the United States, including wetland waters of the United States, resulting from a single and complete Covered Activity project is envisioned to not exceed a total of 5 acres and/or would not permanently impact more than 700 linear feet of perennial, intermittent, or third or higher order ephemeral streams, unless this linear-foot limit is waived in writing by the USACE.

Once the anticipated LOP procedure is in place, project proponents would submit project proposals to the Land Use Authority Permittees or Implementing Entity, whoever has jurisdiction, who would act as a "clearinghouse" for the CWA 404 permit applications by conducting the initial screening process to verify project consistency with the SSHCP and ARP. The applications would then be submitted to the USACE by the Land Use Authority Permittee or Implementing Entity, whichever has jurisdiction over the project, for review under the LOP procedure. The Corps would likely prepare a simplified decision document (for their program's administrative record) that would refer to the SSHCP's EIS for compliance with NEPA and aspects of compliance with U.S. EPA's 404(b)(1) Guidelines.. The proposed LOP is envisioned to rely on the SSHCP to address avoidance, minimization and requirements for compensatory mitigation for impacts to aquatic resources. For instance, compensatory mitigation requirements would be the same as those in the SSHCP.

8.2.1.2 CWA Section 404 "Abbreviated" Standard Permit

Project proponents with Covered Activity projects located in the Plan Area that do not meet eligibility requirements under the PGP or the LOP procedure could seek authorization under an abbreviated SP process. This abbreviated SP process could be used as long as the project proponent conformed to the requirements of the SSHCP and ARP. The SSHCP permitting framework would require project compliance with on-site avoidance, minimization, and compensatory mitigation, as prescribed under the Plan.. Projects utilizing the abbreviated SP process are anticipated to only occur within the development envelope of the Plan Area (the UDA).

Advanced identification of plan-wide tradeoffs in aquatic resources loss and conservation would have already addressed aquatic resource impact avoidance at a regional level, thus, an off-site alternatives analyses would not be necessary for SP proponents to prepare for purposes of demonstrating compliance with the 404(b)(1) Guidelines. Therefore, SP proponents' alternatives analysis would be limited to addressing avoidance and minimization at the project site level. NEPA requirements for abbreviated SPs may be satisfied with an Environmental Assessment-level of review, or may require preparation of an EIS if proposing potentially significant effects on the human environment. Even for projects requiring the use of an EIS, the SP process is anticipated to be greatly compressed by relying on the SSHCP, ARP and ordinances. The USACE anticipates the use of tiering from the SSHCP EIS, use of programmatic compliance with other laws such as ESA, and alignment with the compensatory mitigation requirements contained in the SSHCP, ARP and ordinances.

The Plan Permittees would still act as the "initial clearinghouse" for permit applications that may enter into the abbreviated SP process, in the same manner they would for the PGP and LOP reviews. The Land Use Authority Permittees or Implementing Entity, depending on who has jurisdiction over the project, would screen all applications to ensure that the Covered Activity

projects are in compliance with the SSHCP and ARP, and propose to incorporate all applicable terms and measures. The applications would then be submitted to the USACE by the Land Use Authority Permittee or Implementing Entity, whichever has jurisdiction over the project. The USACE would make the final determination whether or not a permit application could be processed under the abbreviated SP process.

The anticipated abbreviated SP process would be attractive to project proponents because it would save time and cost, and increase certainty in comparison to typical information requirements and processes involved in the USACE's review of standard permit applications. For instance, under the SSHCP permitting framework, urban development Covered Activity projects with more than minimal impacts to the aquatic environment are anticipated to only occur within the development envelope of the Plan Area (the UDA). The UDA has already been determined to be the most suitable location for large-scale development as determined by County and City General Plans. It is assumed that development projects processed under the SSHCP abbreviated SP procedure would, similar to the proposed PGP and LOP, not need to expend time and costs involved with developing an off-site alternatives analysis for the USACE's review and consideration, as described above. Also, the on-site avoidance and minimization requirements that are necessary for SP proponents to address would overlap with requirements of the SSHCP (e.g., stream setbacks) and would therefore satisfy the on-site alternatives analysis for purposes of demonstrating compliance with the 404(b)(1) Guidelines. The DEESA determination made by the Land Use Authority Permittees or the Implementing Entity would be submitted with the abbreviated SP application. As described above, the CSA 404 "abbreviated" SP regulatory approach would likely be utilized for some of the anticipated large-scale urban development Covered Activity projects, and would increase the efficiency of the permitting process (compared to the existing, typical standard permit process), while also promoting greater protection of aquatic resources to accrue from a regulatory framework that considers the balancing of landscape- and project-scale impacts to aquatic resources with a coordinated approach to avoidance, minimization and compensation for unavoidable impacts to aquatic resources.

8.3 Programmatic Section 401 CWA Certification/Porter-Cologne Act Waste Discharge

As discussed in Section 7.1.2, a programmatic Section 401 Water Quality Certification (also satisfying the requirements of the state's Porter-Cologne Act) is sought by the SSHCP Plan Permittees. This programmatic 401 Certification may be able to cover projects applied for under the PGP, and potentially cover (all or in part, promoting efficiency) some larger-scale projects applied for under a LOP or SP. Larger-scale Covered Activity projects proposed within the Plan Area that do not qualify for the programmatic Section 401 Water Quality Certification would be required to obtain individual 401 Water Quality Certifications, which may be required for some LOPs and SPs processed by the USACE. However, the Plan Permittees would establish a

programmatic review process to assist in efficient processing of these individual 401 certifications for proposed Covered Activities that are in compliance with all requirements of the SSHCP and ARP. Under this more efficient review process, the Land Use Authority Permittees or Implementing Entity, depending on who has jurisdiction over the project, would still act as the initial "clearinghouse" for permit applications, in the same manner they would for the Section 404 application reviews. The Land Use Authority Permittees or Implementing Entity (as applicable) would screen all applications to ensure that the projects are in compliance with the SSHCP, ARP and applicable Aquatic Resources Protection Ordinance. This initial screening would be anticipated to facilitate a more efficient review process of individual 401 Water Quality Certification applications by the RWQCB by providing a "vetted" and more predictable review. To satisfy CEQA requirements, the Plan Permittees would be able to tier from the SSHCP EIS/EIR, which would greatly quicken their review timeline.

8.4 California Fish and Game Code/Section 1600 Streambed Alteration Agreements

The local Land Use Authority Permittees and the Implementing Entity would develop with CDFW an MOU for land development Covered Activity projects authorized under the SSHCP regulatory framework that notifies CDFW pursuant to Section 1600 et seq. of the California Fish and Game Code. Under this unique MOU, the CDFW would collect a fee for each notification submitted by the local Land Use Authority Permittees or Implementing Entity. However, this expedited MOU process would standardize AMMs and compensatory mitigation. The agreement would describe the SSHCP permitting framework arrangement between CDFW and the local Land Use Authority Permittees and the Implementing Entity, which would include procedures for avoidance, minimization, and compensatory mitigation requirements for all Covered Activities occurring within the Stream Zone, pursuant to Section 1602 of the California Fish and Game Code. Under this MOU, the CDFW would collect fees for each notification, pursuant to Section 1602 of the California Fish and Game Code, and determine whether to issue LSAs to individual Covered Activity projects. However, permitting would be standardized for proposals that comply with requirements set forth in the SSHCP, which would enable CDFW to quicken their permitting process under an MOU permitting procedure. To satisfy CEQA requirements, the CEQA lead agencies would be able to incorporate analysis from the SSHCP EIS/EIR, which would greatly quicken their review timeline. Ultimately, for land development Covered Activity projects that conform with the SSHCP permitting framework, the CDFW would enable the MOU to quicken their permitting process and benefit the County, Cities, and the Implementing Entity collectively.

For municipal projects authorized under the SSHCP regulatory framework, the Implementing Entity would describe such projects in advance and notify the CDFW pursuant to Section 1600 et seq. of the California Fish and Game Code and seek to append those projects to a MSAA or LTLSA.

8.5 Other Federal Laws

8.5.1 Section 7 of the Federal ESA

Section 7 of the ESA requires federal agencies to consult with the USFWS (and/or the National Marine Fisheries Service) to ensure that every action authorized, permitted, funded, or carried out by the federal agency would not jeopardize the continued existence of any federally listed species or destroy or adversely modify designated critical habitat.

As discussed in Section 2.3.1, projects or activities with the potential to discharge dredged or fill material into waters of the United States must consult with the USACE and must comply with Section 404 of the CWA. The USACE's issuance of a CWA 404 permit (or other USACE authorizations for impacts to jurisdictional waters) constitute a federal action, and must comply with the ESA. Therefore, the USACE would consult with the USFWS under ESA Section 7 before issuing a CWA permit (or other CWA authorizations) to any Plan Area project or activity that may impact a federally listed species.

The USACE often acts as the lead federal agency. When acting as lead federal agency, the USACE provides the federal nexus for Section 7 ESA consultation with the USFWS for projects with the potential to affect federally listed species. All of the federally listed species that occur in the Plan Area are SSHCP Covered Species (see SSHCP Chapter 1, Table 1-2).

Under the conventional project-by-project regulatory review process, the USACE first prepares a Biological Assessment to determine if the proposed project or activity may affect listed species or critical habitat. If the Biological Assessment indicates that the project or activity may affect a listed species, the USACE will request a formal consultation with the USFWS under ESA Section 7. (If the Biological Assessment determines that the project or activity is not likely to adversely affect the species or critical habitat, the USACE may request an informal consultation with the USFWS. If the USFWS does not concur with the no adverse determination of the informal consultation, the USFWS may require the USACE to initiate a formal consultation).

Under the conventional project-by-project regulatory review process, the finding by the USACE that the proposed project or activity would adversely impact a federally listed species (or its critical habitat) will initiate the preparation of a Biological Opinion by the USFWS. The Biological Opinion will include a full description of the proposed action, including any conservation measures proposed as part of the action, and will include a detailed discussion of the direct, indirect, and cumulative effects of the action on listed species or critical habitat, and will summarize the information upon which the opinion is based (including the information and analysis provided by the USACE's Biological Assessment). The Biological Opinion presents a determination on whether the proposed action is likely to jeopardize a listed species, or likely to adversely modify its critical habitat. Each Biological Opinion includes an "Incidental Take

Statement," which exempts the USACE and their permittees from the ESA's take prohibitions and penalties, and allows "take" of a specified number of individuals of a listed species, and/or allows modification or degradation of a specified acreage of species habitat. The beneficial effects of the project's conservation measures are taken into consideration for both the jeopardy and the incidental take analysis presented in the Biological Opinion. The incidental take statement also includes nondiscretionary "reasonable and prudent measures" that are necessary to minimize or reduce the impact of the incidental take. In order to be exempt from the prohibitions and penalties of the ESA, the USACE and their permittees must comply with the "terms and conditions" of the Biological Opinion, which implement the reasonable and prudent measures, and outline required future reporting and monitoring. The Biological Opinion's terms and conditions are non-discretionary.

Under the SSHCP and ARP's more efficient project permitting process, the USACE would seek to further streamline their CWA 404 regulatory review of individual future Covered Activities (see Section 7.2) by initiating a single ESA Section 7 consultation with the USFWS for all SSHCP Covered Activities that would require a CWA 404 permit (or other CWA authorization) from the USACE over the 50-year SSHCP. The USACE will request the USFWS prepare a single Programmatic Biological Opinion that programmatically address the direct, indirect, and cumulative effects on federally listed species and designated critical habitats resulting from all USACE's permitting and authorizations, over the 50-year term of the SSHCP. If the USACE can obtain a programmatic Section 7 consultation and Programmatic Biological Opinion, it would eliminate the need for the USACE to initiate individual ESA Section 7 consultations for every SSHCP Covered Activity that may discharge dredged or fill material into waters of the United States, and eliminate the need for the USACE to prepare and submit an individual Biological Assessment for each of those SSHCP Covered Activities, thus eliminating the need for the USFWS to prepare an individual Biological Opinion on each of those SSHCP Covered Activities.

At the time that the final SSHCP and final SSHCP EIS/EIR have completed required public reviews under NEPA and CEQA, the USACE would initiate a request for a programmatic Section 7 consultation with the USFWS, to seek Section 7 ESA coverage for all future SSHCP Covered Activities that the USACE would permit under their proposed multi-layered CWA 404 permitting strategy (i.e., the GPs, LOP, and SPs described in Section 7.2).

With a single programmatic Section 7 consultation anticipated to be in place, the conventional project-by-project "individual" Section 7 consultation would be unnecessary.

8.5.2 Section 106 of the National Historic Preservation Act

The USACE must assure that each Covered Activity project or activity that is permitted or otherwise authorized by the USACE under Section 404 of the CWA also complies with Section 106 of the National Historic Preservation Act (NHPA). The NHPA protects cultural resources that

are listed, or are eligible to be listed, on the National Register of Historic Places. To assure that each USACE decision to issue a CWA Section 404 permit or other CWA authorization to a SSHCP Covered Activity would not directly or indirectly result in a violation of the NHPA, the USACE and the Land-use Authority Permittees may develop a Programmatic Agreement (PA) with the State Historic Preservation Officer (SHPO) to expedite NHPA Section 106 consultations for future SSHCP Covered Activity projects and activities.

In addition, the USACE would also programmatically consult with Native American tribal contacts within the Plan Area, and may consider developing an MOU with the Plan Area Native American tribes concerning coordination and the protection of any Indian Trust Assets and other cultural resources at sites of Covered Activity projects or activities that are permitted or otherwise authorized by the USACE under CWA Section 404.

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SSHCP South Sacramento Habitat Conservation Plan

AQUATIC RESOURCES PROGRAM

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PLAN PARTNERS

County of Sacramento

City of Rancho Cordova

City of Galt

Sacramento County Water Agency

Southeast Connector Joint Powers Authority

VOLUME II
APPENDICES

February 2018

APPENDIX A

Watershed Study for the South Sacramento Habitat Conservation Plan and Aquatic Resources Program

DRAFT

Watershed Study for the South Sacramento Habitat Conservation Plan and Aquatic Resources Program

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ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Definition
amsl	above mean sea level
ARP	Aquatic Resources Program
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
EPA	U.S. Environmental Protection Agency
HUC	Hydrologic Unit Code
MCRA	Mather Core Recovery Area
NHD	National Hydrography Dataset
NRCS	National Resources Conservation Service
SSHCP	South Sacramento Habitat Conservation Plan
SSURGO	Soil Survey Geographic
TAC	Technical Advisory Committee
UDA	Urban Development Area
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USB	Urban Services Boundary
USGS	U.S. Geological Survey

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1 INTRODUCTION

1.1 Purpose of the Watershed Study

The purpose of the watershed study for the South Sacramento Habitat Conservation Plan (SSHCP) and Aquatic Resources Program (ARP) is to describe the overall characteristics of watersheds in the SSHCP and ARP area (collectively called "Plan Area" in this document) (Figure 1). The framework of the watershed study is to describe the physical locations of the watersheds, including what proportion of each watershed is within the Plan Area, as well as the overall conditions of the watersheds in terms of environmental setting (e.g., land formations, soils, topography, existing land use), hydrology, and biological resources. In addition, the watershed study describes how the SSHCP Preserve System relates to each watershed located within the Plan Area, as one of the primary purposes of the SSHCP and ARP is to protect watershed functions, as described below:

> **Protect Watersheds:** Watershed function, and specifically hydrologic regimes, is an important determinant of certain aquatic resource-dependent and aquatic resource-associated plants and wildlife. Therefore, preserving upland landscapes associated with wetland features for maintaining aquatic resource-dependent and wetland-associated species is of primary importance. Sufficient sub-watershed area should be preserved so that natural sources of surface and sub-surface water influx and outflow remain intact, and potential development-related increases in surface runoff and sources of water pollution are avoided (e.g., runoff from roads, roofs, paved surfaces, utility pipes, landscaped areas).

1.2 Definition of Watershed

A watershed is defined by the U.S. Environmental Protection Agency (EPA) as a "land area that drains to a common waterway, such as a stream, lake, estuary, wetland, or ultimately the oceans" (33 CFR 332.2). The U.S. Department of Agriculture (USDA) further defines a watershed as "a geographic area of land, water and biota within the confines of a drainage divide" (USDA 2007). According to the USDA, "watershed boundaries define the aerial extent of surface water drainage to a point. Watershed boundaries always follow the highest ridgeline around the stream channels and meet at the bottom or lowest point of the land where water flows out of the watershed. The boundary between watersheds is defined as the topographic dividing line from which water flows in two different directions" (USDA 2007).

1.3 Functions and Services of Watersheds

According to Black (1997), there are five clearly identifiable functions of watersheds, three that are hydrologic (collection, storage, and discharge) and two that are ecological (chemical and habitat). The hydrologic functions of watersheds include the (1) **collection** of water from rainfall snowmelt and storage that becomes runoff, (2) **storage** of water of various amounts and durations, and (3) **discharge** of water as runoff. The ecological functions of watersheds include (4) providing diverse sites and pathways along which vital **chemical** reactions take place, and (5) providing **habitat** for the flora and fauna that constitute the biological elements of an ecosystem (Black 1997).

There are numerous anthropogenic and biological values of watersheds. According to Postel and Thompson (2005), healthy watersheds provide the following: water supplies for agricultural, industrial, and urban-domestic uses; water filtration/purification; flow regulation; flood, erosion, and sedimentation control; fisheries; timber and other forest products; recreation/tourism; biodiversity preservation; aesthetic enjoyment; climate stabilization; and cultural, religious, and inspiration values.

1.4 Anthropogenic Impacts to Watersheds

Modification of natural landscapes (i.e., vegetation, topography, and hydrology) is one of the prime human impacts on watersheds. Altering natural landscapes for development purposes, resource extraction, or recreation can affect collection, storage, and discharge functions of a watershed. Changes in the landscape resulting from these human activities can increase sedimentation and erosion, increase or redirect natural runoff, and alter hydrologic regimes, including timing of flows and groundwater recharge. In addition, land use modification or conversion can change the way a watershed is used by individual species or species communities, including their distribution and abundance within a watershed (i.e., habitat function) and can directly or indirectly affect the chemical reactions required for the watershed to sustain itself.

Introduction of pollutants into the watershed can happen directly through agricultural activities and runoff from impervious surfaces in more urbanized areas. Over the years, an increase of impervious surfaces has caused "significant changes to both the quality and quantity of the stormwater runoff, leading to degraded stream and watershed systems: an increased quantity of stormwater for stream process to absorb sedimentation, and an increased pollutant load carried by the stormwater" (Morisawa and LaLure 1979, Arnold et al. 1982, Bannerman et al. 1993, as cited in Brabec et al. 2002).

2 METHODS

2.1 Assembly of Baseline Data

Watersheds within the Plan Area were identified by overlaying the Plan Area with the U.S. Geological Survey (USGS) hydrologic unit map data. The watersheds were then intersected with land cover, hydrologic, geological, soil, slope, and elevation data that were assembled for the SSHCP to describe their physical and biological settings. The watersheds were also intersected with known occurrences of plant and animals species that are proposed for regulatory coverage under the SSHCP (Covered Species) and the proposed SSHCP Preserve System. Descriptions of the datasets used in the SSHCP and this watershed study are provided in the following subsections.

2.1.1 USGS National Hydrography Dataset

Watersheds in the United States are delineated by the USGS using a hierarchical system, which divides the U.S. into 21 regions, 221 subregions, 378 hydrologic accounting units, and 2,264 cataloging units (USGS 2013). Each hydrologic unit is identified by a unique Hydrologic Unit Code (HUC) consisting of two to eight digits based on the levels of classification in the hydrologic unit system (USGS 2009). Two additional levels were recently added to the hydrologic unit hierarchy: watershed (10-digit) and subwatershed (12-digit).

For the purpose of this watershed study, the Plan Area was divided at the 10-digit HUC level (i.e., watershed), which yields 10 watersheds within the Plan Area (Figure 2). Note that an 11th watershed, Cache Slough, appears on Figure 2; however, that watershed makes up only 6 acres of the Plan Area and therefore is not analyzed in this study.

2.1.2 Land Cover Dataset

Land cover mapping for the Plan Area occurred in several stages. Vernal Pool and Swale land cover type mapping occurred early in the SSHCP planning process and was accomplished through interpretation of black-and-white aerial imagery dated March 2001 and mapped at a scale of 1 inch = 200 feet (1:2,400). The primary mapping of all other land cover types was completed in 2004 and was developed from the interpretation of color aerial imagery dated November 2002 and mapped at a scale of 1 inch = 400 feet (1:4,800). These original mapping efforts have been updated and refined at various times to reflect modifications of land cover types, such as cover type conversion, to accommodate an expansion of the Plan Area boundary and to correct errors in the original mapping. The current land cover map provides fairly detailed information for the existing conditions in the Plan Area based on 2009 aerial photos and limited field-truthing, with the updates occurring in May 2010, September 2012, January 2013, March 2013, November 2013, May 2014, June 2014, August 2014, and December 2014.

The land cover classification system developed for the SSHCP is a modification of the California Department of Fish and Game (CDFG)[1] List of California Natural Communities. There are 25 land cover types in the Plan Area, of which 17 provide native (e.g., Blue Oak Woodland) or naturalized (e.g., Valley Grasslands, Agriculture) conditions that have habitat value for Covered Species (Figure 3). The other eight land cover types, including developed and disturbed types, have little or no habitat value for Covered Species.

The land cover data were also used to generate a relative measure of impervious surfaces in the Plan Area. Impervious surfaces (e.g., paved roads, parking lots, driveways, rooftops, sidewalks) reflect urban intensity and may be used as a metric for adverse impacts to natural resources as a result of increased runoff, sedimentation, and pollutant loads into receiving waters (Brabec et al. 2002). For the purposes of this study, impervious surfaces are defined as Aqueduct, High-Density Development, and Major Roads. The Aqueduct land cover type is represented by the Folsom South Canal. The High-Density Development land cover type includes urban and suburban residential neighborhoods, urban centers, industrial areas, airports, and wastewater treatment plants. Most of this high-density development occurs inside the Urban Development Area (UDA) in the northwestern portion of the Plan Area. The Major Roads land cover type includes linear features with paved surfaces and can vary from large freeways to smaller arterial roads found within urban settings. It should be noted that this relative measure of impervious surfaces is not intended to calculate actual impacts, such as amount of runoff, etc., but rather to generally characterize the existing urban intensity in the Plan Area and to compare and contrast the different watersheds.

Low-density development was not included in the Impervious land cover category. While this land cover includes some impervious surfaces (e.g., driveways), it primarily consists of relatively sparse residences and other structures, such as farm buildings and small rural neighborhoods with large individual property sizes per house. Plant nurseries are also included in this category.

2.1.3 Hydrology

The USGS (2013) National Hydrography Dataset (NHD) contains hydrologic features such as lakes, ponds, streams, rivers, canals, dams, and stream gages (USGS 2013). The NHD dataset was intersected with the Plan Area to determine the type and quantity of hydrologic features within each watershed (Figure 4).

[1] The List of California Natural Communities was published by the CDFG before CDFG was formally renamed California Department of Wildlife (CDFW) in January 2013. Information from the CDFG prior to January 2013 therefore will be attributed to CDFG in this document, although the names are synonymous.

2.1.4 Geological Formations

The geological formations were derived from the Generalized Geological Map of Sacramento County prepared by the California State Geological Survey (CDMG 1999) (Figure 5). The Generalized Geological Map of Sacramento County, also referred to as a time-stratigraphic correlation map, is based on a correlation of similar-aged rock units from the east side of the Sacramento Valley with those on the west side of the valley, as well as a correlation of rock units from the northern Sacramento Valley with similarly aged rock units in the southern San Joaquin Valley. Because the time-stratigraphic correlation map is prepared on a small scale in the Plan Area, it provides excellent detail and well-refined demarcations in geologic units. However, geological formation data are unavailable for portions of four watersheds located in the western portion of the Plan Area; areas lacking data are identified in the descriptions of the four relevant watersheds in Section 3.2.

2.1.5 Soils

Individual soil units are organized into map units called soil associations, which consist of soil units of the same texture and composition that occur in geographic position. Soils for the Plan Area are from the National Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database (USGS and USDA NRCS 2009) (Figure 6).

2.1.6 Slope and Elevation

Both slope and elevation for the Plan Area were derived from the USGS National Elevation Dataset (USGS 2012) (Figures 7 and 8).

2.1.7 SSHCP Covered Species

A Technical Advisory Committee (TAC), with the assistance of outside experts, created a list of 28 plant and wildlife species proposed for federal regulatory coverage under the SSHCP. The TAC compiled data from a variety of sources, including the CDFG, California Natural Diversity Database (CNDDB), U.S. Fish and Wildlife Service (USFWS) files and databases, California Native Plant Society (CNPS) plant inventories, Sacramento County Audubon files, and solicited opinions from local experts and university researchers and staff from resource agencies. Occurrence data for Covered Species were generated from the data compilation effort and are described in detail in the SSHCP.

For the purposes of the direct effects and conservation analyses, Covered Species habitat was modeled based on the associations between species occurrence data and particular land cover types in the Plan Area and through review by species experts. This information was compiled to

generate models for land cover types and ranges within the Plan Area that each Covered Species is likely to use for breeding, foraging, and/or cover, or other important life history activities. Chapter 3 of the SSHCP describes the methods and results of those models. Figures 9-1 through 9-5 depict Critical Habitat for Sacramento Orcutt grass, slender Orcutt grass, vernal pool fairy shrimp, vernal pool tadpole shrimp, and California tiger salamander. Figures 9-6 through 9-29 depict modeled habitat and species occurrences for the 28 Covered Species.

2.1.8 Preserve Design

This section briefly describes the SSHCP Conservation Strategy in terms of identifying the primary development areas, geographically based Preserve Planning Units, existing conservation (e.g., existing biological Preserves, mitigation sites), and planned conservation that would occur through implementation of the SSHCP. A detailed description of the SSHCP Conservation Strategy is contained in Chapter 7 of the SSHCP.

Urban Development Area/Outside Urban Development Area

The UDA is where the large majority of SSHCP Covered Activities will occur, including anticipated residential, commercial, and industrial development and associated infrastructure (e.g., roads, utilities). For the purpose of the SSHCP and watershed study, it is assumed that the UDA will eventually be built out except for the existing and proposed preserves. Outside the UDA, SSHCP Covered Activities will primarily be limited to infrastructure projects. These include transportation projects, including road upgrade projects, road realignment/extension projects, interchange projects, and connector projects. Covered activities outside the UDA would also include water-related utility projects, including recycled water projects and operations and maintenance of flood control and storm drainage infrastructure.

Preserve Planning Units

To assist with development of an adequate SSHCP Conservation Strategy, the Plan Area was further divided into eight Preserve Planning Units (PPUs) that encompass areas where important Covered Species resources are present, and where habitat preservation will be planned (see Figure 1-1 in the SSHCP). These eight SSHCP PPUs are geographic subdivisions of the Plan Area designed to ensure that adequate Biological Goals and Measurable Objectives (Table 7-1 in the SSHCP) were developed for all biological resources located within the Plan Area.

PPUs were delineated to capture specific habitat or agricultural land cover types or areas identified as being important for a specific suite of species. For instance, PPU 7, which is located in the southeastern portion of the Plan Area, was delineated to encompass the vast majority of

vernal pool grasslands remaining in the County. PPU 7 also contains the designated Cosumnes/Rancho Seco Core Recovery Area (USFWS 2005), which is considered an important area for protection of vernal pool species. PPU 2 contains the designated Mather Core Recovery Area (USFWS 2005). PPU 6, located in the southwestern portion of the Plan Area, was delineated to encompass a vast majority of agricultural cover types that provide foraging habitat for many covered raptor species. While geopolitical or physical landmarks were used to delineate some PPU boundaries, this was done for ease of mapping and to make locating PPU boundaries in the field easier.

Existing Preserve Lands

The Plan Area supports several established Preserves both inside and outside of the UDA. Existing Preserve totals approximately 64,536 acres (17%) in the Plan Area and includes wildlife refuges, nature preserves, lands under conservation easements, open space, mitigation banks, and individual project mitigation sites. Of the 61,364 acres of existing Preserve, 3,172 acres (5%) are inside the UDA and 61,360 acres (95%) are outside the UDA. Existing Preserve areas are considered in the SSHCP to be protected for their resource values, and although they do not count as mitigation for future Covered Activities, they were carefully considered in the SSHCP Conservation Strategy so that proposed preserves can augment and link to the existing Preserves.. Valley grassland comprises 35,290 acres (55%) of the existing Preserve lands, followed by agriculture at 12,365 acres (17%), and blue oak woodland and savanna at 7,223 acres (11%). Existing Preserve also supports substantial acreages of riparian woodland and riparian scrub (2,510 acres, 4%), vernal pool and swale (2,336 acres, 4%), freshwater marsh (1,057 acres, 3%), and open water (720 acres, 1%).

Planned Conservation

Planned conservation will include both planned "hardline" Preserve based on known projects and currently proposed mitigation, and "criteria-based" conservation for future projects. The boundaries of the new criteria-based Preserves are not known at the time of SSHCP preparation.

The planned hardline Preserves in the Plan Area total 1,717 acres. Including the planned hardline Preserves, it is anticipated that approximately 37,030 acres will be newly conserved in the SSHCP Preserve System. The new criteria-based Preserves will be established according to the Conservation Actions for each of the relevant Biological Goals and Measureable Objectives included in Chapter 7 of the SSHCP (see Table 7-1 of the SSHCP).

The Laguna Creek Wildlife Corridor is identified separately from the other Preserves because it is a distinctive and important landscape feature in the Plan Area and is important for maintaining regional

movement and resident habitat for wildlife, conserving riparian habitat, and maintaining hydrologic connections between Preserves inside the UDA. The Laguna Creek Wildlife Corridor will be established through a combination of planned hardline and criteria-based preservation.

3 RESULTS

3.1 Summary of Watersheds in Plan Area

The Plan Area includes a portion or the entirety of 10 watersheds (10-digit hydrologic units), as defined by the Federal Standard for Delineation of Hydrologic Unit Boundaries (USGS and USDA NRCS 2009). Those 10 watersheds are American River, Deer Creek, Laguna Creek, Lower Cosumnes River, Lower Dry Creek, Lower Mokelumne River, Morrison Creek, Sherman Lake-Sacramento River, Snodgrass Slough, and Upper Cosumnes River (Table 1, Figure 2). One additional watershed, Cache Slough, intersects the Plan Area but only comprises 6 acres in the Plan Area and therefore is not discussed in the watershed study.

The Laguna Creek and Morrison Creek watersheds account for about 37% of the Plan Area, and the next three largest watersheds (Deer Creek, Lower Cosumnes, and Snodgrass Slough) watersheds account for another 41%, resulting in the five largest watersheds making up 78% of the Plan Area.

Table 1
Summary of Watersheds in Plan Area

Watershed	Acres of the Watershed in Plan Area	Total Watershed Acreage	Percent of Watershed in Plan Area	Cumulative Percentage of Watershed in Plan Area
Laguna Creek	73,976	96,788	76.4%	23.3%
Morrison Creek	42,926	69,540	61.7%	13.5%
Snodgrass Slough	40,426	51,616	78.3%	12.7%
Lower Cosumnes River	46,682	46,683	100.0%	14.7%
Deer Creek	43,803	81,504	53.7%	13.8%
Upper Cosumnes River	31,885	114,793	27.8%	10%
Lower Dry Creek	18,493	56,110	33%	5.8%
Sherman Lake-Sacramento River	13,987	121,608	11.5%	4.4%
American River	3,452	65,103	5.3%	1%
Lower Mokelumne River	2,019	141,965	1.4%	1%
Grand Total[1]	**317,655**	**845,709**	**28.5%**	**100%**

[1] The total does not include the approximately 268,589 acres of the Cache Slough watershed, which is not discussed in this document.

3.1.1 Land Cover Types in Plan Area

The Plan Area is organized into four main land cover types (Table 2, Figure 3):

Terrestrial. Natural terrestrial land covers comprise approximately 78% of the Plan Area, with valley grassland accounting for 43% of the terrestrial land cover. Blue oak woodland and

savanna account for about 5% of the terrestrial land cover, and riparian communities account for about 3% of the terrestrial land covers.

Aquatic. Aquatic land covers comprise approximately 5% of the natural land covers in the Plan Area, with vernal pool accounting for 1% of the aquatic land covers, and remaining acreage distributed among the other types, including streams/creeks (VPIH) at less than 0.1%, freshwater marsh at 0.9%, open water at 1%, seasonal wetland at 1%, streams/creeks at 1% and swale at 0.4%.

Agriculture. Agriculture comprises about 31% of the Plan Area, with croplands accounting for about 16%, vineyards at 8%, irrigated pasture-grassland at 5%, and orchards at 1%.

Non-Habitat. Non-habitat land covers comprise about 14% of the Plan Area, with low- and high-density development and major roads accounting for about 11% of the non-habitat land covers.

Impervious surfaces (i.e., aqueduct, high-density development, and major roads) total approximately 16,101 acres, or 5% of the Plan Area. Most of the impervious surfaces are located inside the UDA in the northwestern portion of the Plan Area.

3.1.2 Hydrology in the Plan Area

Flowline data are important for the watershed analysis because they describe the flow directions and networks within a watershed. These data, for example, allow for analyses about the effects of upstream hydrologic alterations (e.g., flow rates, timing of peak flows) or discharge of pollutants on downstream hydrology, water quality, and important resources such as aquatic and riparian wildlife habitat.

The Plan Area consists of five NHD flowline features (Table 3, Figure 4).

Stream/River. A stream/river is a naturally flowing body of water that may be perennial, intermittent, or ephemeral (USGS and USDA NRCS 2009). Stream/river accounts for approximately 841 miles of flowline features in the Plan Area and about 60% of the total flowline features.

Canal/Ditch. A canal/ditch is an "artificial open waterway constructed to transport water, to irrigate or drain land, to connect two or more bodies of water, or to serve as a waterway for watercraft" (USGS 2009). Canal/ditch is also an important flowline feature in the Plan Area, totaling approximately 347 miles in the Plan Area and comprising about 25% of the flowline features.

Table 2
Summary of Land Cover Types in Plan Area by Watershed

Land Cover Types	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)	Grand Total (acres)	Percent of Plan Area
Terrestrial												
Blue Oak Savanna	—	2,018	2,550	—	529	—	18	—	—	521	5,637	1.8%
Blue Oak Woodland	—	4,400	1,364	—	1,417	—	—	—	—	1,951	9,132	2.9%
Mine Tailing Riparian Woodland	48	41	158	17	—	—	129	2	—	245	641	0.2%
Mixed Riparian Scrub	—	80	61	285	47	2	200	130	548	100	1,454	0.5%
Mixed Riparian Woodland	0.4	836	262	1,929	401	196	157	51	1,293	733	5,856	1.8%
Valley Grassland	1,336	23,643	42,178	14,593	7,965	0.1	21,294	665	5,947	17,531	135,166	42.5%
Terrestrial Total	*1,384.4*	*31,018*	*46,573*	*16,824*	*10,359*	*198.1*	*21,798*	*848*	*7,788*	*21,081*	*157,886*	*50%*
Aquatic												
Streams/Creeks (VPIH)	—	19	—	—	—	—	55	—	—	—	73	<0.1%
Freshwater Marsh	2	38	167	1,127	47	21	370	40	1,030	112	2,954	0.9%
Open Water	3	200	297	663	9	3	159	9	720	280	2,344	0.7%
Seasonal Wetlands	23	129	419	616	117	—	107	—	782	409	2,600	0.8%
Streams/Creeks	6	228	416	345	78	67	123	24	1,141	350	2,778	0.9%
Swale	3	160	428	144	65	—	359	1	10	81	1,252	0.4%
Vernal Pool	7	274	1,917	619	203	0.1	764	5	421	325	4,535	1.4%
Aquatic Total	*98*	*1,048*	*3,644*	*3,514*	*519*	*91.1*	*1,937*	*79*	*4,104*	*1,557*	*16,536*	*5.2%*

Table 2
Summary of Land Cover Types in Plan Area by Watershed

Land Cover Types	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)	Grand Total (acres)	Percent of Plan Area
Agriculture												
Cropland	—	4,065	5,958	12,614	2,742	1,671	2,245	4,986	16,275	1,273	51,829	16.3%
Irrigated Pasture-Grassland	—	836	5,070	3,447	316	8	1,399	0.1	3,295	1,620	15,991	5%
Orchards	—	137	612	116	212	—	199	1,749	653	229	3,907	1.2%
Vineyards	—	4,231	5,805	4,976	3,821	0.4	330	1,260	5,560	476	26,460	8.3%
Agriculture Total	—	*9,269*	*17,445*	*21,153*	*7,091*	*1,679.4*	*4,173*	*7,995.1*	*25,783*	*3,598*	*98,187*	*31%*
Non-Habitat												
Aqueducts	40	21	31	41	—	—	72	11	—	49	264	<0.1%
Disturbed	98	844	163	69	1	13	3,390	177	190	1,341	6,287	0.2%
High-Density Development	1,531	44	919	667	29	25	6,102	3,049	583	122	13,073	4.1%
Low-Density Development	7	864	4,284	3,976	421	6	3,703	403	1,433	3,510	18,608	5.6%
Major Roads	144	123	467	353	56	4	597	310	541	170	2,764	0.9%
Mine Tailings	18	127	306	—	—	—	212	13	—	422	1,098	3.4%
Recreation/ Landscaped	185	444	143	85	17	—	943	323	6	36	2,180	6.9%
Non-Habitat Total	*2,023*	*2,467*	*6,313*	*5,191*	*524*	*48*	*15,019*	*4,286*	*2,753*	*5,650*	*44,274*	*13.9%*
Grand Total	**3,452**	**43,803**	**73,976**	**46,682**	**18,493**	**2,019**	**42,926**	**13,987**	**40,426**	**31,885**	**317,649**[1]	—

[1] The total does not include the approximately 6 acres of the Cache Slough watershed, which is not discussed in this document. This total also does not include approximately 800 acres of unmapped lands along the Sacramento River, on the river side of the levees.

Table 3
Summary of NHD Flowlines in Plan Area by Watershed

Watershed	Artificial Path		Canal/Ditch		Connector		Pipeline		Stream/River		Grand Total	
	Feet	*Percent*	*Feet*	*Percent*	*Feet*	*Percent*	*Feet*	*Percent*	*Feet*	*Percent*	*Feet*	*Percent*
American River	23,396	48.3	2,325	4.8	—	—	227	0.5	22,484	46.4	48,432	1
Deer Creek	52,425	5.6	68,836	7.4	7,995	0.9	1,207	0.1	799,852	86.0	930,315	12.6
Laguna Creek	125,769	6.6	141,811	7.5	154	<0.1	1,312	<0.1	1,630,736	85.8	1,899,782	25.8
Lower Cosumnes River	236,780	21.8	375,506	34.6	27	<0.1	73	<0.1	471829	43.5	1,084,215	14.7
Lower Dry Creek	26,254	5.5	33,152	7.0	805	0.2	—	—	414,948	87.3	475,159	6.5
Lower Mokelumne River	11,195	12.0	81,978	88.0	—	—	—	—	—	—	93,173	1.3
Morrison Creek	72,483	10.5	40,079	5.8	4,048	1	2,912	0.4	573,510	82.8	693,032	9.4
Sherman Lake-Sacramento River	65,946	26.9	172,021	70.1	81	<0.1	323	0.1	6,858	2.8	245,230	3.3
Snodgrass Slough	243,185	20.8	846,039	72.2	4,195	0.4	—	—	77,909	6.7	1,171,326	15.9
Upper Cosumnes River	199,470	27.9	68,518	9.6	507	0.1	903	0.1	444,746	62.3	714,142	9.7
Grand Total	**1,056,962**	**14.4**	**1,830,311**	**24.9**	**17,812**	**0.2**	**6,957**	**<0.1**	**4,442,871**	**60.4**	**7,354,913**	**100.0**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations. Any discrepancies in individual totals are due to rounding but the grand total for each watershed is consistent.

Connector. A connector is "A known, but nonspecific, connection between two nonadjacent network segments," such as a two-dimensional dam/weir that causes a gap between an upstream lake/pond and downstream stream/river (USGS 2009). Connectors make up about 3 miles in the Plan Area, but only 0.2% of the flowline features.

Pipeline. A pipeline is "A closed conduit, with pumps, valves and control devices, for conveying fluids, gases, or finely divided solids" (USGS 2009). About one mile of pipeline is included in the NHD dataset, accounting for less than 0.1% of the flowline features in the Plan Area.

Artificial Path. An artificial path is used as a surrogate to complete flowlines between NHD waterbodies and NHD areas where there is no obvious channel (USGS 2009). It is the connection between the inflow and outflow points of an in-line open water body. Artificial paths are restricted to one or more of the following features that may occur in the Plan Area:

- Lake/pond;
- Stream/river;
- Swamp/marsh;
- Canal/ditch;
- Wash; or
- Area of complex channels.

About 200 miles of artificial path are included in the NHD dataset, accounting for about 14% of the flowline features in the Plan Area.

3.1.3 Geological Formations in Plan Area

A geologic formation is a geomorphic feature on the Earth's surface representative of an episode of landscape development. The Plan Area includes 17 geological landforms (Table 4, Figure 5). Approximately 57% of the Plan Area is underlain by two main landforms types: Laguna Formation (19%) and the Riverbank Formations (38%).

Riverbank Formations (Qr)

The riverbank formations included four mapping units: Riverbank Formation, Undivided; Riverbank Formation, Upper Unit; Riverbank Formation, Middle Unit; and Riverbank Formation, Lower Unit.

The Riverbank Formation, Undivided, occupies the central portion of the Plan Area, generally subdivided by the Cosumnes River and Deer Creek. In the vicinity of Elk Grove, the Riverbank Formation is about 10 miles wide from west to east. To the east, it laps onto older materials composed of the Laguna Formation and the Turlock Lake Formation. To the west, it is overlain by younger alluvial materials. The Riverbank Formation, Undivided, as well was the other Riverbank formations, were deposited on a plain of aggradation that has been partly dissected. The upper surface of this plain, in most places, represents the upper surface of the Riverbank Formation. The upper surface is characterized by a gently undulating surface. Local variations in relief may be as much as 15 feet. The age of the Riverbank Formation ranges from middle to late Pleistocene and is probably related to the Donner Lake advance of Sierran glaciation. The Riverbank Formation consists of interbedded granitic sand, silt, and clay with metamorphic channel gravels. Its sediments are very similar to those in the Laguna Formation.

The Riverbank Formation, Upper Unit, is located in the southwestern portion of the Plan Area and borders Laguna Creek in the eastern portion. It is unconsolidated, compact dark brown to red alluvium.

The Riverbank Formation, Middle Unit, includes a small area along the north-central boundary of the Plan Area and a larger area along the south-central boundary. The Middle Unit, Riverbank Formation, is locally and remotely derived granitic and basic igneous alluvium (sand, silt, clay, and gravel).

The Lower Unit, Riverbank Formation, is located in the northwestern portion of the Plan Area and consists of red semi-consolidated gravel, sand, and silt. Its surface is higher and much more dissected than the Upper Unit and has much stronger soil profiles.

Copper Hill Volcanics (Jch)

The Copper Hill Volcanics comprise dark to medium green mafic to andesitic pyroclastic rocks deposited in the Late Jurassic (~163-145 million yrs). These volcanics are of similar age to the Salt Spring Slate (Clark 1964) and are found interfingered with the Salt Springs Slate in the northeast corner of the SSHCP area, at elevations above 400 feet above mean sea level (amsl).

Gopher Ridge Volcanics (Jgo)

The Gopher Ridge Volcanics are extrusive volcanic rocks ranging from fine tuff to coarse volcanic breccias and lavas (Clark 1964). The fine tuff is yellow green in color on a fresh face, but weathers to a dark gray, resembling the Salt Spring Slate. These volcanics have been extensively folded and faulted in the same metamorphic belt as the Salt Spring Slate and Copper

Hill Volcanics. The Gopher Ridge Volcanics are the oldest deposits of this group and are found along the western edge of the metamorphic belt at elevations above 150 feet amsl.

Intertidal Deposits (Qi)

The Intertidal Deposits are primarily peat and peaty mud formed in tidal marshes and swamps along the Sacramento River (Atwater 1979). These deposits form in areas influenced by tidal fluctuations in the San Francisco Bay and Sacramento Delta, and are therefore found at elevations within a few feet of mean sea level. These Holocene (<10,000 years) deposits typically range in thickness from 3 to 9 feet, and are mapped in the southwestern portion of the SSHCP.

Mine and Dredge Tailing (t)

Deposits of tailings occur south of the American River near Nimbus and at other scattered localities in the central and eastern portions of the Plan Area. These tailings are the result of gold dredge operations and consist of windrows of gravel, cobbles, boulders, sand, and silt. The largest single expanse of tailings extends from near Folsom southwesterly nearly to Mather Field, a distance of about 12 miles; it has a width that ranges from 1 to 4 miles and covers an estimated 12,000 acres.

Chico Formation (Ku)

The Chico formation is comprised of fossiliferous marine sandstone and minor siltstone found in the eastern portion of the Plan Area.

Basin Deposits (Qhb)

During the Holocene epoch, Basin Deposits formed in sink areas and occur now as unconsolidated clay, silt, and other fine materials. This formation covers a total of 663 acres in the eastern-most corner of the SSHCP Plan Area.

On this formation, four vernal wetlands were mapped. They cover a total of 3.1 acres, all outside the UDA. Average size (mean ± SE) of vernal wetlands on Basin Deposits is 0.78 ± 0.228 acres. Each of the four wetlands on this formation is 0.10 acre or larger.

Two deep pools occur in the Basin Deposits Formation outside the UDA that total 2.4 acres.

Alluvium (Q)

Undifferentiated alluvial deposits are sand, silt, and clay sedimentary deposits found in active stream channels. These deposits are unconsolidated and are found at lower elevations than older alluvial terrace deposits. Within the SSHCP area, these deposits are found along an

approximately 3-mile-long reach of a tributary to the Cosumnes River west of the Amador County Line and south of Jackson Road, and along an approximately 2-mile-long reach of a tributary to Dry Creek in the southeastern portion of the SSHCP area.

Levee and Channel Deposits (Qa)

Unconsolidated to poorly consolidated Levee and Channel Deposits are Holocene (<10,000 years) sediments that typically range in size from sand to clay size particles and are deposited during flood events when a river overtops its banks. These deposits are mapped along approximately 12 miles of the active stream channel of the Cosumnes River (Wagner et al. 1981). At their upstream extent, approximately 1 mile northeast of Wilton, the levee and channel deposits overlie the lower member of the Modesto Formation. The downstream extent of the levee and channel deposits occurs at the intersection of the Cosumnes River and Twin Cities Road.

Salt Springs Slate (Jss)

The Salt Spring Slate is a dark gray slate with poorly sorted angular grains of quartz and feldspar set in a fine grained clay matrix. Conglomerates associated with these deposits are fine grained with well-rounded pebbles (Clark, 1964). The Salt Spring Slate, found at elevations above 200 feet MSL in the eastern portion of the SSHCP area, is part of a northwest/ southeast trending volcanic and metamorphic belt that has been extensively folded and faulted.

Modesto-Riverbank Formation (Qmr)

The Modesto-Riverbank formation is a late Pleistocene (125,000 to 10,000 years) alluvial deposit comprising sand, silt, and gravel derived from the Sierra Nevada Mountains to the east. These fluvial terrace deposits are typically semi-consolidated and tend to form thin, impermeable soils, underlain by shallow hardpan. The formation is found along the Dry Creek, Laguna, and Browns Creek floodplains in the southeastern portion of the SSHCP area (Wagner et al. 1981).

North Merced Gravels (Qtnm)

The North Merced gravels are made up of well-rounded pebbles and cobbles of dark-colored metamorphic rocks. The formation occurs as a thin veneer, capping hills in the east-central part of Sacramento County. The southernmost outcrop area of the gravels is along the top of a southwesterly trending ridge about 2 miles north of Dry Creek. The gravels here overlie sediments of the Laguna Formation and rise from an elevation of about 150 feet to over 320 feet at their eastern extremity. Farther north, the gravels cap other flat-topped hills and are underlain usually by Laguna sediments. A broad area of North Merced gravels trends southwest from Folsom. This area is at most 3 miles wide and extends nearly as far as Florin Road and Bradshaw Road.

The North Merced gravels consist of discontinuous beds of lenticles of stream-laid detritus. This material was deposited by many rivers and streams, which drained the Sierra Nevada during the middle and latter parts of the Pleistocene Epoch. The North Merced gravels are easily distinguished from the underlying materials by the coarseness of the particles and red color of the iron oxide cement.

Laguna Formation (TI)

The Laguna Formation is exposed in the eastern and central portions of the Plan Area. The formation's eastern outcrop extends northward from Dry Creek, where its area of exposure is about 6 miles wide, to its northernmost exposure along Meiss Road. Its central outcrop extends northward from Deer Creek to its northernmost exposure along U.S. 50. This formation, ranging from late Miocene to early Pliocene in age, rests over the older Mehrten Formation. Where the Mehrten is andesitic in character and generally dark-colored, the Laguna is non-volcanic and is generally a tan to brown color. It is composed of a heterogeneous assemblage of beds of silt, clay, and sand with lenticles of gravel deposited on westward-sloping floodplains.

Valley Springs Formation (Tvs)

The Valley Springs Formation is exposed along the eastern side of the Plan Area from the southeastern corner along Dry Creek, northward to the headwaters of Carson Creek. The formation is generally exposed over an area from 1 to 2 miles in width. Its widest exposure is along Arkansas Creek, where it is exposed for 4 miles from east of Ione Road, west to the Cosumnes River.

The formation contains varying amounts of rhyolite ash, vitreous tuff, quartz sand containing abundant glass shards, and pale-colored beds of ashy clay. Frequently, sediments of the formation contain fragments of pumice, some of which may be as much as an inch in diameter. This formation varies with texture composition. There may be expansible clays present, especially in fine-grained material.

Mehrten Formation (Tm)

The Mehrten Formation is exposed discontinuously along a broad belt in the eastern portion of the Plan Area. The belt extends from the south county boundary at Dry Creek, where it is 4 miles wide, to U.S. 50, where it is less than a mile wide. In the subsurface, the Mehrten Formation extends westward from the area of outcrop at least as far west as the Sacramento River.

The Mehrten Formation is divided into two different layers. One is a sedimentary unit composed of gray to black andesitic sands, interbedded bouldery gravels, and blue to brown clay. The black sands are generally soft and well sorted. They were formed as fluvial deposits, having been derived

from andesitic detritus washed down the slopes of the mountains. Frequently laminated, the beds of black sand are commonly about 5 feet thick, although beds of up to 20 feet or more have been reported. Associated with the black sands are beds of stream gravel containing andesitic cobbles and boulders of up to several feet in diameter and beds of brown to blue clay and silt.

The second major unit of the Mehrten Formation is the tuff breccia. This rock is very dense and hard. It is composed of angular pieces and blocks of black, gray, and red fine-grained to porphyritic andesite, which range from less than an inch to over several feet in diameter. The tuff breccia was derived from andesitic eruptions to the east in the Sierra Nevada. During these eruptions, great quantities of highly mobile ash flowed west down the then-existing stream channels and picked up blocks of andesite debris, which were incorporated into the mass. The mass spread out over the westward-sloping plains and solidified as a pavement of hard, concrete-like rock, which ranged from only a few feet to over 30 feet in thickness. Flow patterns are readily evident where the upper surface of the tuff breccia is now exposed. On this surface, soil cover is scant, with the blocks of andesite standing out in bold relief, giving the appearance of a boulder-strewn field. Run-off from precipitation is nearly 100% due to the rocky surface.

Ione Formation (Ti)

The Ione Formation is exposed in the eastern portion of the Plan Area from Jackson Highway north to U.S. 50. In most of Sacramento County, younger sediments overlie this formation. This formation is divisible into three distinct layers. The uppermost layer of the formation is composed principally of uniform graded, medium to coarse quartz sandstone. Below the sandstone is a thick bed of white clay of ceramic quality. In some areas, the clay has been stained red to yellow and, where it is intense, the clay has become iron cemented and is present as ocher. The bottom layer is composed of blue to gray clay with occasional seams of brown coal and lignite. A zone of gravel composed of quartz and metamorphic fragments is reported to be at the base of the formation. North of the American River, the Ione Formation sediments become coarser grained. To the east, the Ione Formation is apparently contemporaneous with the Auriferous gravels of the Sierra Nevada. In certain areas outside of Sacramento County, deposits of the Ione Formation merge eastward with these gravels. The origin of the Ione Formation appears to be of a deltaic and littoral, or near-shore, environment of deposition.

Modesto Formation (Lower) (Qm2)

The Modesto formation is made up of arkosic alluvium and sand with minor gravel and silt, which together form alluvial fans and abandoned channel ridges in valleys and along streams. Qm2 is unweathered alluvium that forms terraces that are topographically lower than Qm1.

Table 4
Summary of Landforms in Plan Area by Watershed

Formation	American River	Deer Creek	Laguna Creek	Lower Cosumnes River	Lower Dry Creek	Lower Mokelumne River	Morrison Creek	Sherman Lake-Sacramento River	Snodgrass Slough	Upper Cosumnes River	Grand Total	Percent of Plan Area
Alluvium	23	829	—	<1	1,045	—	—	—	—	1,106	3,003	<1
Basin Deposits	—	—	—	3,378	—	629	597	1,500	8,548	—	14,652	5%
Chico Formation	—	52	—	—	—	—	—	—	—	—	52	<1
Copper Hill Volcanics	109	1,118	—	—	—	—	—	—	—	—	1,227	<1
Gopher Ridge Volcanics	353	7,666	—	—	—	—	—	—	—	2,076	10,096	3%
Intertidal Deposits	—	—	—	—	—	1,066	—	4,360	455	—	5,881	2%
Ione Formation	—	2,167	1,156	—	—	—	—	—	—	1,995	5,318	2%
Laguna Formation	373	3,433	21,165	5,327	3,621	—	20,718	465	—	6,181	61,282	19%
Levee and Channel Deposits	—	3,215	751	5,919	1,213	323	18	4,115	2,159	444	18,162	6%
Mehrten Formation	6	7,223	11,099	—	4,931	—	8		—	3,191	26,459	8%
Mine and Dredge Tailings	—	452	482	—	—	—	748	375	—	1,185	4,675	1%
Modesto Formation (Lower)	—	5,672	—	—	—	—	—	—	—	2,542	8,214	3%
Modesto-Riverbank Formation	340	175	11,343	57	2,546	—	48	179	—	—	14,688	5%
North Merced Gravel	—	—	184	—	—	—	—	—	—	—	184	<1
Riverbank Formation	504	4,583	20,340	32,001	3,781	—	20,790	2,994	29,265	7,971	122,228	38%
Salt Springs Slate	283	6,217	—	—	—	—	—	—	—	1,301	7,801	2%
Valley Springs Formation	—	987	7455	—	1,356	—	—	—	—	3,892	13,690	4%
Grand Total	**3,452**	**43,803**	**73,976**	**46,682**	**18,493**	**2,020**	**42,926**	**13,987**	**40,426**	**31,885**	**317,655**	**100%**

Note: Due to the relatively coarse scale of the land cover mapping, rounding to nearest acre is applied to acreages 10 or greater. The six acres occurring in Cache Slough are not included in the total. Any discrepancies in individual totals are due to rounding but the grand total for each watershed is consistent.

* Information is not available for the entire Plan Area.

3.1.4 Soils in the Plan Area

There are 129 different soil mapping units within the Plan Area. In order to condense the soil types within the Plan Area, the mapping units were grouped by the surface texture attribute (e.g., loam, clay, silt) (Table 5, Figure 6). Soil mapping units that did not contain a surface texture attribute are listed under "Other Soil Types" in Table 5. Overall, the Plan Area is dominated by loam soil subsets, primarily silt loam, which accounts for about 34% of the Plan Area. The "Other Soil Types" account for less than 5% of the soil types in the Plan Area.

Table 5
Summary of Soil Types in Plan Area by Watershed

Soil Type	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)	Grand Total (acres)	Percent of Plan Area
General Soil Types												
Silt Loam	43	10,939	20,230	30,367	6,366	394	15,233	1,705	12,892	9,306	107,475	34%
Gravelly Loam	104	7,498	22,038	2,335	5,251	—	8,987	41	—	7,332	53,586	17%
Loam	1,203	11,494	12,625	3,658	917	—	11,636	2,560	1,027	4,538	49,658	16%
Fine Sandy Loam	8	4,468	11,881	29	5,135	11	1,203	85	—	3,119	25,940	8%
Clay	—	536	1,462	2,771	127	1,198	2,028	1,642	13,138	920	23,821	7%
Sandy Loam	—	6,408	1,425	4,624	90	277	343	326	861	3,188	17,543	6%
Sandy Clay Loam	—	1,438	1,065	833	143	—	5	4	6,702	323	10,513	3%
Clay Loam	—	—	856	248	—	31	191	1,637	2,812	—	5,775	2%
Water	67	302	616	915	131	99	299	746	1,500	888	5,563	2%
Mucky Clay	—	—	—	—	—	—	—	3,601	92	—	3,693	1%
Loamy Sand	—	—	—	—	—	—	—	—	815	—	815	<1%
Cobbly Loam	—	—	4	—	19	—	—	—	—	—	23	<1%
Silty Clay Loam	—	—	<1	<1	16	9	—	—	—	—	25	<1%
Gravelly Silt Loam	—	21	—	—	—	—	—	—	—	—	21	<1%
Gravelly Sandy Loam	—	—	2	—	3	—	—	—	—	—	5	<1%
Coarse Sandy Loam	—	—	—	—	—	—	—	—	—	1	1	<1%

Table 5
Summary of Soil Types in Plan Area by Watershed

Soil Type	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)	Grand Total (acres)	Percent of Plan Area
Other Soil Types												
Xerorthents, dredge tailings, 2% to 50% slopes	332	335	395	—	—	—	599	362	—	1,427	3,449	1%
Xerarents-San Joaquin complex, 0 to 1% slopes	—	68	896	482	109	—	463	—	60	49	2,127	1%
Urban land	41	—	136	—	—	—	903	412	—	—	1,492	<1%
Xerarents-Urban land-San Joaquin complex, 0 to 5% slopes	101	—	—	—	—	—	359	234	—	5	698	<1%
Xerorthents, dredge tailings-Urban land complex, 0 to 2% slopes	1,197	—	—	—	—	—	—	98	—	—	1,295	<1%
Pits	75	58	18	—	—	—	384	198	10	420	1,163	<1%
Urban land-Natomas complex, 0 to 2% slopes	257	—	—	—	—	—	12	221	—	—	490	<1%

Table 5
Summary of Soil Types in Plan Area by Watershed

Soil Type	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)	Grand Total (acres)	Percent of Plan Area
Xerarents-Redding complex, 0 to 2% slopes	24	18	321	422	—	—	166	—	—	—	950	<1%
Fluvaquents, 0 to 2% slopes, frequently flooded	—	—	—	—	—	—	—	—	517	—	517	<1%
Slickens	—	—	—	—	—	—	26	—	—	21	47	<1%
Lithic Xerorthents, 2% to 8% slopes	—	29	—	—	184	—	—	—	—	197	410	<1%
Dumps	—	135	—	—	—	—	88	—	—	—	223	<1%
Urban land-Xerarents-Fiddyment complex, 0 to 8% slopes	—	—	—	—	—	—	—	114	—	—	114	<1%
Xerofluvents, 0 to 2% slopes, flooded	—	56	—	—	—	—	—	—	—	130	186	<1%
Riverwash	—	—	5	—	—	—	—	—	—	21	26	<1%
Mokelumne soils and alluvial land	—	—	—	—	<1	—	—	—	—	—	<1	<1%

Table 5
Summary of Soil Types in Plan Area by Watershed

Soil Type	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)	Grand Total (acres)	Percent of Plan Area
Placer diggings and Riverwash	—	—	—	—	<1	—	—	—	—	—	<1	<1%
Inks loam and Rock land, 3% to 45% slopes	—	—	<1	—	—	—	—	—	—	—	<1	<1%
Grand Total	**3,452**	**43,803**	**73,976**	**46,682**	**18,493**	**2,019**	**42,926**	**13,987**	**40,426**	**31,885**	**317,649[1]**	**100%**

[1] The total does not include the approximately 6 acres of the Cache Slough watershed, which is not discussed in this document.

3.1.5 Slope and Elevation

The topography of the Plan Area reflects the initial geological conditions as they have been modified over time by wind, rain, and flowing water. Generally, the Plan Area is dominated by flat or gently sloping terrain, and steep slopes are rare. The central and western regions of the Plan Area are dominated by flat terrain. In the eastern region, the flat terrain gives way to rolling hills (USDA NRCS 1993). Elevations range from approximately 5 feet below sea level in the southwest portion of the Plan Area to approximately 670 feet amsl in the eastern portion of the Plan Area. Because much of the Plan Area lies in low, flat terrain with little to no slope, natural drainageways in these areas are usually poorly defined and drainage of stormwater is slow. Tables 6 and 7 show a breakdown of the slopes and elevation ranges, respectively, for each watershed. These topographic features are represented on Figure 7 for elevations and Figure 8 for slopes.

Table 6
Summary of Slopes in the Plan Area

Watershed	0–20%		21%–40%		>40%		Total (acres)
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	
American River	3,452	100	—	—	—	—	3,452
Deer Creek	43,467	99.2	327	0.1	8	<0.1	43,803
Laguna Creek	73,833	99.8	141	0.2	2	<0.1	73,976
Lower Cosumnes River	46,682	100	—	—	—	—	46,682
Lower Dry Creek	18,246	98.7	242	1.3	5	<0.1	18,493
Lower Mokelumne River	2,019	100	—	—	—	—	2,019
Morrison Creek	42,924	99.9	2	<0.1	—	—	42,926
Sherman Lake-Sacramento River	13,987	100	—	—	—	—	13,987
Snodgrass Slough	40,426	100	—	—	—	—	40,426
Upper Cosumnes River	31,447	98.6	405	1.3	34	0.1	31,885
Total	**316,483**	**99.6**	**1,117**	**0.4**	**49**	**<0.1**	**317,649**[1]

[1] The total does not include the approximately 6 acres of the Cache Slough watershed, which is not discussed in this document.

Table 7
Summary of Elevation Ranges in the Plan Area

Watershed	0–500 feet		501–1,000 feet		Total (acres)
	Acres	*Percent*	*Acres*	*Percent*	
American River	3,385	98.1	66	2	3,452
Deer Creek	42,536	97.1	1,267	2.7	43,803
Laguna Creek	73,976	100.0	—	—	73,976
Lower Cosumnes River	46,682	100.0	—	—	46,682

Table 7
Summary of Elevation Ranges in the Plan Area

Watershed	0–500 feet		501–1,000 feet		Total (acres)
	Acres	*Percent*	*Acres*	*Percent*	
Lower Dry Creek	18,451	99.8	42	0.2	18,493
Lower Mokelumne River	2,019	100.0	—	—	2,019
Morrison Creek	42,926	100.0	—	—	42,926
Sherman Lake-Sacramento River	13,987	100.0	—	—	13,987
Snodgrass Slough	40,426	100.0	—	—	40,426
Upper Cosumnes River	31,761	99.6	124	0.4	31,885
Total	**316,149**	**99.5**	**1,499**	**0.5**	**317,649**[1]

[1] The total does not include the approximately 6 acres of the Cache Slough watershed, which is not discussed in this document.

Table 6 shows that more than 99% of the Plan Area supports slopes less than 20%, with a range of just over 98% in the Upper Cosumnes River watershed to 100% in several of the watersheds. Similarly, Table 7 shows that over 99% of the Plan Area has an elevation of less than 500 feet and that all of the watersheds have at least 97% of their elevations at less than 500 feet; only four watersheds have elevations above 500 feet. The Deer Creek watershed accounts for about 3% of the acreage in the Plan Area above 500 feet.

3.1.6 Covered Species

Occurrences of Covered Species recorded throughout the Plan Area are shown in Table 8 and are depicted on Figures 9-1 through 9-29 Generally, Table 8 shows that most of the occurrence data for Covered Species in the Plan Area are concentrated in 5 of the 10 watersheds: Morrison Creek and Laguna for the vernal pool Covered Species and Morrison Creek, Laguna, Snodgrass Slough, Upper Cosumnes River, and Lower Cosumnes River for the other Covered Species. These five watersheds combined account for 72% of the total Covered Species occurrences in the Plan Area. Descriptions of the Covered Species occurrences within the different watersheds are provided in the analyses below for each watershed. It should be noted that the Covered Species occurrence data generally reflect where the most comprehensive surveys have been conducted in the Plan Area and do not necessarily reflect negative findings elsewhere in the Plan Area. For example, most of the vernal pool Covered Species occurrences are known from existing vernal pool Preserves inside the UDA and existing Preserve in PPU 7 outside the UDA, and relatively few occurrences are from planned criteria-based conservation areas simply because many of these areas have not been surveyed.

The SSHCP also includes an analysis of potentially suitable habitat (i.e., modeled habitat) for each of the Covered Species (Table 9, Figures 9-1 through 9-29). Further, several of the

Biological Goals and Measurable Objectives for plant species (Table 7-1, Chapter 7 of the SSHCP) prescribe that before an occurrence can be taken, one must be protected. For three Covered Species (giant garter snake, greater sandhill crane, and Swainson's hawk), the effects analysis also includes "high-value" habitat for the species in the Plan Area. High-value habitat is defined differently for each of the three species (Chapter 3 of the SSHCP), but generally refers to particularly important habitat in the Plan Area . Complete descriptions of the Covered Species are found in Chapter 3 of the SSHCP, effects of the SSHCP to Covered Species are described in Chapter 6, and the SSHC Conservation Strategy for the Covered Species is described in Chapter 7 of the SSHCP.

Similar to the Covered Species occurrences, Morrison Creek and Laguna support the majority of modeled habitat for vernal pool Covered Species, together accounting for 92% of the modeled habitat for both the vernal pool plants and vernal pool invertebrates. Modeled habitat for the other Covered Species is distributed across more watersheds, with Laguna accounting for most of the total, but with substantial modeled habitat in the Deer Creek, Lower Cosumnes River, Upper Cosumnes River, Morrison Creek, and Snodgrass Slough watersheds. More detailed descriptions of the modeled habitat for Covered Species within the different watersheds are provided in the analyses in Section 3.2 for each watershed.

Table 8
Summary of Covered Species Occurrences Within Watersheds[1]

Covered Species	Species Occurrence Total	American River	Deer Creek	Laguna Creek	Lower Cosumnes River	Lower Dry Creek	Lower Mokelumne River	Morrison Creek	Sherman Lake-Sacramento River	Snodgrass Slough	Upper Cosumnes River
Vernal Pool Plants											
Ahart's dwarf rush	2	—	—	—	—	—	—	2	—	—	—
Boggs Lake hedge-hyssop	30	—	3	—	—	—	—	27	—	—	—
Dwarf downingia	10	—	—	2	1	—	—	—	—	7	—
Legenere	56	—	—	2	5	1	—	30	—	12	6
Pincushion navarretia	48	—	—	32	—	16	—	—	—	—	—
Sacramento Orcutt grass	40	—	19	2	—	—	—	19	—	—	—
Slender Orcutt grass	4	—	—	—	—	—	—	4	—	—	—
Occurrences in Watershed	**190**	**0**	**22**	**38**	**6**	**17**	**0**	**82**	**0**	**19**	**6**
Non-Vernal Pool Plant											
Sanford's arrowhead	**63**	**—**	**2**	**—**	**4**	**—**	**3**	**12**	**2**	**35**	**5**
Vernal Pool Invertebrates											
Vernal pool fairy shrimp	572	—	14	305	8	10	—	196	2	17	20
Vernal pool tadpole shrimp	748	2	16	187	3	5	—	505	2	21	7
Ricksecker's water scavenger beetle	4	—	—	3	1	—	—	—	—	—	—
Mid-valley fairy shrimp	33	—	—	5	1	—	—	18	—	9	—
Occurrences in Watershed	**1,357**	**2**	**30**	**500**	**13**	**15**	**0**	**719**	**4**	**47**	**27**

Table 8
Summary of Covered Species Occurrences Within Watersheds[1]

Covered Species		Species Occurrence Total	American River	Deer Creek	Laguna Creek	Lower Cosumnes River	Lower Dry Creek	Lower Mokelumne River	Morrison Creek	Sherman Lake-Sacramento River	Snodgrass Slough	Upper Cosumnes River
Wildlife												
Amphibians/Reptiles												
California tiger salamander		29	—	—	23	—	6	—	—	—	—	—
Giant garter snake		14	—	—	1	5	—	—	1	—	7	—
Western pond turtle		18	—	1	8	2	—	—	2	—	5	—
Western spadefoot		31	—	1	18	—	1	—	9	—	—	2
Birds												
Burrowing owl		90	1	4	23	14	—	—	26	6	16	—
Cooper's hawk		17	—	2	1	6	—	—	4	—	2	2
Ferruginous hawk		26	—	4	6	3	—	—	8	—	2	3
Loggerhead shrike		30	—	4	6	8	—	—	3	—	7	2
Northern harrier		62	1	6	7	20	1	—	9	2	13	3
Greater sandhill crane	All data	3,249	—	—	390	642	259	—	2	1,205	722	29
	Roosts	*48*	—	—	*7*	*29*	—	—	—	—	*12*	—
Swainson's hawk	All data	398	1	31	51	107	19	—	20	8	127	34
	Nests	*293*	—	*22*	*42*	*90*	*15*	—	*11*	*3*	*86*	*24*
Tricolored blackbird	All data	305	3	45	91	33	2	—	87	5	6	33
	Documented nests	*36*	—	*6*	*5*	*3*	—	—	*20*	—	*1*	*1*
White-tailed kite		58	—	4	1	23	—	—	13	4	10	3

Table 8
Summary of Covered Species Occurrences Within Watersheds[1]

Covered Species	Species Occurrence Total	American River	Deer Creek	Laguna Creek	Lower Cosumnes River	Lower Dry Creek	Lower Mokelumne River	Morrison Creek	Sherman Lake-Sacramento River	Snodgrass Slough	Upper Cosumnes River
Invertebrates											
Valley elderberry longhorn beetle	156	1	1	—	1	—	—	—	—	—	153
Mammals											
American badger	8	—	—	—	—		—	7	—	1	—
Western red bat	7	—	—	2	—	—	—	2	2	—	1
All Wildlife Species in Watershed[2]	**4,561**	**7**	**105**	**628**	**868**	**288**	**3**	**205**	**1,234**	**953**	**270**
Total Covered Species in Watershed[2]	**6,108**	**9**	**157**	**1,166**	**887**	**320**	**3**	**1,006**	**1,238**	**1,019**	**303**

1 The occurrence data reported in this table include all documented observations for the Covered Species in the Plan Area. Nest or roost sites are included for Swainson's hawk, tricolored blackbird, and greater sandhill crane.

2 Totals and percentages are based on sums of all occurrence data and do not include subtotals for nests or roosts for Swainson's hawk, tricolored blackbird, and greater sandhill crane, which are subsets of all occurrence data for these species.

Table 9
Modeled Habitat for Covered Species within a Watershed

Covered Species		Total Acres of Modeled Habitat[1,2]	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)
Vernal Pool Plants (general habitat model in acres)												
Ahart's dwarf rush		25,135	126	2,954	6,689	1,269	327	—	10,974	19	2777	
Boggs Lake hedge-hyssop		37,001	183	3,908	8,663	4,954	484	—	12,702	67	815	5,225
Dwarf downingia		24,260	-	1,310	10,991	4,341	1,947	—	2,218	—	1,362	2,091
Legenere		50,971	156	4,174	16,491	6,210	2,107	—	15,118	137	1,679	4,899
Pincushion navarretia		57,437	79	8,242	29,570	1,408	6,351	—	6,841	7.33	—	4,939
Sacramento Orcutt grass		34,491	125	3951	14,275	1,371	2,005	—	9,972	19	—	2,774
Slender Orcutt grass		34,491	125	3,951	14,275	1,371	2,005	—	9,972	19	—	2,774
Non-Vernal Pool Plant												
Sanford's arrowhead		52,824	133	5,124	12,535	9,713	773	13	15,026	41	2,817	6,648
Vernal Pool Invertebrates												
Vernal pool fairy shrimp/Vernal pool tadpole shrimp	General	103,210	378	13,814	40,030	10,004	7,131	—	18,445	326	1,918	11,163
Ricksecker's water scavenger beetle	General	103,436	378	13,795	40,030	10,004	7,131	—	18,390	326	1,918	11,163
Mid valley fairy shrimp	General	53,698	208	5,705	13,594	7,412	770		16,907	309	1,852	6,941

Table 9
Modeled Habitat for Covered Species within a Watershed

Covered Species		Total Acres of Modeled Habitat[1,2]	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)
Amphibians/Reptiles												
California tiger salamander	Upland	85,369	—	—	46,092	13,807	9,911	—	—	—	—	15,559
	Aquatic	4,424	—	—	2,336	1,070	319	—	—	—	—	699
Giant garter snake	Aquatic	7,290	—	3	697	2,430	1	91	441	66	3,559	2
	Upland	27,868	—	181	9,521	8,934	19	3	3,258	114	5,760	78
	High Value[3]	10,481	—	—	1,170	1,518	10	0.4	1,388	45	6,350	—
Western pond turtle	Breeding/ Foraging	6,355	10	392	739	1,866	132	91	515	7	2,005	599
	Nesting/ Aestivation	110,846	899	25,697	33,739	11,195	8,273	199	8,750	425	6,517	15,153
Western spadefoot	Aquatic	13,478	41	1,011	3,477	2,387	471	71	1,566	23	2,987	1,444
	Upland	149,862	1,318	30,062	46,092	14,593	9,911	—	21,312	627	5,945	20,002
Birds												
Burrowing owl	Nesting/ Foraging	204,644	1,336	30,562	55,756	30,654	11,553	1,679	24,956	1,704	25,499	20,945
Cooper's hawk	Foraging	5,637	-	2,018	2,550	—	529	—	18	—	—	521
	Nesting	17,010	48	5,357	1,846	2,231	1,865	199	487	182	1,767	3,028
Ferruginous hawk	Foraging	159,612	1,369	25,055	50,046	19,420	8,701	9	23,951	633	10,452	19,976
Loggerhead	Foraging	72,405	32	5,476	13,826	17,440	3,478	1,679	4,903	1,084	20,767	3,719

Table 9
Modeled Habitat for Covered Species within a Watershed

Covered Species		Total Acres of Modeled Habitat[1,2]	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)
shrike	Foraging/ Nesting	135,112	1,336	23,643	42,178	14,593	7,965	0.13	21,294	626	5,945	17,530
	Nesting	7,878	48	957	481	2,231	448	199	487	182	1,767	1,078
Northern harrier	Foraging	11,309	34	602	2,931	2,506	432	21	1,600	14	2,243	926
	Foraging/ Nesting	199,008	1,336	28,544	53,205	30,654	11,023	1,679	24,938	1,704	25,499	20,424
Greater Sandhill crane	Roosting	1,156	—	8	279	369	28	—	17	—	421	734
	Foraging	84,286	—	3,677	16,315	29,301	3,289	1,421	1,593	855	25,438	2,398
	Foraging/ Roosting	4,322	—	46	336	1,696	48	21	315	8	1,811	43
	High Value	81,473	—	2,569	14,103	30,527	2,599	1,442	75	836	26,848	2,474
Swainson's hawk	Foraging	205,988	1,303	27,862	55,969	32,033	11,408	1,679	26,168	1,711	26,712	21,142
	Nesting	7,237	—	916	323	2,214	448	199	358	180	1,767	832
	High Value[3]	75,534	—	3,177	10,092	25,942	1,942	1,878	1,926	1,356	28,340	881
Tricolored blackbird	Foraging	24,244	12	1,482	7,747	4,874	627	12	2,710	16	4,446	2,318
	Nesting-Foraging	188,539	1,361	27,875	48,721	28,950	10,871	1,692	24,016	1,712	24,016	19,324
White-tailed kite	Foraging	213,154	1,369	31,138	58,554	32,033	11,972	1,679	26,215	1,711	26,712	21,771
	Nesting	17,010	48	5,357	1,846	2,231	1,865	199	487	182	1,767	3,028

Table 9
Modeled Habitat for Covered Species within a Watershed

Covered Species		Total Acres of Modeled Habitat[1,2]	American River (acres)	Deer Creek (acres)	Laguna Creek (acres)	Lower Cosumnes River (acres)	Lower Dry Creek (acres)	Lower Mokelumne River (acres)	Morrison Creek (acres)	Sherman Lake-Sacramento River (acres)	Snodgrass Slough (acres)	Upper Cosumnes River (acres)
Invertebrates												
Valley elderberry longhorn beetle	General	7,878	48	957	481	2,231	448	199	487	182	1,767	1,078
Mammals												
American badger	General	149,136	1,369	26,225	47,492	15,972	8,879	—	22,542	633	7,158	18,866
Western red bat	Foraging	152,890	1,379	24,754	45,883	18,392	8,531	94	23,376	787	10,508	19,186
	Roosting/ Foraging	24,841	48	7,432	4,946	2,062	2,559	196	504	1,540	1,874	3,679

1 Total modeled habitat acreages for a species include areas where different models (e.g., foraging and breeding) for the species overlap (i.e., the acreages in the models for a particular species are not mutually exclusive).

2 Modeled habitat totals may not sum exactly to the modeled habitat acreages reported in the SSHCP due to rounding error.

3 High-value habitat is a subset of modeled habitat and is included in the total modeled habitat acreage.

3.1.7 Preserve Design

The majority of conservation, existing and planned, within the Plan Area will occur within the Laguna Creek watershed, while very little conservation is designated within the American River watershed (Table 10, Figure 10). Watersheds with approximately 22% to 24% of existing conservation include Lower Dry Creek, Lower Cosumnes River, and Snodgrass Slough. Substantial conservation is planned for 7 of the 10 watersheds, ranging from approximately 2,571acres in Deer Creek to approximately 5,119 acres in Lower Cosumnes River. Ultimately, Laguna Creek watershed would have the highest total conservation by percentage at almost 27% and by acreage at more than 25,633 acres.

Table 10
Summary of Watershed Conservation

Watershed	Plan Area Total		Existing Conservation		Planned Conservation		No Conservation		Percentage of Conservation in Plan Area
	Acres	*% of Plan Area*	*Acres*	*% of Watershed*	*Acres*	*% of Watershed*	*Acres*	*% of Watershed*	
American River	997	0.4	0	0	0	0.0	997	0.6	0%
Deer Creek	34,971	13.5	5,464	8.5	2,571	7	26,936	17	23%
Laguna Creek	69,633	26.8	18,356	28.5	14,513	39.4	36,764	23	47%
Lower Cosumnes River	44,411	17	14,266	22	5,119	13.9	25,026	15.8	44%
Lower Dry Creek	17,661	6.8	8,834	13.7	358	1	8,470	5.3	52%
Lower Mokelumne River	2,019	0.8	1,642	2.5	0	0.0	377	0.2	81%
Morrison Creek	10,007	3.9	2,888	4.8	5,883	16	1,236	0.8	88%
Sherman Lake-Sacramento River	9,737	3.7	758	1.8	103	0.3	8,876	5.6	9%
Snodgrass Slough	38,806	15	8,943	13.9	5,497	14.9	24,366	15.4	37%
Upper Cosumnes River	31,602	12	3,368	5.2	2,803	7.6	25,429	16	20%
Total	**259,849**	**—**	**64,519**	**24.8**	**36,847**	**14.2**	**158,483**	**61**	**100**

Table 11 provides a breakdown of the watersheds by non-UDA/UDA areas and PPUs. All but the Upper Cosumnes and Lower Mokelumne River watersheds intersect both the UDA and non-UDA areas and all intersect more than one PPU. Section 3.3 provides descriptions of the watersheds and how they relate to Preserve planning inside and outside the UDA and by PPUs.

Table 11
Summary of Preserve Planning Units by Watershed

Watershed		Outside of Preserve Planning Units (acres)	PPU 1 (acres)	PPU 2 (acres)	PPU 3 (acres)	PPU 4 (acres)	PPU 5 (acres)	PPU 6 (acres)	PPU 7 (acres)	PPU 8 (acres)	Total (acres)
American River	Non-UDA	1,094	—	—	—	—	—	—	—	—	1,094
	UDA	—	1,106	1,251	—	—	—	—	—	—	2,357
Deer Creek	Non-UDA	8,081	—	—	—	—	21,005	2,435	—	—	31,521
	UDA	—	8,150	—	3,003	1,130	—	—	—	—	12,283
Laguna Creek	Non-UDA	—	—	—	—	—	—	8,292	61,441	—	69,733
	UDA	—	—	—	—	—	—	—	—	4,242	4,242
Lower Cosumnes River	Non-UDA	—	—	—	—	—	4,941	31,008	8,942	—	44,891
	UDA	—	—	—	—	—	—	—	—	1,791	1,791
Lower Dry Creek	Non-UDA	—	—	—	—	—	—	1,218	16,176	--	17,394
	UDA	—	—	—	—	—	—	—	—	1,099	1,099
Lower Mokelumne River	Non-UDA	—	—	—	—	—	—	2,019	—	—	2,019
	UDA	—	—	—	—	—	—	—	—	—	—
Morrison Creek	Non-UDA	70	—	--	--	—	—	111	—	—	181
	UDA	12,210	10,146	6,028	11,301	3,060	—	—	—	—	42,745
Sherman Lake-Sacramento River	Non-UDA	—	—	—	—	—	—	9,737	—	—	9,737
	UDA	1,876	326	1,992	—	57	—	—	—	—	4,251
Snodgrass Slough	Non-UDA	—	—	—	—	—	—	39,420	—	—	39,420
	UDA	—	—	—	—	1,006	—	—	—	—	1,006

Table 11
Summary of Preserve Planning Units by Watershed

Watershed		Outside of Preserve Planning Units (acres)	PPU 1 (acres)	PPU 2 (acres)	PPU 3 (acres)	PPU 4 (acres)	PPU 5 (acres)	PPU 6 (acres)	PPU 7 (acres)	PPU 8 (acres)	Total (acres)
Upper Cosumnes River	Non-UDA	—	—	—	—	—	26,602	935	4,348	—	31,885
	UDA	—	—	—	—	—	—	—	—	—	—
Total		**23,330**	**19,729**	**9,271**	**14,303**	**5,253**	**52,549**	**95,182**	**90,906**	**7,132**	**317,655**

3.2 Description of Watersheds in Plan Area

3.2.1 American River Watershed

3.2.1.1 Land Cover Types

Approximately 3,452 acres, or about 5%, of the 65,103-acre American River watershed is located within the Plan Area. This watershed comprises 1% of the entire Plan Area and is located in the northern portion of the Plan Area (Figure 2). A little more than half of the watershed contains Non-habitat land cover types, which primarily includes high-density development and mine tailings (Table 2, Figure 3). The remaining undeveloped land consists of Valley Grassland, Mine Tailing Riparian Woodland, Mixed Riparian Woodland, Blue Oak Woodland, and Savanna and Mixed Riparian scrub. Aquatic resources account for only approximately 98 acres, or about 3%, of the American River watershed. Impervious surfaces cover approximately 1,773 acres, or 51%, of the watershed within the Plan Area. Along with the Morrison Creek (16% impervious surfaces) and Sherman Lake-Sacramento River (24% impervious surfaces) watersheds, the American River watershed has one of the three highest percentages of impervious surfaces in the Plan Area.

3.2.1.2 Hydrology

According to the NHD flowline dataset, the American River watershed contains about 1% of the Plan Area's flowline features. Alder and Buffalo Creeks are the main water sources within this watershed, both of which are tributaries to the American River located north of the Plan Area.

Artificial paths (48%) and streams/rivers (46%) account for most of the flowline features in the American River watershed.

3.2.1.3 Geological Formations

The majority of the American River watershed is comprised of riverbank formations, Laguna formation and gopher ridge volcanics (45%) (Table 4, Figure 5).

3.2.1.4 Soils

The majority of this watershed (59%) contains dredge tailings, pits, and other remnants from mining operations (Table 5, Figure 6). The remaining acreage consists mostly of loam (35%) and gravelly loam (about 3%) soils.

3.2.1.5 Slope and Elevation

The entire American River watershed contains flat to gentle slopes (0-20%). (Table 6, Figure 7). This watershed does not contain any lands above 20% slopes. Similarly, the majority of the watershed is between an elevation range of 0-500 feet, with only about 2% ranging from 500-1,000 feet (Table 7, Figure 8).

3.2.1.6 Covered Species

The American River watershed includes documented occurrences for 10 of the 28 Covered Species, including: tricolored blackbird (*Agelaius tricolor*), Swainson's hawk (*Buteo swainsoni*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), vernal pool tadpole shrimp (*Lepidurus packardi*), burrowing owl (*Athene cunicularia*), and northern harrier (*Circus cyaneus*) (Table 8). However, about 45% of the American River watershed has been influenced by human activities with about half of the watershed dominated by non-habitat land covers and agriculture (Table 2, Figure 3). Subsequently, in combination with making up only 1% of the Plan Area, the portions of the American River watershed within the Plan Area do not support a high overall percentage of the Covered Species occurrences in the Plan Area.

Modeled habitat for several species occurs within this watershed, with substantial amounts of modeled habitat for the covered bird and mammal species (Table 9). Except for Cooper's hawk and greater sandhill crane (*Grus canadensis*), whose modeled habitat is limited to the western portion of the Plan Area, the American River watershed supports more than 1,000 acres of modeled habitat for each of the covered bird and mammal species, including more than 1,384 acres of nesting habitat for loggerhead shrike (*Lanius ludovicianus*) and foraging habitat for Cooper's hawk, more than 1,336 acres of nesting/foraging habitat for burrowing owl, and more

than 5,455 acres of foraging habitat for ferruginous hawk (*Buteo regalis*), loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, and white-tailed kite. The watershed contains more than 1,361 acres of modeled nesting habitat for tricolored blackbird and a nesting colony of approximately 3,900 birds was observed in 2000. The watershed supports about 1,379 acres of foraging habitat and more than 48acres of roosting habitat for western red bat, and more than 1,369 acres of modeled general habitat for American badger (*Taxidea taxus*). The watershed also contains about 48 acres of modeled habitat for valley elderberry longhorn beetle, but only one documented occurrence for the species. The watershed supports very small amounts of modeled habitat for the vernal pool Covered Species, ranging from no modeled habitat for dwarf downingia (*Downingia pusilla)* to 156 acres for legenere (*Legenere limosa*). For amphibians and reptiles, the watershed supports about 51 acres of modeled breeding habitat and 1,318acres of modeled aestivation habitat for western spadefoot (*Spea hammondii*) and 10 acres of modeled breeding/foraging habitat and 899 acres of modeled aestivation/nesting habitat for western pond turtle (*Actinemys marmorata*). The watershed does not have modeled habitat for California tiger salamander (*Ambystoma californiense*) and giant garter snake (*Thamnophis gigas*) because it is outside the geographic range of these two species in the Plan Area. The watershed contains only 133 acres of modeled habitat for Sanford's arrowhead (*Sagittaria sanfordii*).

3.2.1.7 Conservation Considerations

Almost the entire American River watershed is located within the UDA. The 2,358 acres of this watershed within the UDA are split about equally between PPU 1, and PPU 2. Due to its relative lack of vernal pools and vernal pool Covered Species occurrences, the watershed is not considered an important component of the Conservation Strategy inside the UDA. While the American River watershed supports substantial modeled habitat for covered birds and mammals (generally more than 1,000 acres for each), these species are widespread in the Plan Area and the watershed supports a relatively small percentage (generally less than 2%) of the total modeled habitats for these species in the Plan Area. No planned Preserve components are located within this watershed and it is anticipated that much of PPU 2 will eventually be urbanized.

3.2.2 Deer Creek Watershed

3.2.2.1 Land Cover Types

The Deer Creek watershed bisects the Plan Area, extending from the northeastern edge to halfway into the Plan Area (Figure 2). Of the 81,504 acres of the watershed, 43,803 acres (54%) are within the Plan Area (Table 1). A large majority (94%) of the watershed contains "Habitat" land covers, which includes Agriculture (Table 2, Figure 3). Terrestrial land covers (31,018 acres and 71% of the watershed), consisting primary of Valley Grassland (23,643 acres and 54% of the

watershed), account for the majority of the watershed. Other terrestrial land covers include Blue Oak Savanna and Woodland (9% of the watershed) and Mixed Riparian Woodland, Mixed Riparian Scrub, and Mine Tailing Riparian Woodland (2% of the watershed). Approximately 21% (9,269 acres) of the watershed consists of lands used for agricultural purposes and 6% (2,467 acres) fall under the Non-habitat land cover type. The remaining 2% of the watershed (1,048 acres) consists of aquatic resources such as streams and creeks, open water, and vernal pools. Impervious surfaces cover approximately 188 acres, or less than 1%, of the watershed within the Plan Area.

3.2.2.2 Hydrology

Approximately 86% of the NHD data within the Deer Creek watershed contains streams and rivers (Table 3, Figure 4). Deer Creek and its tributaries are the central focus of this watershed. Notable tributaries located within the watershed include Crevis Creek, Carson Creek, and Coyote Creek. The Cosumnes River separates the Deer Creek watershed from the Upper Cosumnes River watershed (see Section 3.2.10). Artificial paths account for about 6% of this watershed, with the majority related to the southern extension of the Folsom South Canal. The remaining NHD features within the Deer Creek watershed are canal/ditch (7%), connector (less than 1%), and pipeline (less than 1%).

3.2.2.3 Geological Formations

Gopher ridge volcanics, Mehrten formation and salt springs slate underlie the majority of the Deer Creek watershed, accounting for about 48% (Table 4, Figure 5). Several other geological formations are prominent within this watershed and include laguna formation, levee and channel deposits, Modesto formation, and riverbank formation.

3.2.2.4 Soils

A wide variety of loam subcategories occur within this watershed (Table 5, Figure 6): loam (26%), silt loam (25%), gravelly loam (17%), sandy loam (15%), fine sandy loam (10%), and sandy clay loam (3%). Additional soils include clay (1%) and soils listed in the other category (2%). A small percentage (less than 1%) includes areas covered in water.

3.2.2.5 Slope and Elevation

The Deer Creek watershed contains slopes from 0 to greater than 40%, with the vast majority of the slopes (99%) within the 0-20% category (Table 6, Figure 7). Less than 1% are within the 20%-40% and less than 1% are within the greater than 40% category. The majority of the steep slopes are concentrated along the portion of Deer Creek River located in the northeastern section

of the watershed. Of all the watersheds, Deer Creek contains the highest percentage (3%) of acreage within an elevation range of 500-1,000 feet (Table 7, Figure 8). This acreage is concentrated along the eastern border of the Plan Area.

3.2.2.6 Covered Species

The Deer Creek watershed includes documented occurrences for 16 of the 28 Covered Species, including: Boggs Lake hedge-hyssop, Sacramento Orcutt grass (*Orcuttia viscida*), Sanford's arrowhead, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, western pond turtle, western spadefoot, and white-tailed kite (Table 8). This watershed contains 2% of the known occurrences for these 16 Covered Species, and contains a substantial percentage of occurrences for two of the Covered Species, including 48% of the Sacramento Orcutt grass records and 15% of the ferruginous hawk records. Covered species have been recorded throughout the watershed, with the majority occurring along hydrologic features and within aquatic or terrestrial habitat. A cluster of vernal pool species records occur along the border of Deer Creek and Morrison watersheds east of the intersection of Grant Line Road and Keifer Boulevard.

Consistent with the occurrence of several vernal pool species, the Deer Creek watershed contains modeled habitat for all of the vernal pool Covered Species, ranging from 1,310 for dwarf downingia to 13,814 acres for vernal pool fairy shrimp and vernal pool tadpole shrimp (Table 9). The Deer Creek watershed contains substantial acreages of modeled habitats for all of the covered bird species, including 602 acres to well over 30,000 acres (64% of the watershed) of modeled foraging habitat for Cooper's hawk, loggerhead shrike, northern harrier, ferruginous hawk, Swainson's hawk, tricolored blackbird, white-tailed kite, and burrowing owl. The watershed also supports large amounts of nesting habitat for many of the covered birds, including more than 30,562 acres for burrowing owl (including foraging habitat), and about 5,357 acres for white-tailed kite. Of the 398 documented Swainson's hawk nest sites, 31 are in the Deer Creek watershed. The watershed also supports 3,177 acres of high-value foraging habitat for Swainson's hawk.

Fifteen of the 96 documented nest colonies for tricolored blackbird and 5 of 63 potential nest colonies are in the watershed. Approximately 14,280 individuals have been observed at the 96 documented nest colonies over the survey years, or 9% of the total individuals observed at nest colonies in the Plan Area. Nest colonies in this watershed have ranged from 30 to approximately 3,500 individuals.

The watershed is important for western spadefoot and western pond turtle, supporting almost 1,011 acres of modeled breeding habitat and almost 30,062 acres of modeled aestivation habitat for western spadefoot (both habitats provide foraging habitat as well) and more than 392 acres of breeding/foraging habitat and more than 25,697 acres of modeled nesting/aestivation habitat for western pond turtle. The Deer Creek watershed does not support modeled habitat for California tiger salamander because it is outside the species' range in the Plan Area, and supports only a small amount of modeled habitat for giant garter snake (3 acres of foraging and 181 acres of upland habitat), whose populations occur in the western portion of the Plan Area.

The Deer Creek watershed supports large acreages of modeled habitat for the covered mammals, including more than 26,225 acres of modeled general habitat for American badger and about 24,754 acres of modeled foraging habitat for western red bat (*Lasiurus blossevillii*) The watershed supports about 7,432 acres of roosting habitat for the western red bat.

The Deer Creek watershed supports a relatively small amount of modeled habitat for Sanford's arrowhead (5,124 acres, or 10% of the total in the Plan Area).

3.2.2.7 Conservation Considerations

The Deer Creek watershed supports substantial biological resources and is an important component of the SSHCP Conservation Strategy, as described in the previous section. Approximately 35% of the Deer Creek watershed is located outside of the UDA, and spans over PPUPPUs, 5 and 6 (Table 11). About 48% of the watershed in the Plan Area is within PPU 5. The Deer Creek watershed includes existing and planned conservation both inside and outside of the UDA. Existing conservation (5,463 acres) occur in a patchy distribution throughout the Deer Creek watershed, with the largest existing Preserve (about 4,490 acres) located immediately north of Rancho Murieta (Figure 10). Planned conservation totals about 2,570 acres and will focus primarily on linkage Preserves, riparian and wetland restoration (see Chapter 7 of the SSHCP). Restoration activities will be focused along the Cosumnes River. Implementation of the SSHCP would result in an integrated system of large Preserves connected by linkage Preserves (Chapter 7 of the SSHCP).

The majority of existing conservation within the Deer Creek watershed targets two terrestrial land covers: blue oak woodland and valley grassland, which together would account for about 78% of the total conservation in the watershed (Table 12). Agricultural areas will also be conserved, including about 914 acres of croplands and irrigated pasture-grassland that provide foraging habitat for several of covered bird species and western red bat. About 281 acres of aquatic habitat would conserved, with most comprised of vernal pool and swale.

Table 12
Summary of Conserved Land Cover Types in the Deer Creek Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Blue Oak Savanna	73	—	73
Blue Oak Woodland	1,423	—	1,423
Mine Tailing Riparian Woodland	<1	—	<1
Mixed Riparian Scrub	1	14	15
Mixed Riparian Woodland	44	312	356
Valley Grassland	2,854	1,609	4,463
Terrestrial Total	*4,395*	*1,935*	*6,330*
Aquatic			
Streams/Creeks (VPIH)	<1	14	14
Freshwater Marsh	7	1	8
Open Water	6	10	16
Seasonal Wetland	5	15	20
Streams/Creeks	28	25	53
Swale	16	16	32
Vernal Pool	104	34	138
Aquatic Total	*166*	*115*	*281*
Agriculture			
Cropland	596	318	914
Irrigated Pasture-Grassland	138	37	175
Orchards	1	4	5
Vineyards	116	51	167
Agriculture Total	*851*	*410*	*1,261*
Non-Habitat Land Cover Type			
Disturbed	2	72	74
Low-density Development	27	33	60
Major Roads	12	5	17
Mine Tailings	10	—	10
Non-Habitat Land Cover Type Total	*51*	*110*	*161*
Grand Total	**5,463**	**2,570**	**8,033**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.3 Laguna Creek Watershed

3.2.3.1 Land Cover Types

The Laguna Creek watershed is approximately 96,788 acres, of which 73,976 acres are within the Plan Area, and comprises 76% of the Plan Area (Table 1). It is located in the southeastern portion of the Plan Area (Figure 2) and contains virtually all of the mapped land cover types in the Plan Area (Table 2, Figure 3). The large majority (91%) of the Laguna Creek watershed is undeveloped. Combined, Valley Grassland, Blue Oak Savanna, and Blue Oak Woodland account for 62% (approximately 46,092 acres) of the land covers in the watershed, and 68% of the natural land covers, including Agriculture. Agriculture accounts for 24% (approximately 17,445 acres) of the land covers in the Plan Area. The Laguna Creek watershed also supports all of the aquatic cover types except Streams/Creeks (VPIH), including approximately 2,764 acres of Vernal Pool, Seasonal Wetland, and Swale, approximately 416 acres of Streams/Creeks, and almost 300 acres of Open Water. Non-habitat land cover types comprise only 9% of the watershed, with Low-Density Development accounting for 68% of the Non-habitat land cover types. Impervious surfaces cover approximately 1,417 acres, or only 2%, of the watershed within the Plan Area.

3.2.3.2 Hydrology

According to the NHD flowline dataset, the Laguna Creek watershed contains almost 26% of the flowline types in the Plan Area, which is slightly higher than its total proportion (20%) of the Plan Area (Table 3, Figure 4). Reflecting the dominance of natural land cover types in the watershed, approximately 86% of the Laguna Creek watershed is stream/river, with artificial paths and canal/ditch accounting for almost all of the remaining 14%.

The main streams/rivers in the Laguna Creek watershed include Laguna Creek (south), which flows west from outside the Plan Area and drains to the Cosumnes River in the western portion of the watershed. Browns, Hadselville, Griffith, and Skunk Creeks all drain into Laguna Creek, with each having various tributaries creating a rich network of drainages in the watershed.

3.2.3.3 Geological Formations

The Laguna Creek watershed is underlain mostly by the laguna formation and the riverbank formation 56% of the watershed (Table 4). Other prominent formations in the watershed include the Mehrten formation and the modesto-riverbank formation.

3.2.3.4 Soils

Approximately 95% of the soil types located within the Laguna Creek watershed are loam subcategories with the majority of the soil type consisting of gravelly loam, silt loam, loam, and fine sandy loam (Table 5, Figure 6).

3.2.3.5 Slope and Elevation

The vast majority (more than 99%) of the Laguna Creek watershed is on flat to gentle slopes 0-20%, with only 141 acres on 21%-40% slopes and 2 acres on slopes greater than 40% (Table 6, Figure 7). Likewise, the entire watershed is at an elevation less than 500 feet (Table 7, Figure 8). In the Laguna Creek watershed, elevations range from about 250 feet amsl in the hillier areas in the eastern portion of the watershed to less than 15 feet amsl in the western portion of the watershed where Laguna Creek (south) drains into the Cosumnes River.

3.2.3.6 Covered Species

The Laguna Creek watershed includes documented occurrences for 23 of the 28 Covered Species, reflecting both its large size and diversity of land cover types (Table 8). Covered species documented in the watershed include dwarf downingia, legenere, pincushion navarretia (*Navarretia myersii* ssp. *myersii*), Sacramento Orcutt grass, vernal pool fairy shrimp, Ricksecker's water scavenger beetle, vernal pool tadpole shrimp, mid-valley fairy shrimp, California tiger salamander, western spadefoot, western pond turtle, giant garter snake, Cooper's hawk, burrowing owl, loggerhead shrike, northern harrier, ferruginous hawk, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, and western red bat.

This watershed has the second highest percentage (19%) of known occurrences for Covered Species after the Sherman-Lake Sacramento River watershed (see Section 3.2.8), including 20% of the vernal pool covered plant occurrences and 37% of the vernal pool invertebrate occurrences (Table 8). The majority of pincushion navarretia (67%), California tiger salamander (79%), and western spadefoot (58%) occurrences in the Plan Area are in this watershed. Approximately 53% of the Plan Area's vernal pool fairy shrimp occurrences and 25% of the vernal pool tadpole shrimp occurrences are in valley grassland and vernal pool land covers located in the northeastern section of the watershed. Three of the four Ricksecker's water scavenger beetle occurrences in the SSHCP database occur in the Laguna Creek watershed. The watershed includes relatively high percentages of occurrences for several other Covered Species, including burrowing owl (26%), ferruginous hawk (23%), tricolored blackbird (30%), and western red bat (29%).

Due to its large size and number of land cover types, of the 10 watersheds in the Plan Area, the Laguna Creek watershed contains among the largest acreages of modeled habitat for most

Covered Species, except for giant garter snake, which generally occurs in the western portion of the Plan Area (Table 9).

Consistent with the occurrence of all the vernal pool Covered Species, the Laguna Creek watershed contains substantial modeled habitat for these species, ranging from 6,689 acres for Ahart's dwarf rush to 10,004acres for the vernal pool invertebrates (Table 9).

The Laguna Creek watershed contains substantial acreages of modeled habitats for all of the covered bird species, including almost 2,550 acres of modeled foraging habitat for Cooper's hawk and 2,931 to 58,554 acres (4%-79% of the watershed) of modeled foraging habitat for ferruginous hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, and white-tailed kite and modeled nesting/foraging habitat for burrowing owl. The watershed supports approximately 16,315 acres of modeled foraging habitat and 279 acres of modeled roosting habitat for greater sandhill crane. The watershed also supports large amounts of modeled nesting habitat for covered birds that can use a variety of more broad-scale land cover types for nesting (e.g., valley grassland, agriculture), including burrowing owl (55,756 acres), loggerhead shrike (42,659 acres), northern harrier (53,630 acres), and tricolored blackbird (48,721). However, for covered birds that are limited to riparian and woodland habitats for nesting, the Laguna Creek watershed supports more modest acreages of modeled nesting habitat relative to its large size, including 1,846 acres for Cooper's hawk and white-tailed kite and 323 acres for Swainson's hawk.

Of the 293 documented Swainson's hawk nest sites, 42 are in the Laguna Creek watershed. The Laguna Creek watershed supports 10,092 acres of high-value foraging habitat for Swainson's hawk. The watershed also supports 7 of the 48 documented roosting sites for the greater sandhill crane in the Plan Area.

Along with the Morrison Creek watershed, the Laguna Creek watershed supports the largest number of documented and potential tricolored blackbird nest colonies in the Plan Area (Table 8), with 20 of 96 documented nest colonies and 27 of 63 potential nest colonies in the watershed. The 20 documented nest colonies have ranged in size from approximately 20 individuals (1 site) to 6,750 individuals (1 site) observed in 1999 and have totaled about 22,630 individuals over the various surveys (14% of the approximately 158,330 individuals observed at all documented nest colonies).

The Laguna Creek watershed is extremely important for California tiger salamander and western spadefoot, and also provides substantial habitat for western pond turtle. As noted above, 76% of the occurrences (23 of 29) of the California tiger salamander are in the Laguna Creek watershed. Reflecting the habitat model parameters for the species (i.e., areas limited to south of the Cosumnes River), 49% of modeled aestivation habitat and 53% of the modeled

breeding/foraging habitat in the Plan Area are in the Laguna Creek watershed (Table 9). For western spadefoot, along with 58% of the documented occurrences (18 of 31), the Laguna Creek watershed supports 3,477 acres of modeled breeding habitat and 46,092 acres of modeled aestivation habitat. For western pond turtle, along with 45% of the documented occurrences (8 of 18), the Laguna Creek watershed supports 739 acres of modeled breeding/foraging habitat and 33,739 acres of modeled nesting/aestivation habitat. The Laguna Creek watershed has some value for giant garter snake, but is not as critical for this species compared to the Lower Cosumnes River (Section 3.2.4), Morrison Creek (Section 3.2.7), and Snodgrass Slough (Section 3.2.9) watersheds. There is one documented occurrence of giant garter snake in the Laguna Creek watershed, 9,521 acres of modeled upland habitat, 697 acres of modeled aquatic habitat, and 1,170 acres of high-value habitat.

The Laguna Creek watershed supports large acreages of modeled habitat for the covered mammals, including 47,492 acres of modeled general habitat for American badger and 45,883 acres of modeled foraging habitat for western red bat. The watershed supports about 4,946 acres of modeled roosting habitat for western red bat. The Laguna Creek watershed supports a moderate amount of modeled habitat for Sanford's arrowhead (12,535 acres, or 24% of the total in the Plan Area).

The Laguna Creek watershed also contains federally designated Critical Habitat for California tiger salamander (8,758 acres), Sacramento Orcutt grass (24,510 acres), and vernal pool fairy shrimp and vernal pool tadpole shrimp (27,048 acres).

3.2.3.7 Conservation Considerations

The large majority (88%) of the Laguna Creek watershed is located in PPU 7 outside UDA where limited Covered Activities would occur, but with substantial overlap with PPUs 6 and 8 in the western portion of the watershed. Chapter 7 of the SSHCP provides a detailed description of conservation considerations and conservation planning in these PPUs, with the main points summarized here.

The Laguna Creek watershed is one of the watersheds in the Plan Area least affected by man-made alterations and it supports numerous documented occurrences of Covered Species. In particular, it supports approximately 1,917 acres of the vernal pools in the Plan Area.

The conservation focus in the Laguna Creek watershed within PPUs 6 and 7 is maintaining large landscape Preserves that are interconnected, with valley grassland and vernal pool the primary conservation focus in PPU 7. In PPU 6, agricultural lands adjacent to the river and creek floodplains provide important foraging and roosting habitat for Covered Species such as Swainson's hawk, white-tailed kite, northern harrier, and greater sandhill crane.

Under the SSHCP, 18,315 acres of existing conservation and 14,493 acres of planned conservation would occur in the Laguna Creek watershed, including total conservation of 25,960 acres of valley grassland and 2,192 acres of aquatic habitat (Table 13, Figure 10). Much of the conservation would occur in the eastern part of the watershed in association with the existing 12,500-acre Chance Ranch and planned conservation to build upon the existing conservation, creating a landscape Preserve totaling between 33,500 and 34,000 acres in the southeastern portion of the Plan Area, and including conservation in the Upper Cosumnes River to the north and Lower Dry Creek to the south.

Table 13
Summary of Conserved Land Cover Types in the Laguna Creek Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Blue Oak Savanna	2,362	33	2,395
Blue Oak Woodland	987	—	987
Mine Tailing Riparian Woodland	1	63	64
Mixed Riparian Scrub	23	4	27
Mixed Riparian Woodland	46	6	52
Valley Grassland	13,146	12,814	25,960
Terrestrial Total	*16,565*	*12,920*	*29,485*
Aquatic			
Freshwater Marsh	40	19	59
Open Water	9	12	21
Seasonal Wetland	129	47	176
Streams/Creeks	106	60	166
Swale	132	164	296
Vernal Pool	953	580	1,533
Aquatic Total	*1,329*	*863*	*2,192*
Agriculture			
Cropland	194	140	334
Irrigated Pasture-Grassland	39	380	419
Orchards	—	2	2
Vineyards	120	17	137
Agriculture Total	*353*	*539*	*892*
Non-Habitat Land Cover Type			
Disturbed	8	—	8
High-density Development	6	—	6
Low-density Development	6	85	91
Major Roads	18	11	29
Mine Tailings	22	75	97

Table 13
Summary of Conserved Land Cover Types in the Laguna Creek Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Recreation/Landscaped	8	—	8
Non-Habitat Land Cover Type Total	*68*	*171*	*239*
Grand Total	**18,315**	**14,493**	**32,808**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.4 Lower Cosumnes River Watershed

3.2.4.1 Land Cover Types

The Lower Cosumnes River watershed is 46,683 acres, entirely located within the south-central portion of the Plan Area (Figure 2). This watershed consists primarily of Terrestrial and Agricultural land covers, accounting for 81% of the land covers in the watershed (Table 2, Figure 3). The terrestrial category is dominated by Valley Grasslands (14,593 acres), which accounts for approximately 87% of the total terrestrial land cover in the watershed. Agricultural areas total 21,153 acres and are the largest land covers in the Lower Cosumnes River watershed. Approximately 7% (3,514 acres) of the watershed is Aquatic land covers, including Seasonal Wetlands, Open Water, Freshwater Marsh, Vernal Pools, Wetland Restoration, Streams and Creeks and Swales. Approximately 11% (5,191 acres) of the watershed is Non-habitat land cover dominated by Low-Density Development (3,976 acres) and High-Density Development (667 acres). Impervious surfaces cover approximately 1,061 acres, or only 2%, of the watershed.

3.2.4.2 Hydrology

According to the NHD flowline dataset, the Lower Cosumnes River watershed consists primarily of stream/river (44%), canal/ditch (35%), and artificial path (22%) (Table 3, Figure 4). This watershed contains the lower portion of the Cosumnes River. The Cosumnes River and Badger Creek account for the majority of the stream/river and artificial path flowline data within this watershed. Agricultural areas are the largest land cover in this watershed, which is reflected by the high percentage of NHD flowline features categorized as canal/ditch.

3.2.4.3 Geological Formations

Riverbank formations account for approximately 69% of the Lower Cosumnes River watershed (Table 4, Figure 5). Other important formations include basin deposits, laguna formation and levee and channel deposits.

3.2.4.4 Soils

Approximately 65% of the soils within the Lower Cosumnes River watershed are silt loams with the majority falling within the San Joaquin soil series (Table 5, Figure 6). The remaining soils are subcategories of loam (25%), clay (6%), water (1%), and other (2%).

3.2.4.5 Slope and Elevation

The entire watershed is on flat to gentle slopes (Table 6, Figure 7), with elevations ranging from 0-500 feet (Table 7, Figure 8).

3.2.4.6 Covered Species

The Lower Cosumnes River watershed includes documented occurrences for 19 of the 28 Covered Species, including dwarf downingia, legenere, Sanford's arrowhead, vernal pool fairy shrimp, mid-valley fairy shrimp, Ricksecker's water scavenger beetle, valley elderberry longhorn beetle, California tiger salamander, giant garter snake, western pond turtle, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, and white-tailed kite.

This watershed contains 15% of the Plan Area's known occurrences of Covered Species. The second largest number of sandhill crane occurrences (20%) are in Lower Cosumnes River watershed, as are relatively large percentages of occurrences for Cooper's hawk (35%), loggerhead shrike (62%), northern harrier (32%), Swainson's hawk (27%), and white-tailed kite (40%). Five of the 14 documented occurrences for giant garter snake are in this watershed, primarily in close proximity to the Cosumnes River and its tributaries. Although the Lower Cosumnes River watershed supports 619 acres of vernal pool, it has relatively few occurrences of the covered vernal pool plant and invertebrate species, including no occurrences for most of the plants. There are also no occurrences for western spadefoot or California tiger salamander in the watershed, and only two occurrences for western pond turtle.

The Lower Cosumnes River watershed contains variable amounts of modeled habitats for the covered vernal pool species, ranging from 1,269 acres for Ahart's dwarf rush to 6,210 acres for legenere (Table 9). However, with the exception of Boggs Lake hedge-hyssop, it contains

substantially less modeled habitat for these species compared to the Laguna Creek (Section 3.2.3) and Morrison Creek (Section 3.2.7) watersheds. The Lower Cosumnes River watershed contains substantial acreages of modeled habitats for all of the covered bird species, including modeled foraging habitat ranging from about 19,420 acres for ferruginous hawk to 33,824 acres for tricolored blackbird and about 30,654 acres of modeled nesting/foraging habitat for burrowing owl. Second only to the Snodgrass Slough watershed (Section 3.2.9), the Lower Cosumnes River watershed supports the largest amount of high-value habitat for Swainson's hawk; 25,942 acres or 31% of the total in the Plan Area. The watershed supports variable amounts of modeled nesting habitat for covered birds, about 2,200 acres for the riparian/woodland nesting species (Cooper's hawk, Swainson's hawk, and white-tailed kite); about 30,654 acres for burrowing owl and 16,824 acres for loggerhead shrike; and about 28,950 acres for tricolored blackbird and 30,660 acres for northern harrier. The Lower Cosumnes River watershed also supports 369 acres of modeled roosting habitat for greater sandhill crane, second only to the Upper Cosumnes watershed, and 32% of the total modeled roosting habitat for the species in the Plan Area.

The Lower Cosumnes River watershed contains 90 of the 293 nest sites for Swainson's hawk, second only to the Snodgrass Slough watershed with 86 nest sites (Table 8). The watershed also contains by far the largest number of greater sandhill crane roost sites in the Plan Area (29 of the 48).

The watershed contains 7 of the 96 documented nest colonies for tricolored blackbird and 4 of 63 potential nest colonies. Approximately 2,980 individuals have been observed at the four nest colonies, or 2% of the approximately 158,330 individuals observed at nest colonies in the Plan Area over the different surveys. The four documented nest colonies have ranged in size from 130 to 1,500 individuals.

The Lower Cosumnes River watershed is important for all four of the covered amphibians and reptiles, and particularly giant garter snake. The watershed contains Badger Creek and other creeks that drain into the marsh at the Cosumnes River Preserve, which likely supports high-quality habitat due to its proximity and connectivity to a significant population of giant garter snake. The watershed supports 2,430 acres of modeled aquatic habitat, 8,934 acres of modeled upland habitat and 1,518 acres of high-value habitat for giant garter snake. The Lower Cosumnes River watershed also contains substantial modeled habitat for California tiger salamander, including more than 1, 0700 acres of modeled aquatic habitat and almost 13,807 acres of modeled upland habitat. For western pond turtle, the watershed supports more than 1,866 acres of modeled breeding/foraging habitat (29% of the total in the Plan Area and second only to the Snodgrass Slough watershed). However, compared to some other watersheds, the Lower Cosumnes River watershed supports a modest amount of modeled nesting/aestivation habitat (11,195 acres, or 10% of the total). The western spadefoot has not been documented in the Lower Cosumnes River watershed, but the

watershed supports substantial amounts of modeled habitat for the species, including almost 2,400 acres of modeled breeding habitat and about 14,590 acres of modeled aestivation habitat. The Lower Cosumnes River watershed supports substantial acreages of modeled habitat for the covered mammals, including more than 15,972 acres of modeled general habitat for American badger and almost 19,000 acres of modeled foraging habitat for western red bat. The watershed supports about 2,000 acres of modeled roosting habitat for western red bat. A bat monitoring program in the Cosumnes River Preserve has documented the occurrence of western red bat.

The Lower Cosumnes River watershed supports substantial modeled habitat for Sanford's arrowhead (9,713 acres, or 18% of the total in the Plan Area).

The Lower Cosumnes River watershed also contains federally designated Critical Habitat for Sacramento Orcutt grass (1,842 acres) and vernal pool fairy shrimp and vernal pool tadpole shrimp (2,069 acres).

3.2.4.7 Conservation Considerations

The large majority (96%) of the Lower Cosumnes River watershed is located outside of the UDA. The portions of the watershed that occur within the UDA also overlap with PPUs 4 and 8. The remaining portion of the watershed that is outside of the UDA encompasses approximately 4,941 acres of PPU 5, 31,008 acres of PPU 6, and 8,942 acres of PPU 7 (Table 11). Notably, PPU 6 contains much of the aquatic and riparian resources in the Plan Area. Compared to the other PPUs, PPU 6 is the most important PPU for covered bird species and giant garter snake.

Current existing hardline Preserve areas, all outside of the UDA, total 14,270 acres of the watershed, with almost all located in PPU 6 (Figure 10). They include the Stone Lakes National Wildlife Refuge and the Cosumnes River Preserve. Planned conservation totals 5,116acres and includes agricultural and landscape Preserves as well as wetland and riparian restoration. These areas are immediately adjacent to existing Preserve areas and will focus on expanding the preservation of vernal pool habitat and important agricultural areas that provide foraging habitat for several covered bird species, including Swainson's hawk, white-tailed kite, tricolored blackbird, and greater sandhill crane, and roosting habitat for the crane. The Lower Cosumnes River watershed contains the second-most overall conservation in the Plan Area, with an emphasis on terrestrial and agricultural land covers (Table 14). In addition, approximately 2,340 acres of aquatic habitat will be conserved. Planned conservation will be located within PPUs 6 and 7 of the watershed.

Table 14
Summary of Conserved Land Cover Types in the Lower Cosumnes River Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Mine Tailing Riparian Woodland	17	—	17
Mixed Riparian Scrub	168	53	221
Mixed Riparian Woodland	1,437	111	1,548
Valley Grassland	5,239	1,861	7,100
Terrestrial Total	*6,861*	*2,025*	*8,886*
Aquatic			
Freshwater Marsh	960	42	1,002
Open Water	218	11	229
Seasonal Wetland	417	49	466
Streams/Creeks	133	81	214
Swale	52	38	90
Vernal Pool	171	141	312
Aquatic Total	*1,951*	*362*	*2,313*
Agriculture			
Cropland	4,598	1,867	6,465
Irrigated Pasture-Grassland	365	587	952
Orchards	40	<1	40
Vineyards	386	158	544
Agriculture Total	*5,389*	*2,612*	*8,001*
Non-Habitat Land Cover Type			
Aqueducts	—	20	20
Low-Density Development	62	97	159
Major Roads	<1	<1	1
Non-Habitat Land Cover Type Total	*62*	*117*	*179*
Grand Total	**14,263**	**5,116**	**19,379**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.5 Lower Dry Creek Watershed

3.2.5.1 Land Cover Types

The Lower Dry Creek watershed is located along the southern edge of the Plan Area (Figure 2). Approximately 33% of the watershed is located within the Plan Area. The watershed has very little non-agricultural development. Of the 18,493 acres in the watershed, approximately 5% are Terrestrial land covers and 38% are Agricultural land covers (Table 2, Figure 3).

Valley Grasslands dominate the terrestrial land cover in the watershed, comprising 7,965 of the 10,359 acres mapped as Terrestrial. The large majority (93%) of agricultural areas are cropland and vineyards. Aquatic and Non-habitat land covers each comprise about 3% of the remaining acreage within the watershed. Impervious surfaces cover approximately 85 acres, or less than 1% of the watershed within the Plan Area.

3.2.5.2 Hydrology

Approximately 87% of the flowlines within the Lower Dry Creek watershed are streams and rivers (Table 3, Figure 4). Artificial path (about 6%), canal/ditch (7%), and connector (less than 1%) account for the remainder of the NHD flowline features in this watershed. This watershed encompasses Dry Creek, which is located along the southern boundary of the Plan Area. The watershed ends where Dry Creek terminates into Mokelumne River located to the west (Figure 2).

3.2.5.3 Geological Formations

The Lower Dry Creek watershed consists of several different geological formations with the combined Riverbank formations, Laguna and Mehrten Formations, totaling approximately 67% of the watershed (Table 4, Figure 5). Other formations include Valley Springs, alluvial deposit formations, and levee and channel deposits.

3.2.5.4 Soils

Approximately 91% of the watershed consists of fine sandy loam, gravelly loam, and sandy loam (Table 5, Figure 6). The remaining soils are subcategories of loam (6%), other (2%), clay (less than 1%), and water (less than 1%).

3.2.5.5 Slope and Elevation

The vast majority (99%) of the Lower Dry Creek watershed contains gentle slops (i.e., 0-20% slopes) with a small fraction falling within the 20%–40% and >40% ranges (Table 6, Figure 7). Similarly, most of the watershed is within the 0–500 foot elevation range (Table 7, Figure 8). Only 40 acres (less than 1%), located along the eastern border of the Plan Area, is within the 500–1,000 foot elevation range.

3.2.5.6 Covered Species

The Lower Dry Creek watershed includes documented occurrences for 10 of the 28 Covered Species, including legenere, pincushion navarretia, vernal pool fairy shrimp, vernal pool tadpole

shrimp, California tiger salamander, western spadefoot, northern harrier, greater sandhill crane, Swainson's hawk, and tricolored blackbird. Overall, the watershed only contains 5% of the Covered Species occurrences, but it does contain 33% of the pincushion navarretia occurrences (16 of 48) and 21% of the California tiger salamander occurrences (6 of 29).

Consistent with general lack of occurrences for most of the vernal pool Covered Species, the Lower Dry Creek watershed contains some of the least amount of modeled habitat for these species, ranging from only 327 acres for Ahart's dwarf rush acres to 7,131 acres for the vernal pool invertebrates (Table 9). Although the Lower Dry Creek watershed, at 18,493 acres in the Plan Area, is one of the smaller watersheds, it contains substantial acreages of modeled habitats for all of the covered bird species due to its large amount of natural land and agriculture, and lack of non-habitat cover types (Table 2, Figure 3). It supports more than 432 acres to about 12,000 acres (2%–65% of the total land cover) of modeled foraging habitat for Cooper's hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, white-tailed kite, and burrowing owl. The watershed supports variable amounts of modeled nesting habitat for covered birds, including 1,865 acres for Cooper's hawk and white-tailed kite, 448 acres for Swainson's hawk, 11,553 acres for burrowing owl, 8,413 acres for loggerhead shrike, 10,871 acres for tricolored blackbird (although no nesting colonies have been observed), and 11,023 acres for northern harrier. Nineteen of the 398 Swainson's hawk nest sites are in the watershed. The Lower Dry Creek watershed supports 1,942 acres of high-value foraging habitat for Swainson's hawk. The watershed supports relatively small amounts of modeled habitat for greater sandhill crane, including only 28 acres of roosting habitat and 3,289 acres of foraging habitat.

The Lower Dry Creek watershed is important for California tiger salamander, containing more than 9,911 acres of modeled aestivation habitat and 319 acres of modeled breeding/foraging habitat. As noted above, 6 of the 29 occurrences of California tiger salamander are in the Lower Dry Creek watershed. The watershed is less important for western spadefoot, western pond turtle, and giant garter snake. For western spadefoot, the Lower Dry Creek contains a relatively modest amount of modeled habitat compared to most of the other watersheds, including only 3% of the modeled breeding habitat and 6% of the modeled aestivation habitat in the Plan Area. Similarly, for western pond turtle, the watershed contains less modeled habitat than several of the other watersheds, including only 2% of the modeled breeding/foraging habitat and 7% of the modeled aestivation habitat in the Plan Area. The Lower Dry Creek watershed has low value for the giant garter snake, supporting no modeled aquatic habitat, and only 19 acres of modeled upland habitat.

The Lower Dry Creek watershed supports substantial acreages of modeled habitat for the covered mammals due to its undeveloped condition, including more than 8,879 acres of modeled general habitat for American badger, and about 8,531 acres of modeled foraging

habitat for western red bat. The watershed also supports 2,559 acres of modeled roosting habitat for western red bat.

The Lower Dry Creek watershed supports a very small amount (773 acres) of modeled habitat for Sanford's arrowhead.

The Lower Dry Creek watershed also contains federally designated Critical Habitat for California tiger salamander (1,434 acres), Sacramento Orcutt grass (3,516 acres), and vernal pool fairy shrimp and vernal pool tadpole shrimp (4,335 acres).

3.2.5.7 Conservation Considerations

The Lower Dry Creek watershed is located primarily within southern portion of PPUPPU 7 (93%), with the remaining acreage located in PPUs 6 and 8. Almost the entire watershed is located outside of the UDA, except for the 1,099 acres in PPU 8 (Table 11). Because the majority of PPU 8 is located within Galt's city limits or sphere of influence it is anticipated that much of PPU 8 will eventually be urbanized.

Relative to some of the other watersheds, the Lower Dry Creek watershed has a lower priority for new conservation. Most of the species with modeled habitat in the watershed are broad ranging in the Plan Area and the conservation focus is elsewhere. Even for the more limited California tiger salamander, the conservation focus is in the Laguna Creek watershed, which contains 79% of the occurrences and large majority of modeled habitats for the species (Table 9). Further, other than expected build-out in PPU 8, the Covered Activities will have small impacts in the Lower Dry Creek watershed. The large majority (96%) of conservation in Lower Dry Creek Watershed is in existing conservation (8,652 acres), located primarily within PPU 7, and mostly in Chance Ranch (Tables 15 and 11). A small amount of planned conservation, primarily agriculture, is also proposed in the watershed. The majority of total conservation will be concentrated on terrestrial habitats, with emphasis on blue oak woodland and valley grassland and will be located within PPU 8.

Table 15
Summary of Conserved Land Cover Types in the Lower Dry Creek Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Blue Oak Savanna	529	—	529
Blue Oak Woodland	1,406	—	1,406
Mixed Riparian Scrub	3	—	3
Mixed Riparian Woodland	79	—	79

Table 15
Summary of Conserved Land Cover Types in the Lower Dry Creek Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Valley Grassland	5,717	188	5,905
Terrestrial Total	*7,734*	*188*	*7,922*
Aquatic			
Freshwater Marsh	4	—	4
Open Water	4	—	4
Seasonal Wetland	67	4	71
Streams/Creeks	29	<1	29
Swale	50	2	52
Vernal Pool	155	3	158
Aquatic Total	*309*	*9*	*318*
Agriculture			
Cropland	72	152	224
Irrigated Pasture-Grassland	285	7	292
Vineyards	251	<1	251
Agriculture Total	*608*	*159*	*767*
Non-Habitat Land Cover Type			
High-Density Development	1	—	1
Non-Habitat Land Cover Type Total	*1*	—	*1*
Grand Total	**8,652**	**356**	**9,008**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.6 Lower Mokelumne River Watershed

3.2.6.1 Land Cover Types

Although the Lower Mokelumne River watershed is more than 141,965 acres in size, only 3% of the watershed is located in the far southwest corner of the southern Plan Area (Figure 2) and it accounts for only 1% of the Plan Area. Due its minor role in the Plan Area, the discussion in this section is somewhat abbreviated compared to the discussions for the other watersheds. The small portion of this watershed located within the Plan Area is primarily made up of Agricultural land covers, specifically croplands. The remaining acreage includes Mixed Riparian Scrub and Woodland, and Aquatic land covers, and some residential areas. Impervious surfaces cover approximately 29 acres, or 1% of the watershed within the Plan Area.

3.2.6.2 Hydrology

The portion of the Lower Mokelumne River watershed that occurs within the Plan Area contains only artificial path and canal/ditch NHD flowline features (Table 3, Figure 4). The Mokelumne River, represented by the artificial path features, serves as a portion of the southern border for the Plan Area. This watershed extends to the west as a long sliver surrounding the Mokelumne River. The watershed ends where Lower Dry Creek terminates into the river. The canal and ditch flowline features, which account for 88% of the watershed, cross through the agricultural land covers, providing water to the area.

3.2.6.3 Geological Formations

Geological information is only available for the eastern sliver of the Lower Mokelumne River watershed. This portion of the watershed is dominated by intertidal deposits (53%), with basin deposits and levee and channel deposits accounting for the rest of the watershed (Table 4, Figure 5).

3.2.6.4 Soils

The majority (59%) of the Lower Mokelumne River watershed consists of clay soils, specifically Egbert clay, partially drained, 0 to 2% slopes (Table 5, Figure 6). The remaining soils are loam subcategories (35%) and water (5%).

3.2.5.5 Slope and Elevation

The entire watershed is on flat to gentle slopes with elevations ranging from 0 to 500 feet (Tables 6 and 7, Figures 8 and 9).

3.2.6.6 Covered Species

The Lower Mokelumne River watershed only contains three documented occurrences of one Covered Species: Sanford's arrowhead. This species is located on the boundary of the Plan Area within the Mokelumne River. Similar to the Lower Dry Creek watershed, the lack of occurrences of Covered Species within this watershed may be attributed to large amounts of land that have been converted for agricultural purposes. In addition, only a very small portion of the watershed is actually located within the Plan Area.

Due to its small size within the Plan Area, the Lower Mokelumne watershed includes less than 1% of the modeled habitat for Covered Species. The watershed does not contain any modeled habitat for vernal pool species and contains limited habitat for giant garter snake, western pond turtle, and western spadefoot, none of which is high-value giant garter snake habitat. Of the

2,019 acres of this watershed within the Plan Area, anywhere from 9 to 1,700 acres are modeled habitat for several of the covered bird species, including burrowing owl, loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, and white-tailed kite. All of the modeled habitat for Swainson's hawk (1,878 acres) is considered high value. There is limited habitat for Cooper's hawk (200 acres) and ferruginous hawk (9 acres). Approximately 200 acres of modeled roosting habitat for western red bat are present in the watershed. There are 94acres of modeled foraging habitat for western red bat. Only a small amount of modeled habitat for Sanford's arrowhead (13 acres) is in the watershed.

3.2.6.7 Conservation Considerations

The entire Lower Mokelumne River watershed is located outside of the UDA within PPU 6. Approximately 1,640 acres of the 2,019 acres located within the Plan Area contain existing hardline Preserve areas (Table 16, Figure 10). Due to its small size within the Plan Area and general lack of resources for the Covered Species relative to several of the other watersheds, no new conservation is proposed under the SSHCP.

Table 16
Summary of Conserved Land Cover Types in the Lower Mokelumne River Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Mixed Riparian Scrub	1	—	1
Mixed Riparian Woodland	149	—	149
Terrestrial Total	*150*	—	*150*
Aquatic			
Freshwater Marsh	21	—	21
Open Water	3	—	3
Streams/Creeks	<1	—	<1
Aquatic Total	*24*	—	*24*
Agriculture			
Cropland	1,464	—	1,464
Vineyards	<1	—	<1
Agriculture Total	*1,464*	—	*1,464*
Non-Habitat Land Cover Type			
Low-density Development	4	—	4
Non-Habitat Land Cover Type Total	*4*	—	*4*
Grand Total	**1,642**	—	**1,642**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.7 Morrison Creek Watershed

3.2.7.1 Land Cover Types

The Morrison Creek watershed is located within the northern half of the Plan Area (Figure 2). Of the 69,540 acres that comprise this watershed, 62%, or 42,926 acres, are located within the Plan Area, almost entirely inside the UDA (Table 11). Because it is located in the urbanizing portion of Sacramento County, approximately 45% of the watershed has already been developed and contains Non-habitat land covers, primarily High-Density Development. Agriculture accounts for about 10% of the watershed. Terrestrial (51%) and Aquatic (5%) land covers account for the remaining land covers in the Morrison Creek watershed. Valley Grassland accounts for about 98% of the Terrestrial land cover. This watershed also supports all of the aquatic cover types, including approximately 764 acres of Vernal Pools, 359 acres of Swale, and 107 acres of Seasonal Wetlands, which are embedded in the Valley Grasslands. Laguna Creek (north) is a significant east–west landscape feature that plays a prominent role in conservation. Impervious surfaces cover approximately 6,771 acres, or 16%, of the watershed. Along with the American River (51% impervious surfaces) and Sherman Lake-Sacramento River (24% impervious surfaces) watersheds, the Morrison Creek watershed has one of the three highest percentages of impervious surfaces in the Plan Area. Reflecting both its large size and more urbanized character, it also has by far the highest amount of impervious surface acreage in the Plan Area, with Snodgrass Slough having the second highest amount at approximately 1,124 acres.

3.2.7.2 Hydrology

The Morrison Creek watershed contains approximately 9% of the Plan Area's NHD flowline features (Table 3, Figure 4). Approximately 83% of the flowline features are stream and river features including Morrison Creek, Laguna Creek (north), Elder Creek, Strawberry Creek, Unionhouse (Beacon) Creek, and Frye Creek. Folsom South Canal accounts for the majority of the 72,483 linear feet of artificial path features. Canal/ditch features make up approximately 6% of the NHD flowline features within the Plan Area with connectors (1%) and pipeline (less than 1%) rounding out the remaining areas.

3.2.7.3 Geological Formations

The laguna and riverbank formations comprise 97% of the acreage in the Morrison Creek watershed (Table 4, Figure 5). The remaining prominent formations in the watershed include basin deposits and mine and dredge tailings.

3.2.7.4 Soils

The Morrison Creek watershed primarily contains loam subcategories such as silt loam, loam, and gravelly loam, which account for about 84% of the watershed (Table 5). Approximately 50% of the loam soils are from the San Joaquin soil series. Other loam subcategories comprise 4% of the soils, water covers less than 1% of the watershed, and 7% of the soils are listed in the Other category. Approximately 3% of the Other category is related to mining activities (dumps, pits, slickens, and Xerorthents, dredge tailings, 2% to 50% slopes) or urban development.

3.2.7.5 Slope and Elevation

The majority of the watershed is on flat to gentle slopes with elevations ranging from 0–500 feet (Table 6, Figure 7). Only 2 acres of the watershed are within the 20%–40% slope range (Table 7, Figure 8).

3.2.7.6 Covered Species

The Morrison Creek watershed includes documented occurrences for 23 of the 28 Covered Species despite substantial urbanization (Table 8). Covered species documented in the watershed include Ahart's dwarf rush, Boggs Lake hedge-hyssop, legenere, Sacramento Orcutt grass, slender Orcutt grass, Sanford's arrowhead, vernal pool fairy shrimp, vernal pool tadpole shrimp, mid-valley fairy shrimp, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, western spadefoot, giant garter snake, western pond turtle, American badger, and western red bat.

This watershed has the third highest percentage (16%) of known occurrences for Covered Species in the Plan Area, including 43% of the covered vernal pool plants and 53% of the vernal pool invertebrate occurrences (Table 8). Due to the large area of vernal pools (764 acres and second only to the Laguna Creek watershed), swale, and seasonal wetlands, vernal pool flora and fauna are the most important biological resources in the watershed. The majority of most covered vernal pool plant occurrences in the Plan Area are in the Morrison Creek watershed, including both occurrences of Ahart's dwarf rush, all 4 occurrences of slender Orcutt grass, 27 of 30 occurrences of Boggs Lake hedge-hyssop, and 30 of 56 occurrences of legenere. The watershed also includes 12 of 63 occurrences for Sacramento Orcutt grass (with all but 2 of the remaining occurrences in the Deer Creek watershed). Similarly, the vernal pool invertebrates are well-represented in the Morrison Creek watershed, including 505 of the 748 occurrences of vernal pool tadpole shrimp, 196 of the 572 occurrences of vernal pool fairy shrimp, and 18 of 33 occurrences of mid-valley fairy shrimp. Western spadefoot, which is strongly associated with vernal pools and other ephemeral wetlands, has also been frequently found in the Morrison

Creek watershed, with 9 of the 31 occurrences in the Plan Area. The large majority of occurrences for these vernal pool species outside the Morrison Creek watershed are from the Laguna Creek watershed (Section 3.2.3). Although not a vernal pool species, 12 of the 63 occurrences of Sanford's arrowhead are from the watershed.

The Morrison Creek watershed, which includes Laguna Creek (north) and several other prominent creeks, includes 1 of 14 occurrences of giant garter snake (2 of 18 occurrences of western pond turtle

While there are occurrence data for all of the avian Covered Species in the Morrison Creek watershed, with a range of 1% of the occurrences for greater sandhill crane to 31% of the occurrences for Cooper's hawk, none stand out as prominent in the watershed. Also, except for species such as Swainson's hawk, tricolored blackbird, and sandhill crane (see discussion below), the occurrence data for avian species are not comprehensive for the Plan Area. Similarly, there are little data for the mammals in the Plan Area, with occurrence records for American badger (7 of 8 occurrences in the Plan Area) and western red bat (2 of 7 occurrences in the Plan Area).

Due to its large size and large number of land cover types, of the 10 watersheds in the Plan Area, the Morrison Creek watershed contains among the largest acreages of modeled habitat for most Covered Species (Table 9).

Consistent with the occurrence of all the vernal pool Covered Species, the Morrison Creek watershed contains substantial modeled habitat for these species, ranging from 2,200 acres for dwarf downingia to 18,400 acres for the vernal pool fairy shrimp and vernal pool tadpole shrimp (Table 9).

The Morrison Creek watershed contains substantial acreages of modeled habitat for all of the covered bird species, including up to 26,000 acres of modeled foraging habitat for Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, and white-tailed kite; about 1,593 acres of modeled foraging habitat for greater sandhill crane (but only 17 acres of modeled roosting habitat); and almost 24,956 acres of modeled nesting/foraging habitat for burrowing owl. The watershed also supports large amounts of modeled nesting habitat for covered birds that can use a variety or more broad-scale land cover types for nesting (e.g., valley grassland), including loggerhead shrike (21,781 acres), northern harrier (24,938 acres), and tricolored blackbird (24,016 acres). However, for covered birds that are limited to riparian and woodland habitats for nesting, the Morrison Creek watershed supports modest amounts of modeled nesting habitat relative to its large size, including 487 acres for Cooper's hawk, 487 acres for white-tailed kite, and 358 acres for Swainson's hawk.

The Morrison Creek watershed contains 11 of the 293 Swainson's hawk nest sites and supports 1,926 acres of high-value foraging habitat for the species.

Along with the Laguna Creek watershed, the Morrison Creek watershed supports the largest number of documented and potential tricolored blackbird nest colonies in the Plan Area, with 42 of the 96 documented nest colonies and 16 of 63 potential nest colonies. The 42 documented nest colonies have ranged in size from approximately 100 individuals to 7,500 individuals in 1994. Approximately 50,690 individuals have been observed at the nest colonies over the course of the surveys, or 32% of the approximately 158,330 individuals observed at nest colonies in the Plan Area.

As noted above, the Morrison Creek watershed contains several occurrences of western spadefoot, western pond turtle, and giant garter snake, and it also provides substantial modeled habitat for these species. For western spadefoot, vernal pool, swale, and seasonal wetland are primary breeding habitats, and contribute to about 2,240 acres of modeled breeding habitat for the species in the watershed. For western pond turtle, the Morrison Creek watershed supports 515 acres of modeled breeding/foraging habitat and 8,750 acres of modeled nesting/aestivation habitat. The Laguna Creek Wildlife Corridor is an important habitat feature for western pond turtle because it provides important in-stream habitat to support breeding, foraging, movement, and dispersal. The western portion of the Morrison Creek watershed has important value for giant garter snake, but is not as critical for this species compared to the Lower Cosumnes River (Section 3.2.4) and Snodgrass Slough (Section 3.2.9) watersheds. The Morrison Creek watershed contains 3,258 acres of modeled upland habitat, 441 acres of modeled aquatic habitat, and 1,388 acres of high-value habitat for giant garter snake.

The Morrison Creek watershed supports large acreages of modeled habitat for covered mammals, including approximately 22,542 acres of modeled general habitat for American badger and more than 23,376 acres of modeled foraging habitat for western red bat.. The watershed supports a limited amount of roosting habitat for western red bat, including about 504 acres .

The Morrison Creek watershed also contains federally designated Critical Habitat for Sacramento and slender Orcutt grass (1,161 acres) and vernal pool fairy shrimp and vernal pool tadpole shrimp (2,451 acres).

3.2.7.7 Conservation Considerations

About 45% of the Morrison Creek watershed within the Plan Area (99% of which is inside the UDA) is already developed and has little or no habitat value for the Covered Species. For this reason, approximately 23% of the watershed is outside of the PPUs (Table 11), although the Laguna Creek Wildlife Corridor outside the PPUs is an important habitat feature in the

watershed. However, as discussed in Section 3.2.7.6, the Morrison Creek watershed supports almost all of the Covered Species in the Plan Area and, along with the Laguna Creek watershed, is critical for conservation of the vernal pool ecosystems and associated plant and animal species in the Plan Area. The MCRA is an important component of the conservation of these resources in the watershed. Therefore, despite anticipated urban build out of much of the watershed inside the UDA, protection of these remaining resources in the watershed is one of the most important elements of the SSHCP and ARP conservation strategies.

Substantial conservation has already occurred in the Morrison Creek watershed in PPUs 1, 2, and 3, with existing conservation in the watershed totaling approximately 2,888 acres of hardline Preserve areas (Table 17). The SSHCP will add approximately 6,220 acres to existing conserved areas through designation of core, minor, and satellite Preserves and linkage Preserves inside the UDA, almost doubling the amount of conservation. The majority of planned conservation will be focused on valley grasslands (5,885 acres), and vernal pool and swale that occur within the valley grasslands, comprising the vernal pool ecosystem. One of the objectives of the SSHCP is to protect an additional 1,200 acres along the Laguna Creek Wildlife Corridor, which will provide both resident and movement habitat for many of the covered wildlife species, including western pond turtle and giant garter snake (see Chapter 7 of the SSHCP).

Table 17
Summary of Conserved Land Cover Types in the Morrison Creek Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Blue Oak Savanna	—	15	15
Mine Tailing Riparian Woodland	—	1	1
Mixed Riparian Scrub	3	19	22
Mixed Riparian Woodland	1	75	76
Valley Grassland	2,456	4,740	7,196
Terrestrial Total	*2,460*	*4,850*	*7,310*
Aquatic			
Streams/Creeks (VPIH)	9	22	31
Freshwater Marsh	12	227	239
Open Water	4	67	71
Seasonal Wetland	1	35	36
Streams/Creeks	20	23	43
Swale	73	80	153
Vernal Pool	207	197	404
Aquatic Total	*326*	*651*	*977*

Table 17
Summary of Conserved Land Cover Types in the Morrison Creek Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Agriculture			
Cropland	—	244	244
Irrigated Pasture-Grassland	22	58	80
Orchards	—	18	18
Agriculture Total	*22*	*320*	*342*
Non-Habitat Land Cover Type			
Disturbed	3	6	9
High-Density Development	45	<1	45
Low-Density Development	6	39	45
Major Roads	2	2	4
Mine Tailings	—	1	1
Recreation/Landscaped	24	16	40
Non-Habitat Land Cover Type Total	*80*	*64*	*144*
Grand Total	**2,888**	**5,885**	**8,773**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.8 Sherman Lake-Sacramento River Watershed

3.2.8.1 Land Cover Types

The Sherman Lake-Sacramento River watershed is located in the extreme western portion of the Plan Area, with approximately 12% located within the Plan Area (Table 1, Figure 2). The watershed intersects the Plan Area in four separate locations that together comprise about 5% of the Plan Area, including a large area along the northern portion of the Plan Area, a small area in the northwest corner of the Plan Area, and two areas along the western portion of the Plan Area. The Sherman Lake-Sacramento River watershed in the Plan Area is dominated by human activities. Together, Non-habitat and Agricultural land cover types account for 88% of the land covers in the watershed (Table 2, Figure 3). Of these two land cover types, High-Density Development and Cropland contain the largest acreages at 3,049 and 4,986 acres, respectively, accounting for 57% of the total land covers in the watershed within the Plan Area. The Sherman Lake-Sacramento River watershed contains all of the Aquatic land cover types mapped within the Plan Area, but in small amounts ranging from 1 to 40 acres and totaling only 79 acres. Terrestrial land covers, primarily Valley Grassland, comprise the remaining acreage, but only totaling 848 acres, or 6% of the land cover in the watershed within the Plan Area. Impervious

surfaces cover approximately 3,370 acres, or 24%, of the watershed, which is the highest percentage of the watersheds in the Plan Area.

3.2.8.2 Hydrology

According to the NHD flowline dataset, the majority of the hydrologic features within this watershed are canal/ditch (70%) (Table 3, Figure 4). The high percentage of canal/ditch features mapped within the Sherman Lake-Sacramento River watershed is related to the large amount of agricultural land covers mapped in the watershed. Artificial path features account for 27% of the watershed, stream/river features total 3%, and the remaining 0.1% of the watershed consists of pipeline connector features. The Sacramento River and the Folsom Canal encompass the artificial path features mapped within this watershed.

3.2.8.3 Geological Formations

Geological formation data is only available for a little less than half of the Sherman Lake-Sacramento River watershed. Intertidal and levee and channel deposits dominate this watershed, with basin deposits making up most of the rest of the watershed (Table 4, Figure 5).

3.2.8.4 Soils

The majority of the soils located in this watershed are loam subcategories (45%) and clay (12%) (Table 5, Figure 6). The remaining areas contain water (5%), mucky clay (26%) or are listed under the Other category (12%). The majority of the Other category is related to mining activities (dumps, pits, slickens, and Xerorthents, dredge tailings) or urban development.

3.2.8.5 Slope and Elevation

The entire watershed is on flat to gentle slopes with elevations ranging from 0–500 feet (Tables 6 and 7, Figures 8 and 9).

3.2.8.6 Covered Species

The Sherman Lake-Sacramento River watershed includes documented occurrences for 10 of the 28 Covered Species, including Sanford's arrowhead, vernal pool fairy shrimp, burrowing owl, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, and western red bat (Table 8). Overall, the watershed accounts for accounts for 27% of the Covered Species occurrences in the Plan Area, most of which are sandhill crane occurrences. The large majority (88%) of the Sherman Lake-Sacramento River watershed is developed or agriculture, which accounts for the relatively small number of Covered Species with occurrences

in the watershed compared to several of the other watersheds. Also, several of the species occurrences are located in non-habitat land covers and may no longer be extant. Almost all of the covered bird species documented in the Sherman Lake-Sacramento River watershed forage in croplands (4,986 acres in the watershed) and western red bat roosts in orchards.

Consistent with the lack of occurrence records for most Covered Species, the Sherman Lake-Sacramento River watershed lacks substantial modeled habitat for most of the Covered Species. For the covered vernal pool plant and animals, modeled habitat ranges from 7 acres for pincushion navarretia to 326 acres for the vernal pool invertebrates. Likewise, for the amphibians and reptiles, modeled habitat ranges from no habitat for California tiger salamander (the watershed is outside its range in the Plan Area) to about 627 acres of modeled upland habitat for western spadefoot. The occurrence of these species in the watershed is limited by a lack of modeled aquatic habitat, including only 66 acres for giant garter snake, 7 acres for western pond turtle, and 23 acres for western spadefoot.

The croplands and valley grassland (665 acres) in the Sherman Lake-Sacramento River watershed does provide habitat for several of the covered birds. The watershed supports anywhere from 14 to 1,711 acres of modeled foraging habitat for loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, and white-tailed kite, and this habitat also is modeled nesting habitat for northern harrier and tricolored blackbird. Notably, 1,356 acres of the modeled foraging habitat for Swainson's hawk is high-value habitat. The watershed provides about 1,704 acres of modeled nesting/foraging habitat for burrowing owl and about 855 acres of modeled foraging habitat for greater sandhill crane (but no modeled roosting habitat). The watershed contains limited habitat for the covered birds that nest in riparian and woodland habitat—182 acres for Cooper's hawk, Swainson's hawk (only 3 of the 295 nest sites), and white-tailed kite. The watershed contains 3 of the 96 documented nest colonies for tricolored blackbird and no potential nest colonies. While 2 of the 3 documented nest colonies are small, about 100 and 200 birds each, approximately 9,000 individuals were observed at the third site in 1944, making it the largest documented nest colony in the Plan Area.

The watershed contains almost 787 acres of modeled foraging habitat and almost 1,540 acres of modeled roosting habitat for western red bat. The watershed contains 633 acres of modeled habitat for American badger, but with the high level of urban development and intensive agriculture in the watershed, this species is unlikely to occur.

The Sherman Lake-Sacramento River watershed contains only 41 acres of modeled habitat for Sanford's arrowhead.

3.2.8.7 Conservation Considerations

Seventy percent of the Sherman Lake-Sacramento River watershed is located outside of the UDA in PPU 6 (Table 11). The remainder of the watershed overlaps with PPUs 1, 2, and a very small portion (25 acres) of PPU 4, with the rest outside of any PPUs. The Sherman Lake-Sacramento River watershed within the Plan Area has 757 acres of existing conservation, all of which is located in PPU 4 (Table 18, Figure 10). However, the croplands in the watershed are important foraging habitat for several of the covered bird species, including Swainson's hawk (5,630 acres of high-value habitat), loggerhead shrike, northern harrier, greater sandhill crane, tricolored blackbird, and white-tailed kite. Accordingly, the SSHCP protects approximately 3,590 acres of agricultural Preserve within the watershed, or approximately 31% of the total planned agricultural Preserve in the Plan Area. All of the planned conservation will be located within PPU 6.

Table 18
Summary of Conserved Land Cover Types in the Sherman Lakes-Sacramento River Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Mixed Riparian Scrub	—	—	0
Mixed Riparian Woodland	—	<1	<1
Valley Grassland	—	1	1
Terrestrial Total	*0*	*1*	*1*
Aquatic			
Freshwater Marsh	—	—	0
Streams/Creeks	<1	—	<1
Aquatic Total	*<1*	*0*	*<1*
Agriculture			
Cropland	753	101	854
Orchards	—	—	0
Vineyards	—	—	0
Agriculture Total	*753*	*101*	*854*
Non-Habitat Land Cover Type			
Disturbed	2	—	2
Low-density Development	1	<1	1
Major Roads	1	—	1
Non-Habitat Land Cover Type Total	*4*	*<1*	*4*
Grand Total	**757**	**102**	**859**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.9 Snodgrass Slough Watershed

3.2.9.1 Land Cover Types

Snodgrass Slough is the fifth largest watershed in the Plan Area behind the Laguna Creek Lower Cosumnes, Deer Creek and Morrison Creek watersheds and is entirely contained within the western portion of the Plan Area (Table 1, Figure 2). About 64% of the watershed is Agriculture, of which, about 63% is Croplands; Croplands cover about 40% of the entire watershed. Non-habitat land cover types, dominated by Low-Density Development, account for 7% of the watershed. Terrestrial habitat, dominated by Valley Grassland (76%), Mixed Riparian scrub and Woodland, covers about 19% of the watershed. The Snodgrass Slough watershed accounts for the highest acreage of Aquatic land cover within the Plan Area. Approximately 4,104 acres of the watershed supports all of the aquatic cover types mapped within the Plan Area, and represents 25% of the aquatic habitat in the Plan Area. Impervious surfaces cover approximately 1,124 acres, or 3%, of the watershed.

3.2.9.2 Hydrology

Reflecting the dominance of agricultural land covers within the watershed, approximately 72% of the NHD flowlines in the Snodgrass Slough are canal/ditch features (Table 3, Figure 4). Artificial paths account for almost 21% of the watershed while stream/river features comprise 7% and connector features are less than 1% of the watershed.

3.2.9.3 Geological Formations

Geological formation data are available for approximately 60% of the Snodgrass Slough watershed. Almost the entire watershed consists of riverbank formations, which make up approximately 72% of the watershed (Table 4, Figure 5). The remaining 1% of mapped geological data for the watershed consists of basin, intertidal and levee and channel deposits.

3.2.9.4 Soils

The majority of the soils in the Snodgrass Slough watershed are subcategories of loam soils (60%) (Table 5, Figure 6). The largest acreage falls into the silt loam category (32%), most of which contains the San Joaquin soil series. Approximately 32% of the watershed contains clay soils with water (4%) and the Other (1%) category rounds out the remaining acreage.

3.2.9.5 Slope and Elevation

The entire watershed is on flat to gentle slopes with elevations ranging from 0–500 feet (Tables 6 and 7, Figures 8 and 9).

3.2.9.6 Covered Species

The Snodgrass Slough watershed includes documented occurrences for 18 of the 28 Covered Species, including dwarf downingia, legenere, Sanford's arrowhead, vernal pool fairy shrimp, vernal pool tadpole shrimp, mid-valley fairy shrimp, giant garter snake, western pond turtle, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, and American badger, (Table 8). This watershed contains 17% of known occurrences for Covered Species in the Plan Area, fourth only to the Laguna Creek (26%) watershed, Sherman Lake-Sacramento River (20%) and Morrison Creek watersheds (16%). While the watershed contains occurrences for only two of the covered vernal pool plant species, it has the highest number of occurrences of dwarf downingia (7 of the 10 occurrences in the Plan Area) and second highest number of occurrences of legenere (12 of the 56 occurrences in the Plan Area). The watershed contains a small percentage of the occurrences in the Plan Area for vernal pool fairy shrimp (3%) and vernal pool tadpole shrimp (3%), but does contain 27% (9 of 33 occurrences) for mid-valley fairy shrimp. As an aquatic plant species, Sanford's arrowhead is well represented in the Snodgrass Slough watershed, with 56% of the occurrences (35 of 63) in the Plan Area.

The Snodgrass Slough watershed is important for both giant garter snake and western pond turtle. It supports an important subpopulation of giant garter snake, with 7 of the 14 occurrences in the Plan Area and 5 of the 18 occurrences for western pond turtle. Reflecting the more perennial and intermittent nature of the aquatic habitats (about 70% of the aquatic habitats are freshwater marsh, stream/creek, and open water), there are no documented occurrences for western spadefoot in the watershed. Also, the watershed is outside the range of California tiger salamander.

There are occurrence data for all of the avian Covered Species in the Snodgrass Slough watershed, including 32% of the occurrences for Swainson's hawk (127 of the 398 occurrences). Occurrence data for the other species ranges from 2% of the Plan Area occurrences of tricolored blackbird to 22% of the occurrences for greater sandhill crane (see discussion below).

Of the covered mammals, one of the eight occurrences for American badger are in the Snodgrass Slough watershed.

Due to its large size and large number and dominance by agriculture, of the 10 watersheds in the Plan Area, the Snodgrass Slough watershed contains among the largest acreages of modeled habitat for the Covered Species that use agriculture (Table 9).

For plants, the Snodgrass Slough contains over 1,679 acres of modeled habitat for legenere and over 2,817 acres of modeled habitat for Sanford's arrowhead. The watershed contains 1,918 acres of modeled habitat for the vernal pool invertebrates.

As an important area for giant garter snake and western pond turtle, the Snodgrass Slough contains large amounts of modeled habitat for both species. For giant garter snake, the watershed supports 3,559 acres of modeled aquatic habitat, 5,760 acres of modeled upland habitat and 6,350 acres of high-value habitat. The Snodgrass Slough and Lower Cosumnes River (Section 3.2.4) combined support 92% of the high-value habitat for giant garter snake. The Snodgrass Slough watershed also contains the largest amount of modeled breeding/foraging habitat for western pond turtle of the 10 watersheds in the Plan Area (2,005 acres, or 32% of the total in the Plan Area), and also contains almost 6,517 acres of nesting/aestivation habitat. Although western spadefoot has not been documented in the Snodgrass Slough watershed, the watershed supports 2,987acres of modeled aquatic habitat and 5,945 acres of modeled upland.

The Snodgrass Slough watershed contains substantial acreages of modeled habitats for all of the covered bird species, including approximately 2,243to 26,700 acres of modeled foraging habitat for loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, and white-tailed kite; about 10,452 acres for ferruginous hawk; and about 25,499 acres of modeled nesting/foraging habitat for burrowing owl.

The watershed also supports large amounts of modeled nesting habitat for covered birds that can use a variety or more broad-scale land cover types for nesting (e.g., cropland, irrigated pasture-grassland, and valley grassland), including burrowing owl (25,499), northern harrier (28,260 acres), and tricolored blackbird (24,016 acres). Although the watershed supports substantial modeled nesting habitat for tricolored blackbird, only 1 of the 96 documented nest colonies and 2 of 63 potential nest colonies are in the watershed; about 100 individuals were observed at the documented nest colony in 1992. The watershed also contains more than 421 acres of modeled roosting habitat for greater sandhill crane, which accounts for 36% of the total in the Plan Area; modeled roosting habitat in the Snodgrass Slough and Lower Cosumnes River watersheds account for 99% of the total modeled roosting habitat in the Plan Area. Much of the high-value habitat (33%) for greater sandhill crane occurs in Snodgrass Slough. Twelve of the 48 documented roosting sites for greater sandhill crane in the Plan Area are in this watershed. For covered birds that are limited to riparian and woodland habitats for nesting, the Snodgrass Slough watershed supports modest amounts modeled nesting habitat relative to its large size—

1,767 acres for Cooper's hawk, Swainson's hawk, and white-tailed kite. However, despite a limited amount of modeled nesting habitat, the watershed has the highest proportion (38%) of Swainson's hawk nest sites of the watersheds in the Plan Area. Further, reflecting the value of agriculture as foraging habitat for Swainson's hawk, the watershed includes 28,340 acres of high-value foraging habitat for the species.

The Snodgrass Slough watershed supports more than 10,508 acres of foraging habitat and 1,874 acres of modeled roosting habitat for western red bat, including. The watershed also supports about 7,158 acres of modeled general habitat for American badger.

3.2.9.7 Conservation Considerations

The majority of the Snodgrass Slough watershed (98%) is located outside of the UDA within PPU 6 (Table 11). The remaining 1,006 acres of the watershed intersect PPU 4 PPU. PPU 4 encompasses the proposed sphere of influence for the City of Elk Grove. Because much of PPU 4 is located in the city's proposed sphere of influence and in the county's Urban Services Boundary (USB), it is anticipated that much of PPU 4 will eventually be urbanized.

The primary conservation considerations for the Snodgrass Slough watershed are giant garter snake and western pond turtle (to a lesser extent) and the covered birds. The watershed supports large percentages of high-value habitat in the Plan Area for giant garter snake and Swainson's hawk. For giant garter snake, the 6,030 acres of high-value habitat is 45% of the total in the Plan Area and for Swainson's hawk, the 31,230 acres of high-value habitat is 37% of the total in the Plan Area.

Existing conservation totals about 8,944 acres (62%) of the watershed and an additional 5,497 acres are planned for conservation (Table 19, Figure 10). A large portion of the planned conservation will include agricultural Preserves (82%) with the remaining acreage set aside for wetland restoration. The agricultural Preserves will provide high-value foraging habitat for Swainson's hawk, as well as many of the other Covered Species that use agricultural habitats. All of the planned conservation will occur within PPU 6. The Snodgrass Slough watershed will contain the highest acreage of total conservation for aquatic and agricultural land covers in the Plan Area.

Table 19
Summary of Conserved Land Cover Types in the Snodgrass Slough Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Mixed Riparian Scrub	232	41	273
Mixed Riparian Woodland	246	67	313

Table 19
Summary of Conserved Land Cover Types in the Snodgrass Slough Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Valley Grassland	3,425	93	3,518
Terrestrial Total	*3,903*	*201*	*4,104*
Aquatic			
Freshwater Marsh	705	48	753
Open Water	465	26	491
Seasonal Wetland	655	24	679
Streams/Creeks	206	45	251
Swale	2	—	2
Vernal Pool	290	2	292
Aquatic Total	*2,323*	*145*	*2,468*
Agriculture			
Cropland	2,617	4,024	6,641
Irrigated Pasture-Grassland	60	891	951
Orchards	—	—	0
Vineyards	—	29	29
Agriculture Total	*2,677*	*4,944*	*7,621*
Non-Habitat Land Cover Type			
Disturbed	2	3	5
High-density Development	1	—	1
Low-density Development	35	201	236
Major Roads	3	3	6
Non-Habitat Land Cover Type Total	*41*	*207*	*248*
Grand Total	**8,944**	**5,497**	**14,441**

Note: Due to the relatively coarse scale of the land cover mapping, rounding is applied to acreages 10 or greater. For acreages of 10–100, the acreage is rounded to the nearest 5 acres. For acreages greater than 100, the acreage is rounded to the nearest 10 acres. All acreages greater than 10 should be considered approximations.

3.2.10 Upper Cosumnes River Watershed

3.2.10.1 Land Cover Types

The Upper Cosumnes River watershed is located in the east-central portion of the Plan Area, which encompasses about 28% (31,885 acres) of the watershed (Table 1, Figure 2). The majority of the watershed in the Plan Area (21, 0810 acres, or 66%), consists of Terrestrial habitat by Valley Grassland (Table 2, Figure 3). Agricultural areas comprise about 11% and aquatic areas comprise about 5% of the watershed in the Plan Area. Non-habitat land cover, primarily Low-Density Development, covers the remaining 18% of the watershed. Impervious surfaces cover approximately 341 acres, or only 1%, of the watershed.

3.2.10.2 Hydrology

According to the NHD flowline dataset, approximately 62% of the Upper Cosumnes River watershed consists of stream/river features (Table 3, Figure 4). The majority of stream/river features in the watershed are tributaries to the Cosumnes River, which is mapped as an artificial path. The river and the Folsom South Canal account for most of the artificial path features mapped in the watershed. Less than 10% of the flowline features within the watershed include canal/ditch and connector or pipeline features.

3.2.10.3 Geological Formations

The Upper Cosumnes River watershed contains a variety of geological formations. Two formations total about 44% of the watershed and include the riverbank and Laguna formations (Table 4, Figure 5). Other prominent formations include Valley Springs, Mehrten, gopher ridge, and Modesto formations.

3.2.10.4 Soils

The majority of the soils within this watershed are subcategories of loam (87%)(Table 5, Figure 6). Approximately 3% of the watershed contains water, 3% clay, and 7% falls within the Other category. Most of the Other category (6%) is related to mining activities (pits, slickens and Xerorthents, dredge tailings, 2% to 50% slopes).

3.2.10.5 Slope and Elevation

While the majority of the Upper Cosumnes River watershed is on flat to gentle slopes with elevations ranging from 0–500 feet, a small percentage (0.4%) is located above 500 feet (Tables 6 and 7). This watershed contains the highest percentage of land with slopes between 20%–40% and greater than 40%. These areas occur along the eastern border of the Plan Area.

3.2.10.6 Covered Species

The Upper Cosumnes River watershed includes documented occurrences for 15 of the 28 Covered Species, including legenere; Sanford's arrowhead; vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, western spadefoot, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, white-tailed kite, and western red bat.

This watershed contains 6% of documented occurrences of Covered Species within the Plan Area (Table 8). Most notably, the watershed contains 153 of the 156 known occurrences (98%)

of valley elderberry longhorn beetle, with the largest concentration of occurrences along the Cosumnes River just south of Rancho Murieta. Other than the longhorn beetle, no other Covered Species with documented occurrences in the watershed occur at particularly high levels relative to the other watersheds, ranging from 4% of total occurrences in the Plan Area for vernal pool fairy shrimp to 12% for ferruginous hawk. Therefore, the 6% of the documented occurrences of all Covered Species in the Plan Area is skewed by the extremely high percentage of valley elderberry longhorn beetle occurrences.

The Upper Cosumnes River contains 1,078 acres of modeled habitat for the valley elderberry longhorn beetle, which is substantially more than some of the other watersheds (Table 9). However, the habitat model for the beetle is very general because it includes all riparian communities under the assumption that the host plant elderberry is present. Therefore, the moderate amount of modeled habitat in the watershed compared to modeled habitat in the American River watershed (48 acres), Lower Cosumnes River watershed (2,231 acres), and Snodgrass Slough watershed (1,767 acres) should not be interpreted as the Upper Cosumnes River watershed having relatively higher value for the species.

The Upper Cosumnes River watershed contains modest amounts of modeled habitat for covered vernal pool species, ranging from 2,091 acres for dwarf downingia to 11,163acres for vernal pool invertebrates.

The Upper Cosumnes River watershed contains substantial acreages of modeled habitats for all of the covered bird species (except greater sandhill crane), including about 521 to 21,700 acres of modeled foraging habitat for Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, and white-tailed kite and about 20,945 acres of modeled nesting/foraging habitat for burrowing owl. The watershed also supports large amounts of modeled nesting habitat for covered birds that can use a variety or more broad-scale land cover types for nesting (e.g., valley grassland), including loggerhead shrike (18,608 acres), northern harrier (20,424 acres), and tricolored blackbird (19,324 acres). For covered birds that nest in riparian and woodland habitats, the watershed supports substantial modeled nesting habitat, including 3,028 acres for Cooper's hawk and white-tailed kite and 832 acres for Swainson's hawk. Due to a relatively small amount of croplands and its location in the eastern portion of the Plan Area, the Upper Cosumnes River watershed supports only 881 acres of high-value foraging habitat for Swainson's hawk, or only 1% of the total in the Plan Area. Twenty-four of the 293 Swainson's hawk nest sites in the Plan Area are in this watershed. Seven of 96 documented nest colonies for tricolored blackbird and 9 of 63 potential nest colonies are in the Upper Cosumnes River watershed. Five the six colonies were observed in 1992, with others in 2000. The six documented nest colonies have ranged in size from approximately 200 individuals to 5,000 individuals at two different sites in 1992. Approximately 16,200 individuals have been

observed at the nest colonies over the surveys, or 10% of the approximately 158,330 individuals observed at nest colonies in the Plan Area. The Upper Cosumnes River has relatively low value for greater sandhill crane, with only 734 acres of modeled roosting habitat and 2,398 acres of modeled foraging habitat.

The Upper Cosumnes River watershed generally defines the northern boundary of the California tiger salamander's range in the Plan Area, and contains a substantial amount of modeled habitat for the species, including 700 acres of modeled aquatic habitat and 15,559 acres of modeled upland habitat. No high-value habitat for the species is present in the watershed and there are no documented occurrences. There are two occurrences of western spadefoot and no occurrences of western pond turtle in the watershed, but there is substantial modeled habitat for the two species, including 1,444 acres of modeled aquatic habitat and 20,002 acres of modeled upland habitat for western spadefoot, and 599 acres of modeled breeding/foraging habitat and 15,153 acres of modeled nesting/aestivation habitat for western pond turtle. The Upper Cosumnes River watershed has low value for giant garter snake, with only 78 acres of modeled upland habitat and 2 acres of modeled aquatic habitat.

The Upper Cosumnes River watershed supports large acreages of modeled habitat for the covered mammals, including more than 18,866 acres of modeled general habitat for American badger and about 19,186 acres of modeled foraging habitat and 3,679 acres of modeled roosting habitat for western red bat. The Upper Cosumnes River watershed supports a moderate amount of modeled habitat for Sanford's arrowhead (6,648 acres).

The Upper Cosumnes River watershed also contains federally designated Critical Habitat for Sacramento Orcutt grass (7 acres) and vernal pool fairy shrimp and vernal pool tadpole shrimp (1,431 acres that is habitat for both species).

3.2.10.7 Conservation Considerations

The Upper Cosumnes River watershed is entirely outside of the UDA and encompasses a large portion of PPU 5 and small sections of PPUs 6 and 7 (Table 11). One of the primary conservation considerations in this watershed is the valley elderberry longhorn beetle, with 98% of occurrences for this species in the Plan Area concentrated along the upper Cosumnes River. It generally has high wildlife habitat value for the covered bird species (except greater sandhill crane), California tiger salamander, western spadefoot, western pond turtle, American badger, and western red bat. It has relatively low value for the covered plant species, vernal pool invertebrates, and giant garter snake.

This watershed currently contains 3,358 acres of existing conservation, which are patchily distributed throughout the watershed (Table 20, Figure 10). Approximately 2,801 acres of the watershed are planned conservation. PPU 5 contains the majority of both existing and planned conservation. Valley grassland will comprise the majority of total conservation for this watershed, with the primary focus on connecting the Landscape Preserve in the Laguna Creek Watershed (PPU 7) with the Cosumnes River. Also, riparian restoration is planned for 890 acres of the watershed, and will be focused along the Cosumnes River. This watershed will contain approximately two-thirds of the riparian restoration within the Plan Area. The riparian restoration will provide both resident and nesting habitat for many of the Covered Species and will provide cover and refuge for species using the river as movement corridors. Importantly, the riparian restoration will provide resident and dispersal habitat for the valley elderberry longhorn beetle along the Cosumnes River.

Table 20
Summary of Conserved Land Cover Types in the Upper Cosumnes River Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Terrestrial			
Blue Oak Woodland	443	—	443
Mine Tailing Riparian Woodland	7	—	7
Mixed Riparian Scrub	21	38	59
Mixed Riparian Woodland	55	376	431
Valley Grassland	2,453	1,479	3,932
Terrestrial Total	*2,979*	*1,893*	*4,872*
Aquatic			
Freshwater Marsh	7	<1	7
Open Water	10	—	10
Seasonal Wetland	46	31	77
Streams/Creeks	26	129	155
Swale	26	9	35
Vernal Pool	87	38	125
Aquatic Total	*202*	*207*	*409*
Agriculture			
Cropland	54	404	458
Irrigated Pasture-Grassland	20	23	43
Orchards	—	116	116
Vineyards	3	10	13
Agriculture Total	*77*	*553*	*630*
Non-Habitat Land Cover Type			
Disturbed	49	<1	49
High-density Development	1	—	1

Table 20
Summary of Conserved Land Cover Types in the Upper Cosumnes River Watershed

Land Cover Types	Existing Conservation (acres)	Planned Conservation (acres)	Total Conservation (acres)
Low-density Development	13	146	159
Major Roads	1	2	3
Mine Tailings	36	<1	36
Non-Habitat Land Cover Type Total	*100*	*148*	*248*
Grand Total	**3,358**	**2,801**	**6,159**

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4 SUMMARY

Although all of the watersheds in the Plan Area support important biological resources, as described in the above sections, 5 of the 10 watersheds in the Plan Area stand out as relatively important for protection in the Plan Area: Laguna Creek, Lower Cosumnes River, Upper Cosumnes River, Morrison Creek, and Snodgrass Slough. The attributes that make these five watersheds particularly important for protection are summarized below.

Laguna Creek

The Laguna Creek watershed contains several attributes that make it important for conservation:

- It is the largest watershed in the Plan Area at 73,976 acres, or 76% of the Plan Area.
- It contains virtually all of the mapped land covers in the Plan Area, 91% of the watershed is undeveloped, and only 2% of the watershed is impervious surfaces.
- It contains 42% of the vernal pool in the Plan Area.
- It contains 26% of the flowline types in the Plan Area, of which 86% are natural stream/river.
- 29% of the watershed is Laguna formation, which is associated with vernal pools.
- It contains documented occurrences of 23 of the 28 Covered Species, including 19% of all Covered Species occurrences in the Plan Area, 20% of the vernal pool plant occurrences, 37% of the vernal pool invertebrate occurrences, 79% of the California tiger salamander occurrences, 58% of the western spadefoot occurrences, and 44% of western pond turtle occurrences.
- It contains large amounts of modeled habitats for all of the covered reptile, amphibian, bird, and mammal species. There are 10,092 acres of high-value habitat for Swainson's hawk. It contains 42 Swainson's hawk nest sites, 20 documented and 27 potential tricolored blackbird nest colonies, including a documented nest colony supporting approximately 6,750 individuals, and 7 roosting sites for greater sandhill crane.
- It contains federally designated Critical Habitat for California tiger salamander (8,758 acres), Sacramento Orcutt grass (24,510 acres), and vernal pool fairy shrimp and vernal pool tadpole shrimp (27,048 acres).
- It already contains 18,315 acres of existing conservation, including the 12,500-acre Chance Ranch.

Lower Cosumnes River

The Lower Cosumnes River watershed contains several attributes that make it important for conservation:

- 82% of the watershed is terrestrial habitat and agriculture and 8% is aquatic. Only 2% of the watershed is impervious surfaces.
- The lower Cosumnes River and Badger Creek are prominent features in the watershed.
- It contains documented occurrences of 19 of the 28 Covered Species, including 15% of all Covered Species occurrences in the Plan Area; 20% of the occurrences of greater sandhill crane; 23%–35% of occurrences of Cooper's hawk, loggerhead shrike, northern harrier, Swainson's hawk, and white-tailed kite; and 5 of the 14 documented occurrences for giant garter snake.
- It contains large amounts of modeled habitats for all of the covered reptile, amphibian, bird, and mammal species. 25,942 acres of high-value habitat are available for Swainson's hawk.
- It contains 90 Swainson's hawk nest sites and 29 roost sites for greater sandhill crane.
- It contains federally designated Critical Habitat for Sacramento Orcutt grass (1,842 acres) and vernal pool fairy shrimp and vernal pool tadpole shrimp (2,069 acres).
- It already contains 14,263 acres of existing conservation, including the Stone Lakes NWR and Cosumnes River Preserve.

Upper Cosumnes River

The Upper Cosumnes River watershed contains several attributes that make it important for conservation:

- 66% of the watershed is undeveloped, with valley grassland the dominant land cover. Only 1% of the watershed is impervious surfaces.
- The upper Cosumnes River is the prominent landscape feature in the watershed and 62% of the flowlines in the watershed are stream/river features.
- It contains documented occurrences of 15 of the 28 Covered Species, including 98% of the valley elderberry longhorn beetle occurrences concentrated along the Cosumnes River.
- It contains large amounts of modeled habitats for all of the covered bird species (except greater sandhill crane), California tiger salamander, western spadefoot, western pond

turtle, American badger, and western red bat. High-value habitat includes 881 acres for Swainson's hawk.

- It contains federally designated Critical Habitat for Sacramento Orcutt grass (7 acres) and vernal pool fairy shrimp and vernal pool tadpole shrimp (1,431 acres).
- It already contains 3,358 acres of existing conservation distributed throughout the watershed.

Morrison Creek

The Morrison Creek watershed contains several attributes that make it important for conservation:

- It is the fourth-largest watershed in the Plan Area at 42,926 acres, or 61%, of the Plan Area and comprises the large majority of the UDA.
- Undeveloped portions of the watershed support substantial areas of vernal pool and swale embedded within more than 21,294 acres of valley grassland.
- 83% of the flowline features are stream and river features, including Morrison Creek, Laguna Creek (north), Elder Creek, Strawberry Creek, Unionhouse (Beacon) Creek, and Frye Creek.
- The Laguna Creek Wildlife Corridor is a prominent landscape feature in the watershed that provides nesting, resident, and movement habitat for many of the Covered Species, including western pond turtle, giant garter snake, and tricolored blackbird.
- 48% of the watershed is Laguna formation, which is associated with vernal pools.
- It contains documented occurrences of 23 of the 28 Covered Species, including 16% of all Covered Species occurrences in the Plan Area 43% of the covered vernal pool plant species occurrences, 53% of the covered vernal pool invertebrate species occurrences, 29% of the western spadefoot occurrences, 19% of the Sanford's arrowhead occurrences, 7% of the giant garter snake occurrences, and 2% of the western pond turtle occurrences.
- It contains large amounts of modeled habitat for all of the Covered Species (except California tiger salamander). High-value habitat includes 1,388 acres for giant garter snake and 1,926 acres for Swainson's hawk.
- It contains 42 documented and 16 potential nest colonies for tricolored blackbird.
- It contains federally designated Critical Habitat for Sacramento and slender Orcutt grass (1,161 acres) and vernal pool fairy shrimp and vernal pool tadpole shrimp (2,451 acres).
- It already contains 2,888 acres of existing conservation focused on valley grasslands and vernal pools.

Snodgrass Slough

The Snodgrass Slough watershed contains several attributes that make it important for conservation:

- It is the fifth largest watershed in the Plan Area and contains large areas of agriculture and aquatic habitats in the western portion of the Plan Area. About 3% of the watershed is impervious surfaces.
- It contains documented occurrences of 18 of the 28 Covered Species, including 17% of all Covered Species occurrences in the Plan Area, 70% of the occurrences of dwarf downingia, 21% of the occurrences of legenere, 27% of the occurrences of mid-valley fairy shrimp, 56% of the occurrences of Sanford's arrowhead, 50% of the occurrences of giant garter snake, 28% of the occurrences of western pond turtle, 32% of the occurrences of Swainson's hawk, and 23% of the occurrences of greater sandhill crane.
- It contains large amounts of modeled habitats for most of the Covered Species. High-value habitat includes 6,050 acres for giant garter snake and 28,340 acres for Swainson's hawkand 26,848 acres for greater sandhill crane. Along with the Lower Cosumnes River watershed, it is critical for conservation of Swainson's hawk foraging habitat, with the watersheds accounting for 72% of the high-value habitat.
- It contains 86 Swainson's hawk nest sites and 12 greater sandhill crane roost sites.
- It already contains 8,944 acres of existing conservation, including aquatic habitats that are important habitats for many of the Covered Species.

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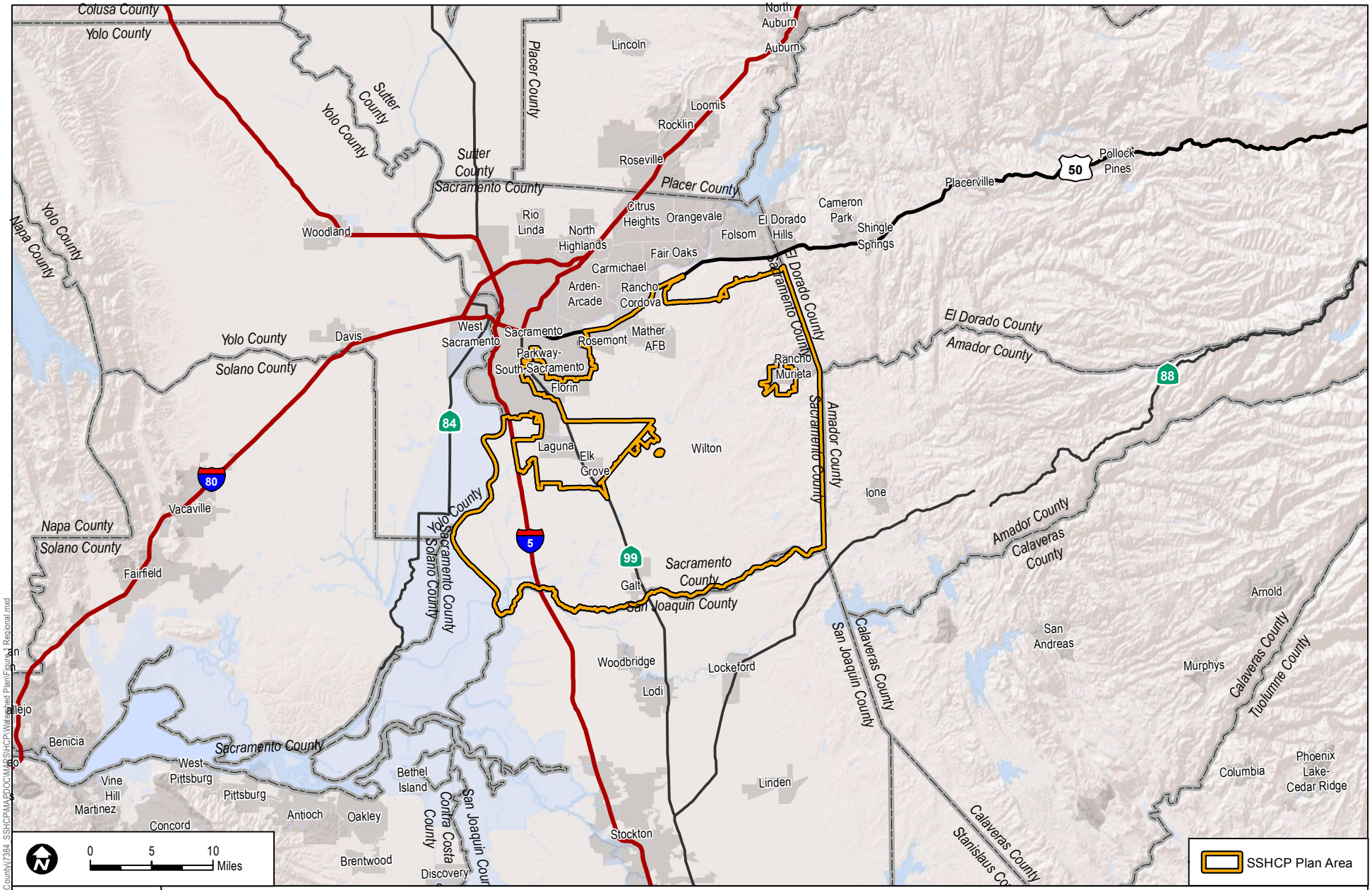

SOURCE: ESRI, County of Sacramento 2014

FIGURE 1

Regional

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

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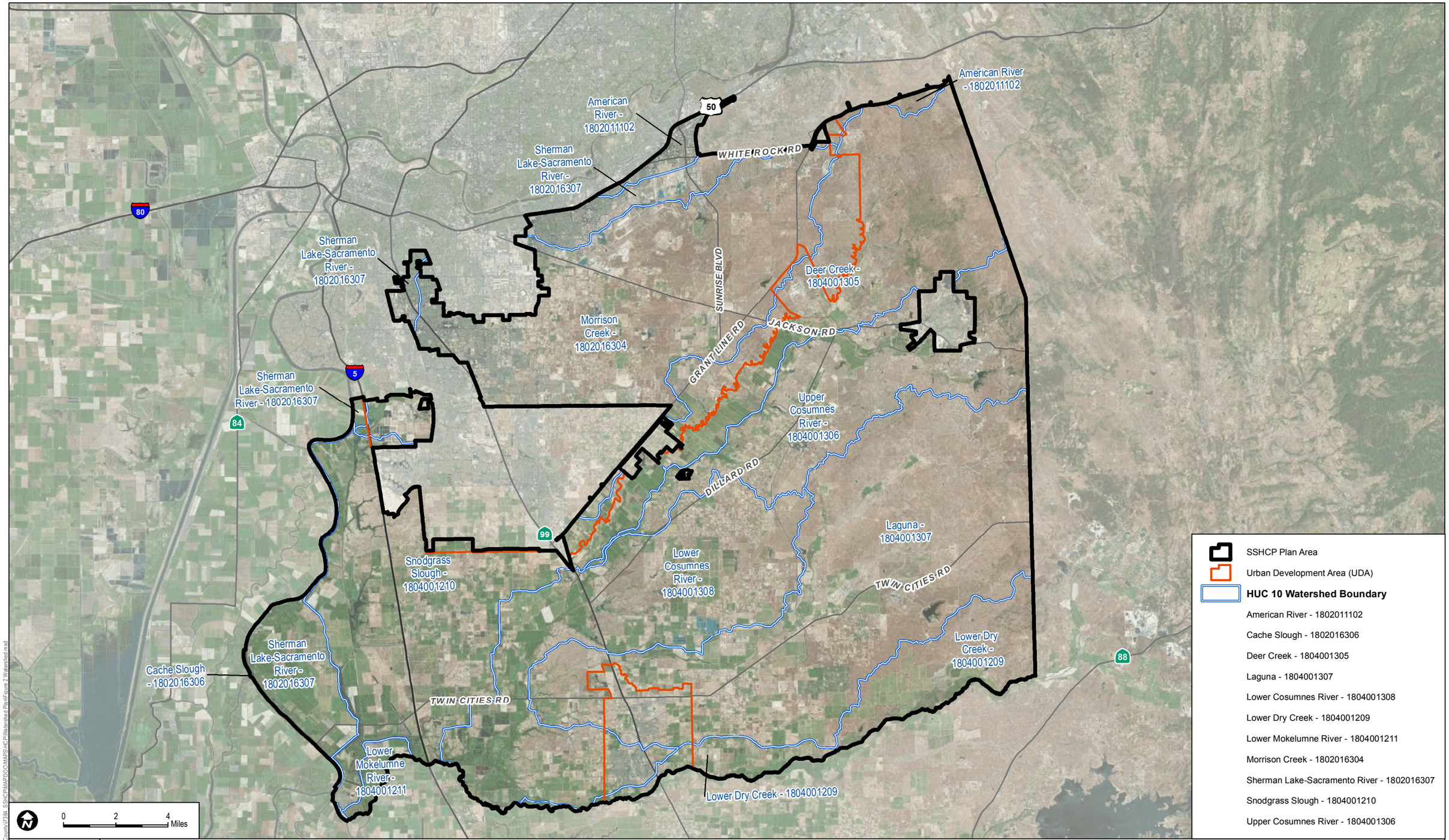

SOURCE: Bing Maps 2015, USGS 2013 National Hydrography Dataset (NHD)

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FIGURE 2

Watersheds

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

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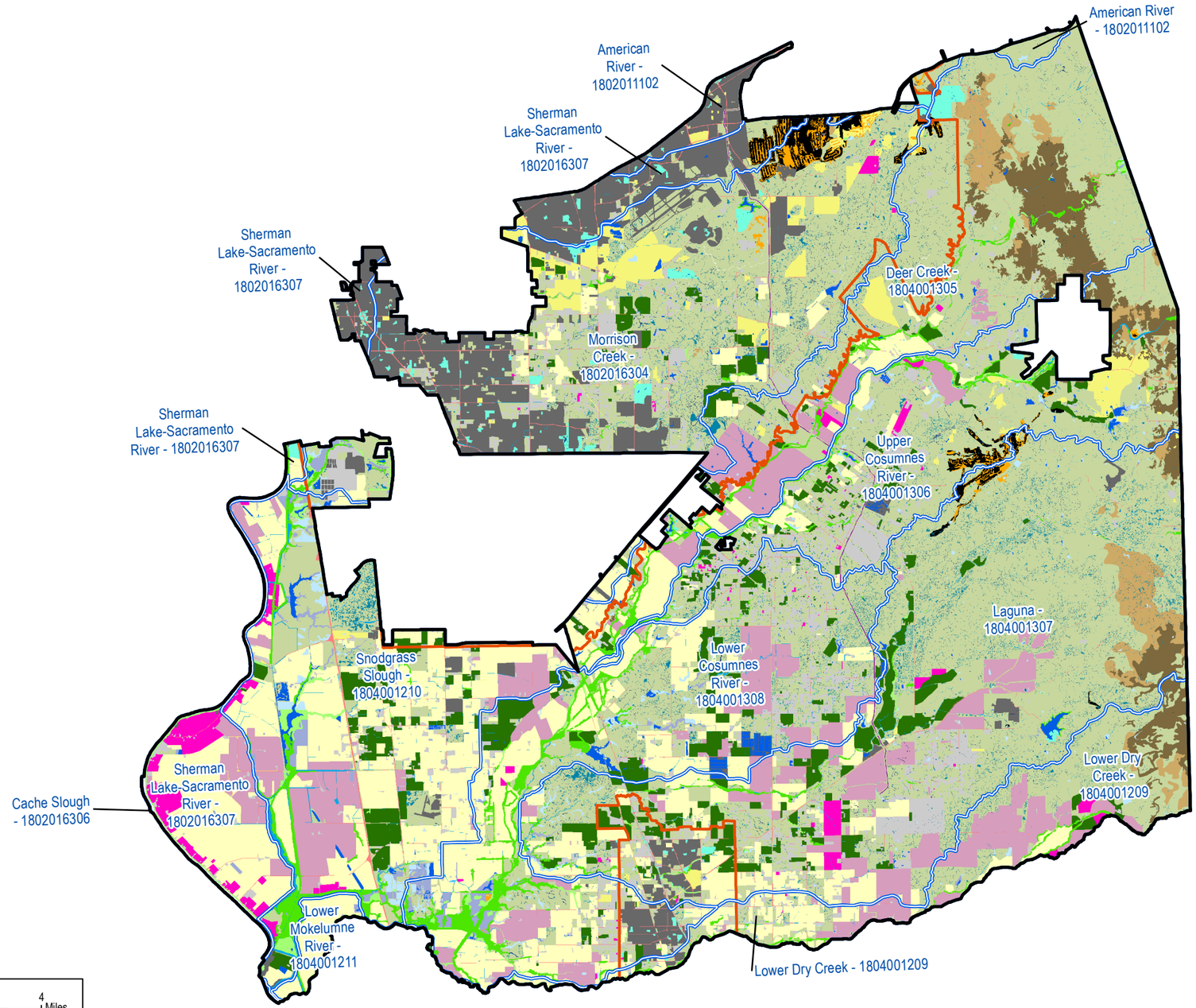

SSHCP Plan Area

Urban Development Area (UDA)

HUC 10 Watershed Boundary

Land Cover Types

Terrestrial

- Blue Oak Savanna
- Blue Oak Woodland
- Mine Tailing Riparian Woodland
- Mixed Riparian Scrub
- Mixed Riparian Woodland
- Valley Grassland

Aquatic

- Freshwater Marsh
- Open Water
- Seasonal Wetlands
- Streams/Creeks
- Swale
- Vernal Pool

Agriculture

- Cropland
- Irrigated Pasture-Grassland
- Orchards
- Vineyards

Non-Habitat

- Aqueducts
- Disturbed
- High Density Development
- Low Density Development
- Major Roads
- Mine Tailings
- Recreation/Landscaped

SOURCE: USGS 2013 National Hydrography Dataset (NHD)

DUDEK

FIGURE 3

Land Cover

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

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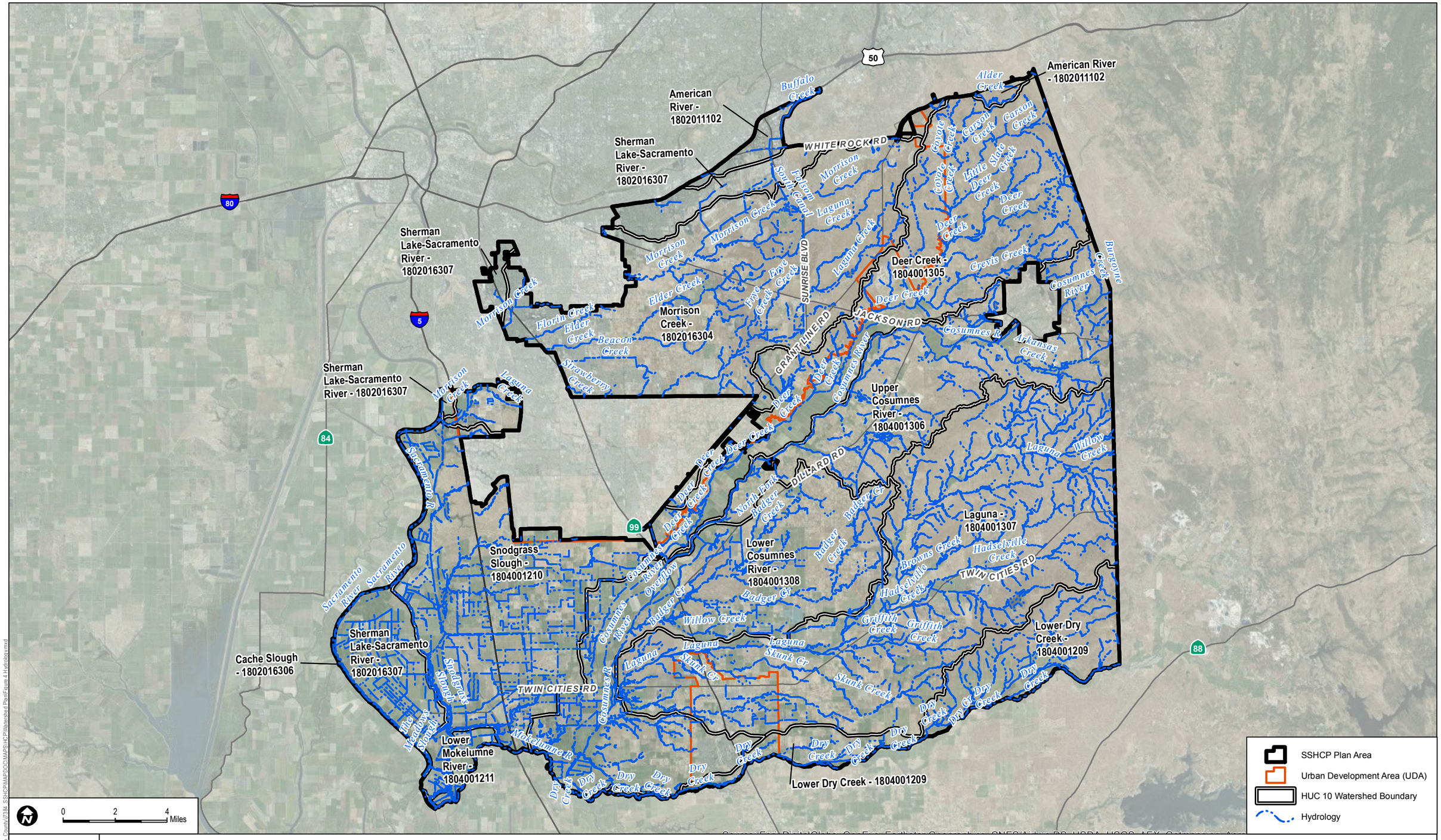

SOURCE: USGS 2013 National Hydrography Dataset (NHD), County of Sacramento 2012

FIGURE 4

Hydrology

DUDEK

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

Path: Z:\Projects\Sacramento_County\7284_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Figure 4 Hydrology.mxd

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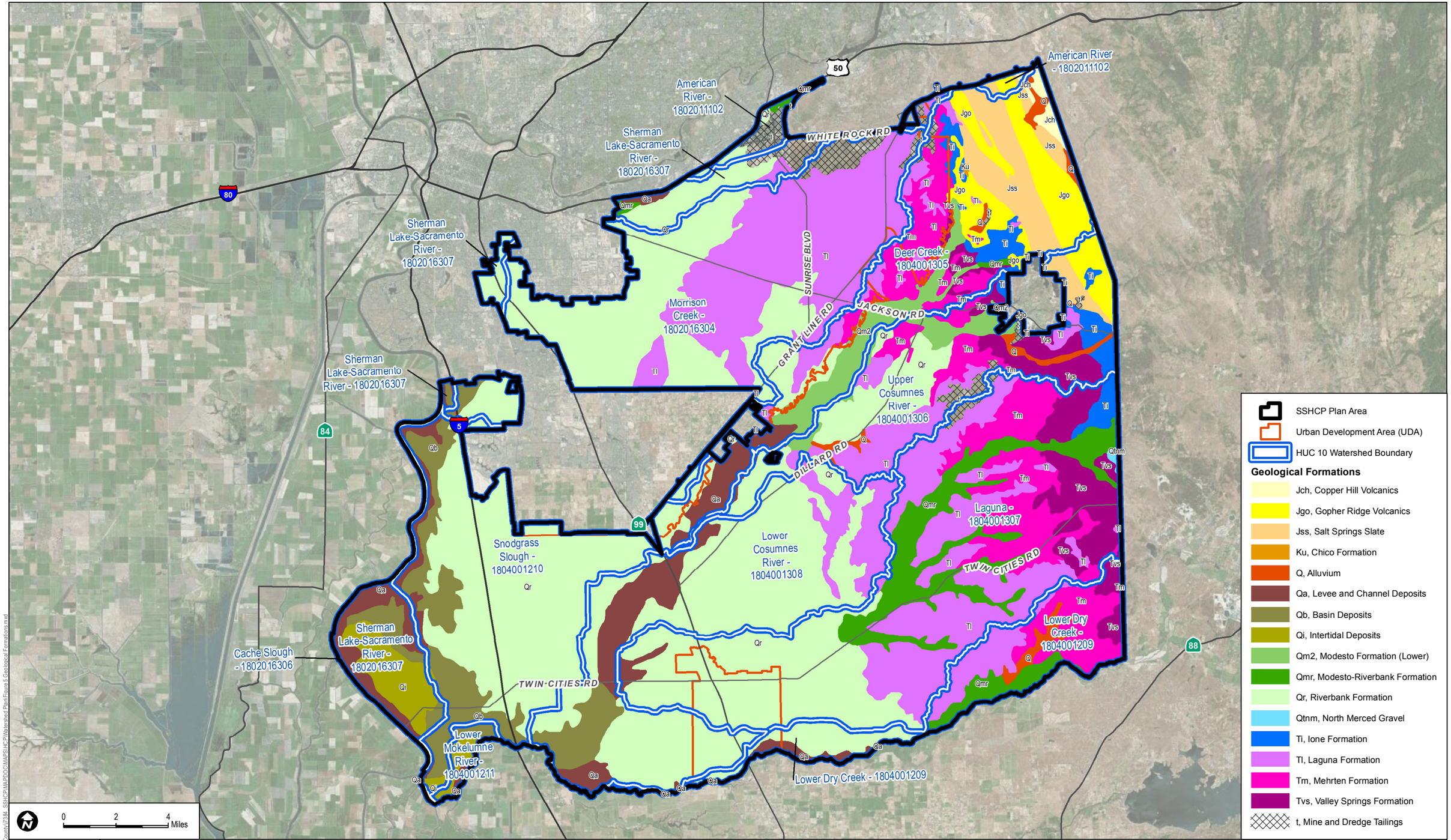

Path: Z:\Projects\Sacramento_County\7284_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Figure 5 Geological Formations.mxd

DUDEK

SOURCE: Bing Maps 2015, County of Sacramento 2014, CA Geologic Survey 1981

FIGURE 5

Geological Formations

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

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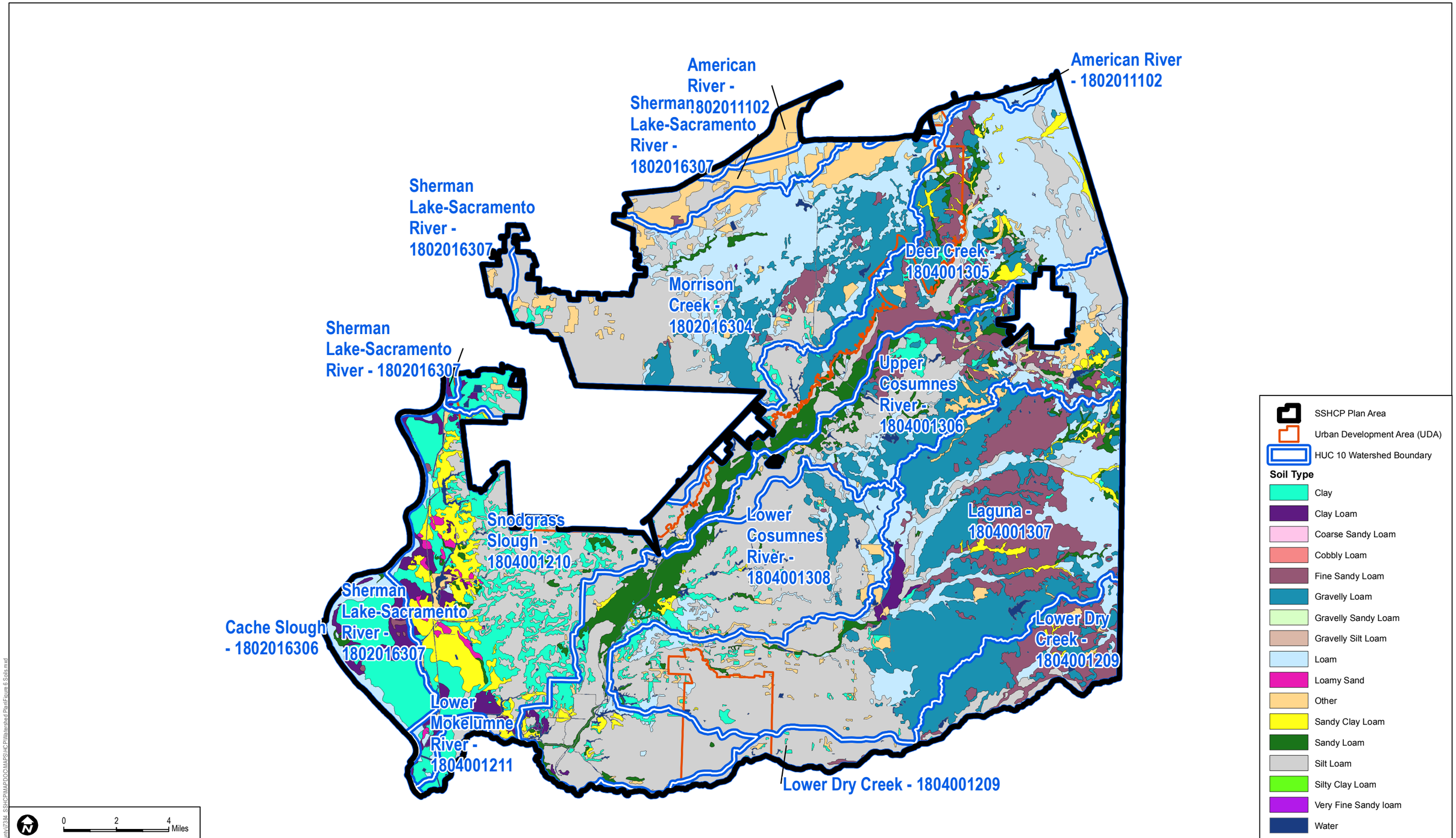

SOURCE: National Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) database 2009

DUDEK

FIGURE 6

Soils

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

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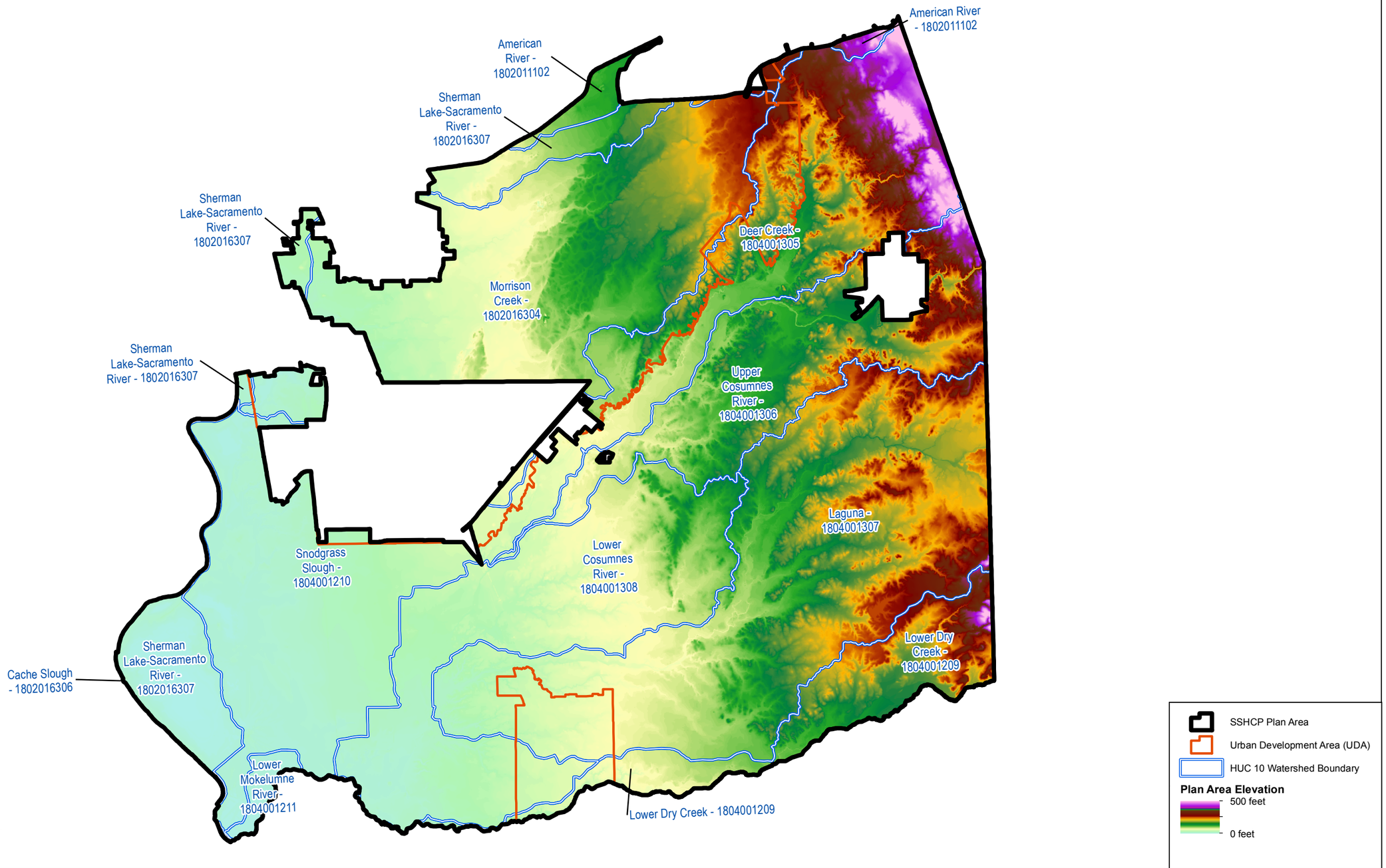

Path: Z:\Projects\Sacramento_County\7398_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Figure 7 Elevation.mxd

SOURCE: USGS National Elevation Dataset (2010)

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FIGURE 7

Elevation

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

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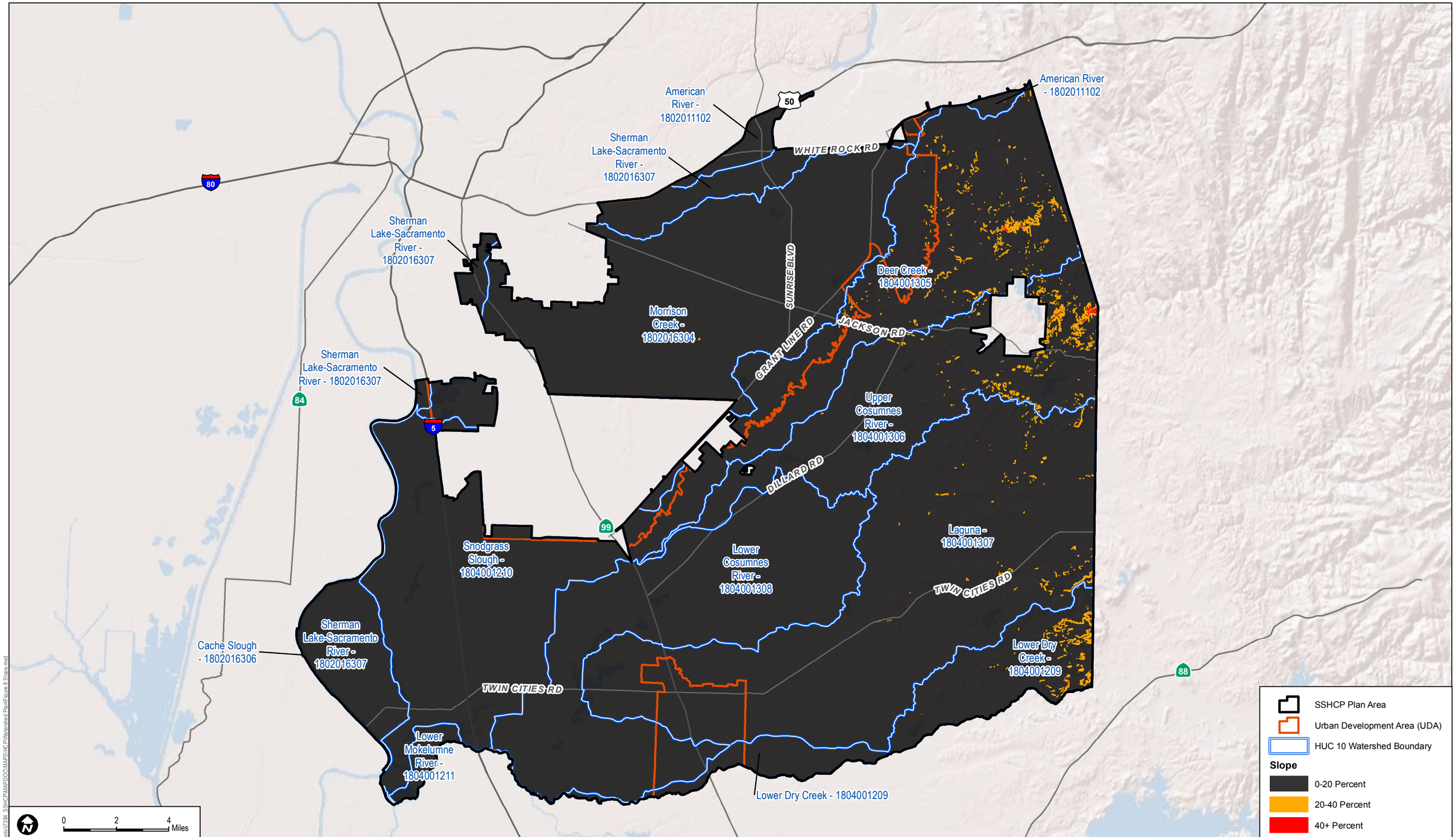

SOURCE: USGS National Elevation Dataset 2012

FIGURE 8

Slope

DUDEK

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

Path: Z:\Projects\Sacramento_County\7398_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Figure 8 Slope.mxd

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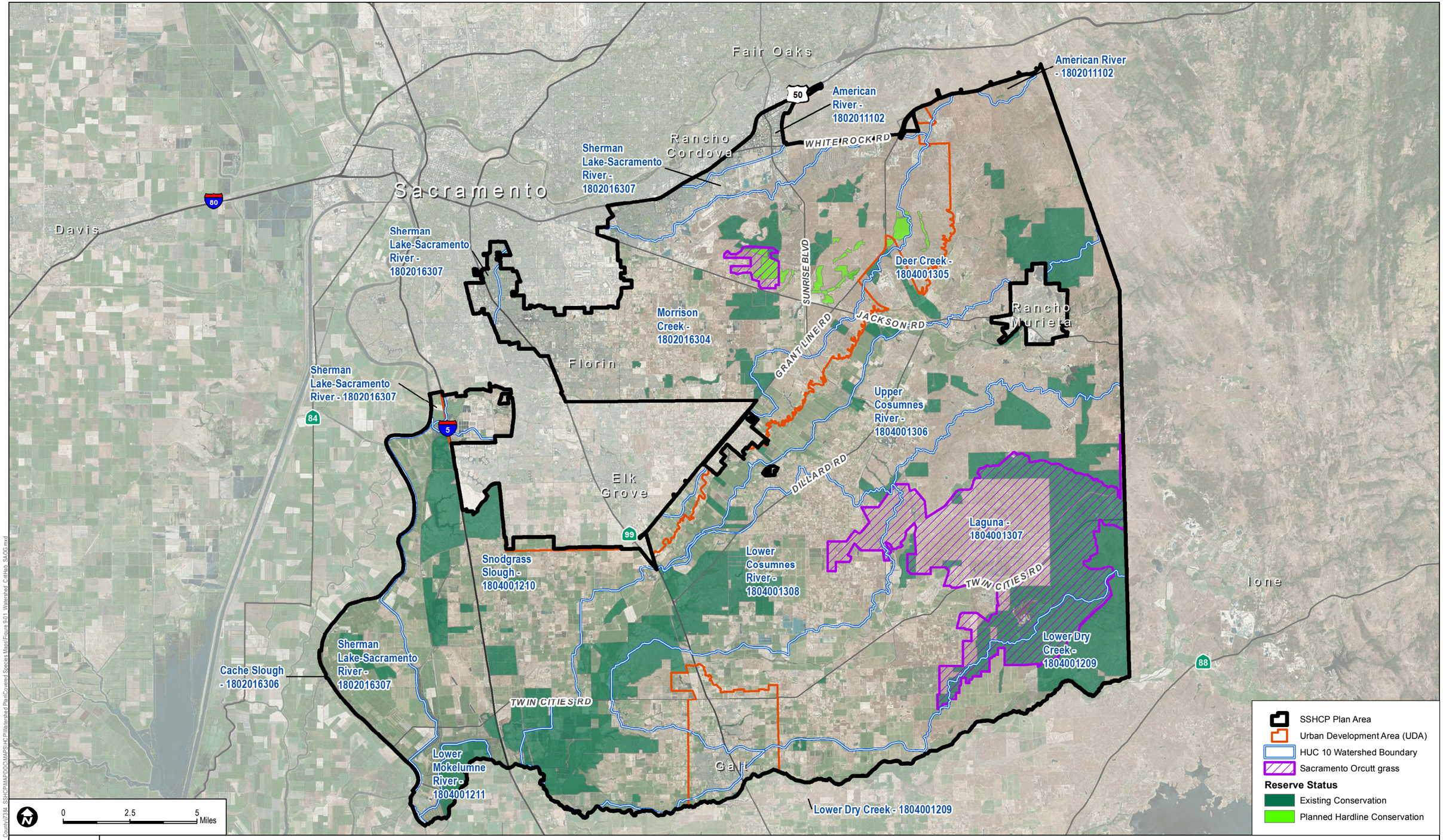

Path: Z:\Projects\Sacramento_County\7304_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-01_Watershed_CritHab_SAOG.mxd

SOURCE: Bing Maps, USGS 2013 NHD, USFWS 2012

FIGURE 9-1

Critical Habitat for Sacramento Orcutt Grass

DUDEK

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

Figure depicts existing preserves and hard-line planned conservation only. For a description of soft-line planned conservation see Sections 7.5.2 and 7.5.3 of the HCP.

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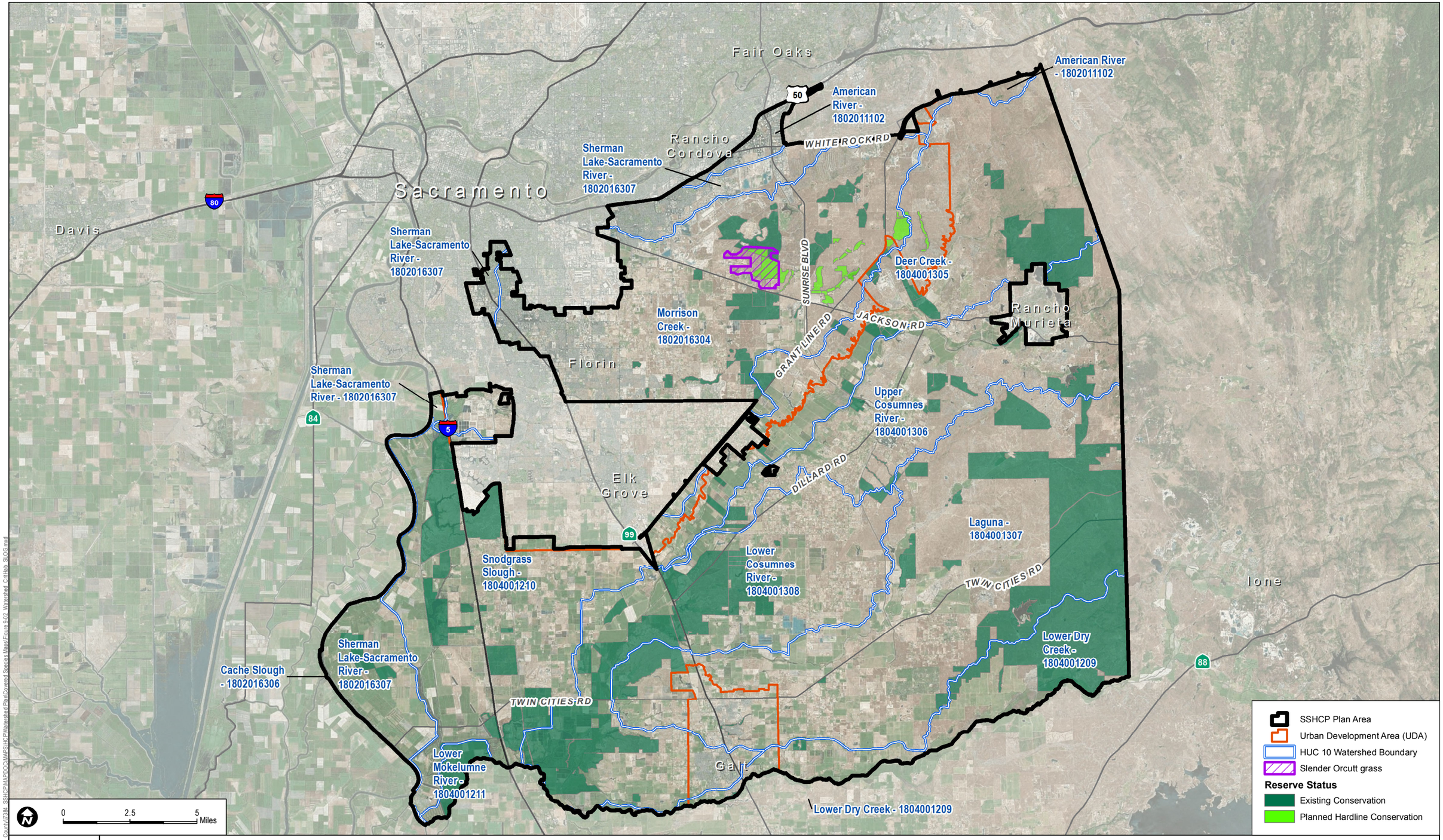

Path: Z:\Projects\Sacramento_County\7304_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-02_Watershed_CritHab_SLO.mxd

SOURCE: Bing Maps, USGS 2013 NHD, USFWS 2012

DUDEK

FIGURE 9-2

Critical Habitat for Slender Orcutt Grass

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

Figure depicts existing preserves and hard-line planned conservation only. For a description of soft-line planned conservation see Sections 7.5.2 and 7.5.3 of the HCP.

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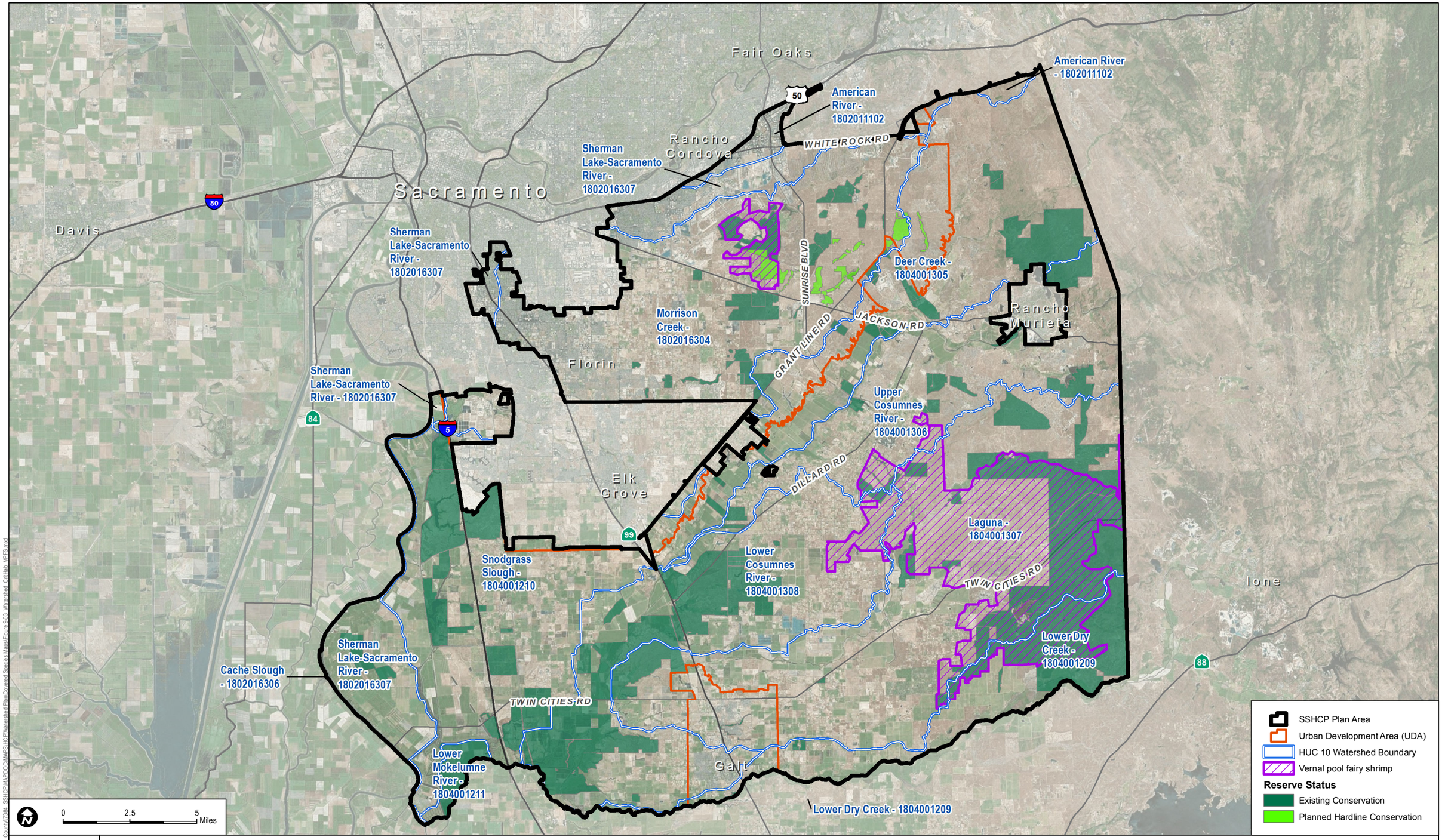

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DUDEK

SOURCE: Bing Maps, USGS 2013 NHD, USFWS 2012

FIGURE 9-3

Critical Habitat for Vernal Pool Fairy Shrimp

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

Figure depicts existing preserves and hard-line planned conservation only. For a description of soft-line planned conservation see Sections 7.5.2 and 7.5.3 of the HCP.

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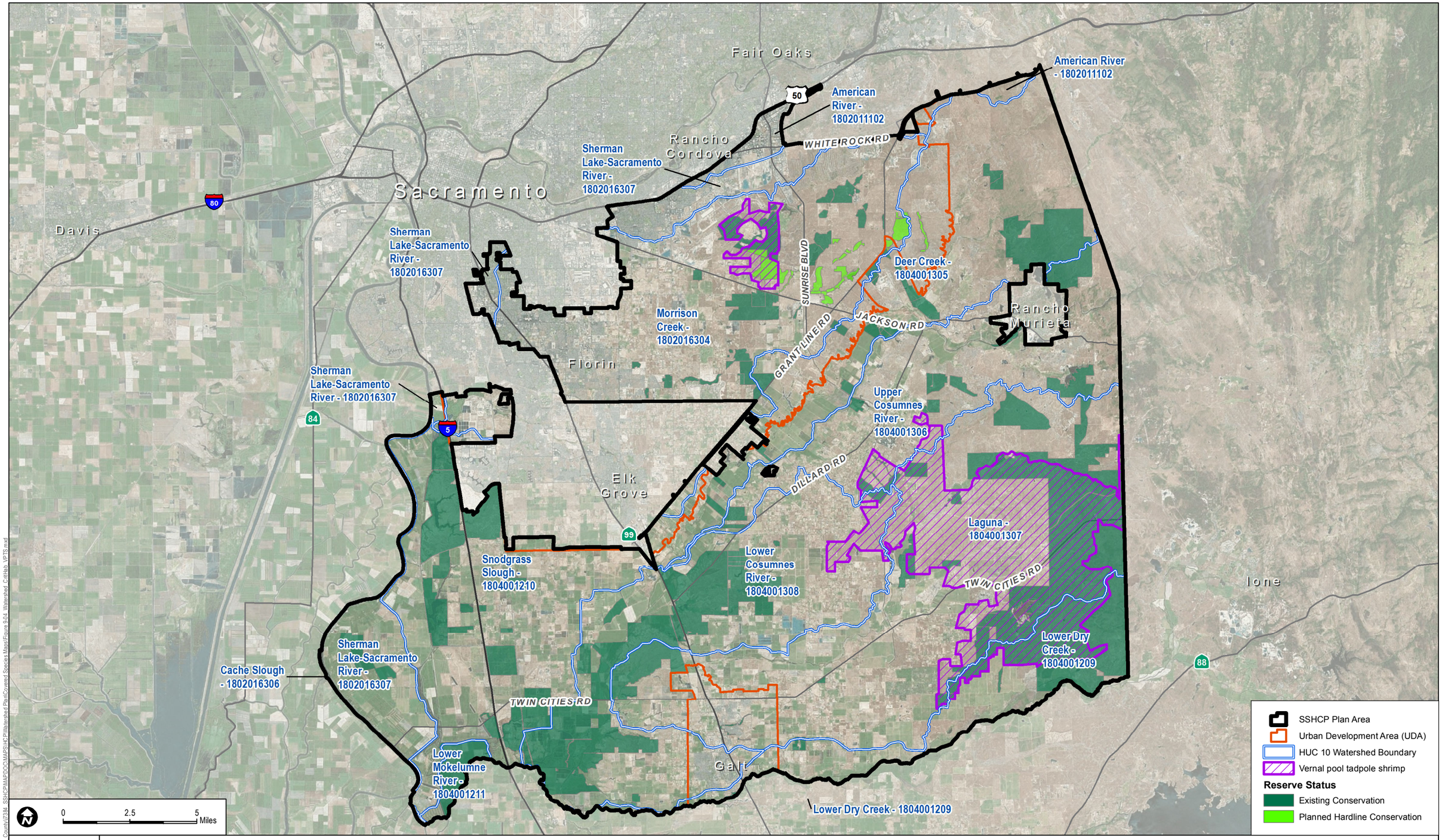

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SOURCE: Bing Maps, USGS 2013 NHD, USFWS 2012

DUDEK

FIGURE 9-4

Critical Habitat for Vernal Pool Tadpole Shrimp

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

Figure depicts existing preserves and hard-line planned conservation only. For a description of soft-line planned conservation see Sections 7.5.2 and 7.5.3 of the HCP.

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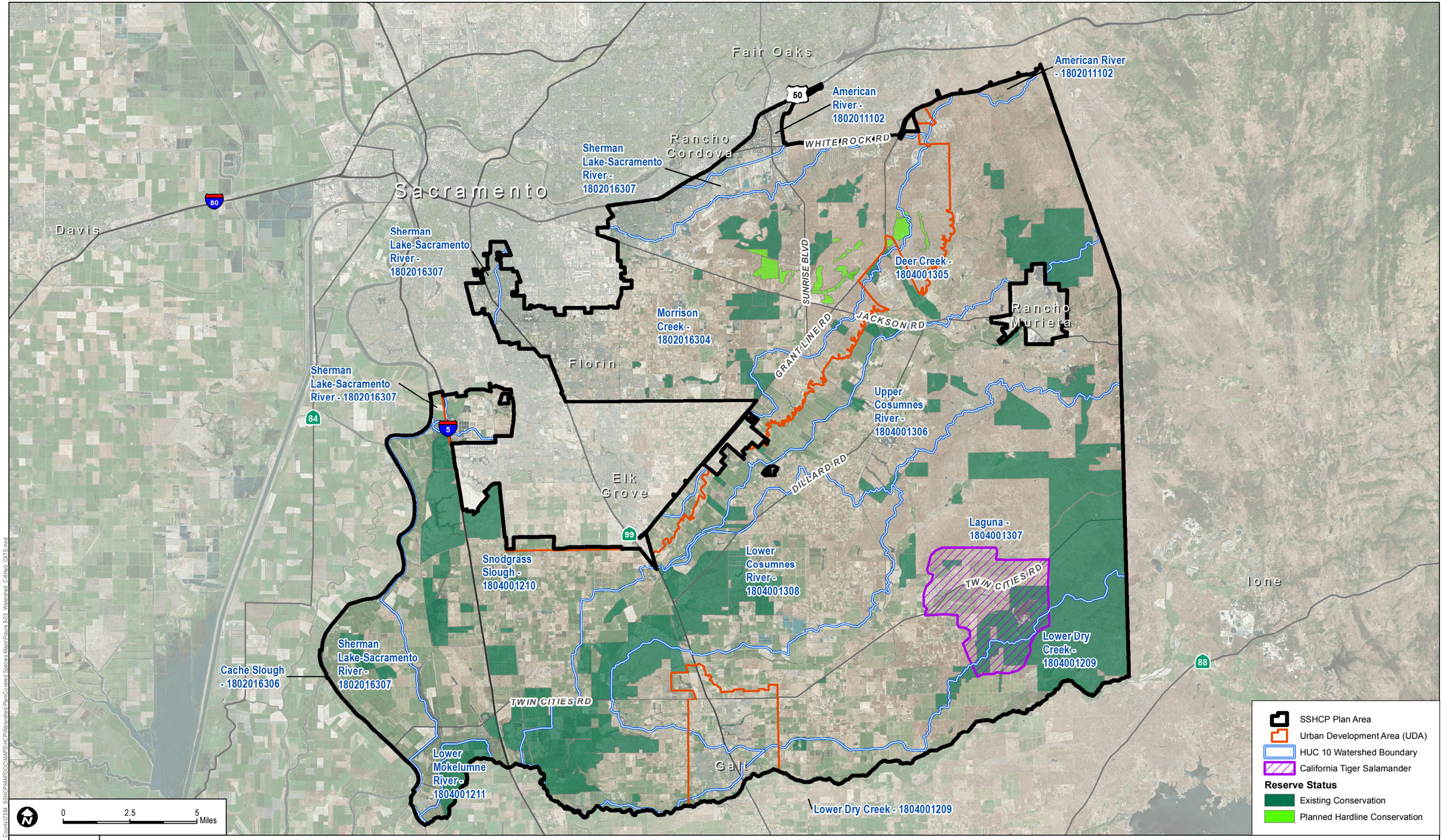

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DUDEK

SOURCE: Bing Maps, USGS 2013 NHD, USFWS 2012

FIGURE 9-5

Critical Habitat for California Tiger Salamander

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

Figure depicts existing preserves and hard-line planned conservation only. For a description of soft-line planned conservation see Sections 7.5.2 and 7.5.3 of the HCP.

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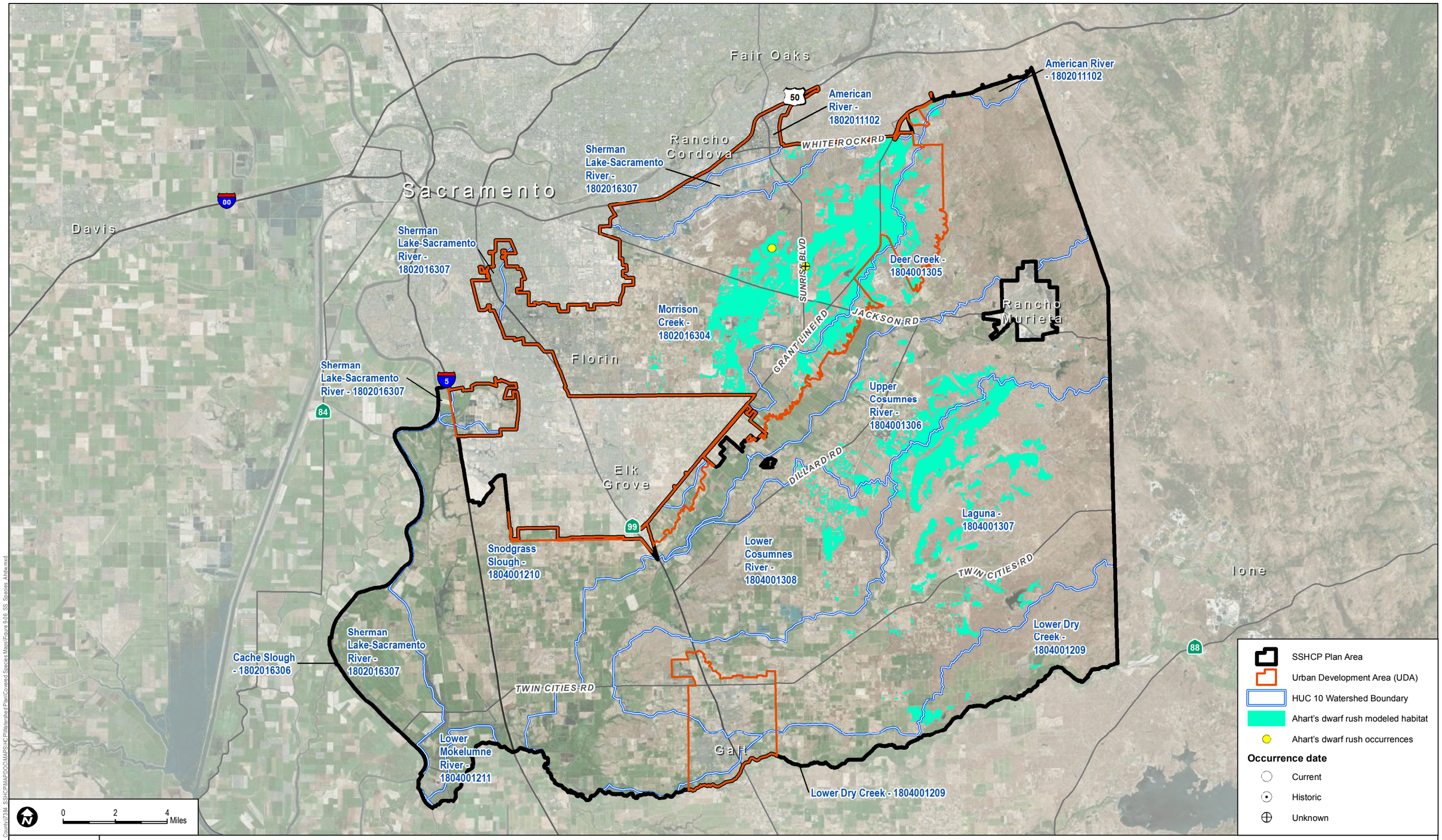

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DUDEK

SOURCE: Bing Maps, County of Sacramento 2015, CNDDB 2012, USGS 2013 NHD

FIGURE 9-6

Ahart's Dwarf Rush Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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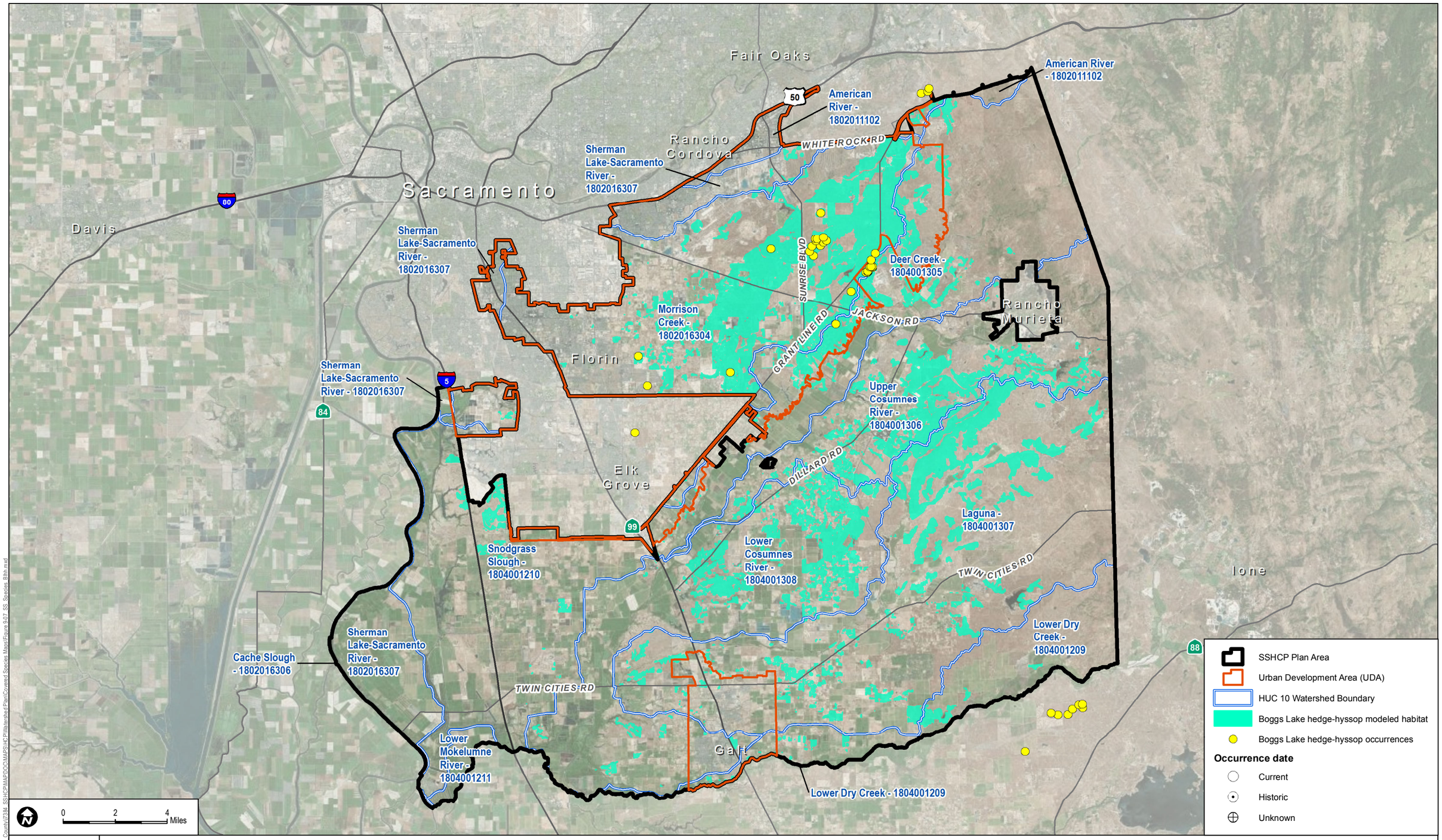

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SOURCE: Bing Maps, County of Sacramento 2012, CDFG 2012, Sugnet & Associates 1993, Jones & Stokes 1990, USGS 2013 NHD

DUDEK

FIGURE 9-7

Boggs Lake Hedge-Hyssop Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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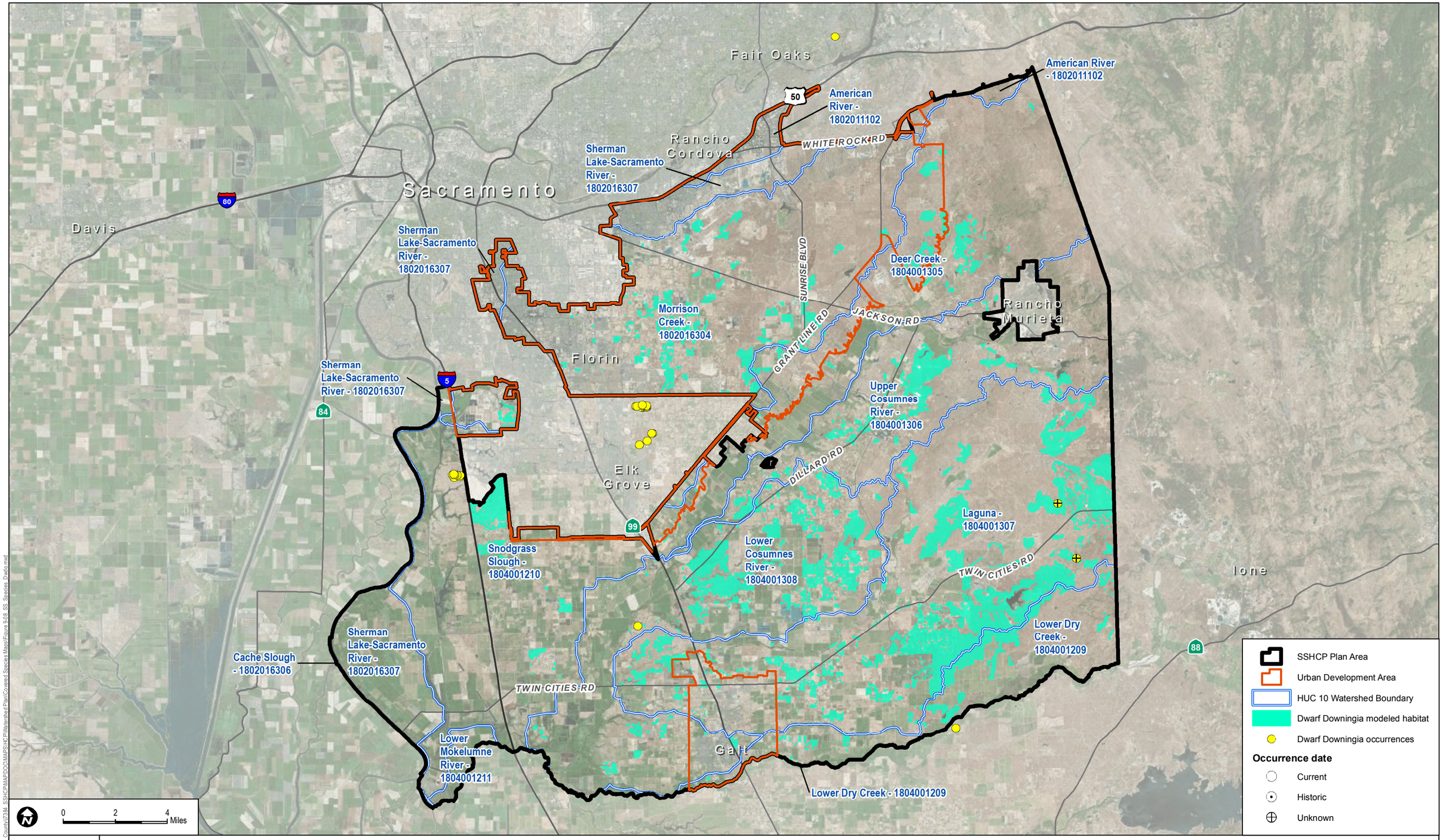

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DUDEK

SOURCE: Bing Maps 2015, County of Sacramento 2015
CDFG 2012, Gibson & Skordal 1994, TNC, USGS 2013 NHD

FIGURE 9-8

Dwarf Downingia Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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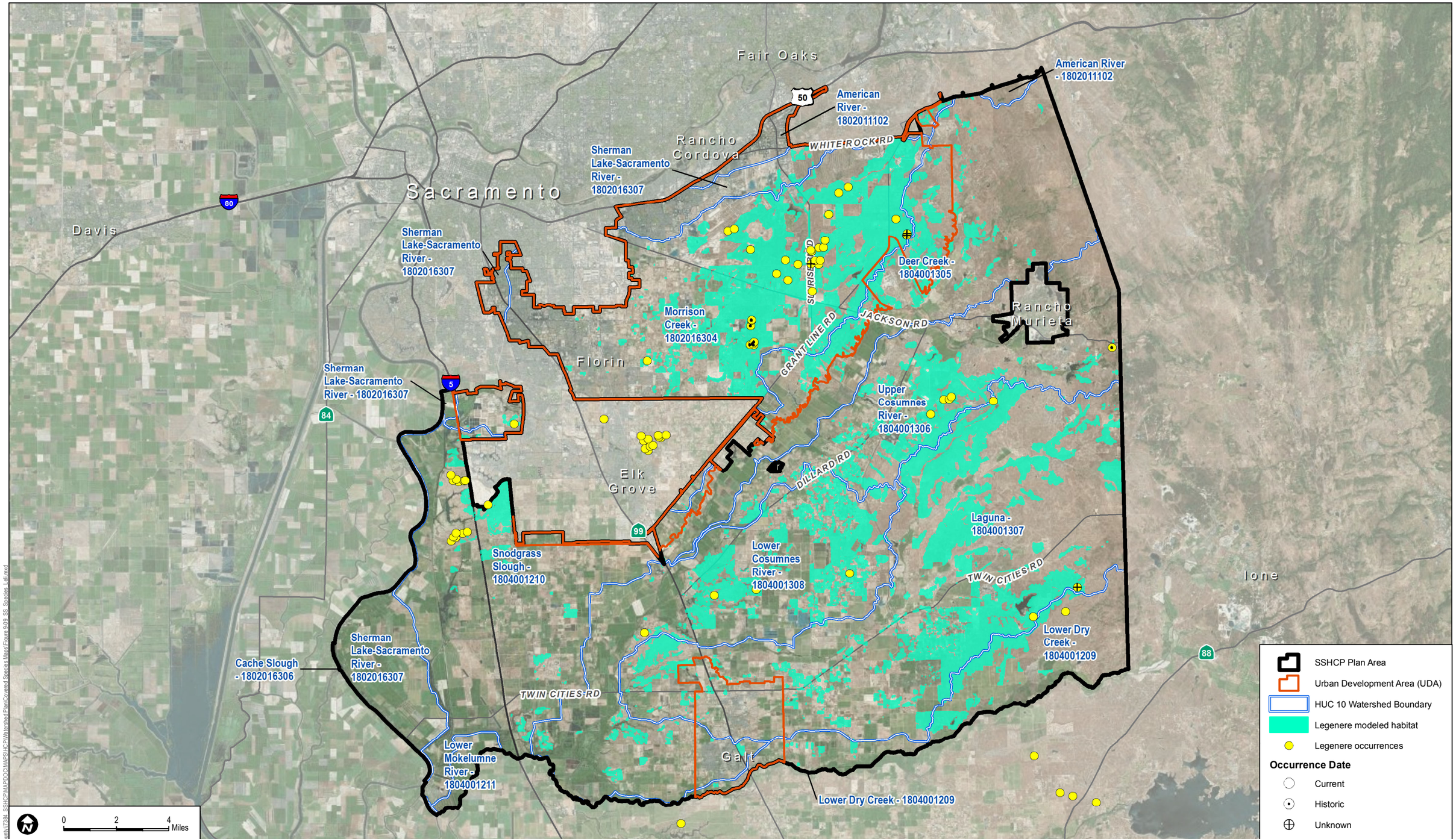

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SOURCE: Bing Maps, County of Sacramento 2015, CDFG 2012, USGS 2013 NHD

FIGURE 9-9

Legenere Modeled Habitat and Known Occurrences

DUDEK

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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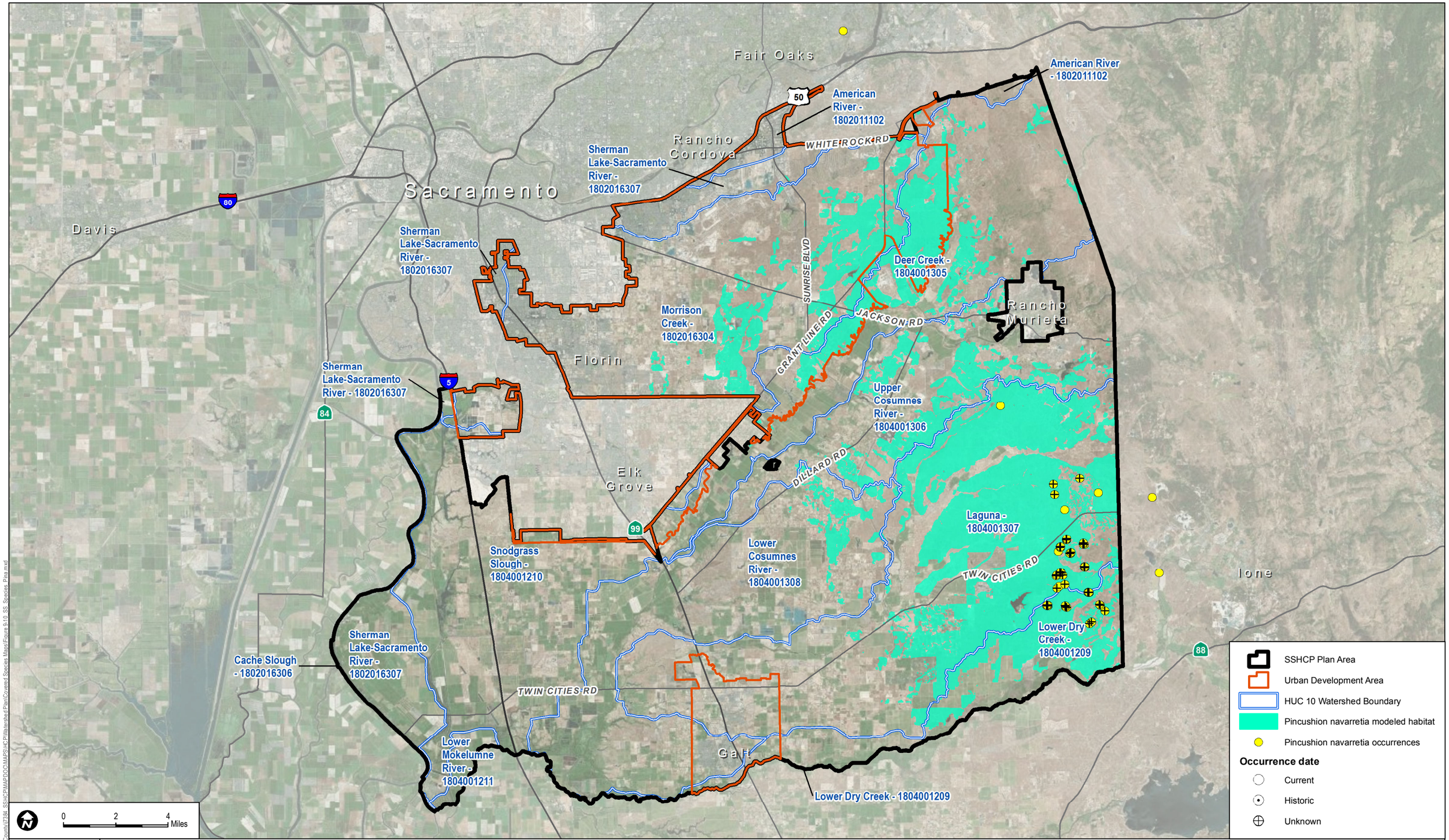

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DUDEK

SOURCE: Bing Maps, County of Sacramento 2015, CDFG 2012, TNC, USGS 2013 NHD

FIGURE 9-10

Pincushion Navarretia Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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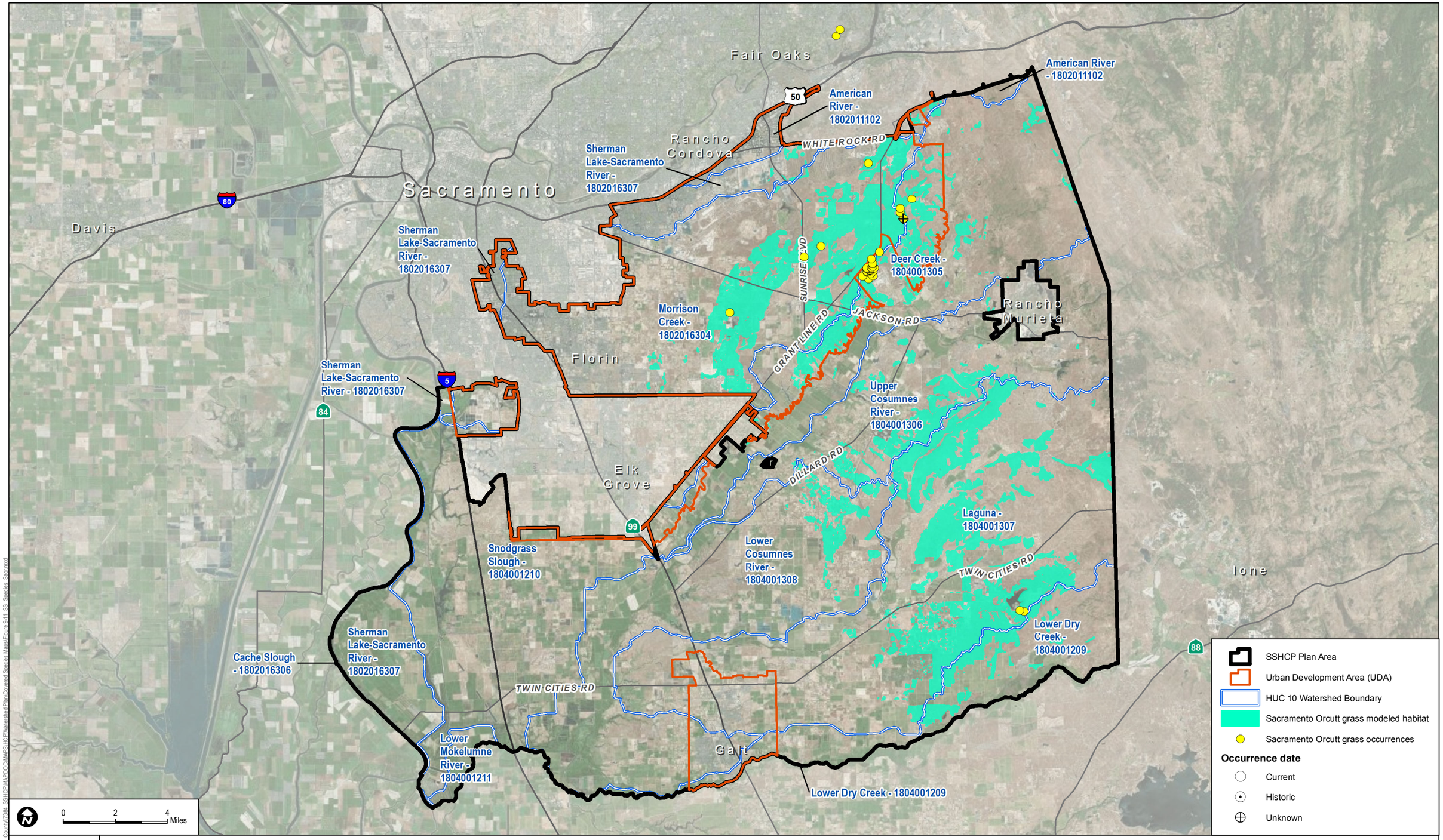

Path: Z:\Projects\Sacramento County\7398 SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-11 SS Species Sacr.mxd

SOURCE: Bing Maps, County of Sacramento 2012, USGS 2013 NHD

FIGURE 9-11

Sacramento Orcutt Grass Modeled Habitat and Known Occurrences

DUDEK

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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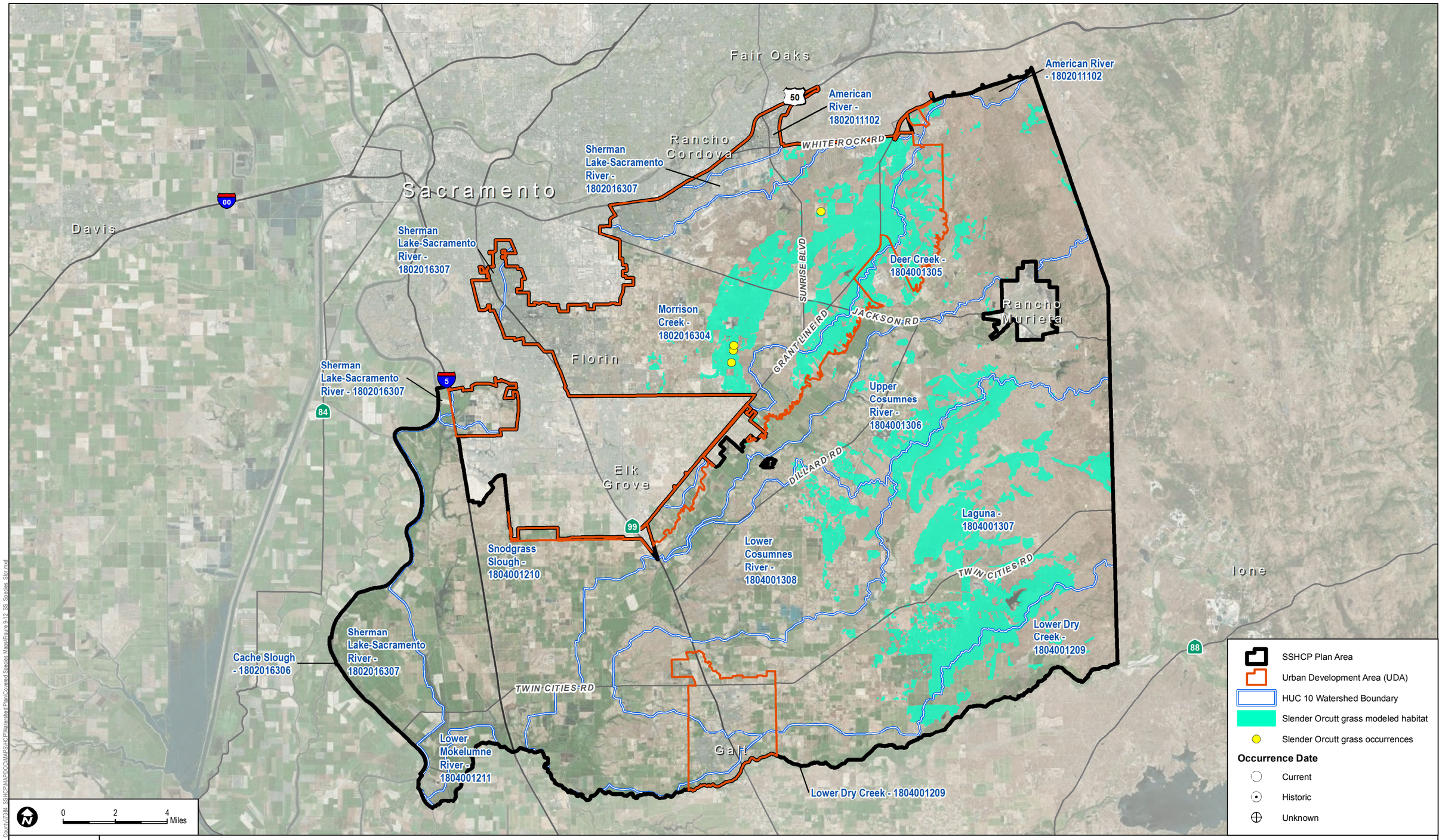

Path: Z:\Projects\Sacramento County\7398 SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-12_SS_Species_Slsr.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2012, USGS 2013 NHD

FIGURE 9-12

Slender Orcutt Grass Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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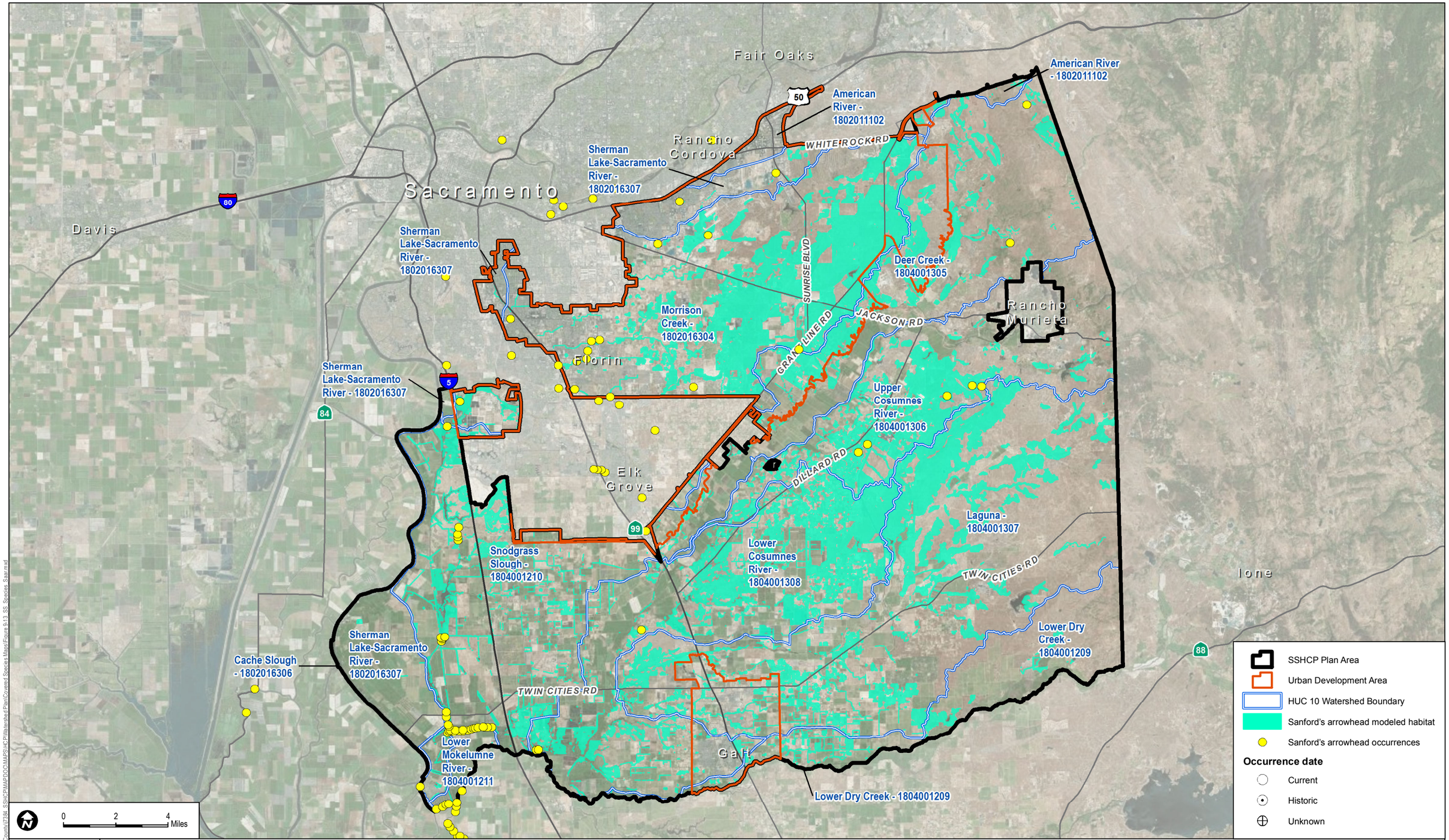

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DUDEK

SOURCE: Bing Maps, County of Sacramento 2012, USGS 2013 NHD

FIGURE 9-13

Sanford's Arrowhead Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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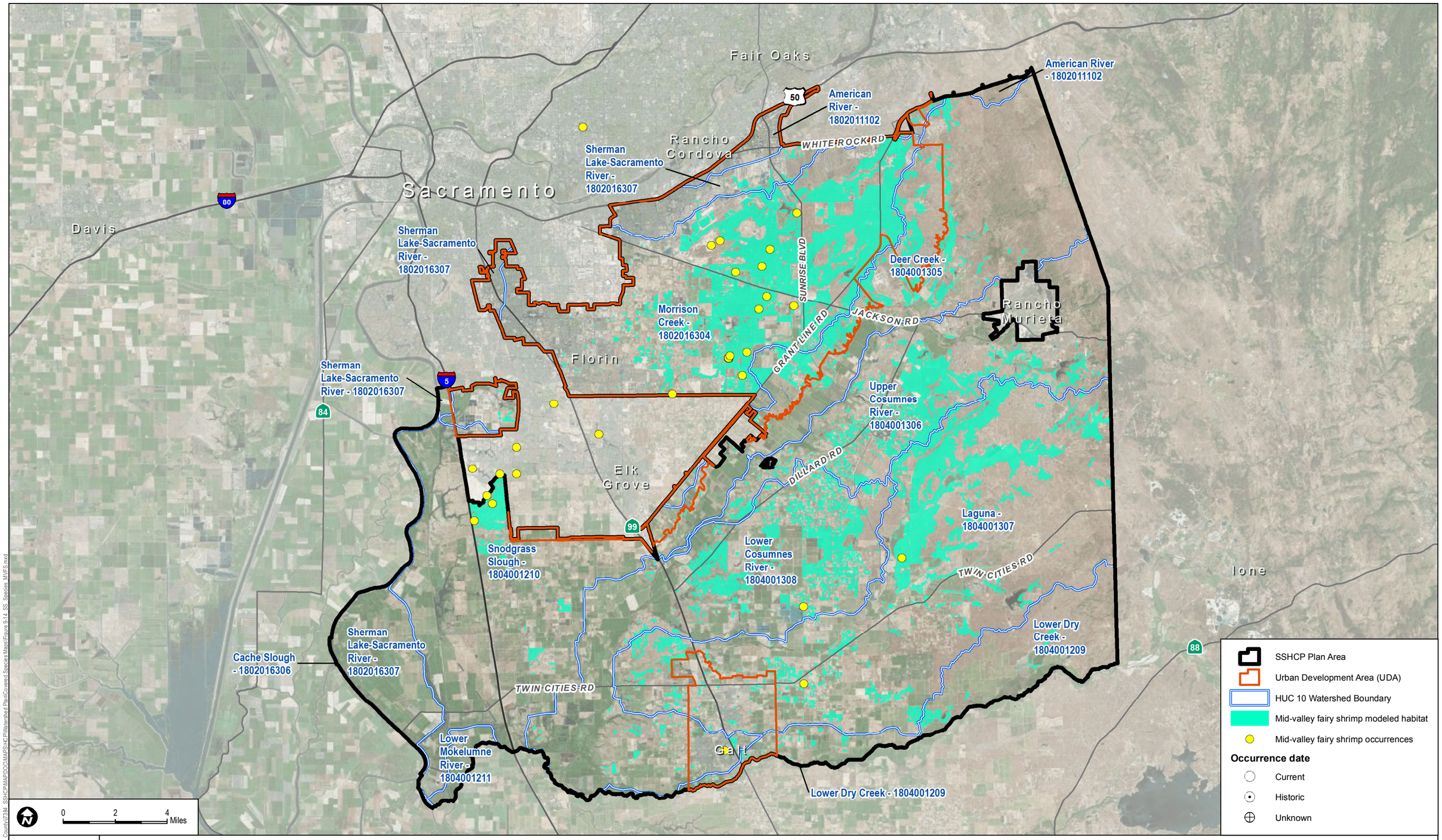

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DUDEK

SOURCE: Bing Maps 2015, County of Sacramento 2014, CDFG 2012, C. Witham 2011, Foothill Associates 2010, Kassis-Sylva 2011, Vollmar 2012, USGS 2013 NHD

FIGURE 9-14

Midvalley Fairy Shrimp Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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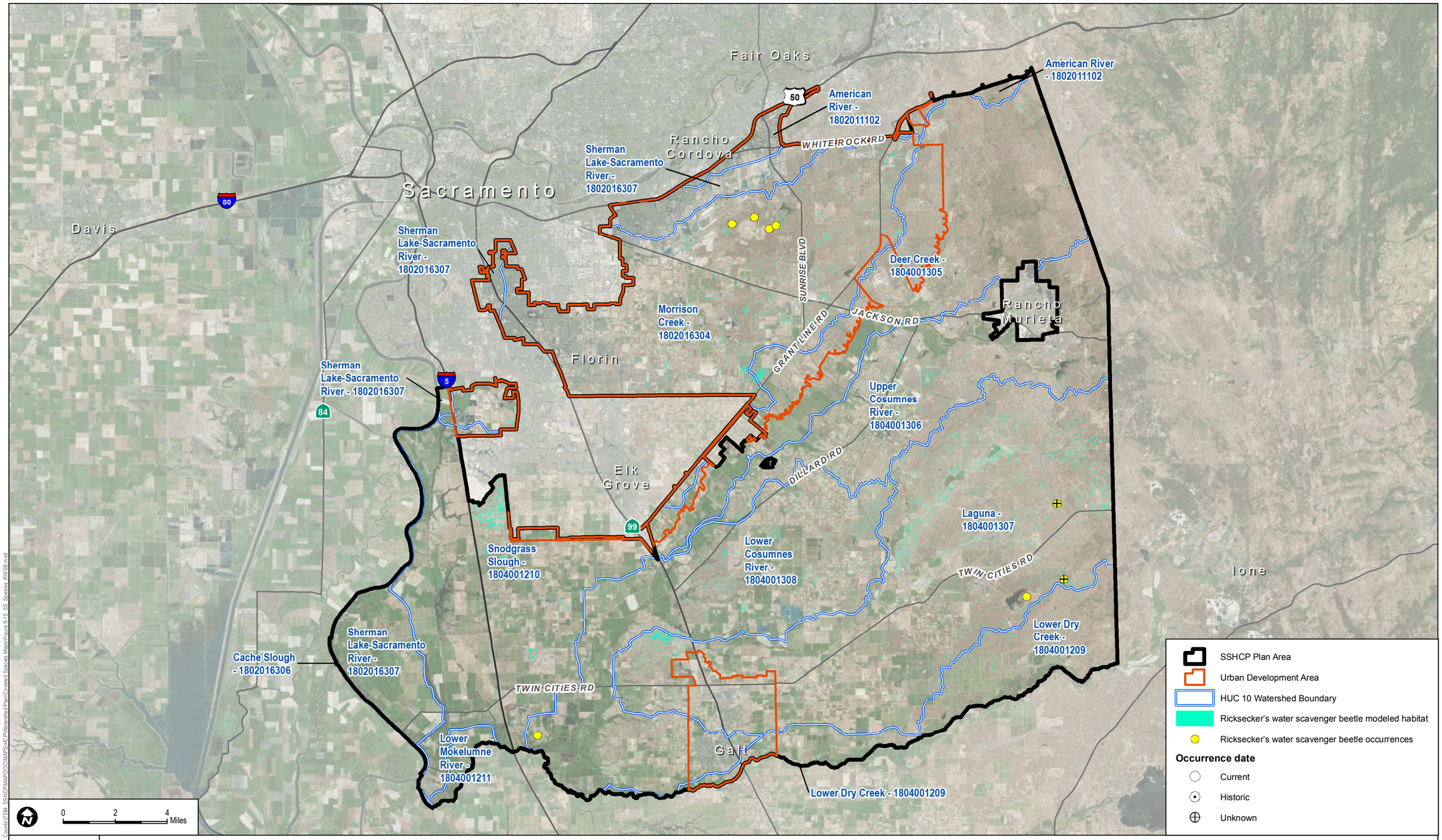

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SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, Chris Rogers 2000, TNC, USGS 2013 NHD

DUDEK

FIGURE 9-15

Ricksecker's Water Scavenger Beetle Modeled Habitat and Known Occurrences

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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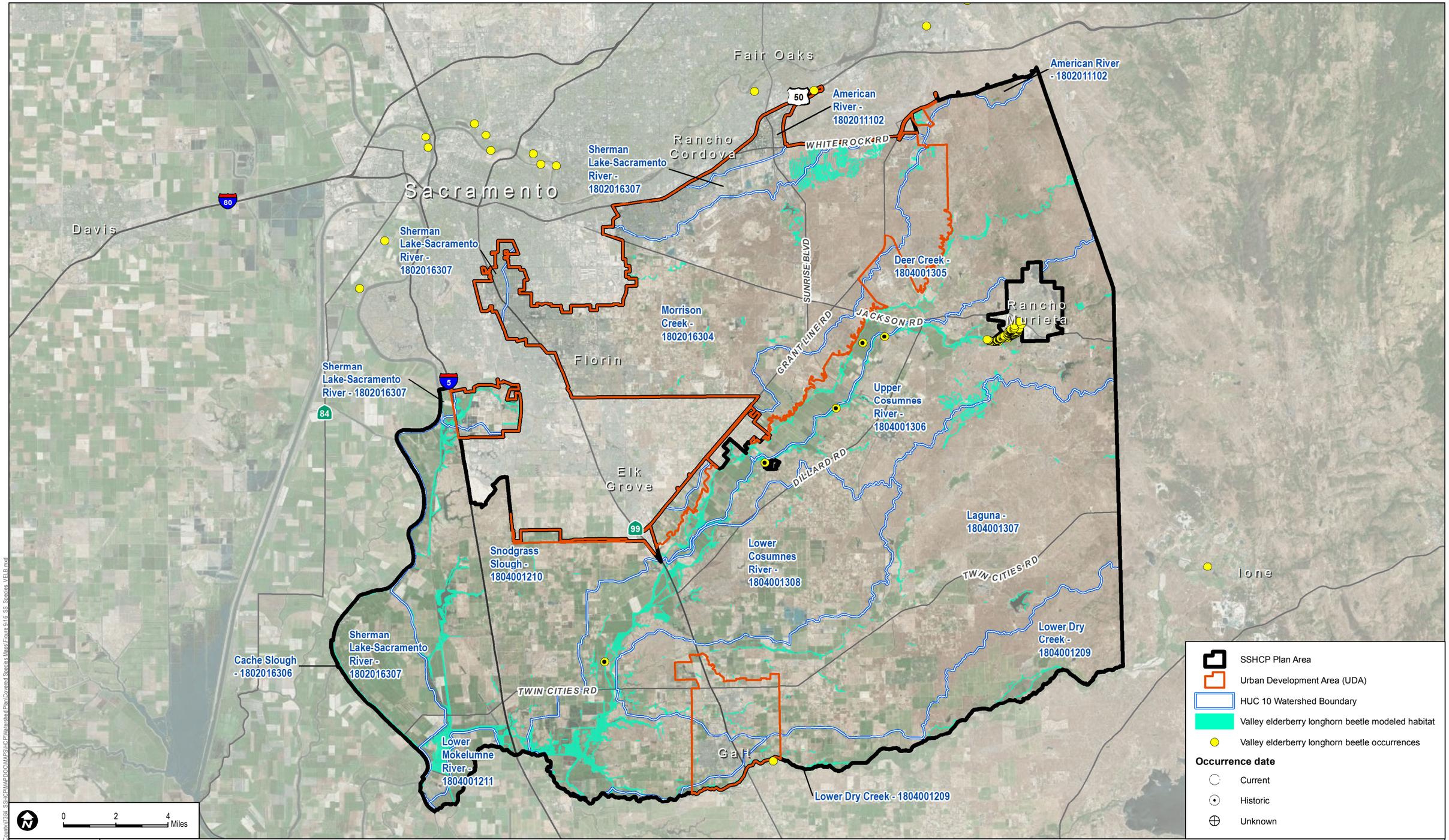

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SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, T. Talley 2003, USGS 2013 NHD

DUDEK

FIGURE 9-16

Valley Elderberry Longhorn Beetle Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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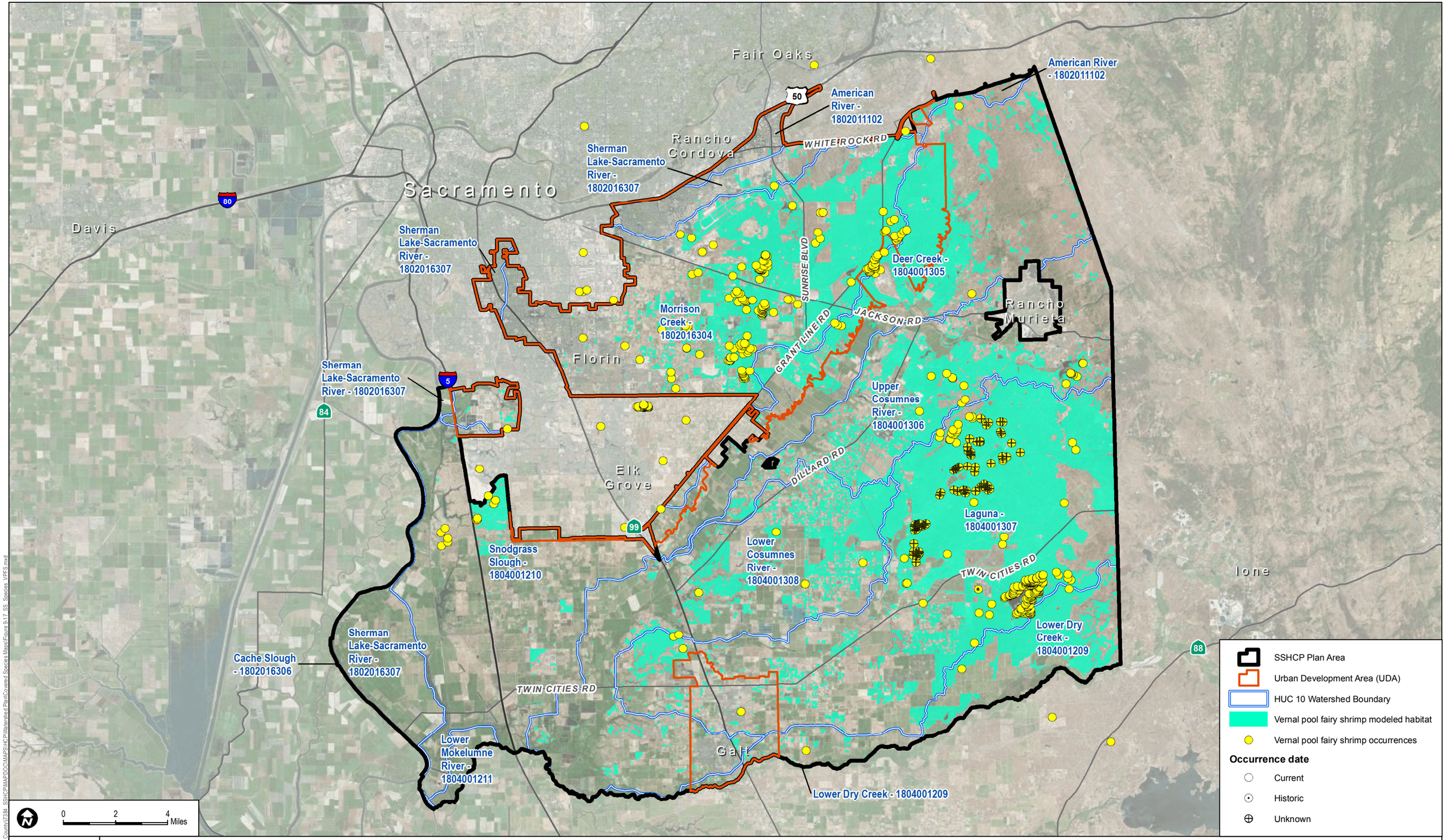

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DUDEK

SOURCE: Bing Maps 2015, County of Sacramento 2014, CDFG 2012, C. Witham 2011, ECORP 2009, EcoAnalysts 2008, Foothill Associates 2011, Helm 2007, Kassis-Sylva 2011, Gibson & Skordal 1994, Sugnet 1996, Richard Hill 1999 Kiefer 2011, LSA 2011, Vollmar 2011, USFWS 2014, Wildlands 2010, USGS 2013 NHD

FIGURE 9-17

Vernal Pool Fairy Shrimp Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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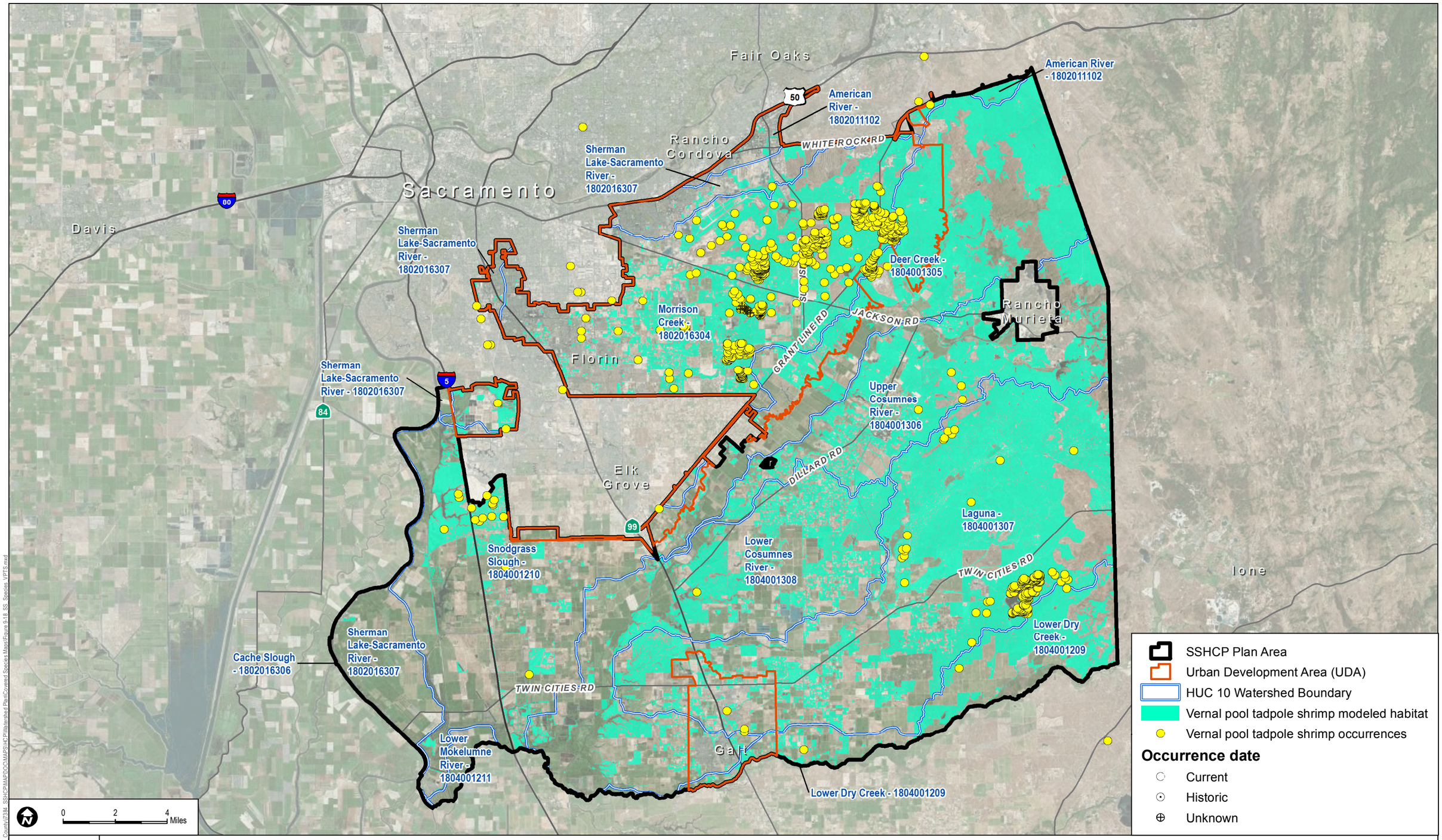

Path: Z:\Projects\Sacramento County\37301 SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-18_SS_Species_VPTS.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, C. Witham 2011, C. Little 2011,ECORP 2012, EcoAnalysts 2008, Foothill Associates 2011, Gibson & Skordal 2011, Helm 2011, Richard Hill 1999, Sugnet & Associated 1997, Kassiss-Sylva 2011, Kiefer 2011, LSA 2009, USFWS 2014, Vollmar 2011, Wildlands 2010, USGS 2013 NHD

FIGURE 9-18

Vernal Pool Tadpole Shrimp Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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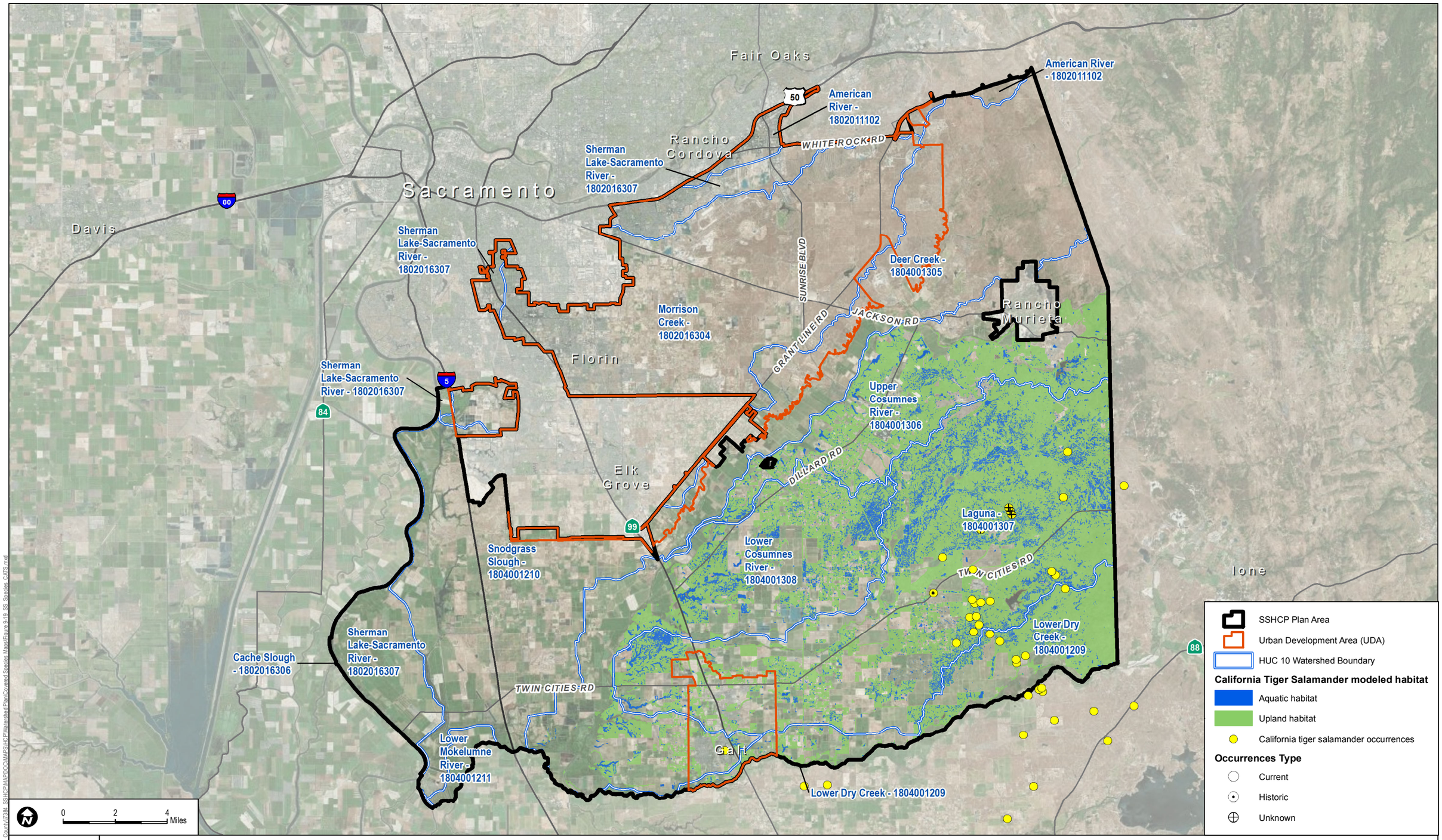

Path: Z:\Projects\Sacramento County\37301 SSHCP\MAPPING\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-19 SS Species CATS.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, USGS 2013 NHD

FIGURE 9-19

California Tiger Salamander Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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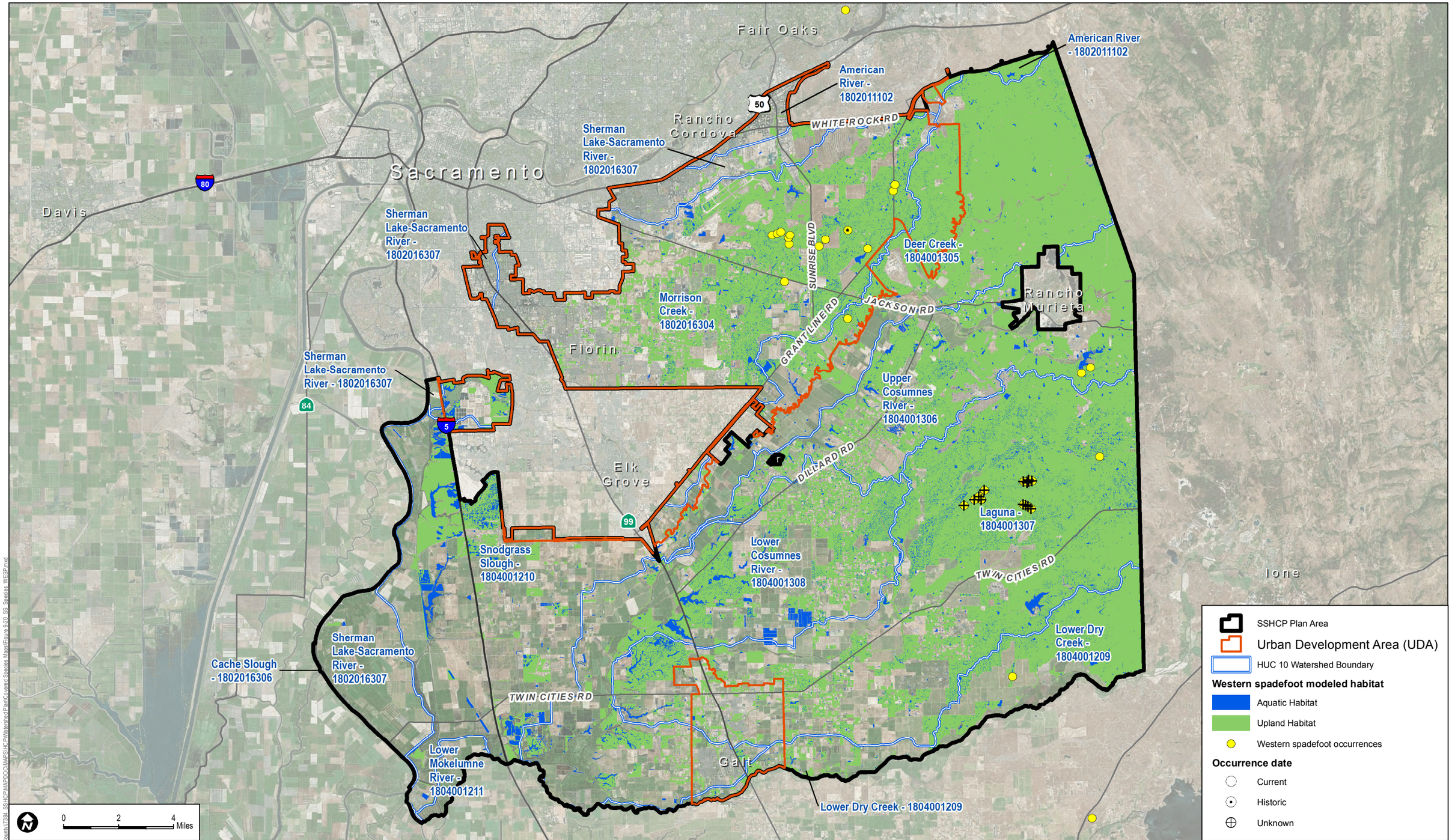

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DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, CNDDB 2012, CNPS 1999, USGS 2013 NHD

FIGURE 9-20

Western Spadefoot Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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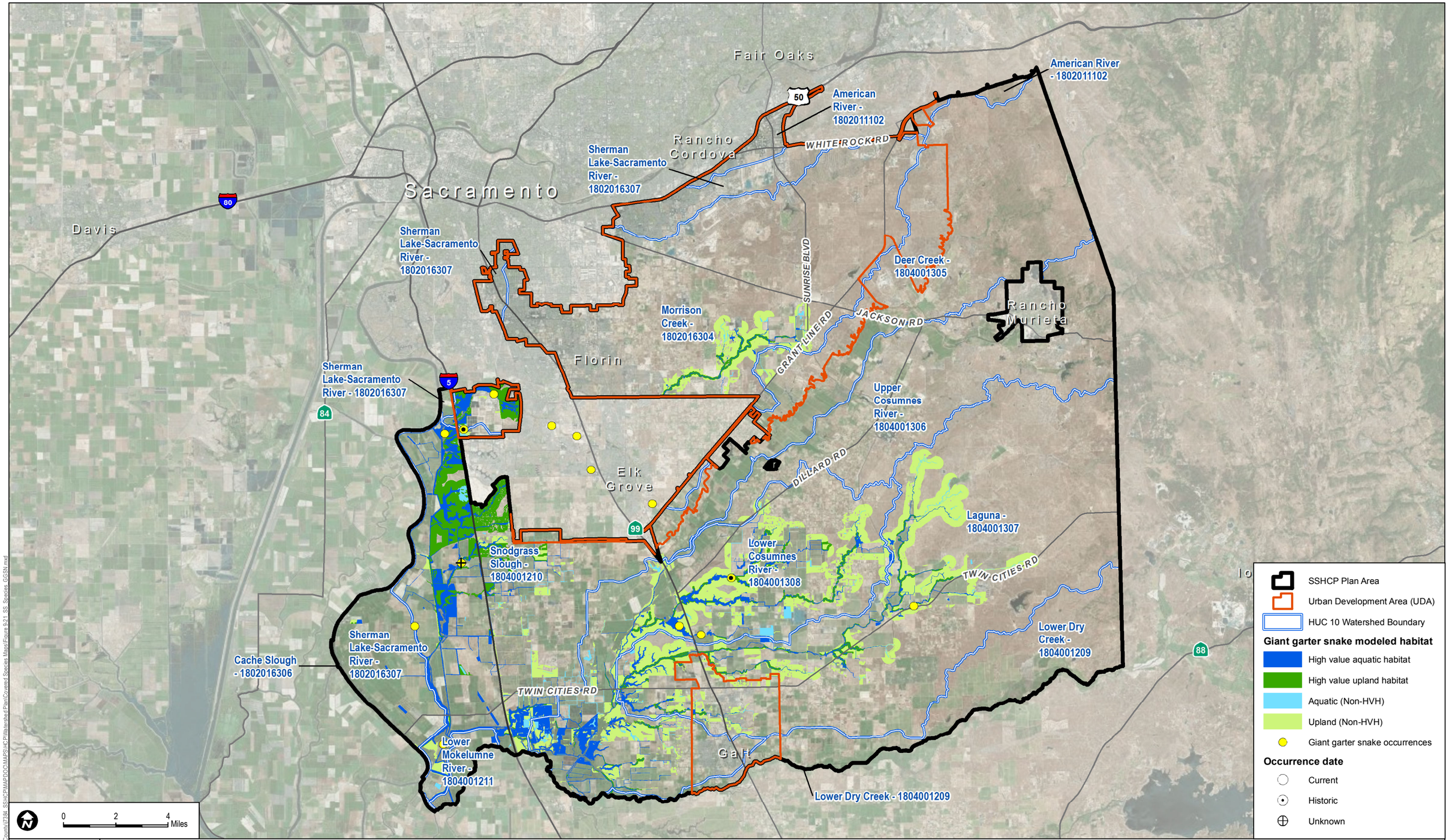

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, CNPS 1999, USGS 2013 NHD

FIGURE 9-21

Giant Gartersnake Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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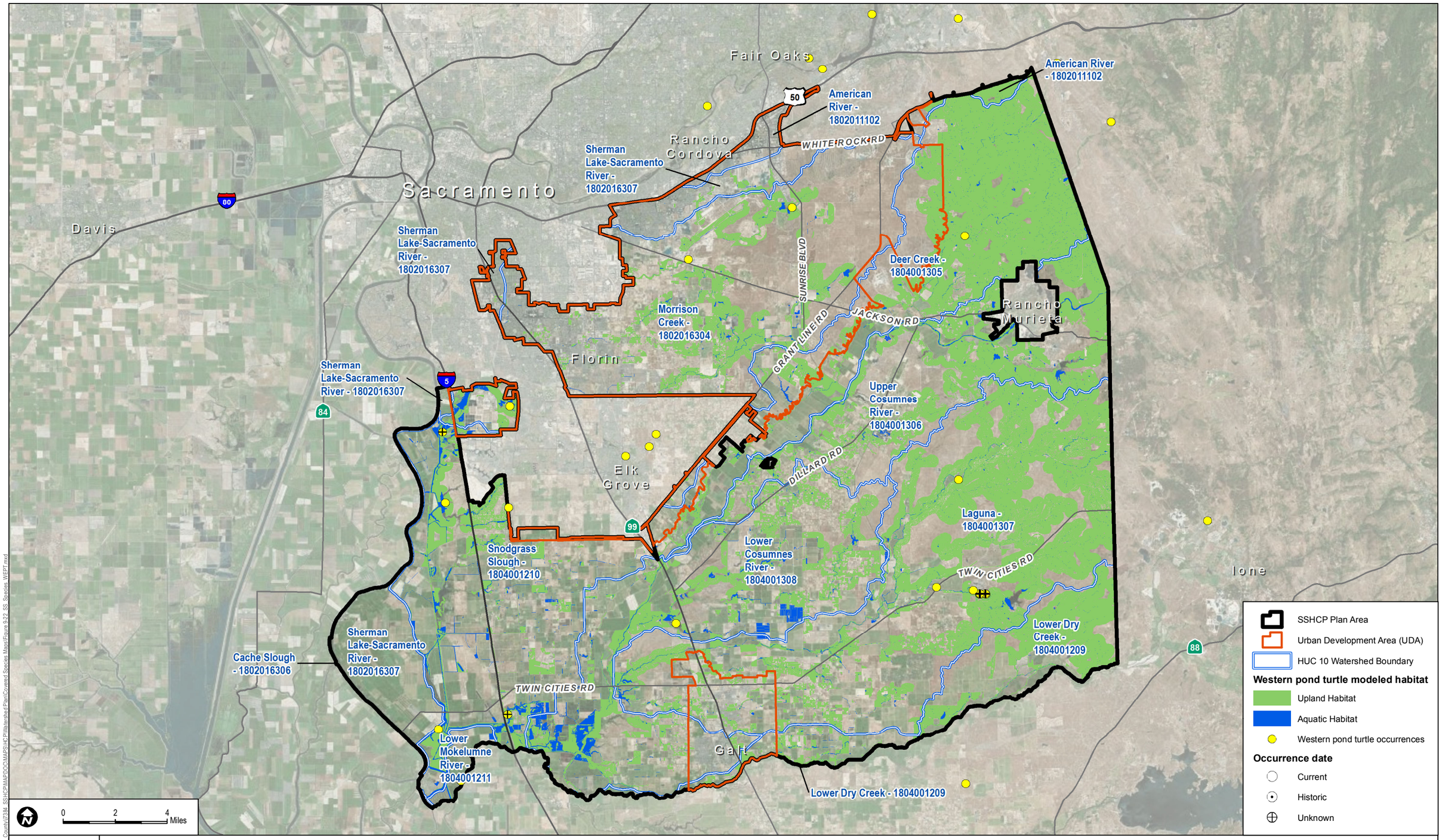

Path: Z:\Projects\Sacramento County\27386 SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-22 SS Species WEPT.mxd

DUDEK

SOURCE: Bing Maps 2015, County of Sacramento 2014, USGS 2013 NHD
CDFG 2012, CH2MHILL/Garcia & Associates, EIP Associates

FIGURE 9-22

Western Pond Turtle Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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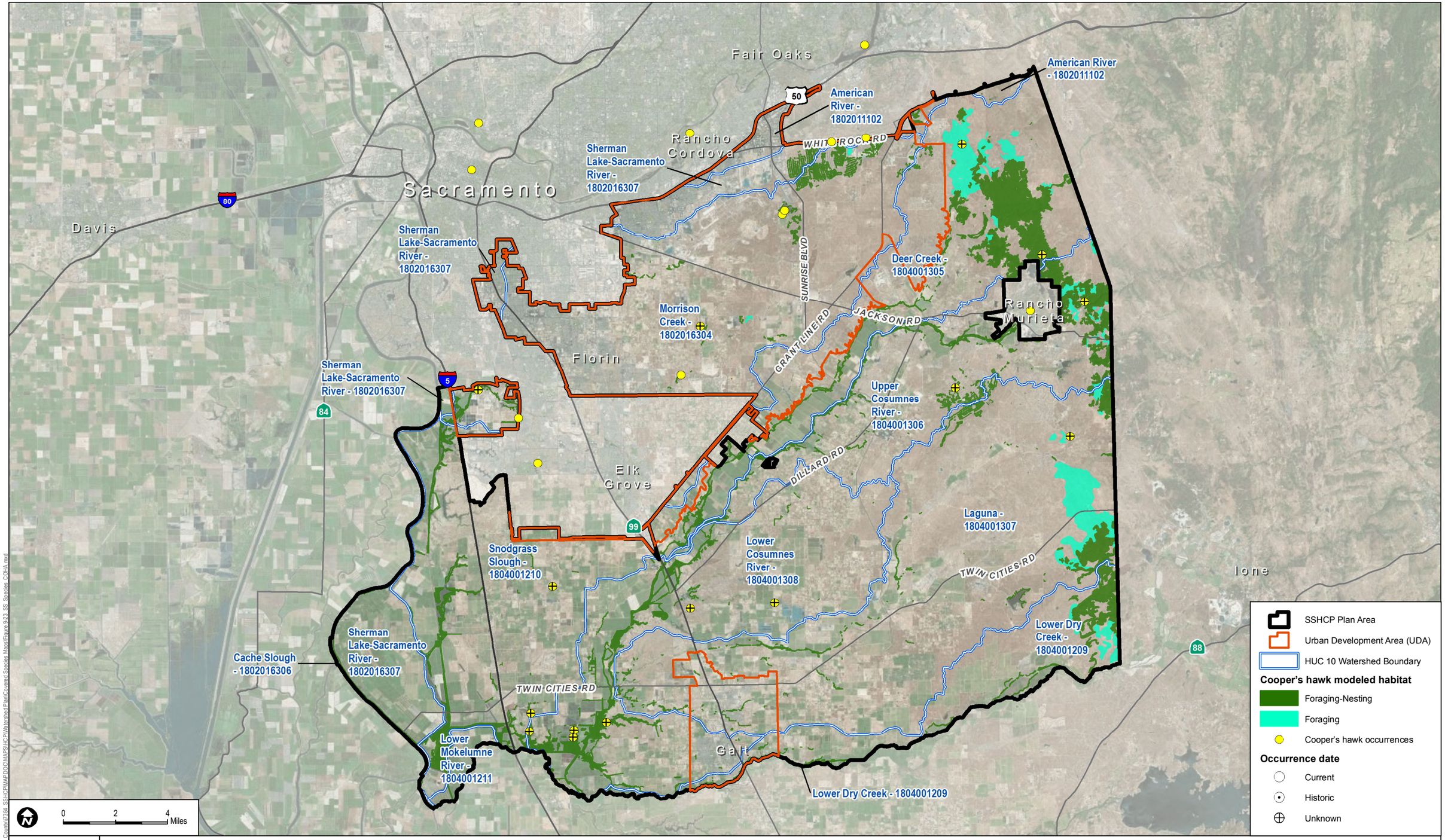

Path: Z:\Projects\Sacramento_County\73284_SSHCP\MAPDOC\MAPS\HCP\WatershedPlan\Covered Species Maps\Figure 9-23_SS_Species_COHA.mxd

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, ebird.org, USGS 2013 NHD

DUDEK

FIGURE 9-23

Cooper's Hawk Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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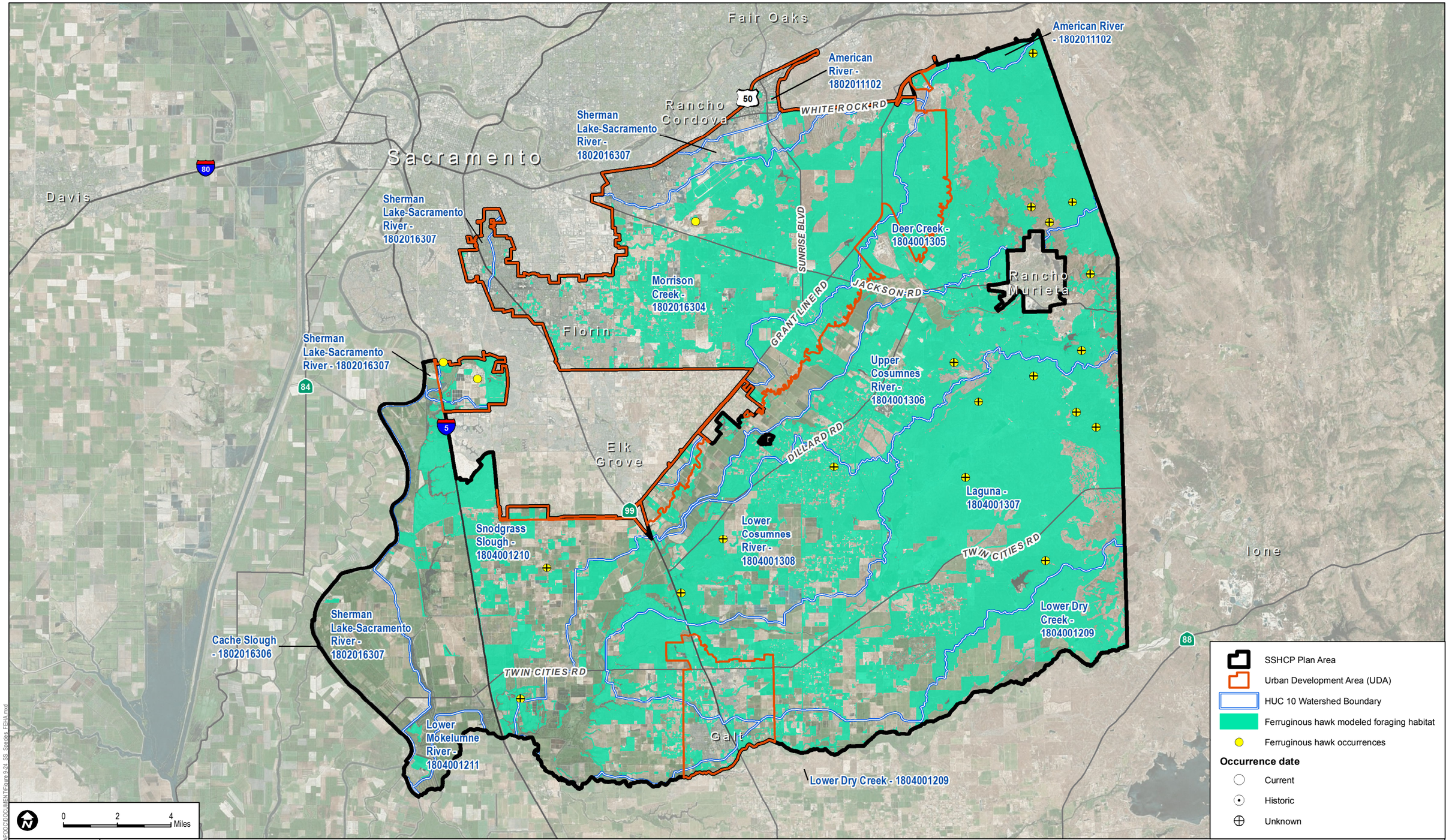

Path: Z:\Projects\P214094\MAP\DOCDOCUMENT\Figure 9-24_SS_Species_FEHA.mxd

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, ebird.org, USGS 2013 NHD

DUDEK

FIGURE 9-24

Ferruginous Hawk Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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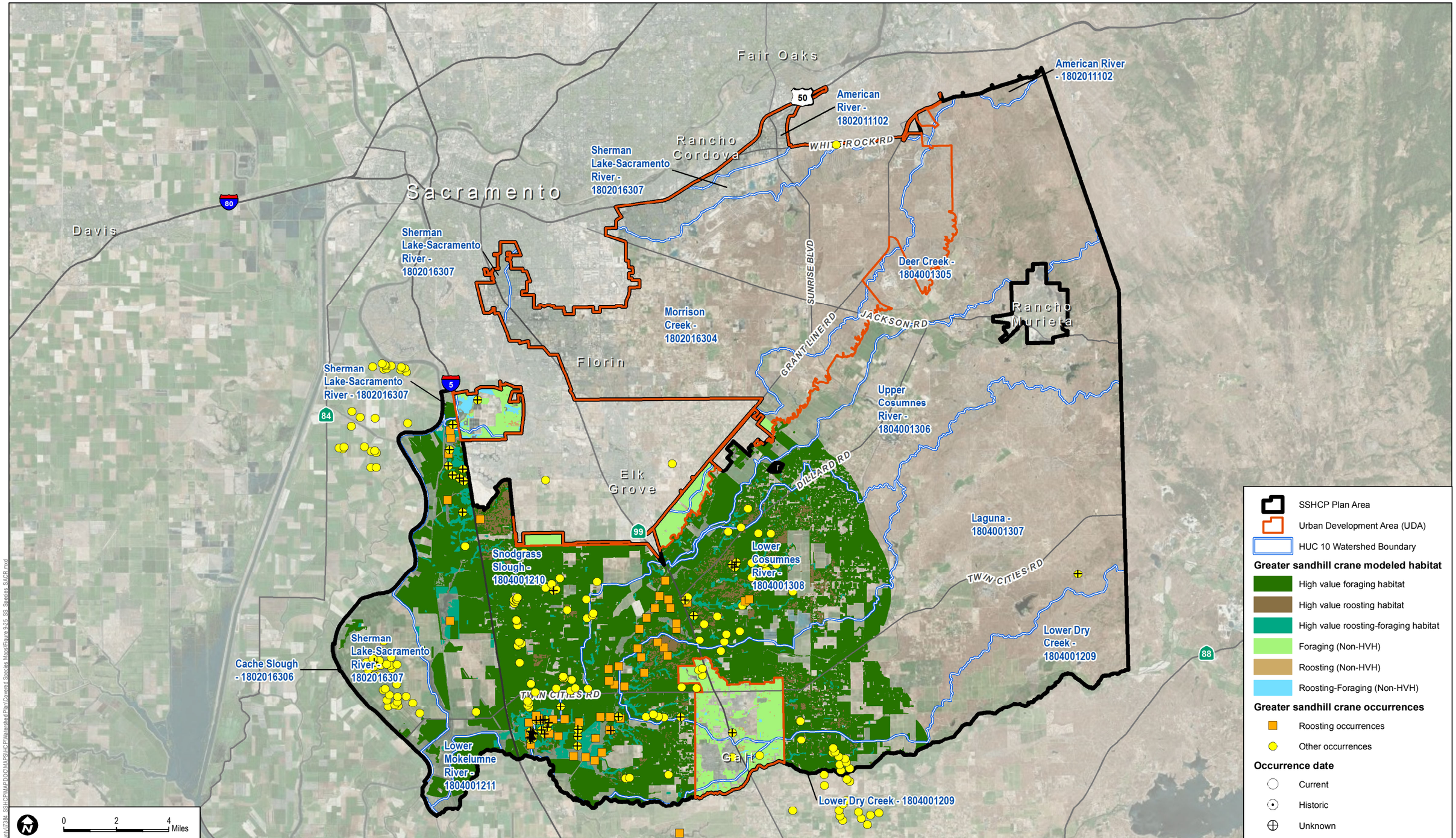

Path: Z:\Projects\Sacramento_County\7390_SSHCP\MAPPING\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-25_SS_Species_SAC.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, TNC 2000, Ivey 2003, Pogson & Lindstedt 2005, ebird.org, ICF 2013, USGS 2013 NHD

FIGURE 9-25

Greater Sandhill Crane Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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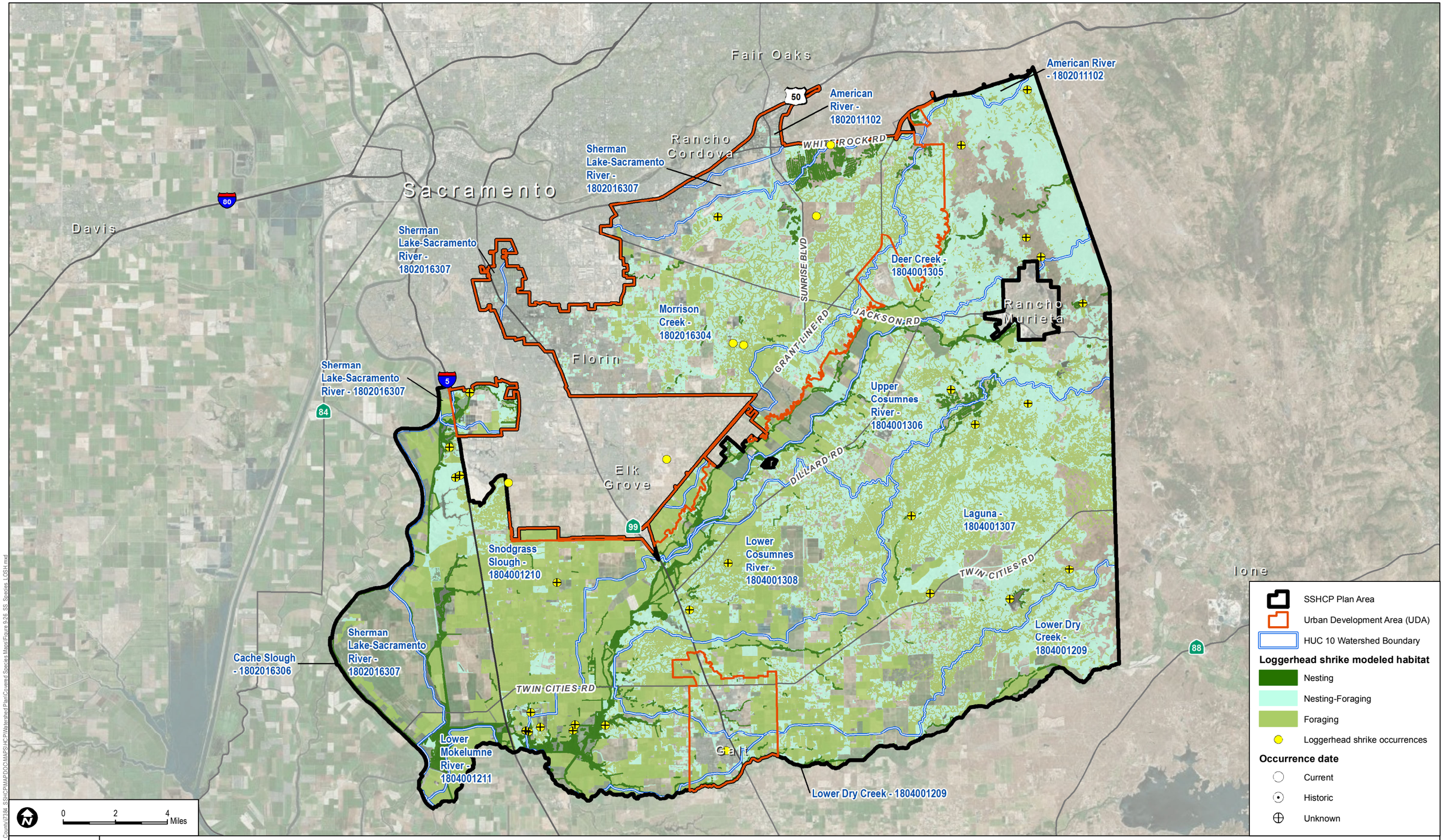

Path: Z:\Projects\Sacramento_County\73284_SSHCP\MAPDOC\MAPS\HCP\WatershedPlan\CoveredSpecies\Maps\Figure 9-26_SS_Species_LOSH.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2012, USGS 2013 NHD

FIGURE 9-26

Loggerhead Shrike Modeled Habitat and Known Occurrences

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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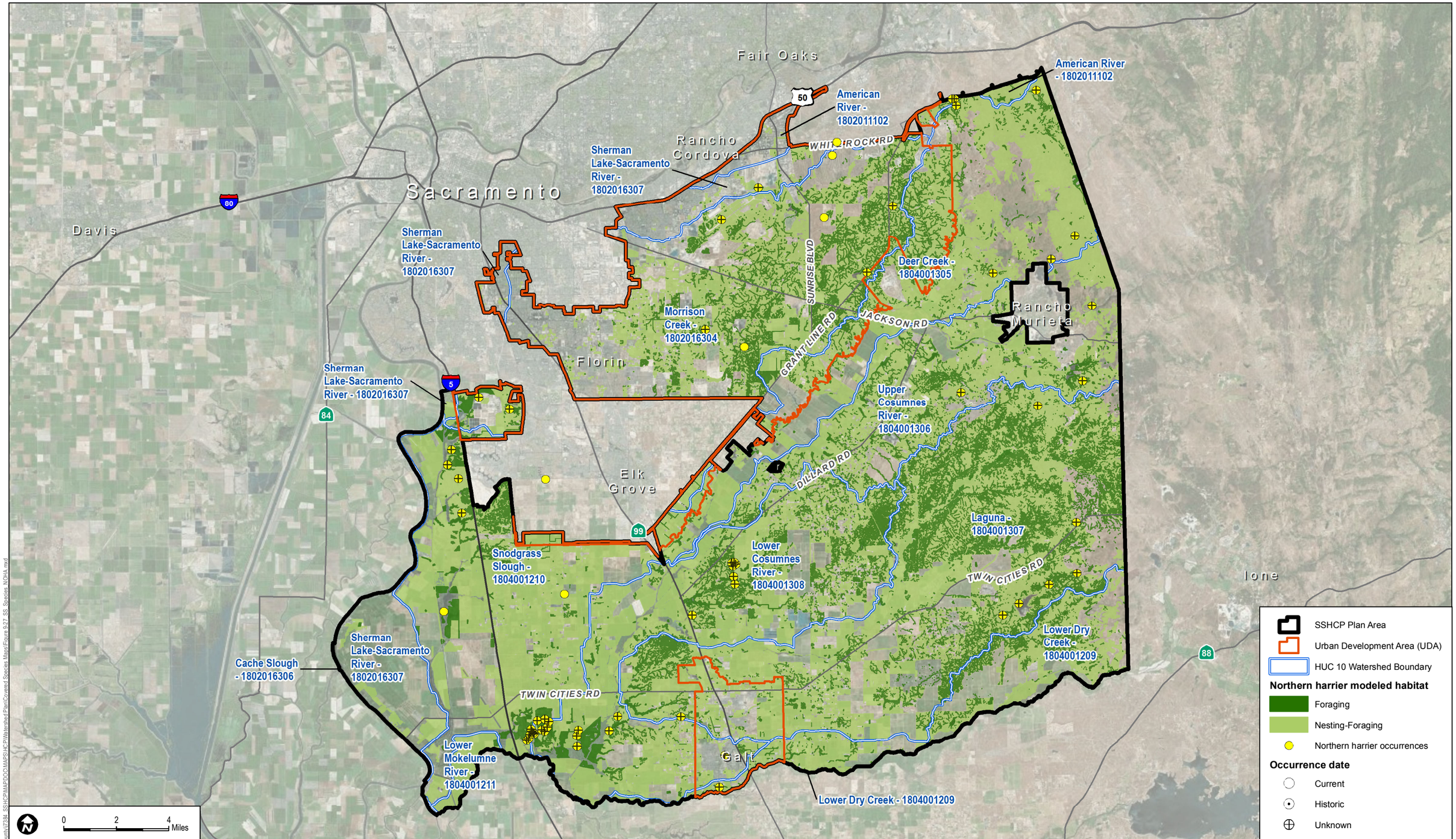

Path: Z:\Projects\Sacramento County\12386 SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-27 SS Species NOHA.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, ebird.org, USGS 2013 NHD

FIGURE 9-27

Northern Harrier Modeled Habitat and Known Occurrences

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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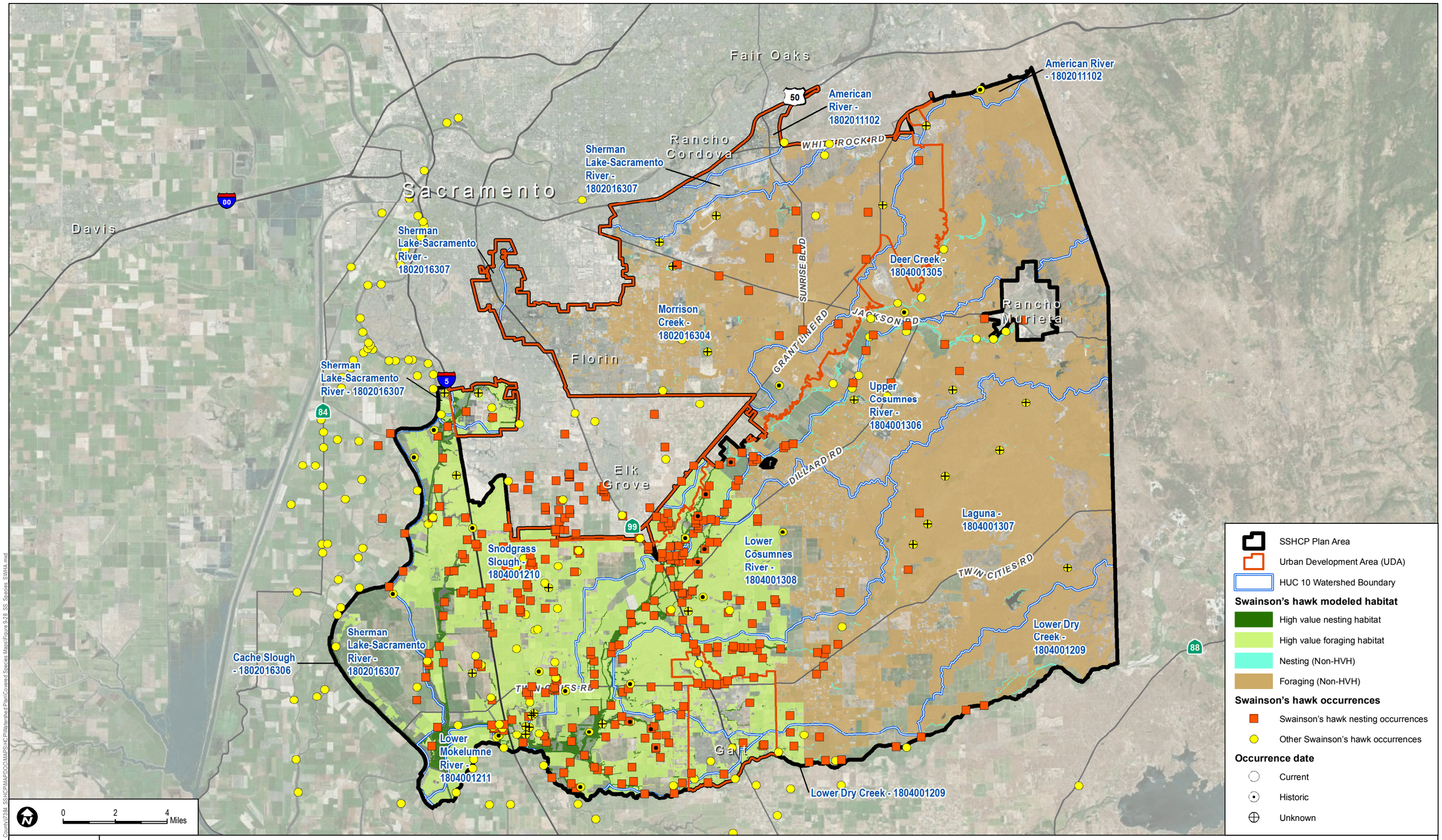

Path: Z:\Projects\SacramentoCounty\87398_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-28_SS_Species_SWHA.mxd

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, BIOS 2012, ESTEP Environmental 2006, ebird.org, USGS 2013 NHD

DUDEK

FIGURE 9-28

Swainson's Hawk Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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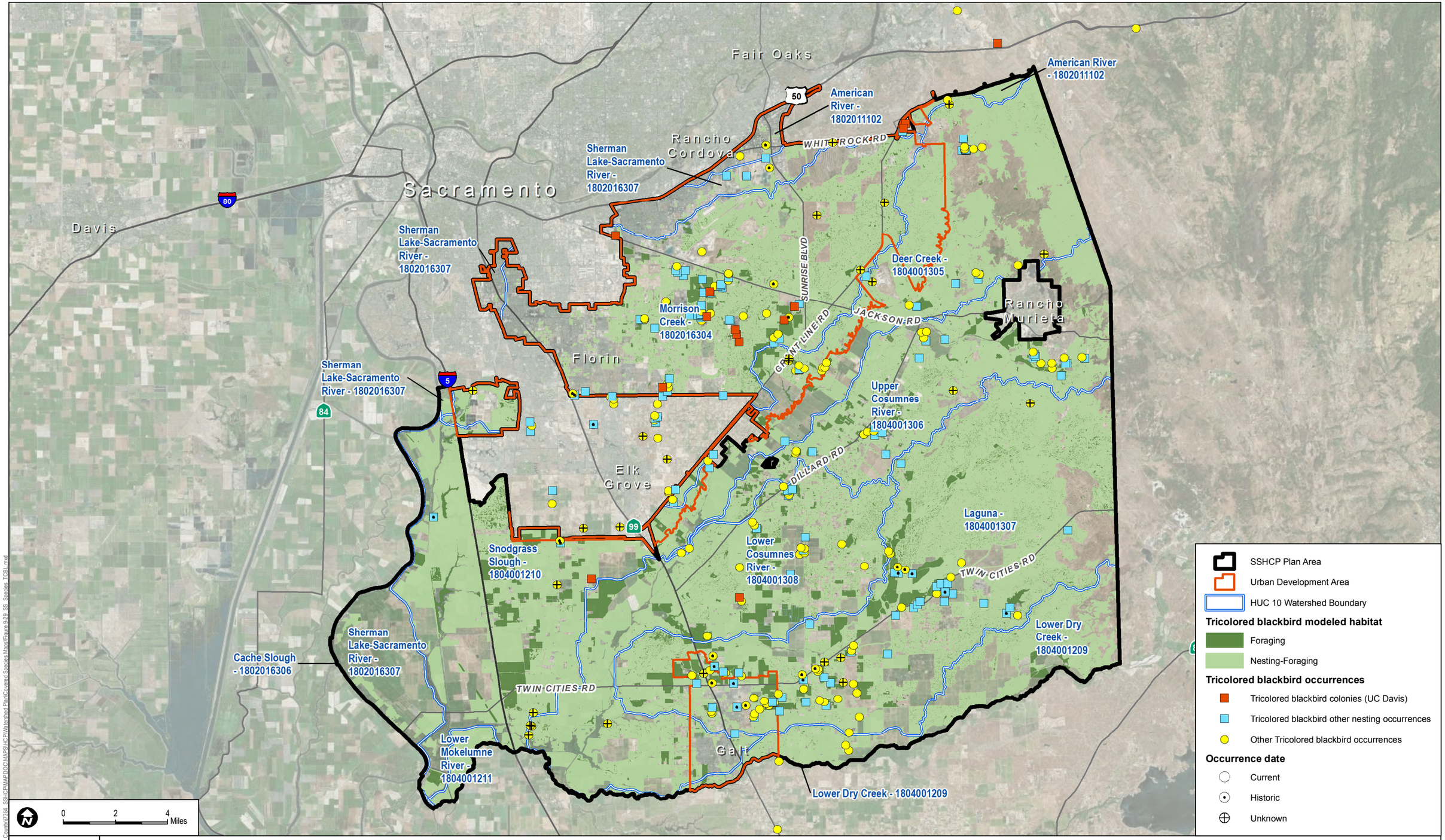

Path: Z:\Projects\Sacramento_County\7284_SSHCP\MAPDOC\MAPS\HCP\WatershedPlan\Covered Species Maps\Figure 9-29_SS_Species_TCBL.mxd

SOURCE: Bing Maps, County of Sacramento 2014, UC Davis 2014, CDFG 2012, BIOS 2012, Lizette Cook 1997, ebird.org, USGS 2013 NHD

DUDEK

FIGURE 9-29

Tricolored Blackbird Modeled Habitat and Known Occurrences

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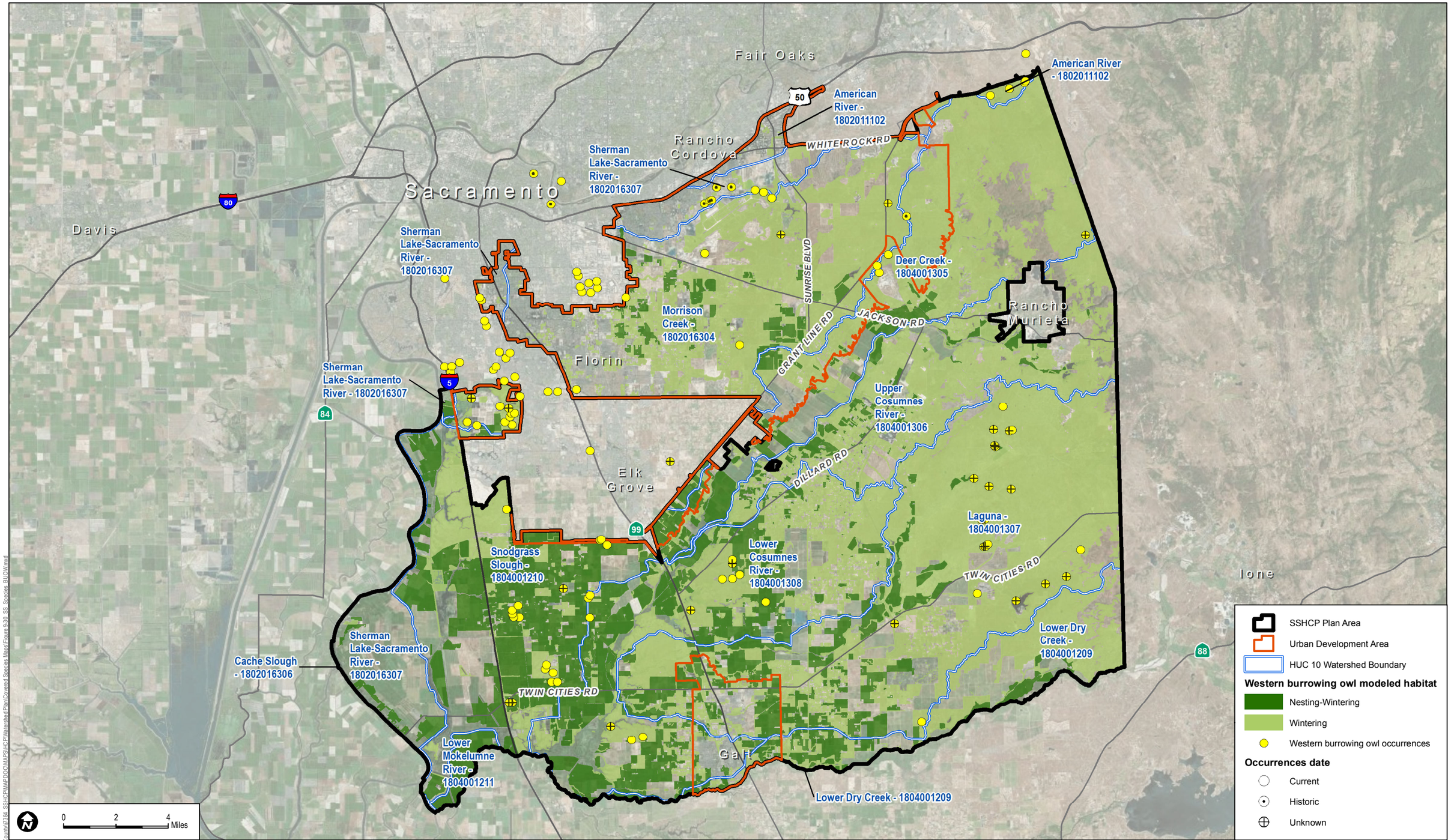

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, Chris Conrad 2004, Ebird.org, TNC, USGS 2013 NHD

DUDEK

FIGURE 9-30

Western Burrowing Owl Modeled Habitat and Known Occurrences

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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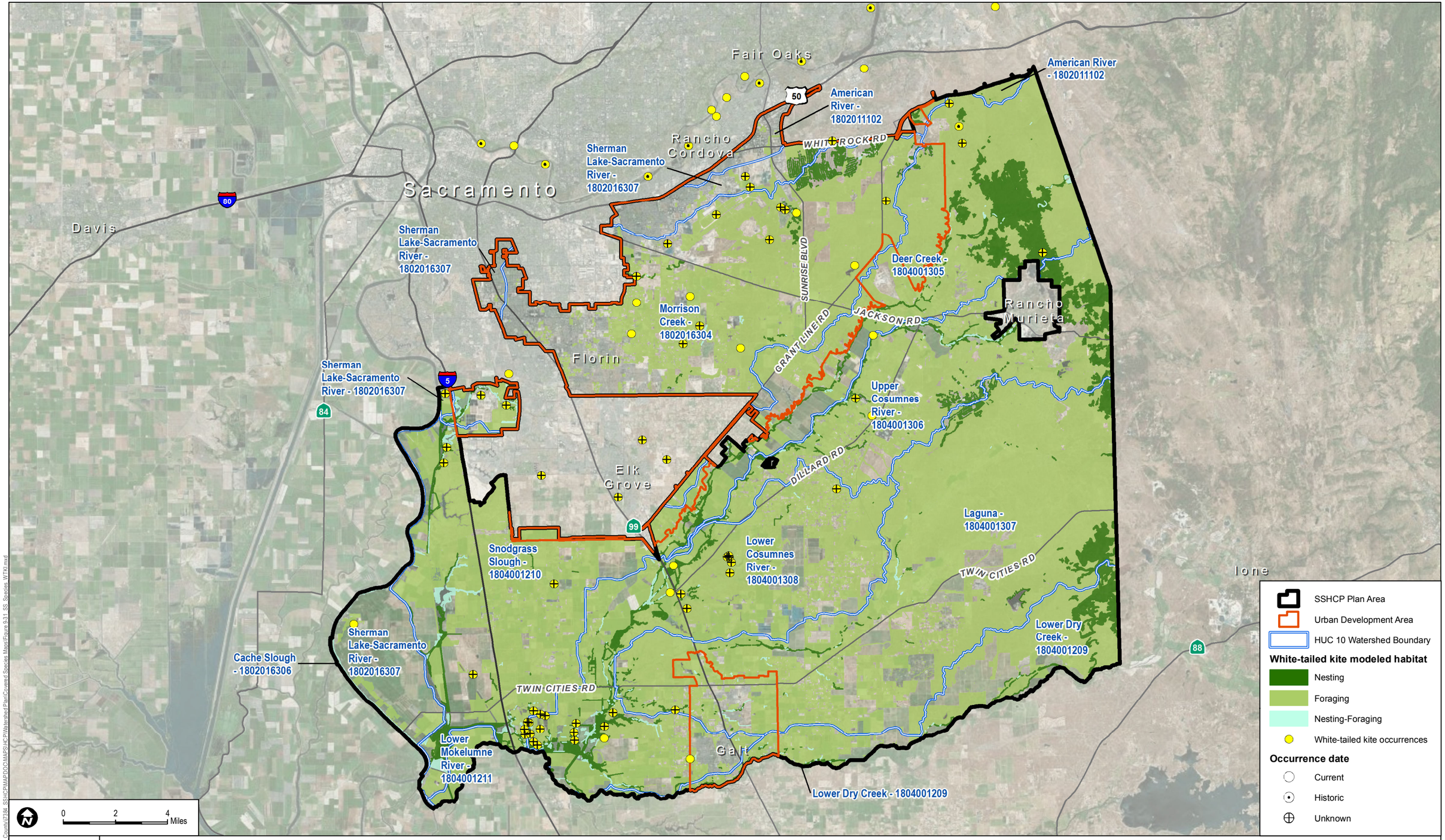

Path: Z:\Projects\Sacramento_County\72304_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan\Covered Species Maps\Figure 9-31_SS_Species_WTK.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, ESTEP 2006, ebird.org, USGS 2013 NHD

FIGURE 9-31

White-Tailed Kite Modeled Habitat and Known Occurrences

NOTE: Historic occurrences are observations prior to 1990. CNDDB points are centroids of CNDDB polygons of variable certainty.

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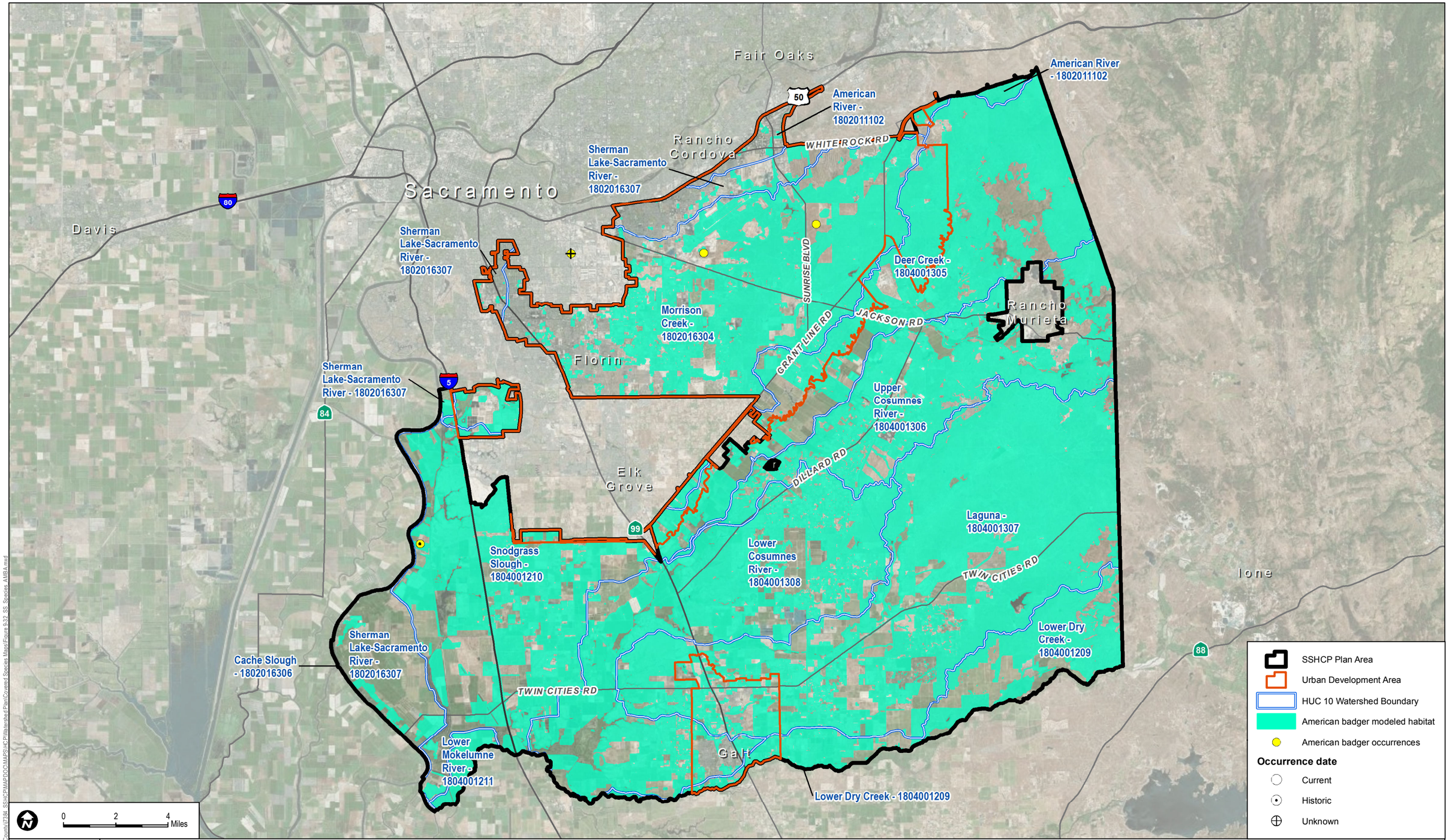

Path: Z:\Projects\Sacramento_County\17304_SSHCP\MAPDOC\MAPS\HCP\WatershedPlan\Covered Species Maps\Figure 9-32_SS_Species_AMBA.mxd

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, USGS 2013 NHD

DUDEK

FIGURE 9-32

American Badger Modeled Habitat and Known Occurrences

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

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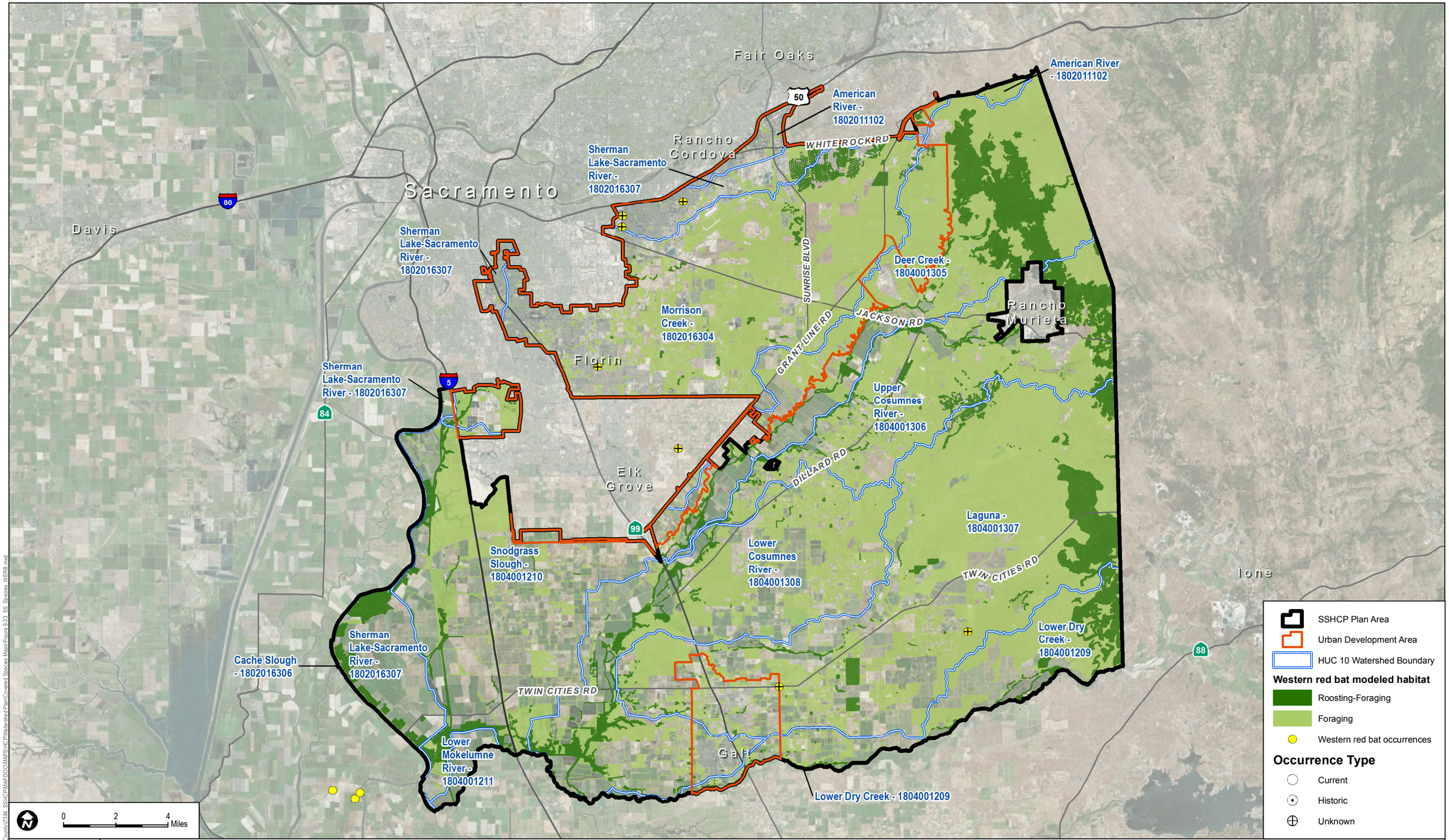

Path: Z:\Projects\Sacramento_County\17304_SSHCP\MAPDOC\MAPS\HCP\WatershedPlan\Covered Species Maps\Figure 9-33_SS_Species_WERB.mxd

DUDEK

SOURCE: Bing Maps, County of Sacramento 2014, CDFG 2012, USGS 2013 NHD

FIGURE 9-33

Western Red Bat Modeled Habitat and Known Occurrences

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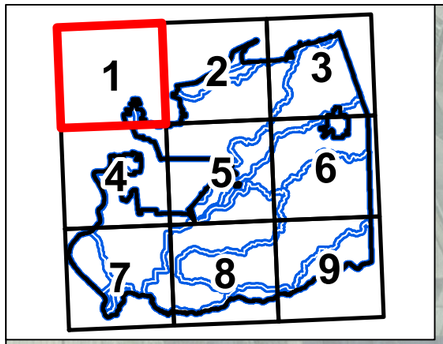

SSHCP Plan Area
Urban Development Area (UDA)
Preserve Planning Units (PPU)
HUC 10 Watershed Boundary

Existing Conservation

EXISTING PRESERVE

1

American River - 1802011102

Sherman Lake-Sacramento River - 1802016307

Sherman Lake-Sacramento River - 1802016307

PPU 2

PPU 3

Morrison

0 1 2 Miles

DUDEK

7384

SOURCE: USGS 2013 National Hydrography Dataset (NHD), County of Sacramento 2014

Figure 10 - Reserve Design Map

SOUTH SACRAMENTO COUNTY HABITAT CONSERVATION PLAN WATERSHED PLAN

MAP NUMBER 1

7:\Projects\Sacramento_County\7384_SSHCP\MAPDOC\MAPS\HCP\Watershed Plan

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APPENDIX B-1

Vernal Pool Classifications

APPENDIX B-1
Vernal Pool Classifications

1 DESCRIPTION OF VERNAL POOLS AND VERNAL POOL COMPLEXES

California vernal pools are a type of seasonal wetland habitat that is characterized by a specific set of physical parameters and a unique assemblage of highly specialized endemic plants and animals. Owing in part to significant loss of this habitat type in the State since the latter part of the 19th century, a number of vernal pool-dependent species are now listed as rare, threatened, or endangered with State and Federal Agencies. California vernal pools and vernal pool complexes have received considerable research attention since first recognition of their unique biota and ecological characteristics in the early 20th century (Stone 1990). Excellent sources of information exist today as a result of numerous scientific investigations, many of which are included or otherwise referenced in published proceedings of four symposia convened over the last 25 years (Jain 1976; Jain and Moyle 1984; Ikeda and Schlising 1990; Witham 1998). Consultant-produced reports pertaining to vernal pool ecology and landscape-scale conservation include Jones and Stokes (1990) and Vollmar (2002). An overview of California vernal pool ecology and biogeography can be found at http://www.maphost.dfg.ca.gov/wetlands/"vp_asses_rept.

The following account provides an overview of vernal pool ecology and conservation as they pertain to analysis and planning needs for the approximately 344,600-acre SSHCP Study Area[1]. As landscape-scale conservation requires, emphasis is placed on the relationships between vernal pool habitat (climate, geology, soils, hydrology, and disturbance) and the associated assemblage of vernal pool-dependent plants and animals, including the 13 species covered by the SSHCP (Table B1-1).

Table B1-1
Vernal Pool Species Covered under the
South Sacramento County Habitat Conservation Plan

Group *Common Name* *Scientific Name*	Status[2]	General Distribution By County or Region[3]	Habitat Associaton[4]
Plants			
Ahart's dwarf rush *Juncus leiospermus* var. *ahartii*	CNPS 1B	Butte, Calaveras, Placer, Sacramento, Yuba	Shallow vernal pools and margins of large pools; 98-328 feet; March-June
Boggs Lake hedge-hyssop *Gratiola heterosepala*	SE, CNPS 1B	Fresno, Lake, Lassen, Madera, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Tehama; Oregon	"Larger" vernal pools, vernal marshes and swamps; 33-7,792 feet; March-August

[1] The "SSHCP Study Area" differs from the "Plan Area" as described in the main body of the SSHCP due to the Sphere of Influence (SOI) boundary changes and the inclusion of the area west of Interstate 5 in the southern portion of the County.

Table B1-1
Vernal Pool Species Covered under the
South Sacramento County Habitat Conservation Plan

Group *Common Name* *Scientific Name*	Status[2]	General Distribution By County or Region[3]	Habitat Associaton[4]
Dwarf downingia *Downingia pusilla*	CNPS 2	Merced, Mariposa, Napa, Placer, Solano, Sacramento, Sonoma, Stanislaus, Tehama, Yuba; South America	Small to medium vernal pools and swales; 3.3-1,450 feet; March-May
Legenere *Legenere limosa*	CNPS 1B	Lake, Napa, Placer, Sacramento, Shasta, San Mateo, Solano, Sonoma*, Stanislaus*, Tehama	"Larger/deeper" vernal pools; 3.3-2,887 feet; April-June
Pincushion navarretia *Navarretia myersii* spp. *myersii*	CNPS 1B	Amador, Lake, Merced, Sacramento	Small to medium size vernal pools; 66-1,083 feet; April-May
Sacramento Orcutt grass *Orcuttia viscida*	SE, FE, CNPS 1B	Sacramento	"Larger/deeper" vernal pools; 98-328 feet; April-July
Slender Orcutt grass *Orcuttia tenuis*	SE, FT, CNPS 1B	Lake, Lassen, Plumas, Sacramento, Shasta, Siskiyou, Tehama	"Larger/deeper" vernal pools; 115-5,775 feet; May-October
Invertebrates			
Mid-valley fairy shrimp *Branchinecta mesovallensis*	FSC	Southern Sacramento County, west to Solano and Contra Costa County, along east side of the Central Valley south to Fresno County	Small to medium vernal pools, rarely vernal swales.
Ricksecker's Water Scavenger Beetle *Hydrochara ricksecker*i	FSC	Alameda, Marin, Placer, Sacramento, San Mateo, Sonoma	Vernal pools and seasonal wetlands.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT	Central Valley, central and southern Coast Ranges, southern Oregon	Small to medium vernal pools, occasionally vernal swales.
Vernal pool tadpole shrimp *Lepidurus packardi*	FE	Central Valley from Shasta County to northern Tulare County; endemic to Central Valley	Medium to large vernal pools.
Amphibians			
California tiger salamander *Ambystoma californiense*	ST, FT	Central Valley and Coast Range, from Sonoma to Santa Barbara County	Breeds in vernal pools and ponds; restricted to rodent burrows during dry months.
Western spadefoot *Spea hammondii*	SSC, FSC	Central Valley and Coast Range from eastern Alameda County to northwest Baja California; Mexico	Breeds in vernal pools and ponds, aestivates during dry months in self - made burrows.

Notes:

1. Data compiled from the California Native Plant Society's Inventory of Rare and Endangered Plants of California (2001), and USFWS Federal Register (1994, 1997, 2004a, 2004b).
2. FE: federal endangered; FT: federal threatened; FSC: federal species of concern; SE: state endangered; SSC: state species of concern; CNPS Lists= List 1B: rare, threatened or endangered in California and elsewhere; List 2: rare, threatened or endangered in California, but more common elsewhere.
3. Asterisks represent recorded extirpations.
4. Flowering periods are given for plants in this column.

1.1 Vernal Pool Habitat, Climate, Landforms, Geologic Formations and Soils

The vernal pool complexes of California are considered to be relatively recent ecological entities, having evolved in the Central Valley landscape after the inland Tertiary-Age sea receded, the late Pleistocene lakes dried, and the present-day Mediterranean-type climate fully developed (Stone 1990; Stebbins 1976; Raven and Axlerod 1978). The vernal pool ecosystem developed and persists as a result of complex relationships between this climate, the region's geology and soils, the vernal pool hydrological cycle, and biological, ecological, and evolutionary processes (Keeley and Zedler 1998; Stone 1990; Holland and Dains 1990).

The annual hydrological cycle that defines the vernal pool wetland ecosystem is driven by the predictable cool wet winters and warm, extremely dry summers that characterize the Mediterranean-type climate of California. In the context of this seasonal regime, vernal pools develop in depressional basins on substrates possessing an impermeable layer that restricts the downward percolation of water through the soil profile. In general, vernal pools are classified by the nature of the water impediment as being hardpan, claypan, or volcanic mudflow-type vernal pools (Holland 1978, 1986; Sawyer and Keeler-Wolf 1995).

Different geologic formations and their associated soils exhibit different propensities for the development of vernal pools (Keeley and Zedler 1998; Holland and Dains 1990; Metz 2001). Further, vernal pools and vernal pool complexes can differ in fundamental physical and biological ways between geologic formations in a given region (Holland and Dains 1990; Smith and Verrill 1998; Platenkamp 1998; Metz 2001; Vollmer 2002; Helm and Vollmar 2002; Laabs et al. 2002; Dittes and Guardino 2002). In addition to landform-specific variance in the soil substrate itself (e.g., particle size fraction, chemistry, depth to hardpan, water retaining capacity, etc.), sub-watershed drainage area, pool size, shape, ponding depth, ponding duration, soil dry-down rates and other hydrological dynamics appear to be related to Geologic Formation (Metz 2001; Smith and Verrill 1998; Hobson and Dahlgren 1998).

Particular geologic formations possess specific biogeographic legacies (e.g., ages, centers of evolutionary origin and diversification, available refugia during long-term extreme climatic cycles, anthropological land management history, etc.); these being reflected in present day patterns of biodiversity (Holland and Dains 1990; Dittes and Guardino 2002).

In the SSHCP Study Area, 18 different geologic formations support vernal wetlands. These geologic formations are listed in Table B1-2 and are further described in Section 3.

Table B1-2
Summary of Landforms, Geologic Formations and Soils in the SSHCP Study Area, with Associated Attributes

Landform	Geologic Formation	Period/Epoch	Age[2] (Ma)	Parent Material/Description
Other	Metamorphic Rocks, Undifferentiated (pKu)	Pre-Cretaceous	Prior to 145	Composed of amphibolite, greenstone, vein quartz, slate, and shale.
High Terrace	Ione (Ti)	Eocene	35-55	Quartz sandstone deposited along ancient inland seashore
Mudflow/Lavaflow	Valley Spings (Tvs)	Oligocene/ Miocene	5-35	Cemented rhyolitic tuff deposited as fluvial clay, silt, and sand
Mudflow/Lavaflow	Mehrten (Tm)	Miocene / Pliocene	2-25	Moderately undurated fluvial sand, silt, and minor gravel alluvium, presumably from reworked andesitic volcanic mudflow deposits to the northeast
High Terrace	Laguna (Tl)	Late Pliocene	2	Weakly to moderately indurated granitic alluvium (sand, silt and minor gravel)
High Terrace	North Merced Gravel (Qtnm)	Late Pliocene / Early Pleistocene	1-2	Thin, locally derived pediment veneer of cobble gravel on very high terraces capping Tertiary and pre-Tertiary rocks, deposited through outwash of Sierra Nevada glaciation
High Terrace	Turlock Lake (Tpl)	Late Pliocene / Early Pleistocene	1-2	Weakly indurated granitic alluvium (sand, fine sand, minor clay and gravel)
Low Terrace	Riverbank Undivided (Qr)	Pleistocene	0.1	Interbedded granitic sand, silt and clay, with metamorphic channel gravels
Low Terrace	Riverbank, Lower Unit (Qrl)	Pleistocene	0.1	Granitic alluvium (sand, silt, clay and gravel)
Low Terrace	Riverbank, Middle Unit (Qrm)	Pleistocene	0.1	Locally and remotely derived granitic and basic igneous alluvium (sand, silt, ,clay and gravel)
Low Terrace	Riverbank, Upper Unit (Qru)	Pleistocene	0.1	Unconsolidated but compact dark brown to red alluvium
Low Terrace	South Fork Gravels (Qsf)	Pleistocene	0.1	Stream-rounded cobbles and gravels in a clay matrix
Other	Upper Unit Modesto (Qmu)	Upper Pleistocene / Holocene	0.01	Mixture of arkosic sand, gravel, and silt consisting of mainly quartz and feldspar.
Other	Surficial Deposits (Qu)	Holocene	recent	Unconsolidated surficial deposits from mixed alluvial sources
Other	Dredge Tailing and Artificial Fill (t)	Holocene	recent	Rows of cobble, gravel, sand, silt, and clay.
Other	Alluvial Floodplain Deposits (Qfp)	Holocene	recent	Composed of fine sands, silts, and clay
Other	Alluvial Deposits, Undivided (Qha)	Holocene	recent	Composed of cobble, gravel, sand, silt, and clay

Table B1-2
Summary of Landforms, Geologic Formations and Soils in the SSHCP Study Area, with Associated Attributes

Landform	Geologic Formation	Period/Epoch	Age[2] (Ma)	Parent Material/Description
Other	Basin Deposits (Qhb)	Holocene	recent	Composed of unconsolidated clay, silt, and fine sands formed in sink areas

Notes:
1 Information compiled from Tugel (1993), Smith and Verrill (1998) and Vollmar.
2 Age estimates of boundaries in mega-annum (Ma).

1.2 The Vernal Pool Hydrologic Cycle

California vernal pools are a subcategory of seasonal wetlands that are characterized by a very specific annual hydrologic regime, which is often cited as the strongest determinant in shaping vernal pool flora and fauna (see Section 1.3). Vernal pool basins transition through four hydro-ecologic phases during the course of a single year: (i) a wetting phase, (ii) an aquatic or inundation phase, (iii) a waterlogged-terrestrial phase, and (iv) a drought phase (Zedler 1987; Keeley and Zedler 1998). This seasonal hydrologic cycle encompasses extremes of inundation and drought, a regime that has been primary in shaping the highly specialized flora and fauna (Stone 1990). To the benefit of native biodiversity, this extreme hydrologic regime has also proven excessively stressful for the majority of non-native plant species that have come to define California's contemporary valley annual grassland habitats.

Differences in ecological function of vernal pools, and in patterns of vernal pool biodiversity are determined in large part by variance in vernal pool hydrologic regimes (Ebert and Balko 1984; Zedler 1987; Holland and Jain 1990; Jones and Stokes 1990; Jokerst 1990; Platenkamp 1998; Keeley and Zedler 1998). The characteristic concentric rings of species that occur around many vernal pools results from timing of germination and maturation relative to the seasonal inundation and dry-down of the pool basin and soil profile (Bliss and Zedler 1998; Keeley and Zedler 1998). Variance in vernal pool hydrology exists within and between pools/complexes within single years (Stone 1990; Holland and Jain 1984; Holland and Dains 1990), and within and among single pools/complexes between years.

A discussion of vernal pool types, or of variance in function of vernal pools requires thinking about the hydrologic regimes in terms of a gradient of inundation and dry-down severity of the pool basin and soil profile. At one end of the topo-hydrologic gradient are "flashy, shallow, small" pools with shallow soils and at the other end are "stable, deep, large" pools with deep soils. At a slightly higher/drier topo-hydrologic position, the "flashy/small" vernal pool type intergrades with less specialized and mostly non-native seasonal wetland species, and then at a slightly higher and drier position, with upland annual grassland vegetation. At a slightly

lower/wetter topo-hydrologic position, the "stable/large" vernal pool type intergrades with seasonal marsh vegetation, comprised mostly of comparatively common and widespread perennial wetland plant species.

The full spectrum of the vernal pool hydrologic cycle can occur within individual large/deep vernal pools during a typical year. In these larger systems, hydrology similar to that of "flashy-smaller" pools can be associated with the topographic higher and drier edges, and "stable" pool hydrology with the deeper pool basins; the intervening slope is intermediate. In a given vernal pool complex, smaller/flashy pools tend to support a vegetation assemblage that represents a higher/drier subset of the larger/stable pool vegetation assemblage in the same setting.

Although "flashy-smaller" pool hydrology and vegetation can be considered as a subset of the larger pool system, "flashy-smaller" pools likely differ from large pools in a number of physical parameters and ecological functions. This may be reflected in the preference of some vernal pool invertebrates for the smaller pool type (Helm 1998; Helm and Vollmar 2002; Simovich 1998).

Different topo-hydrographic pool types function differently within a given hydrological season. For instance, small/shallow pools fill earlier and dry-down earlier over the hydrological season, at times even filling and drying more than once in a single year (Jones and Stokes 1990). Large pools take a longer time to fill and remain inundated longer into the later spring and early summer months. In addition, they almost never completely fill and dry more than once per hydrological year.

These different pool types undoubtedly behave differently through extended dry and wet climatic cycles as well. During very dry periods, large pools may never completely fill, but may still support vernal pool biota in the deepest portions that is characteristic of shallower pools or higher topo-hydrological positions during wetter years. During these dry periods the smallest flashy pools lack the specialized hydrology to support the more deeply adapted elements of the vernal pool biota altogether. During wetter climatic cycles, large pools may begin to function more like emergent marsh habitats, with increasing cover of perennial marsh species in the deeper portions (e.g., common spikerush), and small-flashy pools may begin to resemble the condition of larger vernal pools during drier cycles.

Juxtaposition of interconnected large and small pools together in a single landscape setting probably affords stability to the associated vernal pool biotic assemblage during long periods of time and under fluctuating climatic conditions (Jones and Stokes 1990).

Alteration of the hydrology of vernal pools/complexes may result in shifts towards a seasonal marsh ecosystem if the inundated and/or waterlogged-terrestrial phases of the cycle are prolonged, or towards a less specialized seasonal wetland ecosystem if those phases are

shortened. Thus, consideration of watershed integrity, hydrological buffers, and spatial scale in the creation of vernal pool preserves is fundamental to vernal pool conservation.

Despite the importance of the hydrologic regime as a determining factor in shaping the ecology of vernal pools, few detailed studies exist which address the hydrologic dynamics that exist between the vernal pool sub-watershed, the surrounding soil profile, and pool hydrology. The most detailed study to date, conducted in Sacramento County within the Sunrise-Douglas Specific Study Area, documents the relative importance of direct precipitation, overland flow, and subsurface flow to the seasonal hydrological regime of a small set of vernal pools (Hains and Stromberg 1998). This research indicated that during the single year of data collection in this set of pools, direct precipitation was responsible for most of the hydrological input into pool basins, followed by subsurface flow through the soil profile from adjacent uplands later in the season. Although overland flow was not significant during the season of the study, the model produced indicates that under conditions of higher than normal rainfall, overland flow contributions would increase.

Dynamic relationships were found to exist between the hydrology of the vernal pool basin and the surrounding soil profile (Hains and Stromberg 1998). In the study pools, water flowed from the ponded basin into the drier surrounding upland soils early in the season, and from the saturated upland soils into the pond basin later in the season, thus buffering the pool's inundation regime against excessively rapid filling early in the season, and against rapid drying later.

1.3 Influence of Vernal Pool Hydrology on Biotic Assemblages

The extreme seasonal inundation and drought conditions of the vernal pool hydrologic cycle exert strict demands on the plant and animal inhabitants. As a result, vernal pool organisms possess a suite of life history (Zedler 1990), morphological (Griggs 1974, 1980), and anatomical and physiological (Feaver 1971; Keeley 1981, 1988, 1990, 1998) adaptations that allow them to cope with challenges imposed by the habitat.

In general, all vernal pool organisms have evolved life history adaptations as a way to take advantage of the short, stressful growing season, and to avoid the regular extreme summer drought (Zedler 1990, Kelley and Zedler 1998). The vast majority of vernal pool endemic plant species exhibit an annual life cycle (Zedler 1990). The ability to germinate, grow, and complete reproduction within one growing season allows populations of plants to pass the summer drought as seeds on/in the soil. Similarly, vernal pool invertebrates hatch from their dormant cysts/eggs after the pools fill; they mate, produce cysts/eggs, and die as the pools dry. For populations of these species, the summer is spent on/in the soil in the form of dormant cysts/eggs (Keeley and Zedler 1998). Storage of drought-dormant seeds/cysts in the soil profile may also afford stability to populations over multiple-year drought cycles (Griggs and Jain 1983; Holland 1987; Stone et al. 1988).

The inundated phase presents its own challenges to growth and survival, and an amphibious life history, with corresponding aquatic juvenile morphology and physiology, is an adaptive trait shared by plants and animals alike (Keeley and Zedler 1998). Like vernal pool amphibians, many vernal pool plant species possess dual morphology, with a juvenile grass-like (Isoetid) leaf form that is adapted for maximal growth underwater during the vernal pool inundated phase (Keeley 1981 1990, and 1998).

As the pool progresses through the waterlogged-terrestrial phase and into the drought-phase, the plants assume a different adult morphology that is suited to growth in the terrestrial setting. Adult amphibian vertebrates, including western spadefoot toad (*Spea hammondii*) and California tiger salamander (*Ambystoma californiense*), congregate, mate and lay egg masses in vernal pools during the inundated phase; the eggs hatch to produce aquatic larvae (pollywogs), which mature and metamorphose into the adult terrestrial form before the pool basins completely dry. The metamorphosed juveniles of the season and older adults then migrate to rodent burrows in the uplands after the pools dry to pass the summer in a state of dormancy.

Parameters of vernal pool hydrology (e.g., ponding duration, ponding depth, soil depth and water-holding capacity) have been variously correlated with patterns of plant (Alexander and Schlising 1998; Holland and Dains 1990; Stone et al. 1988; Platenkamp 1998; Dittes and Guardino 2002), invertebrate (Helm 1998; Helm and Vollmar 2002; Platenkamp 1998; Simovich 1998), vertebrate amphibian (Laabs, Orloff and Allaback 2002; Morey 1998), and avian biodiversity (Silviera 1998).

In general, larger/deeper vernal pools have potential to support a wider array of topo-hydrographic positions and greater overall plant diversity, as well as populations of "large pool" plant and animal species, including Orcuttiae grasses, legenere (*Legenere limosa*), California tiger salamander, western spadefoot toad, and vernal pool tadpole shrimp (*Lepidurus packardi*). All of these "large-pool" species require a relatively extended inundation phase for completion of their life cycles, as compared with more frequently occurring vernal pool taxa adapted to shorter inundation regimes.

While larger/deeper pools provide specialized habitat conditions that support several listed plant and animal species, smaller/flashy pools also provide important habitat for listed species. Two such invertebrate species are the vernal pool fairy shrimp (*Branchinecta lynchi*) and mid-valley fairy shrimp (*B. mesovallensis*), which have adapted to short inundation regimes by completing their life cycle in a relatively short amount of time. Similarly, Ahart's dwarf-rush (*Juncus leiospermus* var. *ahartii*), and to some extent, dwarf downingia (*Downingia pusilla*) and pincushion navarretia (*Navarretia myersii*), are rare plant species that are adapted to the "flashy small" pool type.

1.4 Influence of Vernal Pool Interconnectivity on Biotic Assemblage

Interconnectivity is an important consideration for vernal pool conservation for a number of reasons. A landscape encompassing multiple pools of varying sizes located in close proximity to each other is ecologically complex, presents comparatively more niches, is more likely to support meta-population dynamics, and is likely to be more resilient through time, particularly in light of climatic fluctuations, as compared to a landscape with low density and/or low diversity of pool types.

It is useful to consider vernal pool ecosystem interconnectivity at three different spatial/functional scales.

Ecological interconnectivity between individual vernal pools within complexes and between vernal pool complexes mediated by contiguity of hydrology,

Ecological interconnectivity between pools and pool complexes at a local scale as mediated by contiguity of upland matrix,

Ecological interconnectivity between vernal pool complexes in the region as mediated by attractiveness of vernal pool landscapes to waterfowl and shorebirds migrating along the Pacific Flyway.

Interconnectivity at each of these scales involves a set of functioning physical biological components and presents specific ecological implications for associated vernal pool biota.

Hydrological interconnectivity between individual vernal pools or between vernal pool complexes can occur through the soil profile, as surface sheet flow over the soil profile, or by movement of water through swales or seasonal drainages. Alteration of pool or swale hydrology within hydrological-related pool complexes may affect the hydrology of other pools within those complexes. In addition to influence of hydrologic regime, interconnectivity via swales and drainages also presents dispersal opportunities for myriad vernal pool organisms, including rare vernal pool plants, invertebrate and amphibian species that are covered under the SSHCP.

Ecological interconnectivity between pools and pool complexes via contiguity of the upland matrix is an important consideration for life-history needs and dispersal of vernal pool organisms as well. Amphibians, including western spadefoot toad and California tiger salamander, require contiguous uplands for summer aestivation and for terrestrial migration of adults between core and satellite elements within larger meta-populations. Plant seeds and invertebrate cysts and eggs may also be transported between vernal pools across contiguous uplands in mud on the hooves or legs of livestock. Solitary bees that are obligate vernal pool plant pollinators depend on the

uplands surrounding vernal pools as well, and it is not known what interconnectivity means for them regarding the temporal and spatial scale of meta-populations.

In addition, attraction of a given pool or pool complex to migratory waterfowl and shorebirds is likely influenced by the juxtaposition of the pools/complexes with each other and with the immediately surrounding uplands. Similarly, at the regional scale, juxtaposition of vernal pools/complexes with each other, with other open-space areas, and with developed areas, undoubtedly influences attractiveness of those pools and complexes to migratory waterfowl and shorebirds traveling the Pacific Flyway. The use of pools/complexes by waterfowl and shorebirds affects dispersal of seeds and invertebrate cysts and eggs. This interconnectivity has biogeographic implications at both local and regional scales.

1.5 Vernal Pool Organisms

California vernal pools are defined in part by their highly adapted and unique assemblages of obligate-associated plants and animal species. Due to the significant loss of vernal pool habitat throughout California (see Section 4), the Federal Government and/or State of California has listed over 80 vernal pool organisms as Threatened, Endangered or candidates for Listing (Keeler-Wolf et al. 1998). Table 1 includes the 7 vernal pool endemic plant species and 6 vernal pool endemic animal species covered by the SSHCP. A brief discussion of their biology, ecology, and conservation considerations follows. For a more complete discussion of these organisms, refer to the individual SSHCP species accounts (Appendix A of the SSHCP). Legal status, distribution by County, and habitat associations for the 13 vernal pool species are listed in Table 1.

1.5.1 Vernal Pool Plants

Vernal pools support a uniquely adapted, mostly native, and highly endemic flora. The hydrologic cycle that defines this seasonal wetland type is excessively stressful for more commonly occurring wetland species, and it precludes most of the non-native plants species that dominate the surrounding present-day annual grassland. There are more than 100 native plant species that are more or less restricted to the vernal pool ecosystem (Keeler-Wolf et al. 1998; Keeley and Zedler 1998), 90% of these are native, and 55% are entirely restricted to California (Holland 1976; Keeler-Wolf et al. 1998). A typical vernal pool usually supports 15–25 species (Holland and Jain 1977, 1984; Zedler 1987).

The vernal pool flora is comprised of two biogeographic elements: strict California vernal pool endemics, and more widely occurring cosmopolitan aquatic species (Keeley and Zedler 1990). Most of the California vernal pool endemics are derived from upland progenitors that evolved into the developing vernal pool landscape since the Pleistocene (Stone 1990).

Vernal pool plant species composition has been shown to vary at multiple spatial scales, with 28% of overall variability occurring between state regions, 17% of variability occurring between areas at the scale of counties, and 55% of the variability occurring among pools within landscape complexes or "within pastures" (Holland and Jain 1981). Variability at the largest scale is influenced by climate, source biota, geological surface and site history (Holland and Dains 1990).

At the smallest scale, within pool variability in plant species composition is attributable mostly to variance in inundation regime (Kopecko and Lathrop 1975; Schlising and Sanders 1982; Zedler 1987; Holland and Jain 1988; Jokerst 1990; Keeley and Zedler 1998; Bauder 2000). Barbour et al. (2003) investigated within-pool variance in plant species composition and concluded that whole pool vegetation assemblages are complexes of several apparently independent communities, each of which can be found in other pools, and which may have individual geographic restrictions. The fact that greatest differences in community types were found between the deep and shallow parts of single pools is evidence of the strong selective force of the vernal pool inundation regime.

The terms "shallow pool species and deep pool species" or "edge species and basin species" have been used to describe contrasting preferences of plants for the different portions of the larger range of vernal pool hydrological regimes. A good example of a shallow pool or edge species is found in Ahart's Dwarf Rush, one of the rare species covered under the SSHCP. Good examples of deep pool, or basin species are found in Sacramento and slender Orcutt grasses, two rare species also covered by the SSHCP. However, not all species are as easily assignable to the two categories. Vernal pool plants are able to occupy these hydrological-stressful habitats owing to genetically fixed physiological, structural (anatomical and morphological), and life history traits.

The majority of vernal pool plant species have evolved the annual life cycle (Stone 1990; Zedler 1990; Keeley and Zedler 1998). In this fashion plant populations avoid the predictable and extreme summer drought in the form of dormant seeds. Since not all seeds may germinate every year, some vernal pool plant species have been shown to maintain a persistent dormant soil seed bank that acts as a buffer against single or multiple years with poor rainfall (Griggs and Jain 1983).

Germination occurs either early in the season during the wetting phase, or later on during the inundation phase of the vernal pool annual hydrological cycle (Keeley and Zedler 1998). Many vernal pool species possess dual morphology, with a juvenile form specialized for growth in the aquatic phase, and then later an adult form that is more suited to conditions of the inundated terrestrial and drought phases of the hydrological cycle (Zedler 1990). It is common to see flowering and fruiting species at drying pool margins while at the same time other species are present as seedlings and aquatic juveniles in the inundated pool basin.

Seed dispersal of vernal pool plants tends to be limited. This is thought to be an adaptation to the discontinuous and unpredictable occurrence of vernal pools in the larger upland landscape. Successful germination, growth, and reproduction of a vernal pool plant seed is likely to be the highest in the same pool that supported the seed's parent plant. Most vernal pool plants lack specialized seed dispersal mechanisms. As a result, seeds tend to fall near the parent plant. Some dispersal of seeds also occurs via flowing water, on the hooves and legs of livestock (tule elk [*Cervus canadensis nannodes*], antelope [*Antilocapra americana*] and grizzly bears [*Ursus arctos horribilis*] originally), and on the feathers and feet of waterfowl and shorebirds, suggesting that some seeds may travel greater distances.

Genetics have been investigated for only a limited number of vernal pool plant species (Elam 1998). Owing to certain population traits (e.g., small or fluctuating population numbers) it is hypothesized that some vernal pool species are subject to effects of genetic drift. This is expected to result in reduced genetic diversity and a high degree of among-population (between pool) variation (Elam 1998). Other genetic characteristics of vernal pool plants include limited gene flow between pools (e.g., seed and pollen dispersal), high among-population (between pool) variation, and variable ecological selection within and between pools (Elam 1998).

Some vernal pool species are pollinated by wind (Orcuttiae grasses), some are self-pollinated (legenere, dwarf downingia) and others (e.g., *Lasthenia, Downingia, Blennosperma, Limnanthes*) by a suite of co-evolved specialist solitary bees of the family Andrenidae (Thorp and Long 1998, Thorp 1990). These solitary bees nest in small tunnels excavated in the uplands around vernal pools and rely on vernal pool plants entirely to supply pollen for their young while the plants, in turn, depend on the pollination services of the bees to produce seeds for the next generation..

See Appendix A of the SSHCP for specific life histories of vernal pool associated plants addressed in the SSHCP.

1.5.2 Vernal Pool Invertebrates

Invertebrates are a major part of California landscapes with respect to species richness, abundance and total biomass. Insects are especially diverse and dominant in terrestrial environments, but they can also share dominance of freshwater environments with crustaceans (Hickman et al. 2001). Insects are nearly absent in marine environments, perhaps because of the early occupancy of these aquatic habitats by a great number of crustaceans (Evans 1984). The only successful move of crustaceans to terrestrial habitats has been by the isopods (popularly known as pill bugs) (Hickman et al. 2001).

One well-known group of crustaceans, the branchiopods, has some members that are found only in vernal pools. Vernal pool branchiopods include fairy shrimp (Anostraca), tadpole shrimp

(Notostraca) and clam shrimp (Conchostraca). California hosts at least nine endemic and up to 29 total fairy shrimp species (Bauder et al. 1997), four of which are listed as endangered and one as threatened under the Federal Endangered Species Act (FESA). Fairy shrimp do not occur in running waters and none are true marine organisms (Zedler 1987). Branchiopods occurring within the SSHCP Study Area are the mid-valley fairy shrimp (*Branchinecta mesovallensis*), vernal pool fairy shrimp (*Branchinecta lynchi*) and the vernal pool tadpole shrimp (*Lepidurus packardi*).

The only vernal pool insect covered under the SSHCP is the Ricksecker's water scavenger beetle (*Hydrochara rickseckeri*). See Appendix A of the SSHCP for specific life history of Ricksecker's water scavenger beetle.

Vernal Pool Crustaceans

In a survey of California vernal pools Simovich (1998) found 67 species of crustaceans and 60-100 species of insects and other invertebrates. Aquatic crustaceans found in vernal pools include branchiopods (fairy shrimp, tadpole shrimp, and clam shrimp), cladocerans (water fleas), copepods, ostracods (seed shrimp), and rotifers (Zedler 1987). Crustacean diversity in vernal pools is mediated by a number of possible factors such as inundation period and pool size (Simovich 1998). Inundation period regulates presence of crustaceans based on time required for development. Long inundation periods may allow the co-existence of similar (especially congeneric) species by reducing temporal overlap. Vernal pools of varying sizes may provide more available niches for crustaceans to inhabit, increasing diversity.

Crustaceans are sometimes more diverse in ephemeral than in permanent water bodies, perhaps due to decreased predation and non-limited resources (Simovich 1998). Historical climatic fluctuations may have created opportunities for gene exchange between previously isolated gene pools as vernal pool complexes expanded and retracted in response to increased dry and wet periods. Genetic variability in vernal pool crustaceans found within populations (i.e. within pools) may be a result of fluctuating selection and generation overlap (Simovich 1998) that occurs as a result of prolonged diapause (Ellner et al. 1999). The combination of typically large crustacean cyst banks in vernal pools (Belk 1998) together with overlapping generations (due to lack of all cysts hatching each year) creates the potential for significant within pool genetic variation (Simovich 1998).

Dispersal capability sets a limit on the distribution of any organism. As crustaceans cannot fly, their dispersal is limited to passive movement. Simovich (1998) and Ahl (1991) postulated that crustacean dispersal between vernal pool complexes probably occurs by movements of birds that eat crustacean disseminules. Proctor (1964) and Proctor and Malone (1965) found that disseminules were passed successfully through the intestinal tracts of mallard ducks, chickens, pigeons and canaries. Proctor et al. (1967) found that viable disseminules were retained for

longer periods in killdeer than in mallard ducks, suggesting that killdeer and similar shorebirds could possibly be more effective than ducks as dispersal agents for aquatic organisms, as they can carry disseminules longer distances. Large-scale flood events, which no longer occur due to levees and damming of major rivers, are postulated as influential in dispersal of crustacean disseminules historically (USFWS 1999). Dispersal is critical for the long-term survival of these species (LAS 2004).

See Appendix A of the SSHCP for specific life histories of vernal pool associated crustaceans addressed in the SSHCP.

1.5.3 Aquatic Mollusks

Studies of two aquatic snails (*Fossaria sonomensis* and *Bakerilymnaea cockerelli*) in vernal pools by Gallagher (1993) and Newman (1973) found that both snails use a form of aestivation (summer dormancy) to avoid the extreme drought of the summer-dry vernal pool. These snails migrate into the sediments before the pool dries, reappearing as the first inhabitants of vernal pools when flooding occurs. Snails lay egg masses inside vernal pools, making snails totally dependent on pools as are fairy shrimp and tadpole shrimp. Gallagher (1993) also found that vernal pool inundation period was an important factor in regulating snail dynamics. Alexander (1976) postulated that stonefly larvae are potentially significant predators on snail egg masses in vernal pools.

1.5.4 Vernal Pool Insects

Most insects that use California vernal pools are winged opportunists, utilizing vernal pools when available but abandoning them as soon as they become unsuitable (Zedler 1987). Common large aquatic insects known to visit vernal pools include predaceous dragonfly nymphs, back-swimmers, water boatmen, predaceous diving beetles and water scavenger beetles. Flies are reported from vernal pools as well, but are probably largely accidental (Zedler 1987).

Surveys of natural and constructed pools in Folsom County, California, found 58 species of insects inhabiting vernal pools including one springtail (Collembola), one mayfly (Ephemeroptera), four dragonflies (Odonata), nine true bugs (Hemiptera), one stonefly (Trichoptera), 26 beetles (Coleoptera) and 16 flies (Diptera) (Rogers 1998).

Although the role of insects in vernal pool ecology is probably substantial, little is known about the insects that inhabit vernal pools (Zedler 1987). Terrestrial insects may serve as food sources for vernal pool organisms, prey on or compete with vernal pool organisms, and have some indirect effects on vernal pool ecology.

Mosquitoes are of concern to the public owing to their potential to spread disease, including West Nile Virus and Encephalitis. Detailed studies of mosquitoes in vernal pools are mostly

lacking. In a survey of aquatic macro-invertebrates in 27 natural and 37 artificially constructed pools, Rogers (1998) found that mosquito larvae and midge larvae together comprised less than 2% of the invertebrate richness in natural pools. Some of the artificial pools were similar to natural pools with regard to mosquito and midge populations. During the 2nd year of this study however, these fly species comprised between 40% and 78% of the invertebrate composition in pools at one site. In general, it is thought that functioning vernal pools do not provide optimal breeding habitat for mosquito populations because they support a diversity of predatory invertebrate species (water beetles, backswimmers, tadpole shrimp, amphibian larvae) that feed on the aquatic mosquito larvae (Rogers pers. comm.; Alexander pers. comm.).

Flower Visiting Insects

The most conspicuous terrestrial insects associated with vernal pools are oligolectic bees. Oligolectic bees only visit a small number of closely related plants (e.g. *Limnanthes, Lasthenia*, *Blennosperma*) for pollen food. These specialized bees are important to vernal pool plants and overall vernal pool ecology (Bauder et al. 1997; LSA 2004; Thorp 1976, 1990; Thorp & Leong 1995, 1996, 1998). The highest percentages of specialist-feeding bees occur in areas of California with a Mediterranean and desert climate. These bees rely entirely on their local, specific food plants and on the availability of suitable nest habitat.

Vernal pool specialist bees are critical pollinators of vernal pool plants because of their inherent fidelity to these plants. This relationship highlights the importance of maintaining the connections between vernal pools and the uplands surrounding them. The bees construct nests primarily in upland areas near pools (although nests have been found in created pools; (S. Chamberlain, pers. obs.) and probably do not move far from their nest sites. Leong and Thorp (1995) found that most bees they studies did not travel more than about 0.5 mile. Fragmentation of vernal pool habitats increases distances between pools, possibly inhibiting movement of these dispersal-limited bees (Leong and Thorp 1995), and decreasing visitation rates to their associated flowers. Decreased visitation rates may result in lower seed output, reducing the size of the soil seed bank, the "insurance policy" of vernal pool plants against unfavorable hydrological conditions.

1.5.6 Amphibians

There are four amphibians known to inhabit vernal pools within the SSHCP Study Area, including the Pacific chorus frog (*Pseudacris regilla*), western toad (*Bufo boreas*), western spadefoot toad and the California tiger salamander. The western spadefoot toad and the California tiger salamander are covered under the SSHCP.

See Appendix A of the SSHCP for specific life histories of vernal pool associated amphibians addressed in the SSHCP.

1.5.7 Birds

Vernal pools and vernal pool complexes are important to the conservation of many bird species. Silveira (1998) reported observing 86 different taxa (44 waterbirds and 42 landbirds) using vernal pools and associated uplands at eight areas in the Sacramento Valley and from two areas in northeastern California. These birds use a variety of vernal pool types, visit pools differently at different times of year and exploit different microhabitats within a given pool (Silveira 1998).

Birds are important to the conservation of vernal pool species, as they are essential for the dispersal of vernal pool disseminules from one pool to another. Migratory birds moving along the Pacific Flyway spread plant seeds as well as invertebrate eggs and cysts between vernal pool complexes. Dispersal is important to populations as it limits isolation that can lead to inbreeding and reduces the chances of local extirpation.

1.5.8 Waterfowl and Shore Birds

During the wet season, waterfowl and shorebirds visiting vernal pools feed on a wide variety of food sources, rest, and in some cases nest. Some birds feed on invertebrates from the deeper portion of the pools, while others forage along the shoreline feeding on invertebrates or grazing the vegetation (Silveira 1998; Sloat and Whisler 2002). Vernal pools provide essential high protein food sources to migratory birds at a time critical to the development of building flight muscles and reproductive organs (Siveira 1998; USDOI 1994).

Waterfowl tend to use vernal pools with larger surface areas more often than smaller pools (Baker et al. 1992), however smaller pools are also frequently used, especially for individual breeding pairs (Silveira 1998). Uplands associated with vernal pools are also heavily used by Canada geese (*Branta canadensis*), which require new vegetation growth late in the winter and early in the spring for protein (Silveira 1998; Bogiatto pers. comm.).

A study of shorebird use of Central Valley habitats did not include large areas of vernal pool grasslands, and therefore did not report much use of vernal pool habitat by shorebirds (Shuford et al. 1998). In contrast, a study conducted over two spring seasons at the Sacramento National Wildlife Refuge, showed that although vernal pools comprised less than 2% of the refuge's total available wetland habitat, they held the highest shorebird densities, and more species preferred vernal pools than any other wetland type (Feldhiem et al. 1999).

Although waterfowl and shorebirds require these seasonal wetlands to help complete their migration and are important to the conservation of vernal pool species, these birds are not specifically covered under the SSHCP.

2 VERNAL POOL FUNCTIONS AND ECOSYSTEM SERVICES

2.1 Functions

Vernal pool functions have been defined as the hydrologic, biogeochemical, and habitat support processes that characterize and define vernal pools as self-maintaining wetland ecosystems (Butterwick 1998). The term "Values" as applied to vernal pool ecosystems is a more subjective concept. Ecosystem values relate to the perceptions of people and society regarding vernal pools; these perceptions reflect cultural, socioeconomic and policy issues that can change over time (Butterwick 1998; NRC 1995).

Consideration of ecosystem function is the basis of the Hydrogeomorphic (HGM) approach to wetland assessment (Environmental Protection Agency [EPA], United States Army Corps of Engineers [ACOE]), which likely represents one of the more comprehensive frameworks and cohesive descriptions of vernal pool functions and ecosystem processes. Ten vernal pool functions have been proposed as part of the draft HGM approach; each function is associated with one of three categories: hydrology, biogeochemistry, and habitat support (Butterwick 1998). Each vernal pool ecosystem function is described below, along with a brief discussion of determinant factors, functional variance, and relationships among functions.

The HGM approach represents a conceptual framework that is useful in facilitating communication about an exceedingly complicated ecological phenomenon. It is important to recognize that in nature these 10 vernal pool ecosystem functions are closely interrelated and overlap in the processing through time of elements, compounds and genetic information. Additionally, these functions operate and interrelate in causal-dependent relationships at multiple spatial and temporal scales: from within single vernal pools within a single annual hydrologic cycle, to among all vernal pool complexes on a given set of geologic landforms over evolutionary time.

Finally, it is important to acknowledge that paradoxically, landscape-level ecosystem function and related evolutionary dynamics are critical components of long-term conservation planning/management, yet they are not readily perceivable and they are difficult to define and to quantify.

2.1.1 Hydrology (3 Functions)

Function 1- surface water storage is the capacity of the vernal pool basin to pond water seasonally and retain surface water for long duration. This function is dependent on a variety of factors, including but not limited to surface topography (e.g., area of drainage, dimensions of depression basin), soil depth and water-holding capacity, and the nature of the water-impermeable layer in the soil profile.

Function 2- subsurface water exchange is the capacity of the subsurface area above the restrictive layer to hold water and allow exchange of water between the pool basin and the surrounding landscape. This function is dependent on a variety of factors, including but not limited to the water holding capacity of the soil, soil permeability, and soil depth. These factors together influence the dynamics of water exchange between pool basins and surrounding pool and upland areas.

Function 3- surface water conveyance is the capacity to convey concentrated inter-storm water flow into and out of pool basins through swales. Swales lack bed and bank morphology yet they are critical components of drainage and interconnectivity of vernal pool-annual grassland landscapes. This function is dependent on a number of factors, including but not limited to topography, the nature of the soil profile, and the juxtaposition of pools/pool complexes within sub-watershed areas.

2.1.2 Biogeochemical (2 Functions)

Function 4- element removal is the capacity of vernal pools to remove and concentrate imported nutrients, contaminants, elements and compounds from the water through abiotic and biotic processes. This function is dependent on myriad physical, chemical and biological components of the ecosystem.

Function 5- element cycling is the capacity of vernal pools to support biogeochemical processes that convert and recycle elements and compounds from one form to another. The vernal pool biota provides both material and metabolic process to the function of element cycling. The annual development and decay of plant and animal biomass involves cycling (assimilation, conversion, release and breakdown) of myriad inorganic elements and organic and inorganic compounds.

2.1.3 Habitat Support (5 Functions)

Function 6- maintenance of characteristic vegetation is the capacity of vernal pools to support a characteristic suite of native plant species. Vernal pool plant species are uniquely adapted to the extreme regimes of inundation and drought that defines the annual vernal pool hydrologic cycle.

Function 7- maintains characteristic aquatic invertebrates is the capacity of vernal pools to provide the hydrologic, chemical, and temperature conditions that are required to support their characteristic aquatic invertebrate fauna. Like vernal pool plant species, vernal pool invertebrate species are uniquely adapted to the extreme regimes of inundation and drought that defines the annual vernal pool hydrologic cycle.

Function 8- maintains amphibian and avian populations is the capacity of vernal pools to provide suitable aquatic and terrestrial habitat for amphibians to complete their entire life cycle,

and for resting, feeding, hiding and reproduction of avian populations. Amphibian and avian species both depend on the quality of contiguous uplands, and particularly for birds, the juxtaposition of wetlands with other wetlands and habitat types (see Function 10).

Function 9- maintain populations of sensitive taxa is the capacity of vernal pools to perpetually support populations of rare, threatened or endangered species, almost all of which are strict vernal pool endemics. It should be noted that this function might not be discernible from Functions 6, 7 and 8 above, since sensitive taxa represent a subset of the vernal pool biotic assemblage; they are dependent on and interact with the same physical and biological conditions, functions and process as their more common vernal pool associates. The presence or absence of any given species, rare or otherwise, may depend as much on biogeography and history as on particular characteristics of a given vernal pool. A vernal pool does not need to support sensitive species to qualify as a fully functioning vernal pool, whereas nearly all of the other 10 functions mentioned here are essential. For these reasons, and because designation of species as sensitive is somewhat subjective in itself, Vernal Pool Function 9 may more appropriately be considered as a "Vernal Pool Value" (see Section 3.2.2).

Function 10- maintain habitat interspersion and connectivity is the capacity of vernal pools to interact with other vernal pools, vernal pool complexes and other wetland and upland habitat types. The juxtaposition of vernal pools and vernal pool complexes across the landscape influences meta-population dynamics, migration, recruitment, establishment and persistence of species through time and space, and the long-term dynamics of population genetics (evolution).

2.2 Ecosystem Processes (Values)

Vernal pool (wetland) values are those qualities and/or functions of the ecosystem that relate to societal perceptions of "goods and services" (Butterwick 1998; NRC 1995). These values are subjective because they relate not only to complex interrelated parameters of the vernal pool ecosystem, but also to the prevailing socio-economic, political and educational status of California's human population. Wetland ecosystem values, considered as a function of societal perception, vary not only through time in a given geographic area, but also across geography at any point in time (NRC 1995).

Since vernal pool habitats are generally part of larger watershed-scale systems, they may play various roles in the hydrological function of the larger landscape. By retaining direct precipitation as well as seasonal overland and subsurface flow during the rainy season, they buffer against flooding in downslope areas, and large complexes may even affect microclimate when hydrated during the warmer spring and early summer months by modifying local temperatures (the opposite of roofing or asphalt, which tend to increase local temperatures). Since vernal pools also function in geo-chemical processes (element removal and cycling), they

potentially mediate water quality when interconnected via swales or drainages, by assimilating and processing dissolved and suspended pollutants in runoff, and atmospheric pollutants precipitated in rainfall or dust.

3 HABITAT DISTRIBUTION

3.1 California Distribution

In California, vernal pool habitats occur in settings ranging in elevation from about 10 feet in Solano County to over 5,500 feet in Plumas County (CDFG 2003), and in association with a variety of geologic formations. The greatest areas of vernal pool habitat though, are associated with the Great Central Valley (Holland and Jain 1977; Holland 1978; Stone 1990). Areas of vernal pool habitat are also associated with the coastal terraces of San Diego County (Zedler 1987), and with scattered sites in the low elevation regions of the Peninsular and south and north Coast Ranges, the Sierra Nevada Range Foothills, the Cascade Range Foothills, and the Modoc Plateau (Holland and Jain 1977; Zedler 1987; Holland 1986).

The first maps of vernal pool complexes within the Central Valley were produced for CDFG by Holland (1978) and are shown in Figure 1. The most recent treatment of California vernal pools recognizes 17 biogeographically defined Vernal Pool Regions (Figure 2), including the Sand Diego, Western Riverside County, Santa Barbara, Carrizo, Central Coast, Livermore, San Joaquin Valley, Southern Sierra Foothills, Southeastern Sacramento Valley, Northwestern Sacramento Valley, Northeastern Sacramento Valley, Solano-Colusa, Santa Rosa, Lake-Napa, Mendocino, Sierra Valley, and Modoc Plateau Vernal Pool Regions (CDFG 1998).

3.2 Central Valley Distribution

The largest total number of vernal pools and the largest most intact vernal pool complexes remaining in the state are found in the Great Central Valley (Holland and Jain 1988; Keeler-Wolf et al. 1998; Vollmar 2002). These are distributed among 6 of the 17 biogeographic areas, including the San Joaquin Valley, Southern Sierra Foothills, Solano-Colusa, Northwestern Sacramento Valley, Northeastern Sacramento Valley, and Southeastern Sacramento Valley Vernal Pool Regions. The SSHCP Study Area is included entirely within the Southeastern Sacramento Valley Vernal Pool Region (Keeler-Wolf et al. 1998).

The Southeastern Sacramento Valley Vernal Pool Region includes all of the vernal pool complexes located within Sacramento, Placer, Amador, and El Dorado Counties, as well as a portion of the pool complexes located in northwest Calaveras County, northeast San Joaquin County, southern Yuba County, and as indicated in Figure 3, a small inclusion of pools in southern Sutter County. It has been noted that, although there are bio-geographical differences, the boundary between the Southeastern Sacramento Valley Vernal Pool Region and the Southern Sierra Foothills Vernal Pool Region is defined in part by jurisdictional areas of regulatory agencies and the treatments of bioregional assessment teams (Keeler-Wolf et al. 1998).

3.3 SSHCP Study Area Distribution

The SSHCP Study Area encompasses a significant portion of the vernal pool complexes that remain within the Southeastern Sacramento Valley Vernal Pool Region, as indicated in Figures 1 through 3. The current extent and distribution of vernal pools/wetlands in the SSHCP Study Area is illustrated in Figure 4. This map (Figure 4) was produced by the Geographic Information Center (GIC) at California State University, Chico using digital ortho-rectified black and white aerial photographs that were flown on March 15, 2001. For a more detailed description of this mapping procedure and constraints and assumptions relating to the map data, refer to Section 5.2 of this document.

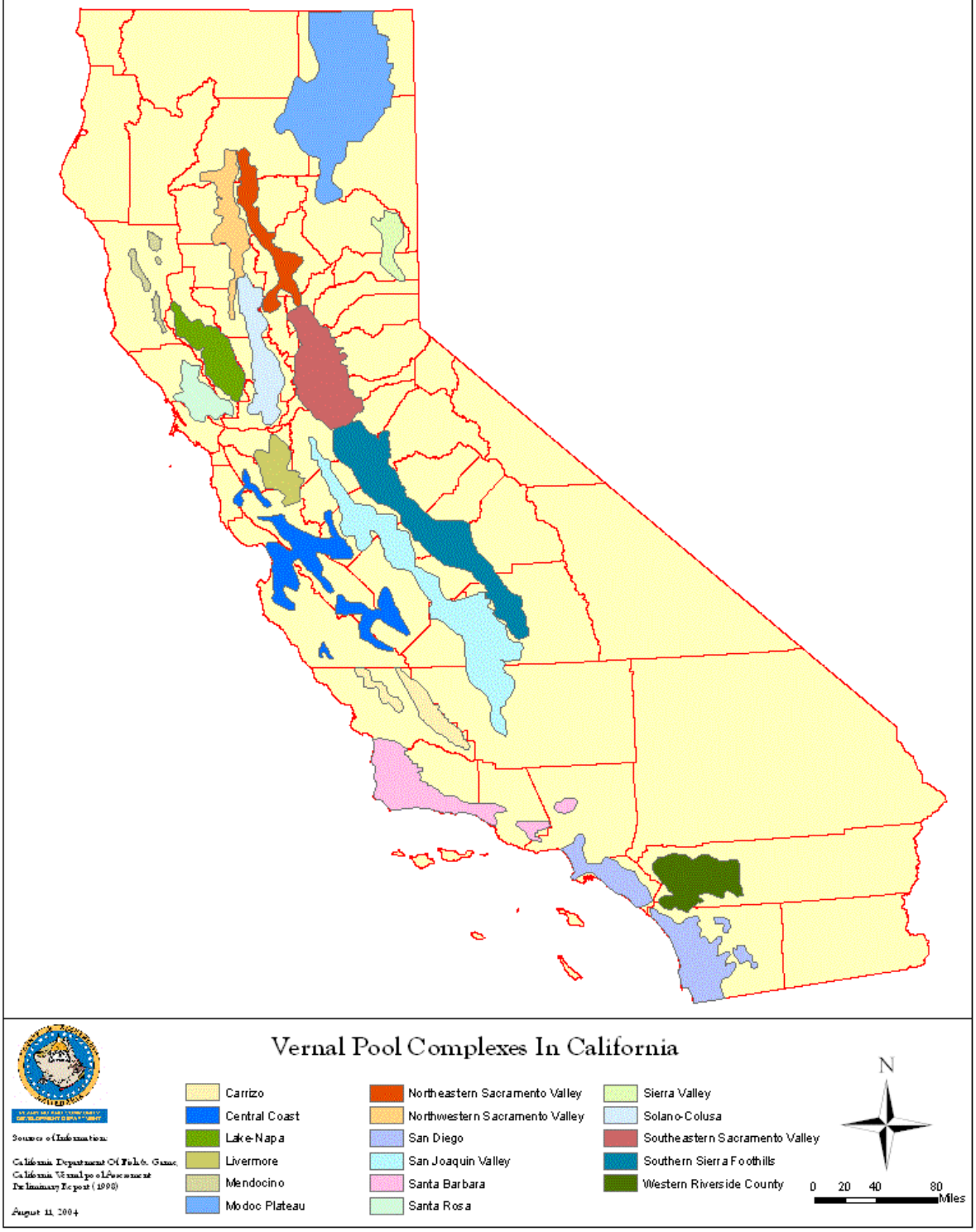
The remaining extant vernal pool/annual grassland complexes located within the region as of 2001 are mostly concentrated in the south-eastern portion of Sacramento County. Here they are associated with 18 geologic formations that occur within the boundaries of the SSHCP Study Area, as illustrated in Figure 5.

Table B1-3 numerically summarizes the distribution of vernal wetlands across geologic formations in the SSHCP study area. This table contains the total number of acres represented by each geologic formation and the total number of vernal wetted acres occurring on each formation within the SSHCP Study Area. Totals calculated for each geologic formation are also presented as percentages of the total vernal wetted area and total land area.

The number of vernal wetlands and total wetted acres for each geologic formation that contain vernal features within the SSHCP Study Area are presented in Table B1-4. These parameters are further described for the vernal wetlands both inside and outside the Urban Development Area (UDA); Figures 6 and 7 illustrate these data.

South Sacramento Vernal Pool

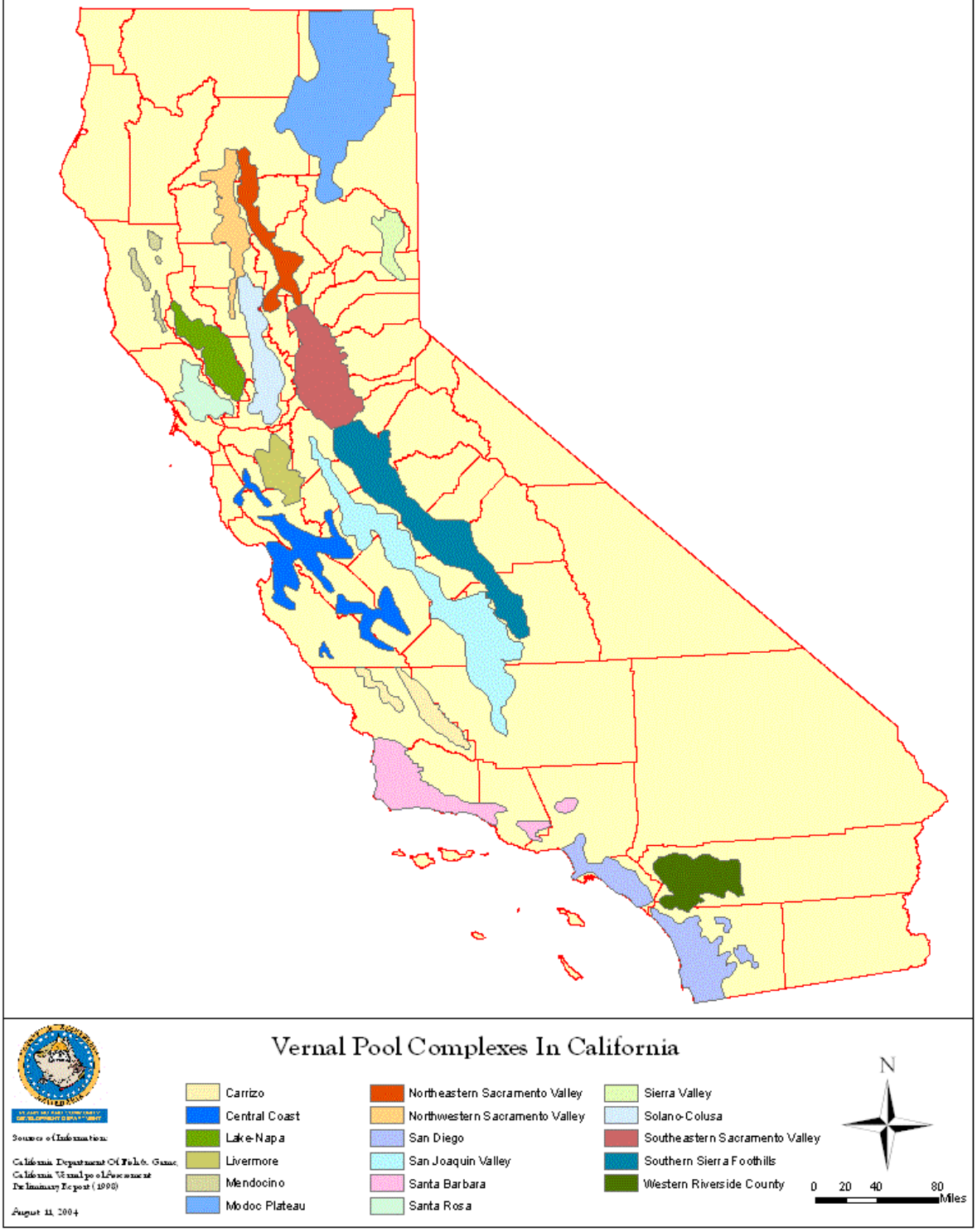
South Sacramento HCP | Figure 2 | Vernal Pool Habitat Account



South Sacramento HCP

Figure 2

Vernal Pool Habitat Account



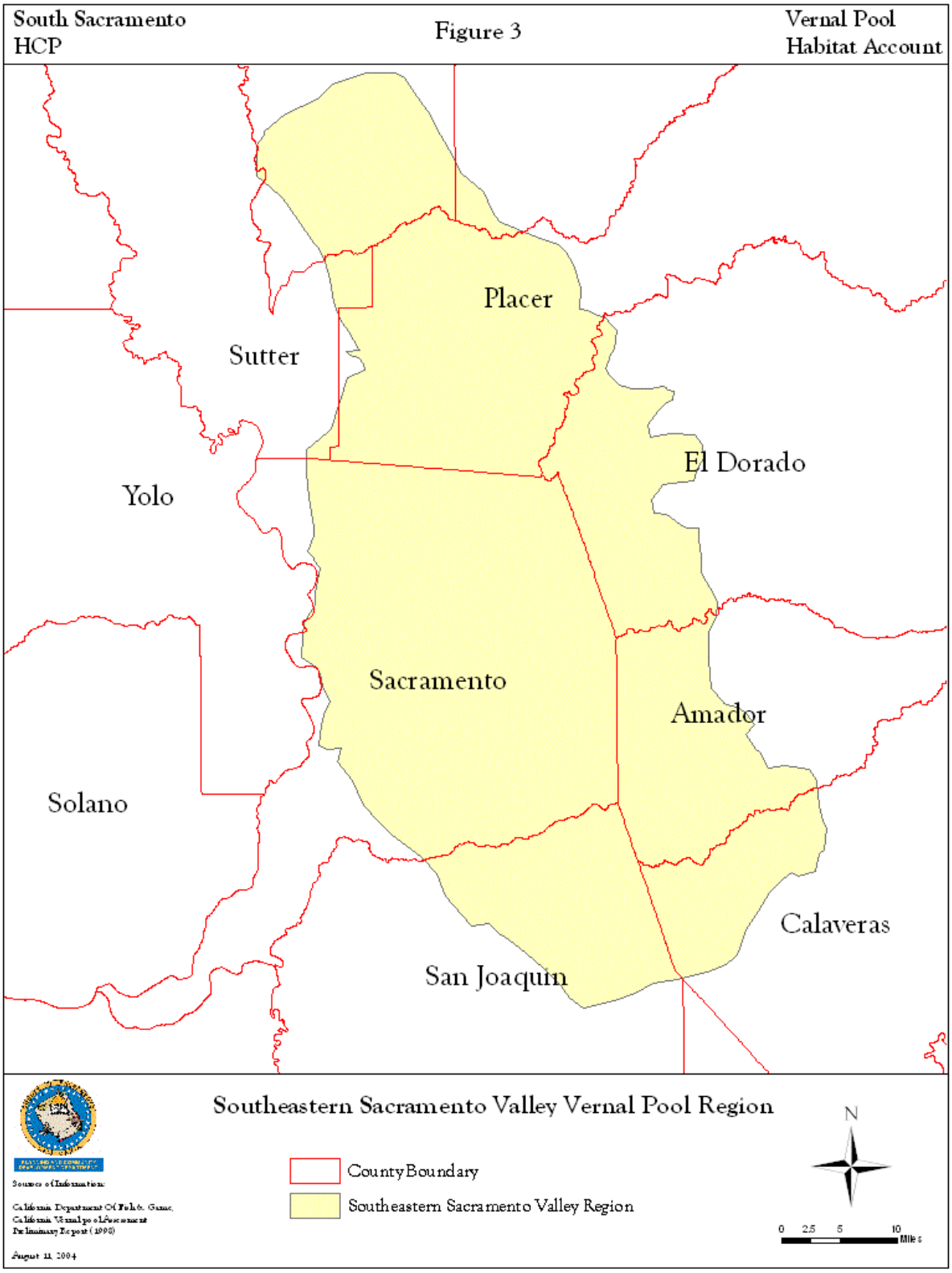

South Sacramento HCP
Figure 3
Vernal Pool Habitat Account
Placer
Sutter
El Dorado
Yolo
Sacramento
Amador
Solano
Calaveras
San Joaquin
Southeastern Sacramento Valley Vernal Pool Region
County Boundary
Southeastern Sacramento Valley Region
N
0 2.5 5 10
Miles
August 11, 2004

Table B1-3
Land and Vernal Wetland Acre Distribution by Geologic Formation in the SSHCP Study Area

Geologic Formation	Land Area (acres)	Vernal Wetland Area (acres)	Percent of Formation Occupied by Vernal Wetland Area (%)	Percent of Total Vernal Wetland Area (%)1	Percent of Total Land Area (%)1
Laguna (Tl)	67,582	1372.9	2.03	34.3	19.6
Riverbank, Lower Unit (Qrl)	53,357	494.8	0.93	12.4	15.5
Riverbank, Undivided (Qr)	51,425	700.6	1.36	17.5	14.9
Riverbank, Upper Unit (Qru)	28,212	303.9	1.08	7.6	8.2
Mehrten (Tm)	26,667	386.8	1.45	9.7	7.7
Metamorphic Rocks (pKu)	24,288	38.2	0.16	1.0	7.0
Riverbank, Middle Unit (Qrm)	18,953	187.5	0.99	4.7	5.5
Upper Unit Modesto (Qmu)	18,051	116.8	0.65	2.9	5.2
Dredge Tailing and Artificial Fill (t)	14,527	5.2	0.04	0.1	4.2
Valley Springs (Tvs)	13,648	248.1	1.82	6.2	4.0
Alluvial Floodplain Deposits (Qfp)	9,733	10.9	0.11	0.3	2.8
Undifferentiated Surficial Alluvial Deposits (Qu)	4,497	64.1	1.43	1.6	1.3
South Fork Gravels (Qsf)	3,975	48.8	1.23	1.2	1.2
Alluvial Deposits, Undivided (Qha)	3,419	1.6	0.05	0.04	1.0
Ione (Ti)	2,956	3.1	0.10	0.08	0.9
Turlock Lake (Tpl)	2,095	9.5	0.45	0.2	0.6
Basin Deposits (Qhb)	663	3.1	0.47	0.08	0.2
North Merced Gravels (Qtnm)	561	3.6	0.64	0.09	0.2
Total	**344,609**	**3999.5**	**N/A**	**100**	**100**

Notes:
[1] Total refers to the entire SSHCP Study Area, rather than individual geologic formations.

South Sacramento HCP

Figure 4

Vernal Pool Habitat Account

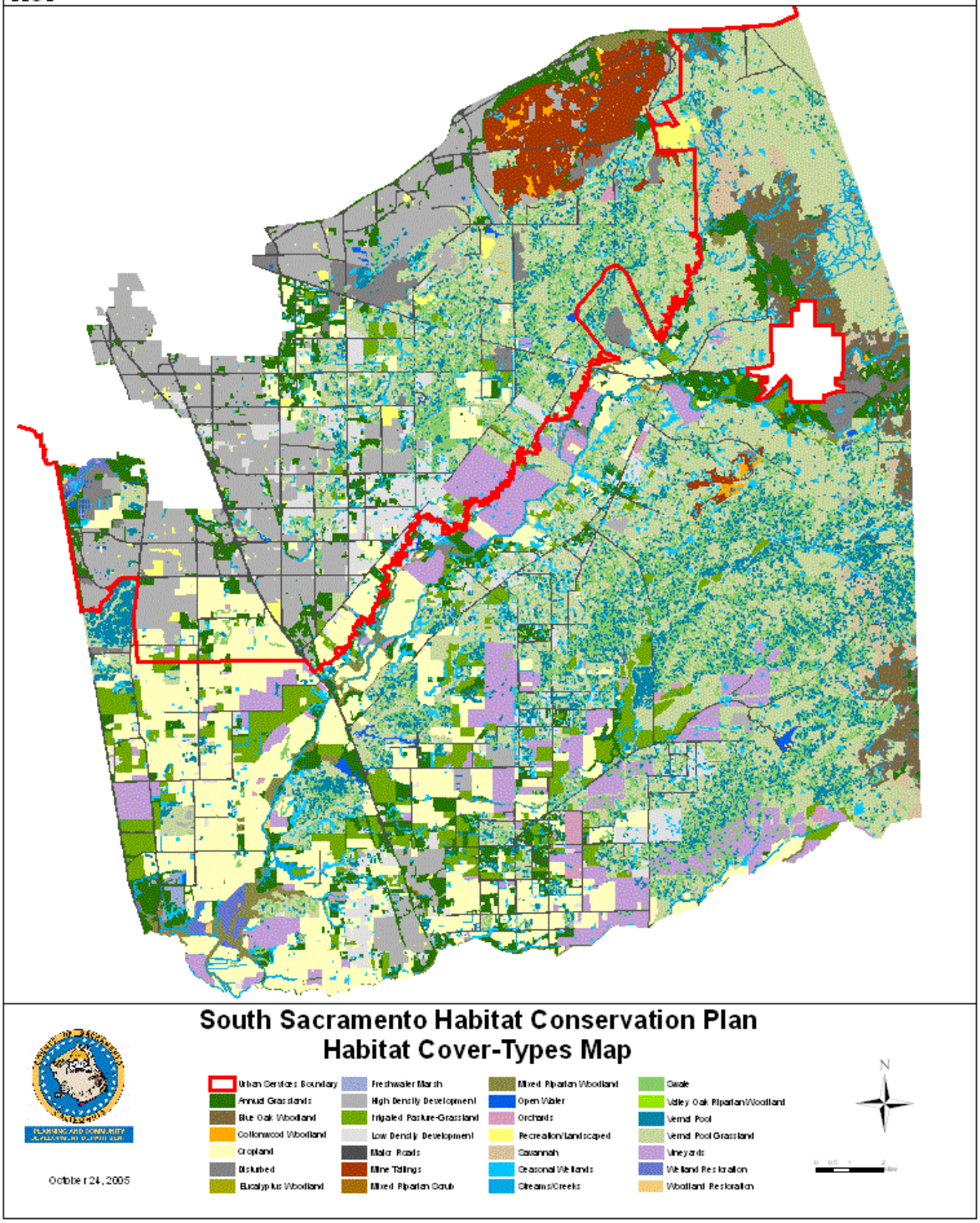


Table B1-4
Number of Vernal Wetlands and Wetland acres for each Geologic Formation within the SSHCP Study Area that Contain Vernal Features

Geologic Formation	Total Acreage Inside SSHCPA	Number of Vernal Wetlands			Wetland Acres		
		Total	*Inside UDA*	*Outside UDA*	*Total*	*Inside UDA*	*Outside UDA*
Laguna (Tl)	67,582	**26844**	8484	18360	**1372.9**	587.5	785.4
Lower Unit Riverbank (Qrl)	53,357	**1719**	1055	664	**494.8**	107.1	387.7
Riverbank Undivided (Qr)	51,425	**9095**	1466	7629	**700.6**	107.2	593.4
Upper Unit Riverbank (Qru)	28,212	**2546**	240	2306	**303.9**	11.3	292.7
Mehrten (Tm)	26,667	**9759**	298	9461	**386.8**	14.8	372.1
Metamorphic Rocks (pKu)	24,288	**829**	17	812	**38.2**	0.3	37.9
Middle Unit Riverbank (Qrm)	18,953	**1970**	251	1719	**187.5**	22.6	165.0
Upper Unit Modesto (Qmu)	18,051	**1888**	1	1887	**116.8**	0.8	116.0
Dredge Tailing and Artificial Fill (t)	14,527	**162**	64	98	**5.2**	2.5	2.7
Valley Springs (Tvs)	13,648	**4018**	2	4016	**248.1**	0.1	248.0
Alluvial Floodplain Deposits (Qfp)	9,733	**59**	0	59	**10.9**	0	10.9
Undifferentiated Surficial Alluvial Deposits (Qu)	4,497	**1550**	568	982	**64.1**	23.8	40.4
South Fork Gravels (Qsf)	3,975	**586**	586	0	**48.8**	48.8	0
Alluvial Deposits, Undivided (Qha)	3,419	**32**	0	32	**1.6**	0	1.6
Ione (Ti)	2,956	**89**	0	89	**3.1**	0	3.1
Turlock Lake (Tpl)	2,095	**342**	342	0	**9.5**	9.5	0
Basin Deposits (Qhb)	663	**4**	0	4	**3.1**	0	3.1
North Merced Gravels (Qtnm)	561	**84**	41	43	**3.6**	2.2	1.4
Total	**344,609**	**61576**	**13415**	**48161**	**3999.5**	**938.5**	**3061.4**

Abbreviations are: UDA = Urban Development Area.

Figure 6 Number of Vernal Wetlands by Geologic Formation in the SSHCP Study Area. See Table B1-2 for Geologic Formation Names.

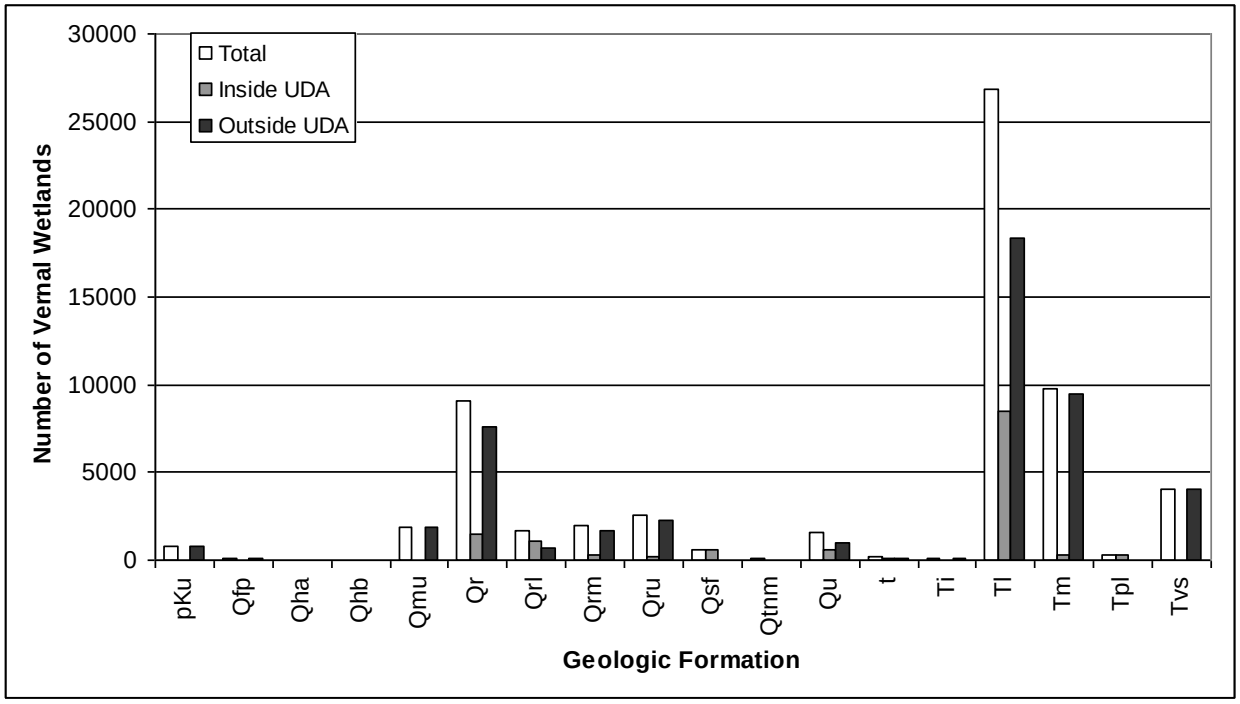
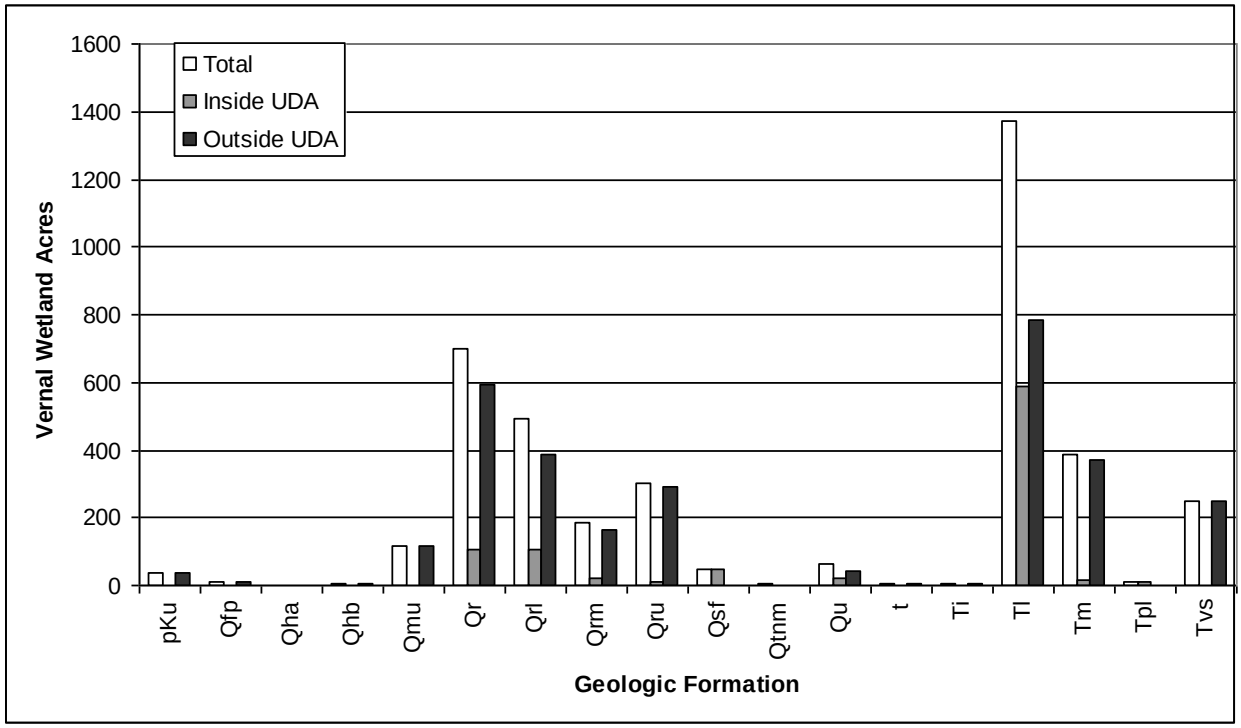


Figure 7 Number of Wetted Acres by Geologic Formation in the SSHCP Study Area. See Table B1-2 for geologic formation names.



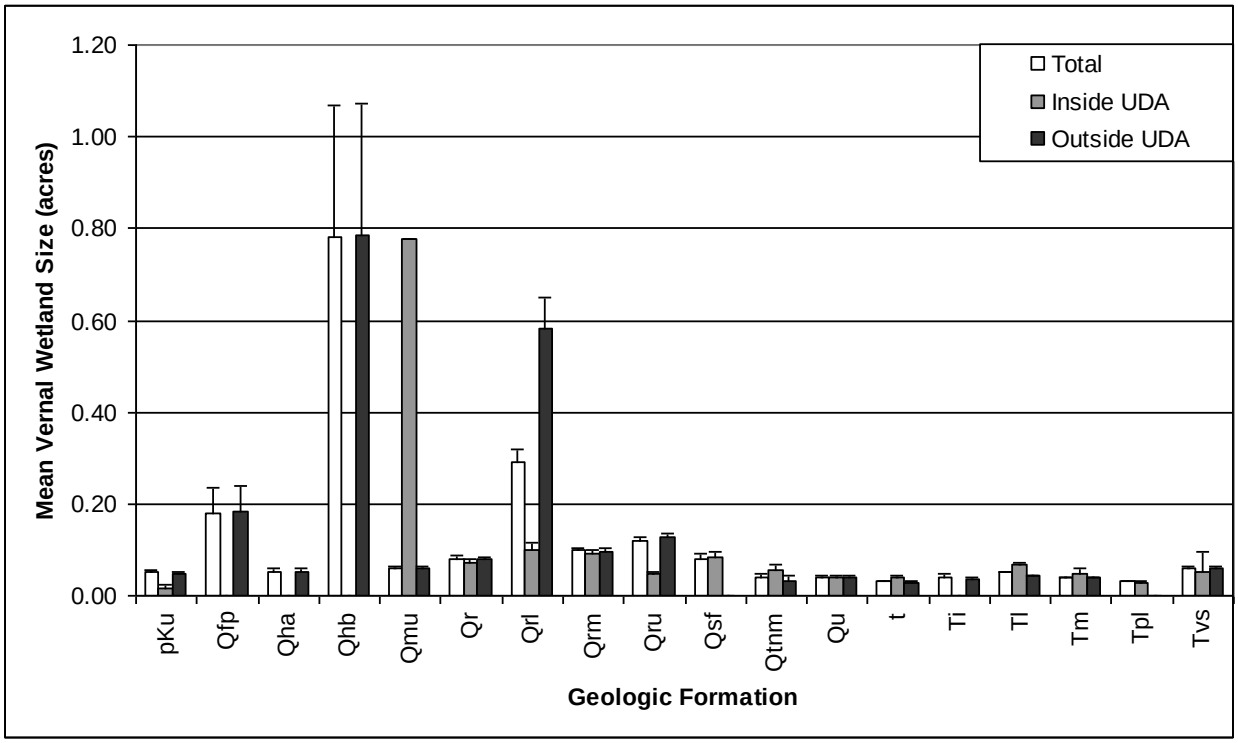
The mean size of vernal pools / wetlands (in acres) for each geologic formation both inside and outside the UDA is summarized in Table B1-5 and illustrated in Figure 8.

Table B1-5
Mean Vernal Wetland Size (acres) for Geologic Formations within the SSHCP Study Area

Geologic Formation	Total # of Vernal Wetlands	Mean Vernal Wetland Size		Mean Vernal Wetland Size Inside the UDA		Mean Vernal Wetland Size Outside the UDA	
		Mean	*SE*	*Mean*	*SE*	*Mean*	*SE*
Laguna (Tl)	26,844	0.05	0.001	0.07	0.004	0.04	0.001
Lower Unit Riverbank (Qrl)	1,719	0.29	0.028	0.10	0.013	0.58	0.067
Riverbank Undivided (Qr)	9,095	0.08	0.006	0.07	0.007	0.08	0.007
Upper Unit Riverbank (Qru)	2,546	0.12	0.008	0.05	0.006	0.13	0.008
Mehrten (Tm)	9,759	0.04	0.001	0.05	0.012	0.04	0.001
Metamorphic Rocks (pKu)	829	0.05	0.005	0.02	0.006	0.05	0.005
Middle Unit Riverbank (Qrm)	1970	0.10	0.006	0.09	0.010	0.10	0.006
Upper Unit Modesto (Qmu)	1888	0.06	0.004	0.78	N/A (one record)	0.06	0.004
Dredge Tailing and Artificial Fill (t)	162	0.03	0.003	0.04	0.005	0.03	0.005
Valley Springs (Tvs)	4,018	0.06	0.003	0.05	0.043	0.06	0.003
Alluvial Floodplain Deposits (Qfp)	59	0.18	0.054	N/A	N/A	0.18	0.054
Undifferentiated Surficial Alluvial Deposits (Qu)	1550	0.04	0.002	0.04	0.003	0.04	0.003
South Fork Gravels (Qsf)	586	0.08	0.011	0.08	0.011	N/A	N/A
Alluvial Deposits, Undivided (Qha)	32	0.05	0.011	N/A	N/A	0.05	0.011
Ione (Ti)	89	0.04	0.006	N/A	N/A	0.04	0.006
Turlock Lake (Tpl)	342	0.03	0.003	0.03	0.003	N/A	N/A
Basin Deposits (Qhb)	4	0.78	0.288	N/A	N/A	0.78	0.288
North Merced Gravels (Qtnm)	84	0.04	0.009	0.05	0.013	0.03	0.011
Total	**61,576**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

Abbreviations are: UDA = Urban Development Area.

Figure 8 Mean (mean + 1 SE) Vernal Wetland Size for All Vernal Wetlands, and Those Inside and Outside the Urban Development Area by Geologic Formation in the SSHCP Study Area. See Table B1-2 for geologic formation names.



Large vernal wetlands (those covering 0.10 or more acres) comprise 10% of the total number of wetlands that occur in the SSHCP Study Area. Table B1-6 gives a summary of the large vernal wetlands and total wetted acres occurring on each geologic formation within the SSHCP Study Area. These large vernal wetlands were further sub-divided into five size categories (Table B1-7) that are illustrated graphically in Figure 9.

Table B1-6
Top 10% (Vernal wetlands greater than 0.1 acres) of Largest Vernal Wetlands and Total Vernal Wetland Acre for Geologic Formations within the SSHCP Study Area

Geologic Formation	Wetland Acres			Number of Vernal Wetlands		
	Total	*Inside UDA*	*Outside UDA*	*Total*	*Inside UDA*	*Outside UDA*
Laguna (Tl)	686.5	364.0	322.5	2,088	942	1,146
Lower Unit Riverbank (Qrl)	458.6	82.6	376.0	553	195	358
Riverbank Undivided (Qr)	465.4	66.4	399.0	989	164	825
Upper Unit Riverbank (Qru)	238.5	5.6	232.9	583	20	563
Mehrten (Tm)	186.6	7.8	178.8	636	13	623

Table B1-6
Top 10% (Vernal wetlands greater than 0.1 acres) of Largest Vernal Wetlands and Total Vernal Wetland Acre for Geologic Formations within the SSHCP Study Area

Geologic Formation	Wetland Acres			Number of Vernal Wetlands		
	Total	*Inside UDA*	*Outside UDA*	*Total*	*Inside UDA*	*Outside UDA*
Metamorphic Rocks (pKu)	19.5	0.0	19.5	59	0	59
Middle Unit Riverbank (Qrm)	133.2	15.8	117.4	391	44	347
Upper Unit Modesto (Qmu)	70.1	0.8	69.3	191	1	190
Dredge Tailing and Artificial Fill (t)	1.7	0.7	1.0	10	4	6
Valley Springs (Tvs)	151.9	0.0	151.9	413	0	413
Alluvial Floodplain Deposits (Qfp)	9.7	0.0	9.7	13	0	13
Undifferentiated Surficial Alluvial Deposits (Qu)	28.3	10.3	18.0	122	48	74
South Fork Gravels (Qsf)	32.9	32.9	0.0	82	82	0
Alluvial Deposits, Undivided (Qha)	0.7	0.0	0.7	3	0	3
Ione (Ti)	1.5	0.0	1.5	7	0	7
Turlock Lake (Tpl)	2.4	2.4	0.0	8	8	0
Basin Deposits (Qhb)	3.1	0.0	3.1	4	0	4
North Merced Gravels (Qtnm)	1.8	1.1	0.7	6	4	2
Total	**2492.4**	**590.4**	**1902.0**	**6,158**	**1525**	**4,633**

Abbreviations are: UDA = Urban Development Area.

Table B1-7
Top 10% (Vernal Wetlands Greater than 0.1 acres) of Largest Vernal Wetlands (in 5 Categories) for Geologic Formations within the SSHCP Study Area

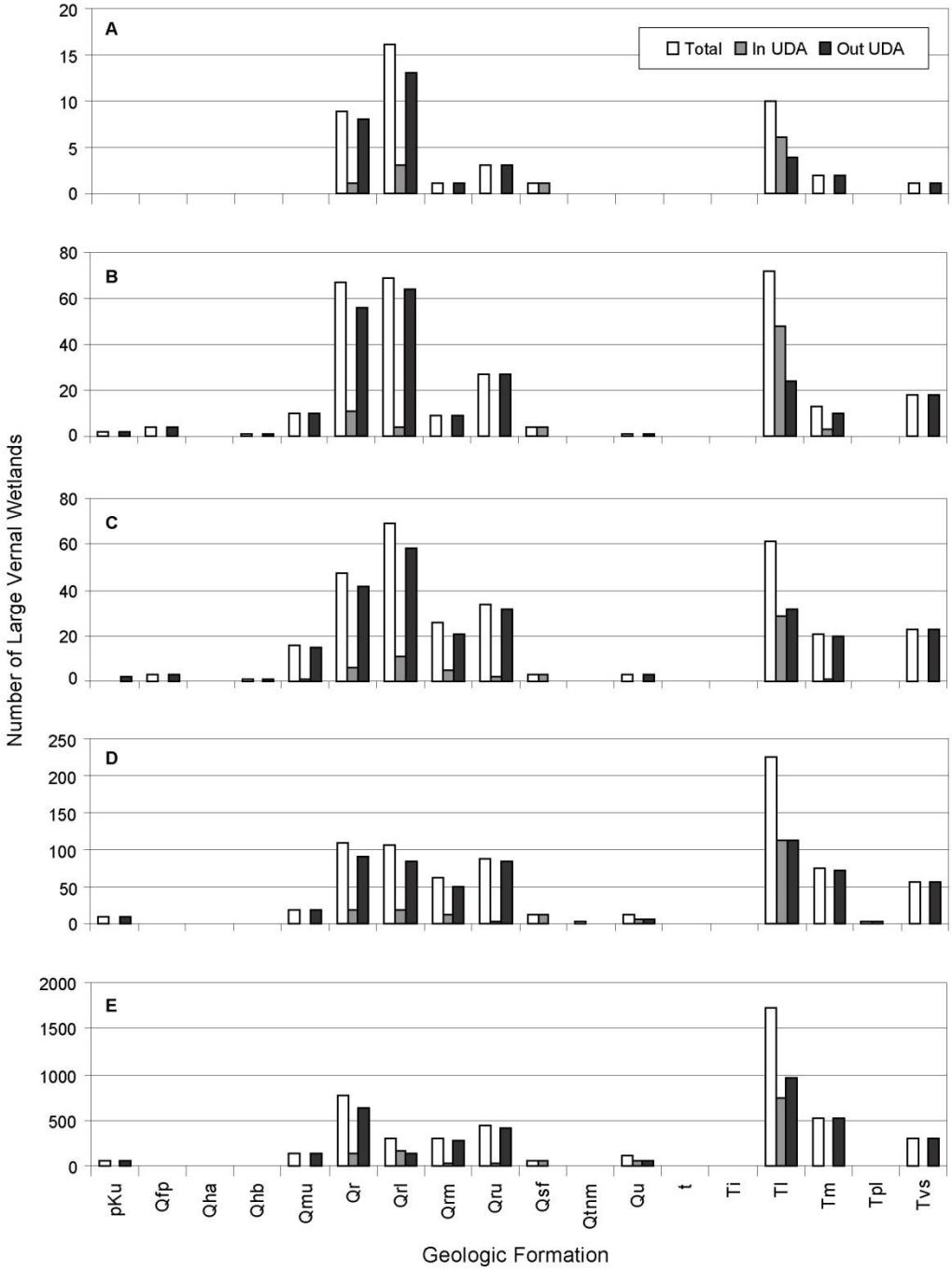
Geologic Formation	Number of Large Vernal Wetlands (acres)					
	Total	*>4.0*	*4.0-1.1*	*1.1-0.7*	*0.7-0.37*	*0.37-0.10*
		(Inside the UDA / Outside the UDA)				
Laguna (Tl)	2088	6/4	48/24	29/32	111/114	748/972
Lower Unit Riverbank (Qrl)	553	3/13	5/64	11/58	20/85	156/138
Riverbank Undivided (Qr)	989	1/8	11/56	6/41	18/92	128/628
Upper Unit Riverbank (Qru)	583	0/3	0/27	2/32	2/85	16/416
Mehrten (Tm)	636	0/2	3/10	1/20	1/73	8/518
Metamorphic Rocks (pKu)	59	0/0	0/2	0/2	0/8	0/47
Middle Unit Riverbank (Qrm)	391	0/1	0/9	5/21	12/51	27/265
Upper Unit Modesto (Qmu)	191	0/0	0/10	1/15	0/20	0/145
Dredge Tailing and Artificial Fill (t)	10	0/0	0/0	0/0	0/0	4/6
Valley Springs (Tvs)	413	0/1	0/18	0/23	0/57	0/314

Table B1-7
Top 10% (Vernal Wetlands Greater than 0.1 acres) of Largest Vernal Wetlands (in 5 Categories) for Geologic Formations within the SSHCP Study Area

Geologic Formation	Total	Number of Large Vernal Wetlands (acres)				
		>4.0	*4.0-1.1*	*1.1-0.7*	*0.7-0.37*	*0.37-0.10*
		(Inside the UDA / Outside the UDA)				
Alluvial Floodplain Deposits (Qfp)	13	0/0	0/4	0/3	0/0	0/6
Undifferentiated Surficial Alluvial Deposits (Qu)	122	0/0	0/1	0/3	5/7	43/63
South Fork Gravels (Qsf)	82	1/0	4/0	3/0	14/0	60/0
Alluvial Deposits, Undivided (Qha)	3	0/0	0/0	0/0	0/0	0/3
Ione (Ti)	7	0/0	0/0	0/0	0/0	0/7
Turlock Lake (Tpl)	8	0/0	0/0	0/0	2/0	6/0
Basin Deposits (Qhb)	4	0/0	0/1	0/1	0/1	0/1
North Merced Gravels (Qtnm)	6	0/0	0/0	0/0	1/1	3/1
Total	6158	**43**	**297**	**309**	**780**	**4729**
In/Out	**1,525/4,633**	**11/32**	**71/226**	**58/251**	**186/594**	**1,199/3,530**

Abbreviations are: UDA = Urban Development Area.

Figure 9 Large vernal wetlands (the largest 10%) and their distribution among geologic formations in the SSHCP Study Area and position relative to the Urban Development Area. The graphs represent wetlands in the following large vernal wetland size categories from the top down: (A): >4.0 acres; (B): 4.0-1.1 acres; (C): 1.1-0.7 acres; (D): 0.7-0.37 acres; and (E): 0.37-0.10 acres. See Table B1-2 for geologic formation names.



The following discussion of the distribution of vernal wetlands in the SSHCP Study Area is organized by geologic formations with the most wetted acres to the formation with the least. Four geologic formations, Laguna, Undivided Riverbank, Mehrten, and Valley Springs contain 80% of the vernal wetlands mapped in the SSHCP Study Area (Table B1-4). The Laguna Formation contains 43% of all mapped vernal wetlands in the SSHCP Study Area. The Mehrten Formation is next in rank (although 5th in terms of overall acreage) bearing 16% of the total number of vernal wetlands, with Undivided Riverbank supporting 15% of the total. Some formations (e.g. Basin Deposits) are relatively minor in terms of number of acres covered, but are important because they support a few very large vernal wetlands.

Average vernal wetland size was calculated for each formation (mean ± 1SE). Means inside and outside the UDA were compared using a Student's t-test. For most of the formations, there was no significant difference between the means (at the .95 confidence level) inside and outside the UDA. However, means did differ significantly between wetlands inside and outside the UDA on the Metamorphic Rocks Formation, meaning that the larger average size of vernal wetlands outside the UDA is not attributable to random chance.

Deep pools were identified during the mapping process as pools that were at least 50% inundated as of March 15, 2001 (the date the aerial photographs were taken).

SSHCP covered species dependent on vernal pools (Table B1-1) are documented as occurring on 13 of the 18 geologic formations discussed below. Reported occurrences of these species were most often from vernal wetlands on the Laguna Formation. However, some formations (e.g., Lower Unit Riverbank, Riverbank Undivided) containing a smaller percentage of the overall number of vernal wetlands have a relatively high number of covered species occurrences.

3.3.1 Laguna Formation (Tl)

The Laguna Formation is the most extensive geologic formation in the SSHCP Study Area with a total of 67,582 acres (28,230 acres inside the UDA and 39,352 acres outside the UDA). It comprises 20% of the total SSHCP land area and is part of the High Terrace Landform that is restricted to the east side of the Central Valley (Smith and Verrill 1998; Jones and Stokes 1990; Reiner and Swenson 2000). The Laguna Formation is composed of interbedded alluvial gravel, sand and silt, deposited from ancient river channels draining from the Sierra Nevada Range, including the Feather, Yuba, American, Cosumnes, and Merced Rivers (Helley and Harwood 1985). It occurs in a band several miles wide running north-south along the eastern half of the SSHCP Study Area. Associated soil families include Redding, Red Bluff and Corning.

The Laguna Formation encompasses 43.5% of the 61,576 total vernal wetlands within the SSHCP Study Area. Of the 26,844 vernal wetlands occurring on this formation, 8,484 are located

inside the UDA and 18,360 are outside the UDA). The Laguna Formation ranks first in importance in terms of total number of wetlands.

Approximately 34% (1,373 acres) of the total vernal wetland acreage within the entire SSHCP Study Area occurs on the Laguna Formation. There are 587.5 vernal wetted acres within the UDA and 785.5 acres outside the UDA. Mean vernal wetland size (± 1 SE) on the Laguna Formation is 0.05 ±0.001 acres.

About one third (2,088) of the 6,158 largest vernal wetlands (defined as those ≥ 0.10 acre) mapped within the SSHCP Study Area occur on the Laguna Formation. The Laguna Formation also has the greatest portion (one third) of the top 10% of the largest vernal wetlands (pools >0.10 acres), encompassing a total of 2,088 of the 6,158 large vernal wetlands that occur in the SSHCP Study Area. Over half (55%) of the large wetlands on the Laguna Formation occur inside the UDA; the rest are located outside the UDA.

The Laguna formation has a total of 10,112 deep pools (3,330 inside the UDA and 6,782 outside the UDA). The total acreage of deep pools is 603.3 acres (296.3 acres inside the UDA and 307 acres outside the UDA).

Surveys conducted within the SSHCP Study Area to date have reported all 13 covered species (see Table B1-1) from vernal wetlands on the Laguna Formation (CDFG 2005). Sacramento Orcutt grass and slender Orcutt grass, the only SSHCP "no take species", are reported exclusively from the Laguna Formation.

3.3.2 Mehrten Formation (Tm)

The Mehrten Formation is made up of eroded, high standing remnants of andesitic volcanic mudflow fans that were deposited during the Pliocene and Miocene, 10-25 million years ago. In the San Joaquin Valley, this stratum overlies the Valley Spring Formation and sits under the Laguna Formation. Vernal pools tend to be located on the western edge of the Merhten Formation because the eastern portion increases in slope, precluding pool development (Smith and Verrill 1998). There are 26,667 acres of Mehrten Formation within the SSHCP Study Area (3,441 acres inside the UDA and 23,226 acres outside the UDA).

The Mehrten Formation ranks second in total number of vernal wetlands in the SSHCP Study Area, with 9,759 (16%) mapped (298 inside and 9,461 outside the UDA). There are a total of 387 wetted acres associated with the Mehrten Formation (15 acres inside and 372 acres outside the UDA). Mean size (± 1SE) of vernal wetlands on the Mehrten Formation is 0.04 ±0.001 acres. Vernal wetlands are similar in average size both inside and outside the UDA.

The Mehrten Formation encompasses about 10% (636) of the 6,158 largest vernal wetlands inside the SSHCP Study Area. All but 13 of these largest pools are located outside of the UDA.

The Mehrten Formation has a total of 1,829 deep pools (62 inside the UDA and 1,767 outside the UDA). The total acreage of deep pools is 43.9 acres (1.7 acres inside the UDA and 42.2 acres outside the UDA).

Covered species occurring in vernal wetlands on this formation include vernal pool tadpole shrimp, vernal pool fairy shrimp, legenere, and pincushion navarretia.

3.3.3 Riverbank Undivided Formation (Qr)

The Riverbank Undivided Formation covers the third largest area in the SSHCP with a total of 51,425 acres (15,850 acres inside and 35,575 acres outside the UDA). This formation is part of the lower, younger terrace deposited along the entire east side of the Central Valley and the west side of the Sacramento Valley during the Pleistocene (100,000 years ago). Soils with claypans and duripans are common, as are vernal pools (Smith and Verrill 1998). Riverbank Formation is generally confined to the central portion of the SSHCP Study Area and occurs on either side of the Cosumnes River.

The Riverbank Undivided Formation contains the third largest number of vernal wetlands within the SSHCP Study Area with a total of 9,095 (1,466 within the UDA and 7,629 outside the UDA). This is about 15% of the total number of vernal wetlands mapped. The total vernally wetted area of Riverbank Undivided Formation is 701 acres (107 acres within the UDA and 594 acres outside the UDA).

The mean size of vernal wetlands (±1 SE) on Riverbank Undivided Formation is 0.08 (±0.006) acres. The Riverbank Undivided Formation supports about 16% of the 6,158 largest vernal wetlands (top 10% largest) mapped within the SSHCP Study Area. Most of the 989 largest pools on this formation occur outside the UDA (174 inside and 825 outside the UDA).

The Riverbank Undivided Formation has a total of 2,462 deep pools (374 inside the UDA and 2088 outside the UDA). The total acreage of deep pools is 182.8 acres (33.1 acres inside the UDA and 149.7 acres outside the UDA).

Based on surveys conducted within the SSHCP Study Area to date, covered species reported from Riverbank Undivided include the vernal pool endemics vernal pool fairy shrimp, vernal pool tadpole shrimp, mid valley fairy shrimp, as well as California tiger salamander and the vernal pool plant, legenere.

3.3.4 Valley Springs Formation (Tvs)

The Valley Springs Formation is made up of eroded, high-standing remnants of rhyolitic volcanic mudflow fans that were deposited 20-35 million years ago. Vernal pools tend to be located on the western edge of the formation because the eastern portion increases in slope, precluding pool development (Smith and Verrill 1998). A total of 13,648 acres of Valley Springs Formation occurs on the south-eastern edge of the SSHCP Study Area (91 acres are inside the UDA and 13,557 acres are outside the UDA).

The Valley Springs Formation supports 4,018 vernal wetlands, all but 2 are located outside the UDA. These vernal wetlands total 248 acres. Mean size (±1 SE) of these vernal wetlands is 0.06 ±0.003 acres.

The Valley Springs Formation encompasses less than 10% (413) of the 6,158 largest vernal wetlands (≥ 0.01 acres). All of the largest wetlands on this formation are outside the UDA.

The Valley Springs Formation has a total of 1,606 deep pools that are outside the UDA. The total acreage of deep pools is 58.7 acres.

Pincushion navarretia is the only covered species found in vernal wetlands on this formation.

3.3.5 Upper Unit Riverbank Formation (Qru)

The Upper Unit Riverbank Formation is a compacted mixture of granitic sand, silt, and clay with channels of metamorphic gravel, dark brown to red in color. Sediments in this formation are similar to those in the Laguna Formation. This formation developed during the middle to late Pleistocene and covers 28,212 acres (6,295 acres inside the UDA and 21,917 acres outside the UDA) in the central to southern portion of the SSHCP Study Area, overlapping onto the older Laguna Formation to the east and covered by younger alluvium in the western portion.

The 2,546 vernal wetlands associated with Upper Unit Riverbank Formation cover a total of 304 acres. About 90% of these vernal wetlands are located outside the UDA. Mean size (± 1SE) of vernal wetlands on this formation is relatively large (0.12 ±0.008 acres). Vernal wetland mean size inside the UDA is 0.05 acres; outside the UDA, mean size is 0.12 acres. Statistically, the difference between the means is not significant (p = 1.658).

Of the 6,158 largest vernal wetlands (vernal wetlands ≥0.10 acre), 538 are located on the Upper Unit Riverbank Formation. Most of these large pools are located outside the UDA; only 20 occur within the boundaries of the UDA.

The Upper Unit Riverbank Formation has a total of 726 deep pools (12 inside the UDA and 714 outside the UDA). The total acreage of deep pools is 75.2 acres (0.6 acres inside the UDA and 74.6 acres outside the UDA).

Five covered species have been recorded from vernal wetlands on this formation within the SSHCP Study Area: western spadefoot, California tiger salamander, vernal pool fairy shrimp, vernal pool tadpole shrimp, and mid-valley fairy shrimp.

3.3.6 Middle Unit Riverbank Formation (Qrm)

The Middle Unit Riverbank Formation is similar in composition to the other Riverbank Formations. There are approximately 18,953 acres of Middle Unit Riverbank Formation located within the SSHCP Study Area (5,886 acres inside the UDA and 13,067 acres outside the UDA). This formation occurs in a few disjunct patches in the south-central and north-central parts of the SSHCP Study Area.

There are 1,970 vernal wetlands that occur on The Middle Unit Riverbank Formation (251 inside and 1,719 outside the UDA). These wetlands cover 188 acres, only 23 of which are found inside the UDA. Vernal wetland mean size (± 1 SE) is 0.10 ±0.006 acres. Average pool size inside and outside of the UDA does not differ significantly (p = 1.65).

The Middle Unit Riverbank Formation contains 391of the 6,158 top 10% largest vernal wetlands. Most of these large vernal wetlands are located outside the UDA.

The Middle Unit Riverbank Formation has a total of 501 deep pools (92 inside the UDA and 409 outside the UDA). The total acreage of deep pools is 50.3 acres (12.3 acres inside the UDA and 38 acres outside the UDA).

SSHCP covered species recorded from this formation include vernal pool tadpole shrimp, mid-valley fairy shrimp, Ricksecker's water scavenger beetle, and legenere.

3.3.7 Upper Unit Modesto Formation (Qmu)

The Upper Unit Modesto Formation is the youngest unit of Pleistocene alluvium consisting of distinct alluvial terraces, some alluvial fans, and abandoned channel ridges (Helley and Harwood 1998). It forms the lowest deposits lying topographically above Holocene deposits along streams in valleys. Streams that still exist today deposited the Modesto Formation between 12,000 and 26,000 years ago. In the SSHCP Study Area, Upper Unit Modesto Formation covers a total of 18, 051 acres, bordering the Cosumnes River, Laguna Creek, Skunk Creek, Hadselville Creek, and Browns Creek. Most of these acres are outside the UDA (17,864 acres) and only 185 acres occur within the UDA.

The Upper Unit Modesto Formation supports 1,888 vernal wetlands covering a total of 117 acres. All but one of these wetlands occurs outside the UDA. The mean size (± 1SE) of vernal wetlands on this formation is 0.06 ±0.004 acres.

The Upper Unit Modesto has 191 of the top 10% of largest vernal wetlands (≥ 0.10 acres). Only one of these large wetlands occurs inside the UDA.

The Upper Unit Modesto Formation has a total of 837 deep pools (1 inside the UDA and 836 outside the UDA). The total acreage of deep pools is 63.8 acres (0.8 acres inside the UDA and 63 acres outside the UDA).

Four covered species are reported to occur in vernal wetlands on this formation: California tiger salamander, mid-valley fairy shrimp, Ahart's dwarf rush, and pincushion navarretia.

3.3.8 Lower Unit Riverbank Formation (Qrl)

There are 53,357 acres of Lower Unit Riverbank Formation (40,273 acres inside the UDA and 13,084 acres outside the UDA), making it the second largest geological formation within the SSHCP Study Area. It is made up of higher riverbank terraces and remnants of alluvial fans. The most extensive exposure of Lower Unit Riverbank is in and around the City of Sacramento and was probably deposited by the American River. The modern Sacramento River is impinging on and eroding this alluvial fan (Helley and Harwood 1985). Lower Unit Riverbank deposits occur in the northwest portion of the SSHCP Study Area.

The Lower Unit Riverbank Formation has 1,719 vernal wetlands within the Study Area (1,055 inside the UDA; 664 outside the UDA). The total area covered by vernal wetlands on the Lower Unit Riverbank Formation is 495 acres, about three-quarters of which, occurs outside the UDA. Mean size (±1 SE) of vernal wetlands on this formation is rather large, nearly 1/3 acre (0.29 ±0.028 acres). Average vernal wetland size is 0.1 acres inside the UDA and about 0.6 acres outside the UDA. The difference between the means is not statistically significant (p = 5.36).

Lower Unit Riverbank has 553 of the 6,158 largest vernal wetlands mapped in the SSHCP Study Area. Of these, 195 occur inside the UDA and 358 occur outside the UDA.

The Lower Unit Riverbank Formation has a total of 353 deep pools (233 inside the UDA and 120 outside the UDA). The total acreage of deep pools is 67.1 acres (29.8 acres inside the UDA and 37.2 acres outside the UDA).

Several occurrences of the SSHCP covered species vernal pool fairy shrimp, vernal pool tadpole shrimp, mid-valley fairy shrimp, all vernal pool endemics, are recorded for this formation.

Legenere, another covered species, has also been reported from Lower Unit Riverbank Formation within the SSHCP Study Area.

3.3.9 Undifferentiated Surficial Alluvial Deposits Formation (Qu)

Undifferentiated Surficial Alluvial Deposits are found on 4, 497 acres largely confined to the banks of streams and rivers on the eastern side of the SSHCP Study Area. About a fourth of the area (1,189 acres) is located within the UDA and 3,309 acres are located outside the UDA. This formation derives from various alluvial sources deposited in geologically recent times.

There are 1,550 vernal wetlands on the Undifferentiated Alluvial Deposits Formation: 568 are found inside the UDA and 982 are outside. Total wetted area is 64.1 acres (23.8 acres inside and 40.4 acres outside the UDA). Mean size (±1 SE) of vernal wetlands on this formation is 0.04 ± 0.002 acres.

The Undifferentiated Surficial Alluvial Deposits Formation has 122 of the 6,158 largest vernal wetlands (1.9%). Forty-eight (48) of these occur within the UDA and 74 occur outside the UDA.

The Undifferentiated Surficial Alluvial Formation has a total of 565 deep pools (243 inside the UDA and 322 outside the UDA). The total acreage of deep pools is 30.2 acres (12.9 acres inside the UDA and 17.3 acres outside the UDA).

Six covered species are reported from vernal wetlands on Undifferentiated Surficial Alluvial Deposits in the SSHCP Study Area: western spadefoot, vernal pool fairy shrimp, vernal pool tadpole shrimp, mid-valley fairy shrimp, legenere, and pincushion navarretia.

3.3.10 Metamorphic Rock Formation (pKu)

Exposed metamorphic and granitic rocks are found in the northeastern part of the SSHCP Study Area. These rocks are part of the oldest geologic complex formed before the Cretaceous period, at least 145 million years ago. The Metamorphic Rock Formation of covers 7% (24, 288 acres) of the total land area in the SSHCP Study Area, of which 86 acres occur in the UDA and 24,201 acres are outside the UDA.

The Metamorphic Rock Formation has 829 vernal wetlands within the SSHCP Study Area, (17 inside the UDA and 812 outside the UDA). Total vernal wetland area for the Metamorphic Rock Formation is 38.2 acres, almost all of which falls outside the UDA. The average size (mean ± 1 SE) of vernal wetlands on this formation is 0.05 ±0.005 acres. This is the only formation on which average vernal wetland size differs significantly between those inside the UDA and those outside the UDA. Here, average vernal wetland size is statistically significantly smaller inside the UDA (p

= 0.002).The Metamorphic Rock Formation contains 59 of the 6,158 largest vernal wetlands (≥0.10 acres) in the SSHCP Study Area. All of these large wetlands occur outside the UDA.

The Metamorphic Rock Formation has a total of 213 deep pools outside the UDA. The total acreage of deep pools is 6 acres.

Vernal pool fairy shrimp is the only SSHCP covered species recorded from the Metamorphic Rock Formation at the time of this report.

3.3.11 South Fork Gravels Formation (Qsf)

South Fork Gravels form a broken belt of rounded pebbles and cobbles in a matrix of coarse sand that extends in a northeasterly direction in the center of the UDA. The age of this deposit has not been determined, but it is thought to be older than the Laguna Formation. South Fork Gravels cover a total 3,975 acres within the SSHCP Study Area (1.2% of total land area), all of which are inside the UDA.

The 586 vernal wetlands on the South Fork Gravels Formation occupy a total of 48.8 acres. Mean vernal wetland size (±1 SE) is 0.08 ± 0.011.

The South Fork Gravels Formation has 82 of the 6,158 vernal wetlands 0.1 acre or larger. All are located within the boundaries of the UDA.

The South Fork Gravels Formation has a total of 143 deep pools inside the UDA. The total acreage of deep pools is 18.8 acres.

Vernal pool fairy shrimp, vernal pool tadpole shrimp, mid-valley fairy shrimp, Ricksecker's water scavenger beetle, and legenere are covered species reported from the South Fork Gravels Formation in the SSHCP Study Area.

3.3.12 Turlock Lake Formation (Tpl)

The Turlock Lake Formation is part of the high terrace on the east side of the Central Valley (Smith and Verrill 1998) that formed about a million years ago. It is made up of slightly cemented sand, gravel and silt occurring as a thin layer over the Laguna Formation in the upper central portion of the SSHCP Study Area. The Turlock Lake Formation covers a total of 2,095 acres, all of which are inside the UDA.

The Turlock Lake Formation has 342 vernal wetlands (9.5 wetted acres) within the SSHCP Study Area. Mean size (± 1SE) of these vernal wetlands is 0.03 ±0.003 acres. Eight of the 342 vernal wetlands on Turlock Lake Formation are 0.10 acres or larger. All of these large wetlands occur within the UDA.

The Turlock Formation has a total of 55 deep pools inside the UDA. The total acreage of deep pools is 2.2 acres.

SSHCP covered species reported from the Turlock Lake Formation to date are western spadefoot, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

3.3.13 Dredge Tailing and Artificial Fill Formation (t)

The Dredge Tailing and Artificial Fill Formation consists of rows of large cobble, gravel, sand, silt, and clay deposited along riverbanks as a result of gold mining undertaken during the 1800's. This formation covers 14,527 acres, 4.2% of the total land area of the SSHCP. Most (12,735 acres) of the land covered by dredge tailings and artificial fill occurs within the UDA in the northern portion of the SSHCP Study Area and 1,791 acres occur outside the UDA.

Less than one percent (162) of the mapped vernal wetlands occur on this formation (64 inside and 98 outside the UDA). These vernal wetlands cover about 5 acres; half of which occur within the UDA and the other half outside the UDA. Average vernal wetland size (mean ± 1SE) is 0.03 ±0.003 acres. There is no significant difference between the mean size of wetlands inside compared with outside the UDA.

Ten of the 6,158 largest pools occur on this formation, 4 of them inside and 6 outside the UDA.

The Dredge Tailings and Artificial Fill Formation has a total of 75 deep pools (10 inside the UDA and 65 outside the UDA). The total acreage of deep pools is 2.2 acres (0.8 acres inside the UDA and 1.4 acres outside the UDA).

No SSHCP covered species have been reported from this formation to date.

3.3.14 Ione Formation (Ti)

The Ione Formation is composed of three distinct layers: quartz sandstone overlying white clay, with gray or blue clay below. This developed during the Eocene (40-50 million years ago) when the Central Valley was covered by inland sea. Ione formation is exposed in the eastern portion of the SSHCP Study Area.

It covers a total of 2,956 acres (61 acres are inside the UDA and 2,895 acres are outside the UDA).

Eighty-nine vernal wetlands (3.1 wetted acres) have been mapped on Ione Formation. All fall outside the boundary of the UDA. Vernal wetland mean size (± 1 SE) is 0.4 ±0.006 acres. Of the 6,158 large vernal wetlands (≥ 0.1 acres), 7 occur on the Ione Formation. All of these large vernal wetlands are outside the UDA.

The Ione Formation has a total of 32 deep pools outside the UDA. The total acreage of deep pools is 0.8 acres.

There are no SSHCP covered species reported from this formation at this time.

3.3.15 North Merced Gravels (Arroyo Seco Gravel) Formation (Qtnm)

The North Merced Gravels Formation is made up of coarse, round pebbles and cobbles derived from dark metamorphic rocks that were laid down by streams and rivers draining the Sierra Nevada 1-3 million years ago. In the SSHCP Study Area, this formation occurs as a thin layer that overlies very high terraces of Laguna Formation sediments, covering 561 acres (500 acres are inside the UDA and 61 acres are outside the UDA).

There are 84 vernal wetlands on the North Merced Gravels Formation; 41 of these are found inside the UDA and 43 are outside the UDA, for a total of 3.6 wetted acres. Average size (mean ± 1 SE) of vernal wetlands mapped on this formation is 0.04 ±0.009 acres.

Six of the 6,158 largest vernal wetlands (4 inside and 2 outside the UDA) occur on North Merced Gravels within the Study Area.

The North Merced Gravels Formation has a total of 45 deep pools (9 inside the UDA and X outside the UDA). The total acreage of deep pools is 2.6 acres (1.2 acres inside the UDA and X acres outside the UDA).

Boggs Lake hedge-hyssop is the only covered species reported from North Merced Gravels in the SSHCP Study Area at this time.

3.3.16 Alluvial Floodplain Deposits (Qfp)

The Alluvial Floodplain Deposits Formation is made up of fine sand, silt, and clays deposited down during the current epoch. It covers 9,733 acres, all of it outside the UDA, primarily in the southwestern portion of the SSHCP Study Area. There are 59 vernal wetlands on this formation covering a total of 10.9 acres.

Vernal wetlands on this formation are relatively large. Mean wetland size (± 1 SE) is 0.18 ±0.054 acres. Thirteen of the largest 10% of vernal wetlands occur on this formation; about half of these are one acre or larger.

The Alluvial Floodplain Deposits Formation has a total of 21 deep pools outside the UDA. The total acreage of deep pools is 2 acres.

Dwarf downingia and legenere are the only covered species reported from vernal wetlands on Alluvial Floodplain Deposits within the SSHCP Study Area to date.

3.3.17 Undivided Alluvial Deposits (Qha)

Undivided Alluvial Deposits are composed of cobbles, gravel, sand, silt and clay. This formation occurs on less than 1% of the total SSHCP Study Area. Of the 3, 419 acres mapped, 838 acres occur inside the UDA and 2,582 acres occur outside the UDA in discrete patches along the boundaries of the SSHCP Study Area. There are 32 vernal wetlands on this formation that cover a total of 1.6 acres, all outside the UDA.

Mean area (±1 SE) of the vernal wetlands on Undivided Alluvial Deposits is 0.05 ±0.011 acres. Three of the top 10% largest vernal wetlands occur on this formation. All three are found outside the UDA.

The Undivided Deposits Formation has a total of 9 deep pools outside the UDA. The total acreage is 0.2 acres.

No covered species have been reported from this formation to date.

3.3.18 Basin Deposits (Qhb)

Basin Deposits occur as unconsolidated clay, silt, and other fine material that formed in sink areas during the Holocene epoch. This recent formation is found in the eastern-most corner of the SSHCP Study Area and covers a total of 663 acres (590 acres inside and 73 outside the UDA).

Four vernal wetlands were mapped on this formation; these cover a total of 3.1 acres, all outside the UDA. Average size (mean ± SE) of vernal wetlands on Basin Deposits is quite large: 0.78 ± 0.228 acres. Each of the four wetlands on this formation is 0.10 acres or larger.

The Basin Deposits Formation has a total of 2 deep pools outside the UDA). The total acreage of deep pools is 2.4 acres.

No covered species have been reported from this formation to date.

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4 THREATS TO HABITAT AND AQUATIC RESOURCES

It is impossible to determine the acreage of vernal pool complexes, the number of vernal pools, or the distribution of types of vernal pools that once occurred in pre-settlement California. Dahl (1990) estimates that California has lost 95% of its pre-settlement wetlands (including vernal pools), more wetland loss than any other state in the Country. Holland (1998) reports a loss of approximately three million acres (~75%) of vernal pool complexes since the European settlement of California. He estimates that, as of July 1997, less than one million acres of mostly fragmented complexes remain. It was further estimated that since 1987, Merced County has lost 30,317 acres of vernal pool habitat, and that between 1972 and 1993 Sacramento County lost 30,512 acres (Holland 1998). Figures for total losses of vernal pool habitat statewide since 1997 are not available. However even at a conservative estimated loss rate of 1.5% per year (it may be greater considering current 50-year build-out projections for Merced, Sacramento, Solano, and Placer Counties), the estimated one million acres remaining in 1997 will be reduced by one-half in 46 years, down to just 12% of the pre-settlement California vernal pool acreage (Keeler-Wolf et al. 1998).

Vernal pool habitat remaining in California is further threatened by direct loss and by degradation resulting from residential and industrial development, agricultural land-use conversion, habitat fragmentation, hydrological alteration, invasive plant species, inappropriate livestock and vegetation management, non-point source water and air pollution and climate change.

4.1 Urban and Industrial Development

The greatest losses of California vernal pool habitat have resulted primarily from land-use conversion to irrigated agriculture, starting in the latter part of the 19th Century (see Section 4.2), and more recently, to residential and industrial development. Development remains the main threat to the continued existence of functioning vernal pool landscapes in the Central Valley and elsewhere in California (Jokerst 1993; Bauder et al. 1997; Keeler-Wolf et al. 1998).

It is important to note that Sacramento and Placer Counties together contain the majority of the vernal pool acreage existing in the Southeast Sacramento Valley Vernal Pool Bioregion. This Bioregion encompasses the majority of the State's Northern Hardpan Vernal Pool type as well (CDFG 1998). Most of the Volcanic Mudflow Vernal Pool type in this Bioregion has already been lost to development (Keeler-Wolf et al. 1998). Considering past losses, projections for development, and the high quality of some of the vernal pool habitat remaining in Sacramento and Placer Counties, the Southeast Sacramento Valley Vernal Pool Bioregion is one of the more ecologically important regions, and one of the most threatened.

Land development threatens the remaining vernal pool ecosystem directly through destruction and fragmentation of habitat. Loss of habitat, however may also indirectly affect the remaining areas by increasing the likelihood of other threats (e.g. habitat fragmentation, hydrological alteration, invasion by noxious species, changes in land management options/practices, pollution, inadequate mitigation measures, etc.).

4.2 Agricultural Conversion

Along with Urban/Industrial development, conversion to intensive agriculture has been a leading threat to vernal pool landscapes. Loss of vernal pool habitat began in earnest in the latter decades of the 19th Century, as agricultural development in the Central Valley spread from the deep-soil of fertile riverine floodplains onto the more poorly-drained soils of the higher-older alluvial fans and terraces (Smith and Verrill 1998). Common methods used to improve cultivation conditions in these vernal pool landscapes included leveling of mound-swale topography, excavation of drainage ditches to lower perched water tables, and ripping and blasting of subsoil horizons for improved water drainage. With the later advent of large-scale water delivery and drainage systems, conversion to irrigated agriculture expanded further still (Smith and Verrill 1998).

Until recently, most of the large tracts of middle and upper terrace-vernal pool habitat in the Central Valley remained intact as part of large-scale annual-pasture livestock ranches which, in most cases, have not significantly altered the landscape. In recent years, however, conversion of these otherwise marginal ranchland soils to vineyards has been increasing and has become a leading threat to vernal pools in the Southeastern Sacramento Valley Vernal Pool Bioregion (Keeler-Wolf et al. 1998).

4.3 Habitat Fragmentation

Fragmentation of vernal pool habitat results from a variety of causes and occurs at a range of spatial and temporal scales. This fragmentation reduces the spatial and ecological continuity within a given land unit (see discussion of ecological connectivity Section 1.4 of this report). Habitat fragmentation is an ongoing and cumulative threat to the vernal pool ecosystem.

It is important to consider the spatial scale of potential effects of developments. For example, Forman and Deblinger (2000) estimated the "road-effect zone" for a busy four-lane highway in Boston, Massachusetts to be an average of 600 meters in width and asymmetric. They suggest that avoidance of roads due to vehicle traffic is probably of more ecological impact to biota than the more evident roadkills. Plants that use animals for dispersal of their propagules are also affected by animal-road avoidance. Fragmentation of natural habitats by roads tends to fragment continuous populations into subpopulations, making each subpopulation more vulnerable to local extinction events due to decreased emigration, immigration and gene flow (Forman and

Alexander 1998). Roads and other fragmenting intrusions also lessen the visual aesthetic appeal of a natural landscape.

At the larger landscape scale, change in regional abundance and distribution of vernal pool habitat may also change the migration and habitat use patterns of waterfowl and shorebirds on the Pacific Flyway, which in turn also affects meta-population dynamics of numerous organisms and alters multiple landscape-scale ecological functions.

Considered at smaller scales, habitat fragmentation can result from placement of roadbeds, railroad tracks, walls, utility corridors or other developments within vernal pool complexes. These types of intrusions can prevent the California tiger salamander or western spadefoot from completing their necessary seasonal migrations to and from rodent burrows in adjacent uplands. In addition to altering the vernal pool hydrologic cycle, interruption of hydrologic interconnectivity by these types of developments can disrupt dispersal of plant seeds and invertebrate cysts/eggs, thus manifesting changes in long-term meta-population dynamics. Fences that limit the movement of livestock through the landscape may also affect meta-population dynamics, since livestock are also implicated in the transport of seeds, cysts and eggs.

One significant negative aspect of habitat fragmentation is the increased edge effect to which remaining preserved vernal pool habitat areas are subject. As remaining habitat areas diminish in size, the ratio of vulnerable edge to preserved interior area increases. Ecological consequences arise because, as this ratio increases, any given interior point (vernal pool or organism) is closer to potential threats existing outside of the preserve boundary. Concomitant with increased edge effect are increased vulnerability to stochastic disturbances, pollution, and increased vulnerability to invasions by non-native plant and feral animal species. Edge effect can be minimized for vernal pool/annual grassland preserves by maximizing the size of the preserve areas (in contrast to creating more numerous smaller preserves), and by designing preserves that are as round in shape as possible. All other factors considered equal, the best shape for an ecological preserve is a circle, and the least preferable is a long narrow rectangle.

Fragmentation ultimately leads to smaller and more numerous tracts of habitat areas, which may be proportionally more difficult to regulate, monitor and manage in a consistent, efficient, and economical fashion. In addition, smaller, more numerous preserves are more likely to be surrounded by developed residential and/or industrial areas that not only present more types and more frequent threats, but may also be less attractive to migratory waterfowl and shorebirds. For these and other reasons fragmented habitats are less likely to maintain complex ecosystem processes and species populations over time.

4.4 Invasive Non-native Plants and Animals

In general, vernal pool habitat is excessively demanding for most non-native plant and animal species; however, a number of invasive species exist which are documented as potential threats to vernal pool habitat. In addition, invasive species not yet known to be a threat to California vernal pools may be introduced in the future (see Data Gaps Section 7). Invasive species in both vernal pool basins and in surrounding uplands can negatively affect vernal pool habitat in a variety of ways, ultimately changing ecological functions and negatively affecting desirable species.

Non-native annual grasses of Mediterranean origin now dominate the uplands associated with vernal pool complexes in California. The transition from native vegetation to exotics began with European settlement and was hastened by years of drought and overgrazing during the late 1800s. Some suggest that rapid evapo-transpiration of water and built-up thatch from non-native grass species (e.g., foxtail chess, Italian wildrye, Mediterranean barley, Medusa-head grass, soft chess) may indirectly affect vernal pool species by lessening the amount of water entering the system through surface and subsurface flow (Marty 2003; Robins and Vollmar 2002). The effects of thatch buildup in uplands may negatively affect obligate vernal pool bee pollinators as well. Thick stands of mulch may also impede juvenile California tiger salamanders and western spadefoots during their migrations from their aquatic pool habitat to the upland areas and burrows used for summer activity and aestivation. Barbed awns and seed coats on non-native grasses can also injure or kill mammals by becoming lodged in their ears, eyes, throats and fur.

Italian wildrye and Mediterranean barley are two non-native facultative wetland species that typically dominate disturbed seasonal wetlands and invade smaller, more ephemeral vernal pool types. In heavy clay soils and in non-grazed systems, these two grasses can encroach upon the pool margins, resulting in a simplified pool edge habitat with diminished native plant diversity (Robins and Vollmar 2002).

Other weedy hydrophytic species reported as growing within vernal pools in the Sacramento Valley include lippia (*Phyla nodiflora*), swamp pricklegrass (*Crypsis schoenoides*), European mannagrass (*Glyceria declinata*), field bindweed (*Convolvulus arvensis*), common unicorn plant (*Probiscidea louisianica*), Bermuda-Grass (*Cynodon dactylon*) and paradox canary-grass (*Phalaris paradoxa*). Cocklebur (*Xanthium strumarium*), a native species, can also dominate vernal pools (Schlising, Unger pers. comm.; Dittes pers. obs.).

Non-native mammals inhabiting grasslands and vernal pool complexes in California include the domestic cat, domestic dog, feral pig, Norwegian rat, black rat, house mouse and perhaps most recently, ferrets. These animals prey on native species, thus decreasing population viability. They also have the potential to spread diseases and parasites to other mammals within the area. Non-native birds such as the European house sparrow and European starling are also invading annual

grasslands and vernal pool complexes. These birds compete with native species for foraging areas and nesting sites.

Non-native amphibians known to invade vernal pools and seasonal wetlands include the introduced tiger salamander (*Ambystoma tigrinum*) and bullfrog (*Rana catesbiana*). Although bullfrogs require permanent bodies of water to complete their life cycles, they can migrate through vernal pools, where they feed voraciously on native amphibians and crustaceans. In general, native amphibians do not occur in water bodies occupied by bullfrogs and non-native fishes. The introduced tiger salamander (*Ambystoma tigrinum* was introduced as fish bait and now several populations have become established in California. The species has been reported to be hybridizing with California tiger salamander (Schaffer et al. 1993).

4.5 Livestock Grazing

In general, livestock grazing under appropriate conditions is thought to be compatible with vernal pool ecosystems, and in many cases even beneficial (Pyke and Marty 2005; Marty 2003; Vollmar and Robins 2002; Griggs 2000). In other cases though, livestock grazing can be deleterious when an incompatible grazing regime is used. Grazing is cited as a threat to a variety of sensitive vernal pool organisms at a number of Central Valley locations (CDFG 2003).

Complete absence of livestock grazing can be disadvantageous to vernal pools in several ways. Barry (1998) concluded that complete rest from grazing: allows upland species to encroach upon pool edges (species in centers of pools are less affected); can cause decreased water runoff and increased soil infiltration, percolation and water storage capacity due to increased vegetation; and can result in decreased diversity around pools. Marty (2003) found that aquatic invertebrate species richness was highest in grazed vernal pools, likely resulting from longer inundation periods due to higher soil compaction.

Some showy vernal pool plants (e.g., *Blennosperma, Downingia, Lasthenia, Limnanthes*) require the pollination services of specialist bees to reproduce (Thorp 1976, 1990; Thorp and Leong 1995, 1996, 1998). These bees nest in the soil of uplands within vernal pool complexes. Therefore, vernal pool conservation must consider nesting requirements of oligolectic (pollen specialist) bees to ensure longevity of some vernal pool plants. Effects of grazing on specialist bees are not known. Given that soil disturbance and compaction in grasslands is a well-known consequence of livestock grazing, with ecological affects varying by site (Duffey et al. 1974), perturbations to bee nests and potential nesting sites are possible. Conversely, these specialist bees may not fare well in situations where excessive thatch, particularly from Medusa-head grass, results because of too little grazing. Soil types, vegetation composition, number and type of livestock, grazing duration, and seasonal periods are all factors affecting soil compaction and erosion by livestock.

Other negative potential effects of livestock grazing on vernal pool habitats result more from inappropriate timing of the grazing regime, than from the intensity of the grazing. For example, Orcutt grass flowers and sets seed during the late spring and summer months. Grazing of Orcutt grass -occupied pools at this time can reduce or eliminate the season's reproductive effort, and over time can exhaust the soil seed bank. Grazing with livestock while the pool is still inundated in the late fall, winter, and early spring months allow plants in the juvenile life stage to escape grazing and trampling impacts. Similarly, grazing in the very late summer and fall months, after seeds have matured and dried, also allows for escape from these negative pressures (Stone et al. 1988). Grazing during the migration of California tiger salamander and western spadefoot can lead to mortality by trampling.

Influence of livestock grazing on the water chemistry of vernal pools has not received direct investigation, although Robins and Vollmar (2002) provide a good review of what is currently known. Excessive livestock use can result in nutrient overloading of vernal pool basins via input of feces and urine. Under these conditions, algal blooms proliferate and eutrophication (oxygen depletion) ensues. Excessive growth of algae also limits light penetration into the water column, limiting growth of plant seedlings and potentially affecting ecology of the invertebrate community. Livestock grazing may also result in the removal of nitrogen from the vernal pool ecosystem by conversion of plant material. Livestock congregating around pool edges may increase soil erosion and pool turbidity, potentially smothering amphibian larvae.

For these and potentially other reasons, overgrazing, under grazing and improperly timed livestock grazing can negatively affect the vernal pool species and vernal pool ecosystems.

4.6 Hydrologic Alterations

As described in Section 1.2 and 1.3 of this report, timing of the four phases of the vernal pool hydrological cycle is considered to be the over-riding factor in determining the biological structure and ecological functions of the vernal pool ecosystem. It follows then that any alteration of a sub-watershed that affects the timing of the hydrological cycle has potential to affect the ecological integrity of the vernal pools present there.

Water added to the system resulting in prolonged inundation and/or waterlogged-terrestrial phases could push the vernal pool hydrology and biota away from the unique vernal pool type and towards that of the common seasonal marsh. Alterations of this type can be observed where construction of berms (e.g., stockponds) and/or obstruction of swales by roadbeds, railroad tracks and canal berms have resulted in the impoundment of water in vernal swales or an increase in pond depth. Vernal pools can also shift toward a seasonal marsh inundation regime as a result of increased precipitation runoff flowing from nearby developed impermeable surfaces, from irrigated landscaping, and from irrigated agriculture.

Conversely, water removed from the vernal pool system resulting in abbreviation of the inundated and/or waterlogged-terrestrial phases can lead to a shift towards the less specialized seasonal wetland type that is dominated by low diversity of mostly non-native plant species and generalist invertebrates. Reduction of duration of the inundated and/or waterlogged-terrestrial phases may result from interruption of flow into pools in settings where swales contribute to pool basin hydrology. Since the hydrological cycle is linked to the surrounding upland soil profile (Hains and Stromberg 1990), disturbances to the surrounding upland soil profile within a watershed containing vernal pools may alter the vernal pool ecological function as well.

Degradation of vernal pools resulting from hydrological alteration are cited as threats at a number of recorded locations, including the Phoenix Field and Phoenix Park Preserves, at other sites in Sacramento County, and elsewhere in the state (CDFG 2003; USFWS 1994; Fisher and Schaffer 1996; Stone et al. 1988; Clark et al. 1998; Dittes pers. obs.).

4.7 Fires

Grassland fires are considered to be a beneficial part of the natural cycle of historic California grassland landscapes and are generally not considered a threat to vernal pools and vernal pool ecosystems. Contemporary annual grassland communities are commonly managed with fire to control the buildup of thatch and the cover of exotic species, namely Medusa-Head Grass and Yellow Star Thistle (Griggs 2000; Mawdsley 2000). However, there are cases where fire carries through vernal pools during the dry summer and fall months, impacting the rare late blooming Orcutt Grasses (Schlising pers.comm.). Removal of upland vegetation (by fire or grazing) may also increase grazing pressures on plants remaining within pools or exclosures. For example, grasshoppers were observed eating large amounts of the rare Orcutt Grass after adjacent uplands were burned and heavily grazed at the Vina Plains Preserve in Tehama County (Schlising pers. comm.).

Management activities associated with fire control activities (e.g., plowing or scraping fuel breaks) may impact vernal pools and vernal pool complexes. Sacramento Orcutt grass pools at the Keifer Landfill have fuel breaks constructed through them along Grant Line Road and along Keifer Boulevard. These fuel breaks may directly affect plants and animals and may also alter the hydrology both the impacted pool and surrounding pools.

4.8 Recreation Activities

Recreation is not commonly considered when discussing threats to vernal pools. Since vernal pools are aesthetically appealing for only a short part of the year, unlike riparian areas that have living vegetation and water for a significant part of the year, they have been described as having an

"image problem" (Zedler 1987). Impacts from recreation may become more of a concern as more development occurs and more preserves are established in close juxtaposition with housing tracts.

Vernal pool impacts resulting from recreation activities are reported from the Phoenix Park Preserve in Sacramento County (Clark et al. 1998). In this urban-natural area interface, trampling from foot, horse and bicycle traffic within the highly accessible Preserve was reported to compact soils, eliminate plant cover where trails came close to pools, and disturb plants and wildlife. In addition litter accumulation is also cited as a problem (CDFG 1983; Clark et al. 1998). Recreational off-road vehicle use during the wet season can create large ruts and reduce vegetative cover; this activity has been observed in Butte, Tehama and Sacramento Counties (Dittes per. obs.). Uncontrolled dogs and cats may disturb wildlife as well.

4.9 Pollution

A variety of point and non-point-source pollutants enter the vernal pool landscape via overland and subterranean flow of water, and atmospheric pollution can enter in precipitation and in the form of dust. Wind-blown trash accumulation and even illegal dumping of household garbage and garden waste has also been cited as threats in some vernal pool systems (CDFG 2003; Clark et al. 1998).

4.10 Water Pollution

One of the nutrients primarily responsible for eutrophication of freshwater systems is phosphorous, which is often bound to soil particles from agricultural land. Approximately 65 percent of the sediment washed into U.S. streams, rivers and lakes is from cropland, pastures and rangeland. Non-point sources of pollution in urban and residential areas include failing septic systems, septic system additives, improper disposal of household chemicals, storm water runoff, construction activities, and inappropriate use of fertilizers and pesticides (Master et al. 1998).

Impermeable surfaces such as asphalt, concrete, and roofing increase the intensity of storm water runoff and provide a path for runoff laden with sediment, heavy metals, oil and oxygen-demanding organic matter (Master et al. 1998). Nutrients or toxicants are dissolved in water and enter streams where they may move downstream, accumulate in deposits and be ingested by organisms (NRC 1992). Sacramento County (1993) stated that "urban storm water runoff discharges contain non-point source pollutants that lower the quality of receiving waters" in Sacramento County, and indicated that pasture runoff could also serve as a source of "surface water quality degradation".

Pesticide residues in water and soil are well known to have various deleterious effects on non-target organisms (Davidson 1979; Hurlbert et al. 1972; Simon and Buikerma 1997; Wurster 1968), although specific studies addressing the effects of pesticides in vernal pool ecosystems are

lacking. A recent study in the Sacramento area (Roseville) reported that urban runoff containing pyrethroides (the active ingredients found in most insecticides available for residential use) was responsible for sediment toxicity in about half the number of samples collected. In some cases, sediment toxicity caused total or near total (>90%) mortality when exposed to the aquatic amphipod species *Hyalella azteca* in laboratory exposures (Weston et al. 2005).

Herbicides are commonly used to control unwanted plants, native or otherwise. Duffey et al. (1974) recommend that herbicides should not be used on grasslands managed for nature conservation. The effect of herbicides on vernal pool organisms and ecology has not been quantified. However, Clark et al. (1998) observed that plants were killed in vernal pools that received herbicide-laden runoff from nearby areas. Enough seeds apparently were stored in the soil seed bank to allow plants to become reestablished the following year, but continued runoff containing herbicides would likely limit the ability of the vernal pool flora to recover. Similarly, herbicide runoff from the treated ground around a wooden utility pole in Eastern Merced County was observed to result in complete lack of vegetation in an adjacent vernal pool that received the runoff (Dittes pers. obs.)

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5 CLASSIFICATION OF VERNAL POOLS / WETLANDS

Vernal pools/wetlands have been variously classified, depending on the scope and purposes of the particular effort. Classification systems developed by various regulatory agencies and consultants for vernal pools and seasonal wetlands, their defining parameters, and applicability to the SSHCP are summarized in the following discussion. These classification systems are variously based on landforms, geologic formations, soils, hydro-geomorphology, composition of vegetation, or combinations of these in the context of geographic setting (Butterwick 1998; Cowardian et al. 1979; Holland 1986; Jones & Stokes 1990; Reiner and Swenson 2000; Sawyer and Keeler-Wolf et al. 1998; Vollmar 2002).

5.1 Previous Vernal Pools/Wetlands Classification in Sacramento County and the SSHCP Study Area

The first comprehensive classification of Sacramento County's vernal pool habitat was based on association of vernal pool complexes with geologic landform (Jones and Stokes 1990). Landforms result from specific episodes of geologic activity and are physically recognizable features of the earth's surface that have distinguishable shape, range, and composition (Smith and Verrill 1998). According to this system, Sacramento County vernal pools fall into one of four categories: Young-Terrace Pools (Riverbank Formation), Old Terrace Pools (Laguna and Arroyo Seco Gravels), Mudflow Pools (Mehrten and Valley Springs Formation), or Drainage way (recent alluvial deposits over other formations). These four landforms are further subdivided by specific geologic surficial deposits (or formations) based on differences in age, parent material, soil profile development, texture, geomorphic expression, lithology, stratigraphy, induration, and depositional environment (Helly and Hardwood 1985).

Although it was noted that vernal pool habitat varies according to landform association, no quantifiable data were used to describe the patterns of variance. Qualitative generalizations regarding vernal pool shape, depth, size and surface drainage were provided for each of the soil series present in the County (Jones and Stokes 1990). It was acknowledged however, that substantial fieldwork is required before justifying the use of soil series as a primary category of vernal pool classification.

The Nature Conservancy (TNC) modified and applied this landform and geologic formation-based classification system to their Cosumnes River Watershed Project (Reiner and Swenson 2000). As part of this effort, vernal pools in the southeast SSHCP Study Area were categorized according to the following landform categories: Low Terrace Grasslands (Riverbank), High Terrace Grasslands (Laguna), Terrace Drainageway Grasslands (Modesto/Riverbank), and Mudflow Grasslands (Mehrten and Valley Springs Formations).

These landform categories were used by TNC in conjunction with soil maps and vernal pool density maps to qualitatively designate priority conservation areas within the watershed project boundary. As with the system of Jones and Stokes (1990), physical parameters of vernal pool variability were not quantitatively described within or between landforms for the Cosumnes River Watershed Project.

5.2 Classification System of Vernal Pool Complexes for the SSHCP

The SSHCP Vernal pool classification system includes a modification of the landform approach of Jones and Stokes (1990). This landform classification was used to describe vernal pool conservation goals within the Sacramento County General Plan (1993). TNC also used a landform-based approach for conservation planning in the Cosumnes River Watershed Project in southeast Sacramento County (Reiner and Swenson 2000), although it was slightly modified from the approach first proposed by Jones and Stokes (1990).

This current SSHCP classification system builds on these approaches, with additional refinement afforded by currently available GIS technology and GIS geological formation data (California Geological Survey 2003), and recent SSHCP Land Cover Types produced by EDAW (2005).

The SSHCP classification system for vernal pools/wetlands is intended to be workable for the scale and resolution of the SSHCP mapping effort, and for the general timeline and budget constraints of the SSHCP. Within the scope of these considerations, the classification system is intended to be refined enough to identify, delineate and prioritize conservation needs for the region's vernal wetlands to the fullest extent possible at this time.

This vernal wetland classification system will increase the probability that overall biodiversity, special-status species, and myriad complex ecological functions operating up to the landscape level, are captured within appropriate and proportional mitigation-related habitat preserves.

Analysis of vernal wetland distribution in the SSHCP Study Area is based on the mapping conducted by the Geographical Information Center (GIC) in Chico, California in 2005 (Figure 4). Delineation of vernal wetlands was performed by use of ortho-rectified black and white aerial photographs that were flown on March 15, 2001. These orthophoto images were brought into ArcView 3.3 GIS software and the vernal wetland signatures were digitized into polygons which were recorded as a shape file. Vernal pool/wetlands were identified primarily by visual signatures, including contrasting shades (color) and to some degree texture and shape.

The mapping criteria and methodology used for the SSHCP Study Area were similar to those used by GIC in creating regional maps of vernal pool wetlands for Tehama County and Shasta County. In the SSHCP Study Area, these wetlands were usually found in isolation and sometimes are interspersed with and/or connected to swales. The vernal pools/wetlands usually

have a relatively distinct boundary or contrasting edge that makes them visually discernible from less distinct saturated soil formations ("spongy areas").

The vernal pool/wetland delineations conducted remotely by interpretation of aerial photos are expected to differ somewhat from jurisdictional vernal pool acreages obtained using the standard USCOE (1987) 3-parameter approach (boundaries determined on the ground using indicators of hydrology, hydric soil and hydrophytic vegetation).

This is an unavoidable consequence of remote delineation. Comparison of the remote delineation with on-the-ground 3-parameter delineations was made at a few sites where the jurisdictional delineations were available (vicinity of Sunrise-Douglas and Mather Field vernal pool complexes). In these cases, there was good correspondence in the polygons and signatures derived by these two methods (Radmacher pers. comm.; Sacramento County 2005). It is important to note though, that some of the other landscape settings may differ in agreement between the remotely mapped vernal wetlands and what is actually on the ground. It is critical to note that owing to time constraints and lack of access to private property, on-the-ground verification/delineation of vernal wetlands is not possible at this time.

Expected discrepancies between results of the two delineation scales and methods are likely to include:

1. ***Overestimation of the number and acreage of jurisdictional vernal pool wetland features using the aerial photo data set:*** On the aerial photograph, some features delineated as vernal wetlands may appear vernal pool- like, with defined boundaries and hydric reflective signatures that contrast with the surrounding upland annual grassland. In reality however, these wetland features may or may not support an actual vernal pool hydrologic cycle. If the mapped feature ponds water for too short duration, the feature may be a less-specialized seasonal wetland; if ponding is of excessive duration, the feature may actually be a less specialized seasonal marsh. In addition, some mapped signatures may not be associated with ponded basins at all; rather they may merely reflect saturated soil profiles without "pools", especially with soils heavy in clay. In all three cases, wetland features mapped that do not support the vernal pool hydrologic cycle do not provide habitat support function for the vernal pool flora and fauna.
2. It is important to note that this type of error is not likely to apply equally across all vernal pool complexes that occur on the various geologic formations. For instance, the mapping of vernal pools is more likely to be very accurate and precise for the vernal pools associated with the high-terrace Laguna Formation. In contrast, accuracy and precision is comparatively less for vernal pools occurring on the heavier clay soils associated with the low terrace Riverbank Formations.

3. ***Underestimation of the number of separate and/or small jurisdictional vernal wetland features using the aerial photo data set:*** In some cases, the higher degree of resolution afforded by use of three parameters on the ground will result in exclusion of small non-wetland areas that bridge closely-juxtaposed wetland basins. From the scale of the aerial photograph, the shallow bridges are not discernible, and so multiple jurisdictional-delineable basins are conjoined and a lesser number of larger pools are perceived. In addition, a number of isolated smaller/shallower wetlands that exhibit less distinct visual signatures were likely overlooked on the aerial photo delineation, and would be included in the 3-parameter field delineation.
4. ***Underestimation of size of functioning "hydrologic complex" with the 3-parameter delineation;*** in the preceding two cases, the differences between the two delineation methods trend towards increased resolution of jurisdictional boundaries using the 3-parameter field delineation. Importantly however, the 3-parameter approach can result in underestimation of the functional wetland area. Any given vernal wetland area is functionally related with surrounding vernal pools, seasonal wetland ecotones and with uplands, subterranean groundwater and surrounding saturated soil profiles. These areas are involved with the functions of hydrology, element cycling, and habitat support, but they may not satisfy one or more of the 3 field criteria, and so are usually excluded from jurisdictional acreage calculations.

Owing to the regional-scale view afforded, and greatly increased resolution and accuracy as compared to the previous regional vernal pool map (Jones and Stokes 1990), the map produced from the 1:200-scale aerial photograph (GIC 2005) is highly valuable for regional conservation planning and is used here for the SSHCP.

It is important to consider however, that the 3 considerations discussed above, combined with human error that is inherent in the aerial photo-mapping and digitizing process, somewhat limit the 1:200-scale GIS layer with regard to calculating exact vernal wetland acreages for precision impact analysis and mitigation planning. Owing to time and budget constraints and lack of access to private property however, on-the-ground delineations are not possible to conduct prior to completion of the SSHCP. Accurate three-parameter jurisdictional delineations will eventually be conducted on all lands as they are developed and on all preserves as they are established.

5.2.1 Classification by Geologic Formations

Physical parameters of vernal pool complexes appear to vary by geologic formation. These factors may include drainage area, slope, soil structure, soil depth, pool size, pool depth, timing of vernal pool hydrologic cycle and vernal pool interconnectivity. These physical parameters in turn affect the structure and ecological dynamics of the associated vernal pool flora and fauna.

Different geologic formations support characteristic vernal pool types. In addition, specific geologic formations may possess specific biogeographic legacies that are reflected in present day patterns of vernal pool plant and animal biodiversity.

It follows then, that in order to ensure preservation of the full spectrum of impacted vernal pool types and functions, mitigation in-kind will involve preservation/restoration of vernal pools that occur in as close proximity as possible on the same type of geologic formation.

5.2.2 Classification of SSHCP Vernal Pool Complexes with Vernal Wetland-Acre/Density Index (VWADI)

In addition to correlation with geologic formations, a Vernal Wetland Acre/Density Index (VWADI) is used to describe and classify the vernal pool complexes within the SSHCP Study Area. This index is based on the variation in vernal wetland area (acres), and variation in vernal wetland density (number of vernal wetlands per unit land area). These two parameters, assessed together as an index for standardized 160-acre land analysis units, will serve as a primary descriptor of the range of spatial-ecological variability of vernal pool/wetland types in the SSHCP Study Area, within geological formations (see Section 6).

These analyses will provide the framework for the development of the SSHCP vernal pool-annual grassland habitat conservation strategy. For each parameter proposed however, full consideration of assumptions and limitations is required particularly as they relate to resolution and accuracy of the descriptive model (e.g., it is beneficial to know which ecological situations are likely to be overlooked, why, and what is the significance).

Additional ecological measures are also desirable for a more complete and accurate description of spatial and functional variability of vernal pools and vernal pool complexes (Jokerst 1993; Leidy and White 1998; Wacker and Kelly, 2004). It is imperative to consider vernal pool functions and processes at the landscape-scale as well to maximize the likelihood of achieving long-term conservation goals (Alexander and Schlising 1998; Jokerst 1993; Wacker and Kelly, 2004;). Ongoing vernal pool mitigation efforts have received criticism for focusing overly on replacement of acreage while givinglittle attention to the functioning landscape-scale ecosystem (Jokerst 1993; Wacker and Kelly 2004).

For the purposes of the SSHCP, a GIS-derived spatial-ecological index has been developed that allows for a more refined and quantifiable assessment of the region's vernal pool complexes. This relatively simple index is used here in conjunction with earlier regional conservation strategies that were based on association of vernal pool complexes with landform and geologic formation (Jones and Stokes 1990; Reiner and Swenson 2000). This VWADI is based on two parameters that are readily measurable remotely with GIS technology: 1) density of vernal

wetland features per 160-acre Land Analysis Unit(s) (LAU), and 2) wetted acres of vernal wetland habitat per 160-acre LAU.

Note that the size (area) of the vernal wetlands, a third important parameter, is inferable when vernal wetland density and wetted acres in each 160-acre LAU are plotted together on x and y axes. These three parameters considered together as an index reflect landscape-scale spatial relationships with ecological implications that are not discernible by considering each of the parameters in isolation (see following discussion).

Specifically, the VWADI is used here in the SSHCP to more accurately perform the following 3 tasks:

1. Describe spatial-ecological variability of vernal pool landscapes in the greater SSHCP Study Area;
2. Describe and quantify spatial-ecological variability of vernal pool landscapes within and between the various geologic formations encompassed by the SSHCP Study Area;
3. Describe and quantify spatial-ecological variability of vernal pool landscapes within and between different planning areas within the SSHCP Study Area (e.g., inside and outside of UDA).

It is critical to note that although the index itself is relatively simple, the exact utility is determined by the type and quality of the spatial data available. The GIS-data set utilized for the SSHCP was derived through manual delineation of black and white aerial photographs (scale: 1 inch = 400 feet) with limited subsequent field verification (see discussion under Section 5.2 above).

5.2.3 Development of the Vernal Wetland Acre/Density Index (VWADI)

The VWADI was produced by first creating a GIS grid-layer comprised of evenly distributed, contiguous 160-acre squares and then superimposing the grid-layer over the entire SSHCP Study Area on the GIS base Geologic Formation map. The 160-acre square grid unit was chosen for several reasons: this size and shape corresponds with ¼ of a 640-acre section and it therefore roughly corresponds with land-ownership boundaries; also, since preserves should be made as large in area as possible, use of multiple 160-acre subunits will allow for more detailed analysis and preserve planning. The grid units are hereafter referred to as LAUs.

A numbering system was then created to assign a unique identifier to each of the 2,311 LAUs. It was found that 1,372 LAUs encompass vernal pool habitat in the SSHCP Study Area as of 2006.

Once the grid system was created, the GIS program was queried to obtain the following two values for each of the 160-acre LAUs:

1. Vernal wetland density expressed as the total number of vernal wetland features encompassed within the LAU, including pools shared with contiguous LAUs; and
2. Total wet acres of vernal wetland habitat, including the portion(s) of shared wetland(s) that occur within the given LAU;

The density and wet-acre values were then ordinated onto standard-scale X and Y-axes, respectively (see Figures 10, 12, 14, and 16). This ordination results in visual-spatial segregation of different types of vernal pool complexes within continua of density and wetted acreage. Note that within any given LAU and relative to another, a doubling of wetted acreage with constant vernal pool density corresponds to a doubling in the average vernal pool/wetland size (area). Thus, even though it is not a directly measured parameter, vernal pool size is inferable within the index.

Once this ordination was performed for LAUs nested within each of the geologic formations and landforms, and within each of the planning areas previously described (see tasks 1-3, Section 5.2.2), the resulting X-Y Cartesian Grid was divided into 25 VWADI categories by designating 5 intervals along the X-axis (based on vernal pool density and designated A-E), and 5 intervals along the Y-axis (based on vernal pool wet-acres and designated 1-5; (see Figures 11, 13, 15, and 17). In this fashion, each 160-acre LAU is identifiable according to one of these 25 standardized alphanumeric values.

After creation of the 25 VWADI values and ordination of the LAUs a summary calculation was made that describes the numerical and spatial distribution of each "VWADI Category Type" that exists within the SSHCP Study Area for each geologic landform. For example and as indicated in Figure 11, on the Laguna Geologic Formation there are 15 160-acre LAUs that correspond to the D4 VWADI Category; 12 of the LAUs are located inside the UDA and three are outside of the UDA; there are a total of 122 wetted acres present in this category, of which 99 acres are located inside and 23 acres are outside of the UDA.

As with any other ecological index, there are assumptions and limitations to the model that require consideration. The following is an account of rationale, assumptions and limitations as they pertain to use of the VWADI for the purpose of the SSHCP.

Assumptions Regarding the Mapping Data:

- The GIS layer base map (GIC 2005) used to produce the index reasonably reflects conditions in the field with regard to vernal wetland locations and boundaries (see Section 5.0 above).

- Inaccuracies in delineation of vernal wetland boundaries on the GIS layer base map differ between Geologic Formations (e.g., accuracy is higher for vernal pools associated with high-terrace Laguna Formation, and is lower on clay soils of low-terrace Riverbank Formation).

Assumptions Regarding Vernal Pool/Geologic Formation Relations:

- Determinant relationships between geologic formations and physical characteristics of associated vernal pools, and in turn, physical characteristics of vernal pools influence vernal pool biota. For this reason, acquisition of land or easements will occur over broad range of formations.

Assumptions Regarding Vernal Wetland Density and Ecological Interconnectivity:

- Ecological interconnectivity increases with increasing vernal pool density per given land unit. For example two vernal pools located within 3 meters of each other inter-relate differently ecologically than two pools located 90 meters apart.
- Interconnectivity at the local scale generally increases with an increase in the size of any given vernal pool preserve supporting vernal pool complexes of a given density. Similarly, at the regional scale, interconnectivity increases with an increase in the number of juxtaposed large vernal pool preserves supporting vernal pool complexes.
- Maximum interconnectivity is associated with the largest areas encompassing the densest of pool complexes.
- High-density complexes possess specific ecological properties (e.g., attractiveness to migratory waterfowl, greater function of meta-population dynamics, increased number of ecological niches, and population stability in light of drought-wet cycles and perhaps even climate change).
- Vernal wetlands and complexes occur along gradients of interconnectivity (hydrological-spatial).

Assumptions Regarding Size (area) of Vernal Wetlands:

- Larger vernal pools (by area) possess specific ecological properties, functions and values that are different from smaller pools (e.g., a greater volume of water for a given depth, a larger number of possible habitat niches, increased attractiveness to migratory waterfowl).
- Vernal wetlands occur along gradients of size (area-depth).
- Size (area) may be a useful indicator of duration of hydro-period.
- Larger pools (by area) are more infrequently occurring.

Assumptions Regarding Vernal Pool Hydrology:

- Vernal pool hydro-period is one of the primary determinants in structuring the general vernal pool biological assemblage.
- Size (area) may be a useful indicator of hydrology.
- Vernal wetlands occur along gradients of severity of seasonal inundation cycle (duration/depth).
- Vernal pools exhibiting "deep-pool" hydrology (long duration) are more infrequently occurring.

Assumptions Regarding Vernal Pool Conservation Values:

- Vernal wetlands, regardless of size or interconnectivity, possess intrinsic ecological functions and values.
- High-density vernal pool complexes are infrequently occurring, are likely to be more ecologically complex and therefore possess higher conservation value.
- Large vernal pools are more infrequently occurring (in isolation and in complexes), they tend to be more ecologically complex than small vernal pools (in isolation and in complexes) and therefore possess higher conservation value.
- Vernal pools that are known to support special-status plant and/or animal species have high conservation value regardless of interconnectivity or size.

The VWADI approach will serve as an initial guide to address the spatial distribution of differing types of vernal pool complexes, and to aid in formulation of vernal pool habitat conservation goals (see Section 6.0). As time passes and more 3-parameter jurisdictional delineations are conducted in the SSHCP Study Area, the accuracy and precision of the VWADI approach will improve.

5.3 Results of VWADI Analysis

5.1 High Terrace Landform

The High Terrace Landform includes the Laguna, Turlock Lake and Ione Geologic Formations. The relationship between vernal wetland acres and vernal wetland density for the three geologic formations are illustrated in Figure 10 and numerically summarized in Figure 11.

5.1.1 Laguna Geologic Formation (Tl)

The Laguna Geologic Formation encompasses a total of 403 LAU (29.4%), of which 162 (40.2%) are located inside of the UDA and 241 (59.8%) are located outside of the UDA. The 403 LAU are distributed among the five VWADI categories as follows: 104 LAU are included in

Category 1 (36 LAU are inside the UDA and 68 are outside the UDA), 85 LAU are included in Category 2 (38 LAU are inside the UDA and 47 are outside the UDA), 90 LAU are included in Category 3 (36 LAU are inside the UDA and 54 are outside the UDA), 64 LAU are included in Category 4 (21 LAU are inside the UDA and 43 are outside the UDA) and 60 LAU are included in Category 5 (19 LAU are inside the UDA and 41 are outside the UDA).

The number of vernal wetlands per 160-acre LAU range from 1 to 557 and the total wetland acres per 160-acre LAU range from 0.006 to 20.12 acres.

5.1.2 Turlock Lake Geologic Formation (Tpl)

The Turlock Lake Geologic Formation encompasses a total of 11 LAU (0.8%), of which 11 (100%) are located inside of the UDA. The 11 LAU are distributed among the five VWADI categories as follows: one LAU is included in Category 1, two LAU are included in Category 2, four LAU are included in Category 3, and four LAU are included in Category 4. There are no LAU included within Category 5.

The number of vernal wetlands per 160-acre LAU was found to range from 11 to 84 and the total wetland acres per 160-acre LAU range from 0.3 to 6.4 acres.

5.1.3 Ione Geologic Formation (Ti)

The Ione Formation encompasses a total of 13 LAU (0.9%), of which 13 (100%) are located outside of the UDA. The 13 LAU are distributed among the five VWADI categories as follows: one LAU is included in Category 2, one LAU is included in Category 3, three LAU are included in Category 4 and eight LAU are included in Category 5. There are no LAU included within Category 1.

The number of vernal wetlands per 160-acre LAU range from 1 to 71 and the total wetland acres per 160-acre LAU range from 0.02 to 3.15 acres.

Figure 10 Relationship of number of vernal wetlands to wetted acres on High Terrace Landform geologic formations. Each symbol represents one LAU. Black symbols represent LAUs inside the Urban Development Area, while white symbols represent LAUs outside the Urban Development Area. Numbers shown below geologic formation names are number of LAUs inside and outside the Urban Development Area (# Inside / # Outside). Abbreviations are: LAU= Land Analysis Unit.

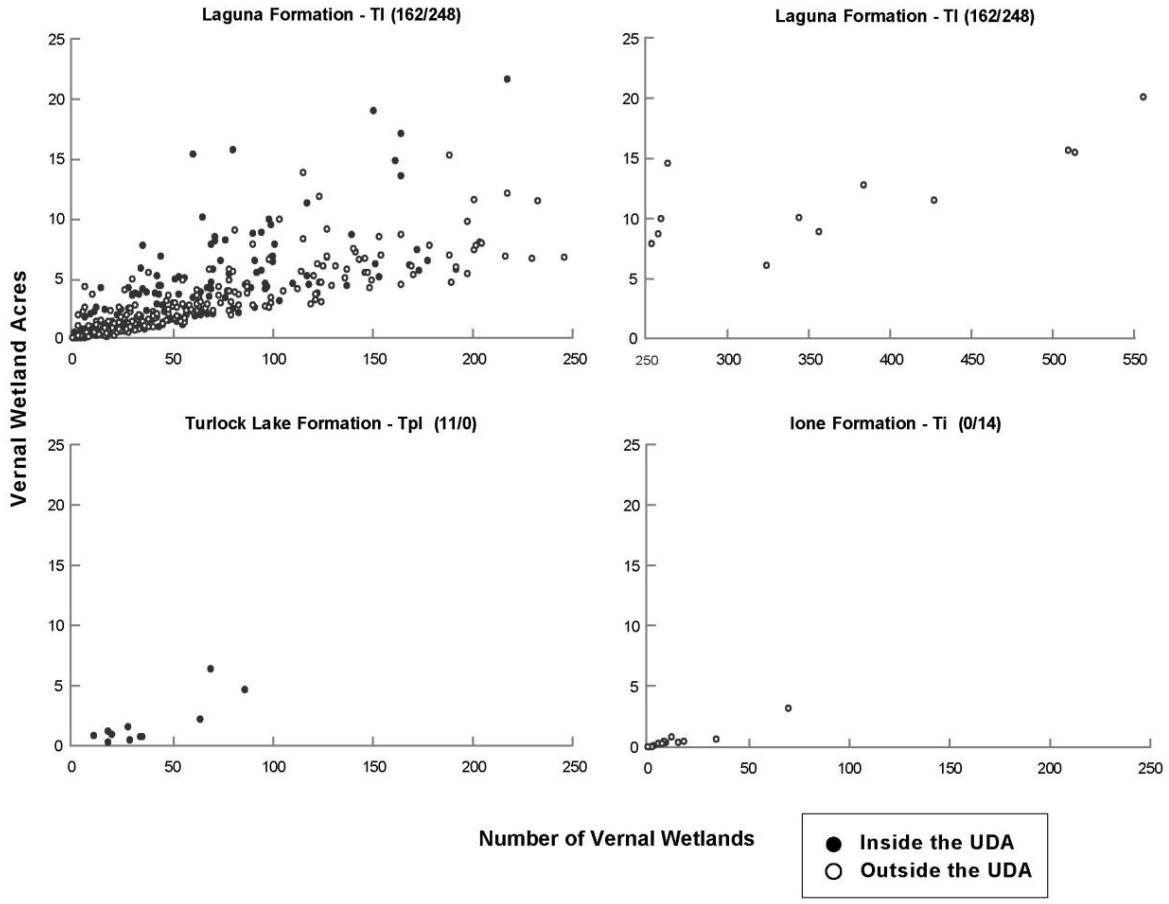
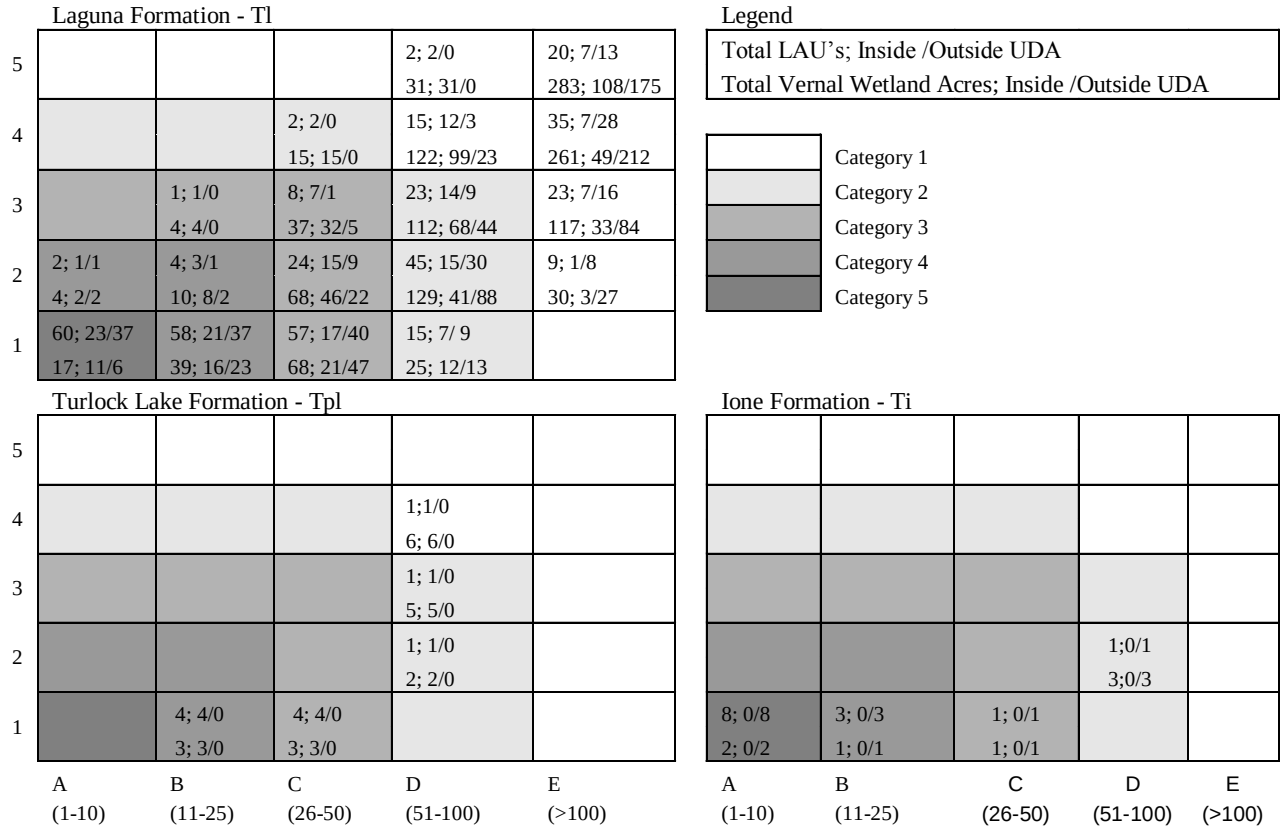


Figure 11 Vernal Wetland Acre/Density Index (VWADI) for High Terrace Landform geologic formations. Number of vernal wetlands (A-E) and vernal wetland acres (1-5) are shown categorically on the x and y axes, respectively. Abbreviations are: LAU = Land Analysis Unit and UDA = Urban Development Area.



5.2 Low Terrace Landform

The Low Terrace Landform includes the Undivided Riverbank, Upper Unit Riverbank, Middle Unit Riverbank, Lower Unit Riverbank and South Fork Gravels Geologic Formations. The relationship between vernal wetland acres and vernal wetland density for the five geologic formations are illustrated in Figure 12 and numerically summarized in Figure 13.

5.2.1 Undivided Riverbank Geologic Formation (Qr)

The Undivided Riverbank Formation encompasses a total of 261 LAU (17.9%), of which 68 (26.1%) are located inside of the UDA and 193 (73.9%) are located outside of the UDA. The total of 261 LAU are distributed among the five VWADI categories as follows: 41 LAU are included in Category 1 (seven LAU are inside the UDA and 34 are outside the UDA), 26 LAU are included in Category 2 (three LAU are inside the UDA and 23 are outside the UDA), 35 LAU are included in Category 3 (five LAU are inside the UDA and 30 are outside the UDA), 50 LAU are included in Category 4 (nine LAU are inside the UDA and 41 are outside the UDA) and 109 LAU are included in Category 5 (44 LAU are inside the UDA and 65 are outside the UDA).

The number of vernal wetlands per 160-acre LAU range from 1 to 254 and the total wetland acres per 160-acre LAU range from 0.01 to 58.02 acres.

5.2.2 Upper Unit Riverbank Geologic Formation (Qru)

The Upper Unit Riverbank Formation encompasses a total of 105 LAU (7.2%), of which 27 (25.7%) are located inside of the UDA and 78 (74.3%) are located outside of the UDA. The 105 LAU are distributed among the five VWADI categories as follows: 15 LAU are included in Category 1 (all outside the UDA), six LAU are included in Category 2 (one LAU is inside the UDA and five are outside the UDA), seven LAU are included in Category 3 (one LAU is inside the UDA and six are outside the UDA), 15 LAU included in Category 4 (four LAU are inside the UDA and 11 are outside the UDA) and 62 LAU are included in Category 5 (21 LAU are inside the UDA and 41 are outside the UDA).

The number of vernal wetlands per 160-acre LAU range from 1 to 237 and the total wetland acres per 160-acre LAU range from 0.01 to 26.98 acres.

5.2.3 Middle Unit Riverbank Geologic Formation (Qrm)

The Middle Unit Riverbank Formation encompasses a total of 63 LAU (4.6%), of which 15 (23.8%) are located inside of the UDA and 48 (76.2%) are located outside of the UDA. The 63 LAU are distributed among the five VWADI categories as follows: five LAU are included in Category 1 outside the UDA, eight LAU are included in Category 2 (one LAU is inside the UDA

and seven are outside the UDA), eight LAU are included in Category 3 (one LAU is inside the UDA and seven are outside the UDA), 12 LAU are included in Category 4 (two LAU are inside the UDA and ten are outside the UDA) and 30 LAU are included in Category 5 (11 LAU are inside the UDA and 19 are outside the UDA).

The number of vernal wetlands per 160-acre LAU range from 1 to 114 and the total wetland acres per 160-acre LAU range from 0.005 to 17.98 acres.

5.2.4 Lower Unit Riverbank Geologic Formation (Qrl)

The Lower Unit Riverbank Formation encompasses a total of 108 LAU (7.9%), of which 79 (73.1%) are located inside of the UDA and 29 (26.9%) are located outside of the UDA. The 108 LAU are distributed among the five VWADI categories as follows: 20 LAU are included in Category 1 (six LAU are inside the UDA and 14 are outside the UDA), nine LAU are included in Category 2 (six LAU are inside the UDA and three are outside the UDA), five LAU are included in Category 3 (all LAU are inside the UDA), 14 LAU are included in Category 4 (13 LAU are inside the UDA and one is outside the UDA) and 60 LAU are included in Category 5 (49 LAU are inside the UDA and 11 are outside the UDA).

The number of vernal wetlands per 160-acre LAU range from 1 to 90 and the total wetland acres per 160-acre LAU range from 0.001 to 47.92 acres.

5.2.5 South Forks Gravel Geologic Formation (Qsf)

The South Forks Gravel Formation encompasses a total of 23 LAU (1.7%), of which 23 (100%) are located inside of the UDA. The 23 LAU are distributed among the five VWADI categories as follows: three LAU are included in Category 2, seven LAU are included in Category 3, six LAU are included in Category 4 and seven LAU are included in Category 5. There are no LAU included within Category 1.

The number of vernal wetlands per 160-acre LAU range from 2 to 64 and the total wetland acres per 160-acre LAU range from 0.07 to 7.07 acres.

Figure 12 Relationship of number of vernal wetlands to wetted acres on Low Terrace Landform geologic formations. Each symbol represents one LAU. Black symbols represent LAUs inside the Urban Development Area, while white symbols represent LAUs outside the Urban Development Area. Numbers shown below geologic formation name are number of LAUs inside and outside the Urban Development Area (# Inside / # Outside). Abbreviations are: LAU= Land Analysis Unit.

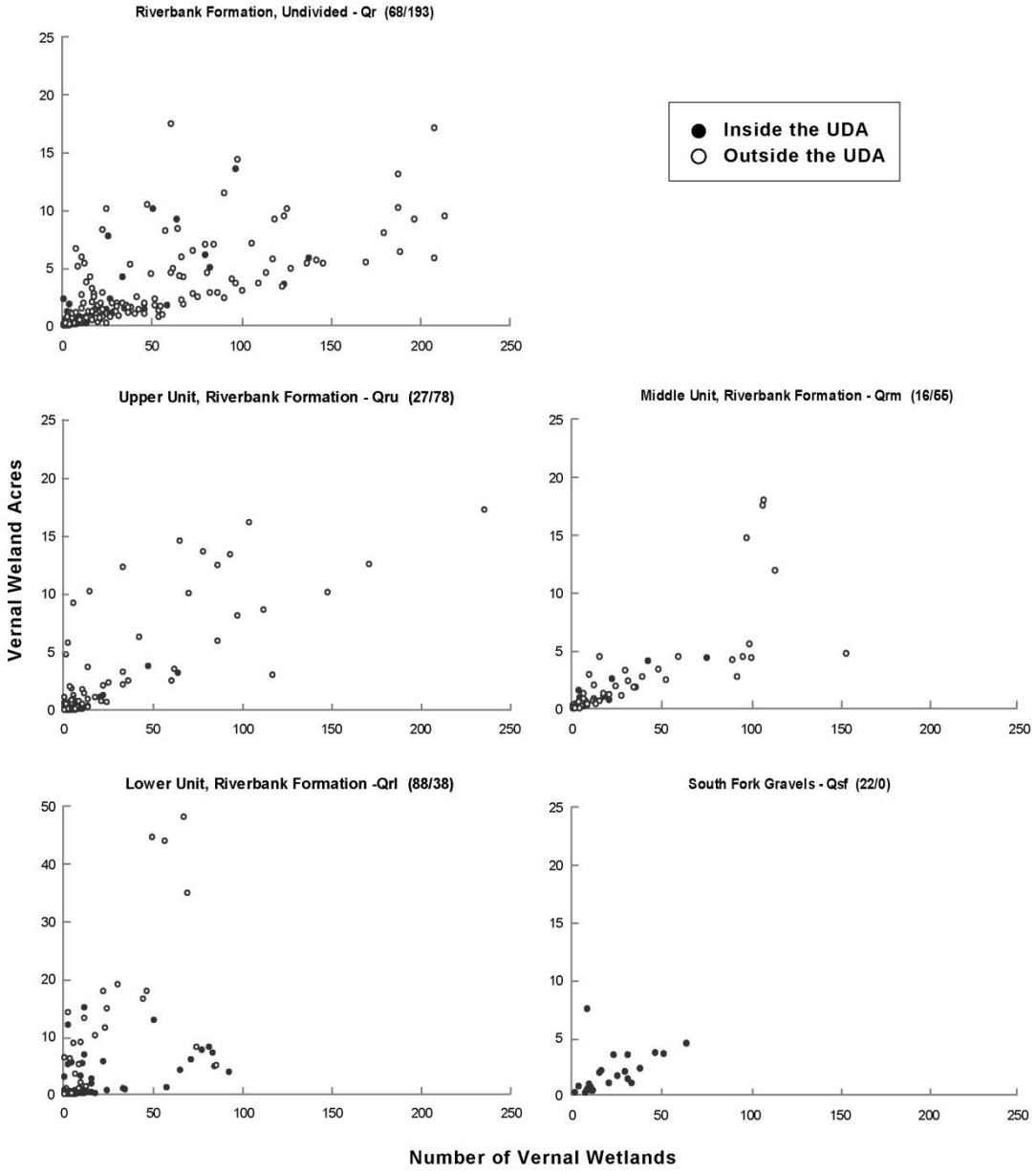
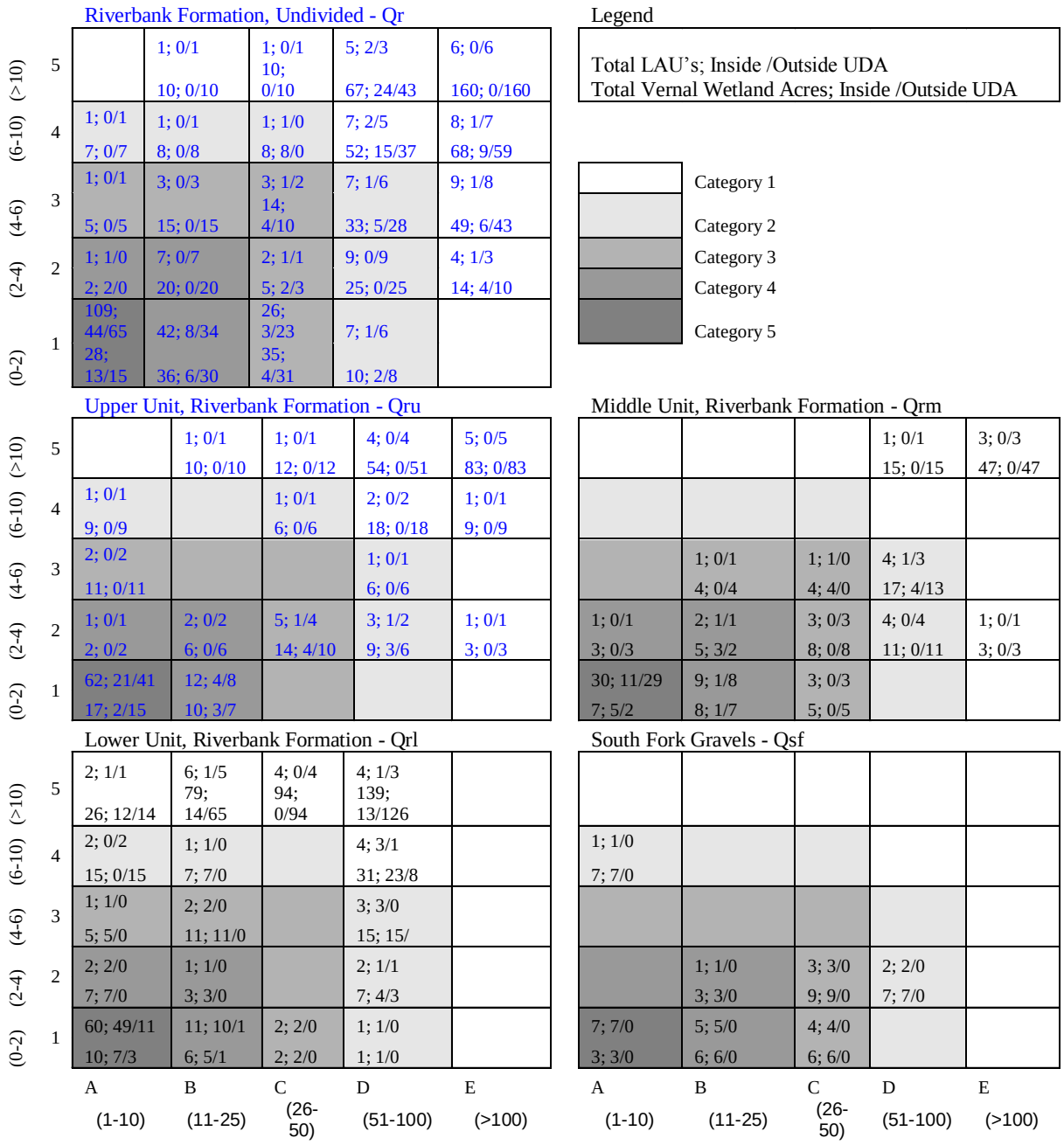


Figure 13 Vernal Wetland Acre/Density Index (VWADI) for Low Terrace Landform geologic formations. Number of vernal wetlands (A-E) and vernal wetland acres (1-5) are shown categorically on the x and y axes, respectively. Abbreviations are: LAU = Land Analysis Unit and UDA = Urban Development Area



5.3 Volcanic Mudflow Landform

The Volcanic Mudflow Landform includes the Mehrten and Valley Springs Geologic Formations. The relationship between vernal wetland acres and vernal wetland density for the two geologic formations are illustrated in Figure 14 and numerically summarized in Figure 15.

5.3.1 Mehrten Geologic Formation (Tm)

The Mehrten Formation encompasses a total of 164 LAU (12%), of which 25 (15.2%) are located inside of the UDA and 139 (84.8%) are located outside of the UDA. The 164 LAUs are distributed among the five VWADI categories as follows: 47 LAUs are included in Category 1 (all 47 are outside the UDA), 31 LAUs are included in Category 2 (three LAUs are inside the UDA and 28 are outside the UDA), 27 LAUs are included in Category 3 (six LAU are inside the UDA and 21 are outside the UDA), 30 LAUs are included in Category 4 (eight LAUs are inside the UDA and 22 are outside the UDA) and 29 LAUs are included in Category 5 (eight LAUs are inside the UDA and 21 are outside the UDA).

The number of vernal wetlands per 160-acre LAU range from 1 to 358 and the total wetland acres per 160-acre LAU range from 0.007 to 12.54 acres.

5.3.2 Valley Springs Formation (Tvs)

The Valley Springs Formation encompasses a total of 85 LAUs (6.2%), of which 85 (100%) are located outside of the UDA. The 85 LAUs are distributed among the five VWADI categories as follow): 21 LAUs are included in Category 1, 14 LAU are included in Category 2, 13 LAU are included in Category 3, 11 LAUs are included in Category 4 and 26 LAUs are included in Category 5.

The number of vernal wetlands per 160-acre LAU was found to range from 1 to 239 and the total wetland acres per 160-acre LAU range from 0.004 to 21 acres.

Figure 14 Relationship of number of vernal wetlands to wetted acres on Volcanic Mudflow Landform geologic formations. Each symbol represents one LAU. Black symbols represent LAUs inside the Urban Development Area, while white symbols represent LAUs outside the Urban Development Area. Numbers shown below geologic formation name are number of LAUs inside and outside the Urban Development Area (# Inside / # Outside). Abbreviations are: LAU= Land Analysis Unit.

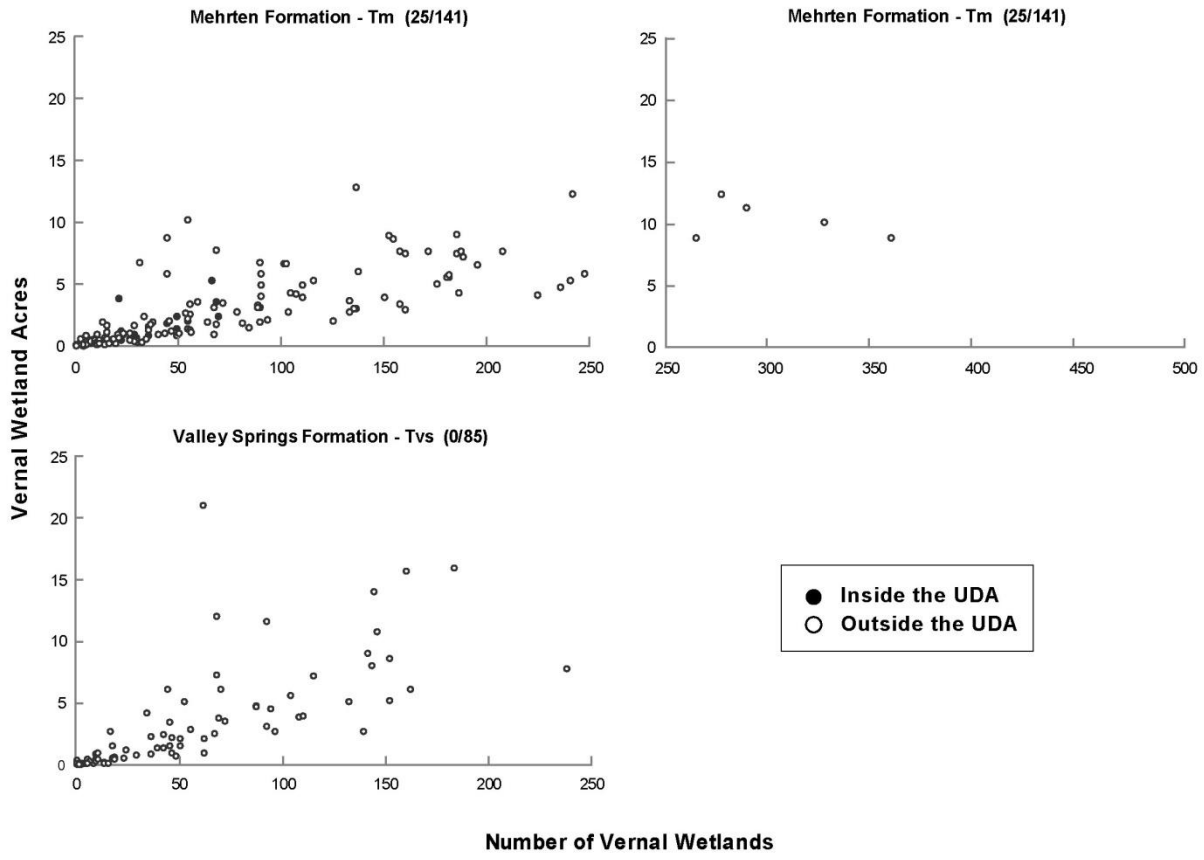
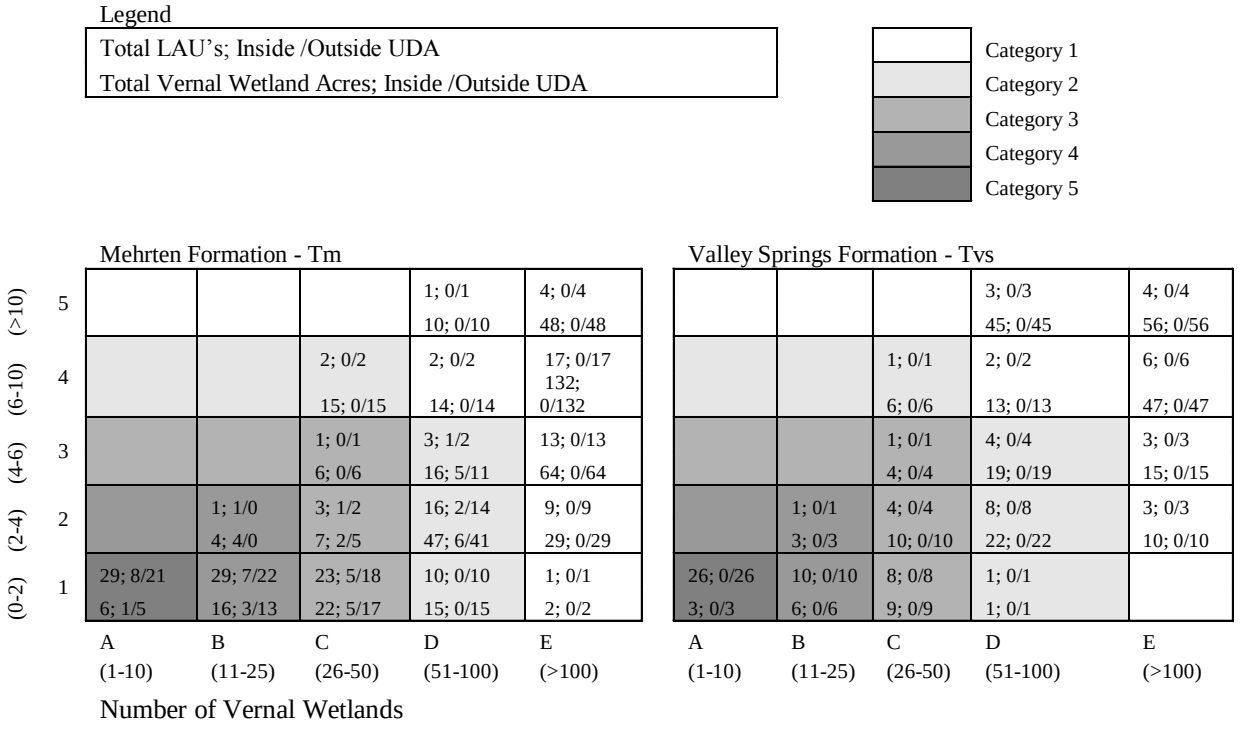


Figure 15 Vernal Wetland Acre/Density Index (VWADI) for Volcanic Mudflow Landform geologic formations. Number of vernal wetlands (A-E) and vernal wetland acres (1-5) are shown categorically on the x and y axes, respectively. Abbreviations are: LAU = Land Analysis Unit and UDA = Urban Development Area.



5.4 Other

The other Geologic Formations which do not fall in High Terrace, Low Terrace or Volcanic Mudflow Landform includes the Upper Unit Modesto, Undifferentiated Surficial Alluvial Deposits, Dredge Tailing and Artificial Fill and Metamorphic Rocks, Undifferentiated Geologic Formations. The relationship between vernal wetland acres and vernal wetland density for these 4 geologic formations are illustrated in Figure 16 and numerically summarized in Figure 17. In addition to these four geologic formations, three other formations are included within this description (North Merced Gravels, Alluvial Deposits and Alluvial Floodplain Deposits), but are not included in the tables or graphs due to low overall number and acreage of vernal wetlands per LAU.

5.4.1 Upper Unit Modesto Geologic Formation (Qmu)

The Upper Unit Modesto Formation encompasses a total of 46 LAUs (3.4%), of which 46 (100%) are located outside of the UDA. The 46 LAUs are distributed among the five VWADI categories as follows: five LAUs are included in Category 1, one LAU is included in Category 2, one LAU is included in Category 3, six LAUs are included in Category 4 and 33 LAUs are included in Category 5.

The number of vernal wetlands per 160-acre LAU was found to range from 1 to 146 and the total wetland acres per 160-acre LAU range from 0.008 to 15.36 acres.

5.4.2 Undifferentiated Surficial Alluvial Deposits Geologic Formation (Qu)

The Undifferentiated Surficial Alluvial Deposits Formation encompasses a total of five LAU (0.4%), of which one (20%) is located inside of the UDA and four (80%) are located outside of the UDA. The 5 LAU are distributed among the five VWADI categories as follows:, one LAU is included in Category 2 inside the UDA, one LAU is included in Category 3 outside the UDA and three LAUs are included in Category 5 outside of the UDA. There are no LAUs in Category 1 or 4.

The number of vernal wetlands per 160-acre LAU was found to range from 1 to 98 and the total wetland acres per 160-acre LAU range from 0.03 to 5.45 acres.

5.4.3 Dredge Tailing and Artificial Fill Geologic Formation (t)

The Dredge Tailing and Artificial Fill Formation encompasses a total of 23 LAU (1.7%), of which 14 (60.9%) are located inside of the UDA and 9 (39.1%) are located outside of the UDA. The 23 LAU are distributed among the five VWADI categories as follows: one LAU is included in Category 2 outside the UDA, two LAUs are included in Category 3 outside the UDA, five

LAUs are included in Category 4 LAUs are inside the UDA and one is outside the UDA) and 15 LAUs are included in Category 5 (10 LAUs are inside the UDA and five are outside the UDA).

The number of vernal wetlands per 160-acre LAU was found to range from 1 to 66 and the total wetland acres per 160-acre LAU range from 0.01 to 1.19 acres.

5.4.4 Metamorphic Rocks, Undifferentiated Geologic Formation (pKu)

The Metamorphic Rocks, Undifferentiated Geologic Formation encompasses a total of 84 LAU (6.1%), of which 1 (1.2%) is located inside of the UDA and 83 (98.8%) are located outside of the UDA. The 84 LAUs are distributed among the five VWADI categories as follows: five LAU are included in Category 2 outside the UDA), six LAUs are included in Category 3 outside the UDA, 15 LAUs are included in Category 4 (one LAU is inside the UDA and 16 are outside the UDA) and 58 LAUs are included in Category 5 outside the UDA).

The number of vernal wetlands per 160-acre LAU range from 1 to 88 and the total wetland acres per 160-acre LAU range from 0.005 to 6.80 acres.

5.5.5 Alluvial Deposits, Undivided Geologic Formation (Qha)

The Alluvial Deposits, Undivided Formation encompasses a total of one LAU (0.07%) which is located outside of the UDA. This LAU is included in Category 5. There are no LAU within Category 1, 2, 3 or 4.

The number of vernal wetlands per 160-acre LAU is one and the total wetland acres 0.40 acres.

5.5.6 Alluvial Floodplain Deposits Geologic Formation (Qfp)

The Alluvial Floodplain Deposits Geologic Formation encompasses a total of 10 LAU (0.7%), all of which are located outside of the UDA. Of these 10 LAUs, one LAU is included in Category 3 and nine LAUs are included in Category 5. There are no LAUs within Category 1, 2 or 4.

The number of vernal wetlands per 160-acre LAU range from 1 to 34 and the total wetland acres per 160-acre LAU range from 0.03to 1.85 acres.

5.5.7 North Merced Gravels Geologic Formation (Qtnm)

The North Merced Gravel Geologic Formation encompasses a total of two LAU (0.1%), both of which are located inside the UDA. One of the LAUs is included in Category 4 and one LAU is included in Category 5. There are no LAUs within Category 1, 2 or 3.

The number of vernal wetlands per 160-acre LAU range from 4 to 13 and the total wetland acres per 160-acre LAU range from 0.11 to 1.36 acres.

Figure 16 Relationship of number of vernal wetlands to wetted acres on other geologic formations (Qmu, Qu, t, and pKu). Each symbol represents one LAU. Black symbols represent LAUs inside the Urban Development Area, while white symbols represent LAUs outside the Urban Development Area. Numbers shown below geologic formation name are number of LAUs inside and outside the Urban Development Area (# Inside / # Outside). Abbreviations are: LAU= Land Analysis Unit.

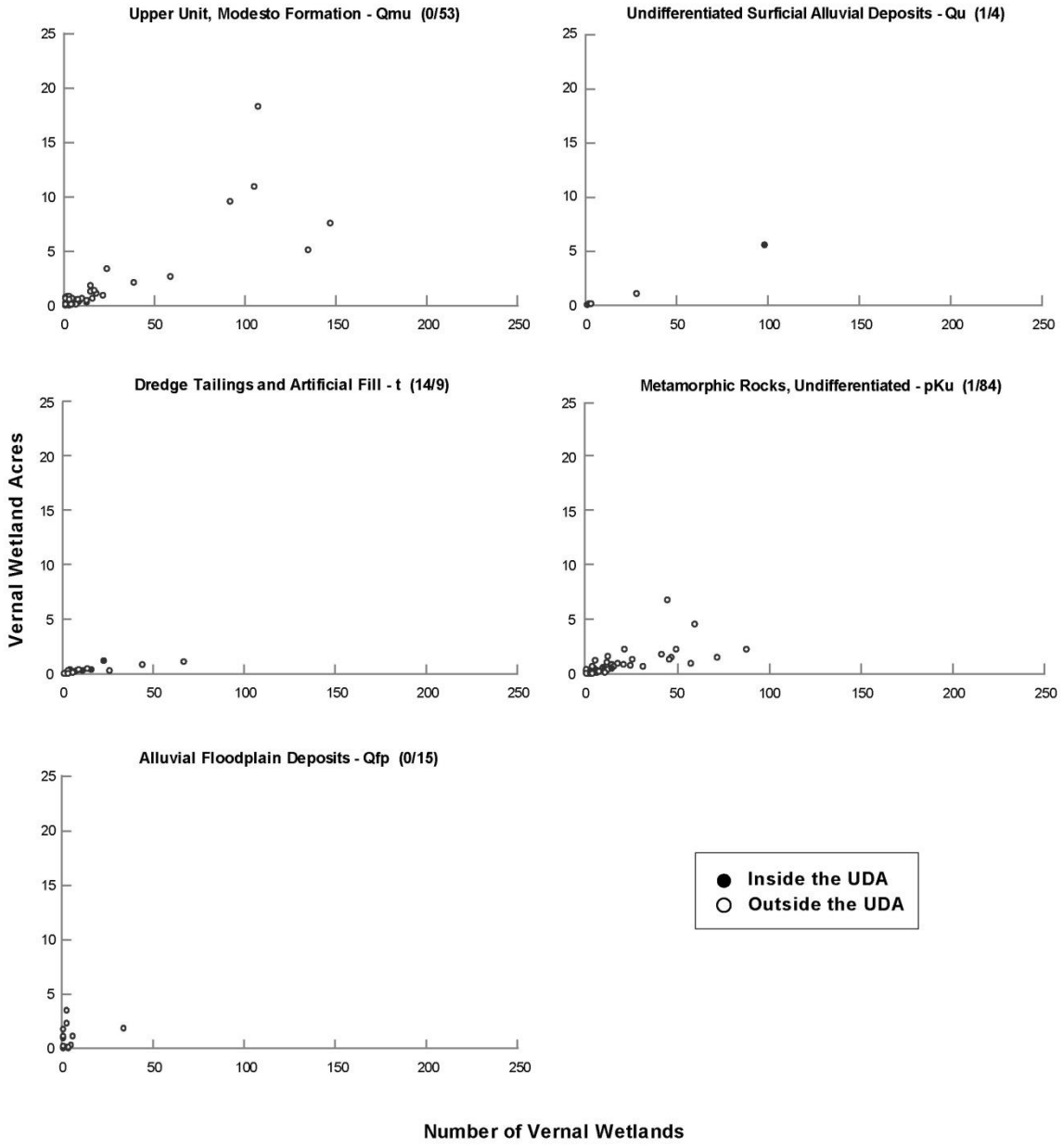
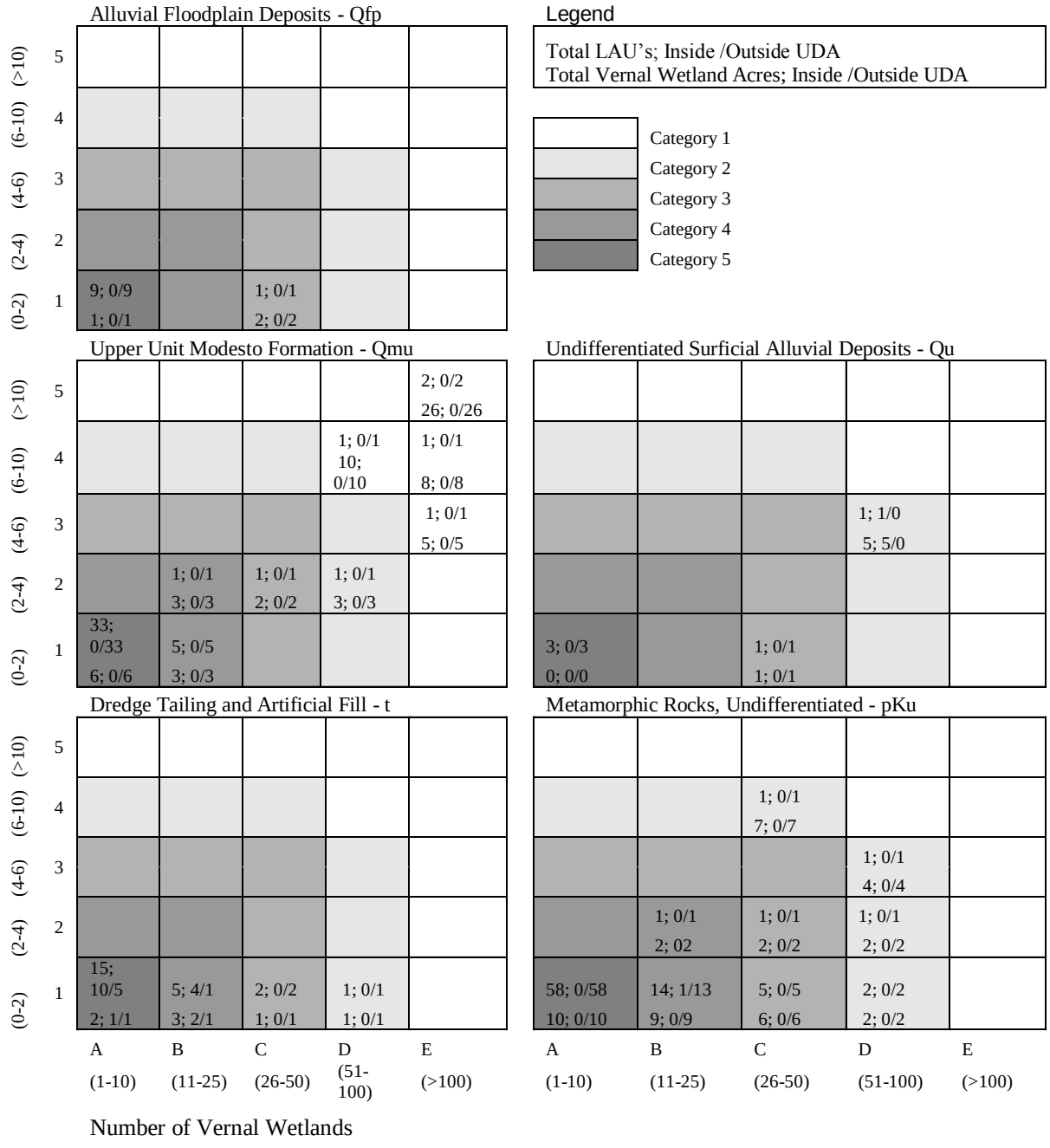


Figure 17 Vernal Wetland Acre/Density Index (VWADI) for Other Geologic Formations (Qfp, Qmu, Qu, t, and pKu). Number of vernal wetlands (A-E) and vernal wetland acres (1-5) are shown categorically on the x and y axes, respectively. Abbreviations are: LAU = Land Analysis Unit and UDA = Urban Development Area.



6 VERNAL WETTED ACRE DENSITY INDEX (VWADI) AND PRESERVE DESIGN

The VWADI was used to classify and describe the spatial distribution of vernal pools and vernal pool complexes within the Study Area. This information was also used to develop the SSHCP vernal pool/ grassland habitat conservation strategy by assisting in identification and definition of proposed preserve zones. This index helps in the assignment of conservation value to each 160-acre LAU, based on a set of considerations and assumptions:

- LAUs with dense vernal pool complexes are infrequently occurring;
- LAUs with large vernal pools are infrequently occurring;
- LAUs with dense vernal pool complexes are ecologically unique and important because they provide vernal pool heterogeneity;
- LAUs with large vernal pools are ecologically unique and important;
- LAUs with large vernal pools and/or dense vernal pool complexes are valuable for conservation because of their infrequency and their ecological uniqueness.
- LAUs with large vernal pools and/or dense vernal pool complexes are valuable for conservation because their mitigation-preservation ratio allows for acquisition of the greatest wetted-acres with the minimal loss of developable upland areas.

Although high density complexes and large vernal pools are emphasized, it is important to note that "small" vernal pool types provide important habitat functions as well. It is assumed however, that the "small" or "shallow"-type vernal pool habitat is present as a sub-habitat type that is present in most vernal pool complexes.

Based on these considerations, it was decided that 5 quantitative categories of conservation value would be used to address the 25 VWADI categories; the highest conservation value will be placed on category 1 LAUs (most wetted acres with densest vernal pool complexes and largest number of large pools), and the least conservation value on category 5 LAUs (least wetted acres, and most isolated and smaller vernal pools). It is recognized that these categories, along with the VWADI values are somewhat subjective and may lack fine ecological resolution (e.g., are all A5/Category-1 and A4/Category-2 LAUs actually ecologically different?). This is, however an objective and quantifiable approach to describing landscape vernal pool patterns available at the present time.

The VWADI is designed to identify high-density vernal pool complexes. High-density pool complexes are targeted specifically because it maximizes (1) the amount of wetted acreages

within a given land Unit, (2) the number of vernal pools within a given land unit and (3) the connectivity between vernal pools within and between land units.

Protecting the maximum number of vernal pools is an essential part of this strategy specifically because (1) vernal pools provides the habitat (both occupied and suitable) for the 13 covered vernal pool species that need to be protected (2) it protects vernal pool heterogeneity including size, shape, depth, landform association and species diversity.

In order to preserve the most ecologically complex vernal pool habitats and to acquire the required wetland acres necessary to mitigate for the proposed impacts, Category 1 and 2 LAUs will be the primary targets for proposed preserves zones. Since all vernal pools, regardless of size or density possess ecological function and conservation values; the remaining LAUs will be targeted where available in order to provide connectivity, buffers and specific species conservation opportunities.

Land Analysis Units in Categories 1 and 2 of the VWADI system have particularly high value for the conservation of ecologically functional vernal pool complexes. It is necessary to conserve most of the acres in these categories both inside and outside the UDA. In particular, ecological connectivity increases with increasing vernal pool density per given land unit, maximum interconnectivity is associated with the largest areas encompassing the densest of pool complexes.

Category 3 and 4 LAUs are targeted in cases where they provide corridors and buffers to existing and proposed preserves, as well as opportunities to protect known locations of vernal pool covered species, unique large pools and pools on specific formations.

Category 5 LAUs will be targeted when they have a clearly defined conservation value such as “no take species”, or unique habitat features and qualities. These features may include large and/or deep vernal pools, corridors, high quality upland habitats, and suitable vernal pool creation/restoration mitigation sites.

The total number and percentages of the different VWADI categories for the 1,372 LAU with vernal wetlands is included below as well as the total vernal pool/wetland acres;

Category 1 (18.7% of all LAUs with vernal pool habitat; includes all LAUs with an VWADI value of A5, B5, C5, D5, E5, E4, E3, E2, E1 and D4). This category contains 2,480 wetland acres (62.2% of the total vernal pools/wetlands mapped within the SSHCP Study Area);

Category 2 (14.0% of all LAUs with vernal pool habitat; includes all LAUs with an VWADI of A4, B4, C4, D1, D2 and D3). This category contains 706 wetland acres (17.7% of the total vernal pools/wetlands mapped within the SSHCP Study Area);

Category 3 (14.7% of all LAUs with vernal pool habitat; includes all LAUs with an VWADI of A3, B3, C1, C2 and C3). This category contains 421 wetland acres (10.6% of the total vernal pools/wetlands mapped within the SSHCP Study Area);

Category 4 (16.8% of all LAUs with vernal pool habitat; includes all LAUs with an VWADI of A2, B1 and B2). This category contains 254 wetland acres (6.4% of the total vernal pools/wetlands mapped within the SSHCP Study Area);

Category 5 (35.8% of all LAUs with vernal pool habitat; includes all A1). This category contains 128 wetland acres (3.2% of the total vernal pools/wetlands mapped within the SSHCP Study Area).

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APPENDIX B-2

Addendum to Vernal Pool Classifications

APPENDIX B-2
Addendum to Vernal Pool Classifications

1 PURPOSE

The purpose of this document is to explain the changes in the analysis methods described in *Vernal Pool Classifications* (Appendix B-1 of the Aquatic Resources Plan (ARP)) that were used to generate the results presented in the ARP. Specifically, the focus of this addendum is regarding the classification of SSHCP vernal pools and the Vernal Wetland Acre/Density Index (VWADI) (Section 5.2 of *Vernal Pool Classifications*).

2 MODIFICATIONS

There are three factors that were modified in the analysis presented in the ARP from those used in the 2010 *Vernal Pool Classifications* document that affect the results: (1) land cover data; (2) land analysis unit (LAU) size; and (3) assigned intervals for vernal pool wetted acreage categories. Each of these modifications is described below.

2.1 Land Cover Data

The 2010 *Vernal Pool Classifications* did not use the most current available land cover data, which identifies the size and location of the vernal pools. The original mapping efforts have been updated and refined at various times to reflect modifications of land cover types (such as cover type conversion), to accommodate an expansion of the Plan Area boundary, and to correct errors in the original mapping. The current land cover map provides fairly detailed information for the existing conditions in the Plan Area based on 2009 aerial photos and limited field-truthing, with the updates occurring in May 2010 and July 2012. The analysis presented in the ARP is based upon the current land cover data.

2.2 Land Analysis Units

The VWADI is based on the variation in vernal pool areas (acres) and variation in vernal pool density (number of vernal pools per unit land area). In the 2010 *Vernal Pool Classifications*, these two parameters were assessed together as an index for vernal pool resources within standardized 160-acre LAUs (i.e., one-quarter sections) and served as the primary descriptors of the range of spatial-ecological variability of vernal pools in the Plan Area. Based on an informal recommendation from the U.S. Fish and Wildlife to the County of Sacramento, a 40-acre LAU was used to generate the results for the VWADI presented in the ARP. The 40-acre LAUs allow for more detailed analysis and preserve planning.

2.3 Assigned Intervals Based Upon Vernal Pool Wetted Acres

As described in Section 5.2.3 of the 2010 *Vernal Pool Classifications*, 25 VWADI categories were designated using 5 intervals, designated A–E, based on vernal pool density and 5 intervals,

designated 1–5, based on vernal pool wet-acres[1] within the LAUs. The VWADI letter category for vernal pool wetland density is presented in Table B2-1. The attributes and assigned VWADI letter category for vernal pool density was not modified in the analysis presented in the ARP even though the LAU was reduced in size from 160 to 40 acres. For example, a 160-acre LAU with more than 100 vernal pools was assigned as "E" in the 2010 *Vernal Pool Classifications*, whereas in the ARP a 40-acre LAU would have to include more than 100 vernal pools to be assigned "E."

Table B2-1
Assigned Intervals Based Upon Vernal Pool Density

Total Number of Vernal Pools/LAU	VWADI Letter Category
1–10	A
11–25	B
26–50	C
51–100	D
>100	E

The attributes and assigned VWADI number category for vernal pool wetted acres was scaled to the 40-acre LAU in the analysis presented in the ARP. The VWADI number category for the vernal pool wet-acres in the 2010 *Vernal Pool Classifications* and the ARP are presented in Table B2-2 to show the differences between the two analyses. The more stringent requirement for the vernal pool density factor, in combination with the reduction in the size of the LAU, provides a more fine-grained analysis of the VWADI categories across the Plan Area landscape.

Table B2-2
Assigned Intervals Based Upon Vernal Pool Wetted Acres

Total Acres Vernal Pools/LAU		
2010 *Vernal Pool Classifications*	*ARP*	VWADI Number Category
0–2	0–0.5	1
2–4	0.5–1	2
4–6	1–1.5	3
6–10	1.5–2.5	4
>10	>2.5	5

[1] The wet-acres or wetted acres is equivalent to the area delineated as a vernal pool in the land cover data.

APPENDIX C

Functional Assessment for the South Sacramento Habitat Conservation Plan and Aquatic Resources Plan

DRAFT

Functional Assessment for the South Sacramento Habitat Conservation Plan and Aquatic Resources Program

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1 INTRODUCTION

The purpose of the functional assessment for the South Sacramento Habitat Conservation Plan (SSHCP) and Aquatic Resources Program (ARP) is to provide a landscape-level assessment of the quality and condition of "potentially jurisdictional waters/wetlands areas" (PJWA) in the Plan Area. The analysis will assist in determining which potentially jurisdictional aquatic resource areas have the highest quality based on the criteria described below and the highest potential for restoration and conservation. Additionally, the data will inform a determination as to whether or not the compensatory mitigation strategy designed under the combined Endangered Species Act (ESA) and Clean Water Act (CWA) regulatory framework of the SSHCP and ARP adequately addresses the potential loss of waters of the U.S. In order to reach these conclusions, overall aquatic resource condition was evaluated by aquatic resource type, habitat type, water quality, hydrologic functioning, geomorphic region, and adjacent land use.

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2 METHODS

The aquatic resources analyzed in the functional assessment include vernal pools, swales, ephemeral streams, seasonal wetlands, freshwater marsh, mine tailing riparian woodland, mixed riparian scrub, mixed riparian woodland, open water, streams/creeks, and valley oak riparian woodland. Points were assigned to each aquatic resource based on the following factors:

- Area of the aquatic resource;
- Watershed (hydrologic unit code (HUC) 10-digit cataloging units);
- Primary adjacent land cover;
- Secondary adjacent land cover; and
- Aquatic resource type.

Function scores are assigned for each of these factors, per aquatic resource feature, based upon ability to maintain or improve the following functions:

- **Habitat.** Points are added if a given type of aquatic resource has the potential to support covered wildlife and plant species.
- **Water Quality**. Points are added for a resource type with the ability to improve or maintain water quality through such processes as filtration and/or trapping of contaminants such as sediment or toxicants and prevention of erosion.
- **Hydrology**. Points are added for a resource type that can facilitate groundwater recharge and store floodwaters via beneficial flood storage and flood flow modifications.

Functional analysis scoring was conducted for both current conditions within the Plan Area and future conditions, which assumed full implementation of the SSHCP. However, the only factor that changed as a result of SSHCP implementation was the watershed factor.

2.1 Functional Analysis Scoring

2.1.1 Factor 1 – Area of Aquatic Resource

The area of aquatic resource factor is based on the ecological rationale that aquatic resources that are greater in size are generally higher functioning. Therefore, habitat, water quality, and hydrology functional scores will be increased for each aquatic resource that is greater than the median area for its aquatic resource type (see Table 1).

Table 1

Factor	Effect on Function Scores		
	Habitat	*Water Quality*	*Hydrologic*
Area			
Greater than median area for type	+2	+2	+2
Less than median area for type	0	0	0

2.1.2 Factor 2 – Watershed

The Plan Area has been divided into ten HUC 10-digit cataloguing units, as defined by the Federal Standard for Delineation of Hydrologic Unit Boundaries (USGS and USDA NRCS 2009): the American River, Deer Creek, Laguna Creek, Lower Cosumnes, Lower Dry Creek, Lower Mokelumne River, Morrison Creek, Sherman Lake – Sacramento River, Snodgrass Slough, and Upper Cosumnes. Each of the HUC 10-digit cataloguing units were characterized in terms of land use, soils, hydrology, and geology in the SSHCP ARP Watershed Plan. Based upon this data, the aquatic resources within each HUC 10 cataloging unit were assigned points for habitat, water quality, and hydrology functions, based upon which HUC 10 watershed they occur in, as follows:

- ***Habitat*** **–** The habitat function scores for Factor 2 were based on Covered Species occurrences (percentages) within each HUC 10 watershed. For current conditions, Covered Species occurrence percentages within the Plan Area range from 2% to 33%. Points for the habitat function scores were assigned within a range of -3 to +3 along a linear scale commensurate with percentage Covered Species occurrences (e.g. a watershed with 0% to 5% occurrence was given a score of -3, indicating the poorest habitat quality; whereas a watershed with 31% to 35% occurrence was given a score of +3, indicating the best habitat quality). For future conditions, Covered Species occurrence percentage distribution among watersheds will be much more bimodal in nature, in which species will either occur within a watershed or not. Therefore, if a watershed is expected to contain Covered Species in the future, it was assigned a score of +3, whereas a watershed that is not expected to contain Covered Species was assigned a score of -3.
- ***Water Quality*** **–** The water quality function scores for Factor 2 were based on percentage natural land cover within each HUC 10 watershed. Unnatural land cover types considered included both urban (e.g., stormwater runoff typical to commercial, industrial, residential properties) and agriculture (e.g., agricultural stormwater runoff with potential to introduce fertilizer, pesticides, animal waste, irrigation, and/or sediment laden runoff into an aquatic feature). For current conditions, natural land cover percentages within the Plan

Area range from 9% to 73%; for future conditions, percentages range from 6% to 71%. Points for the water quality function scores were assigned within a range of -3 to +3 along a linear scale commensurate with percentage natural land cover (e.g. a watershed with 5% to 15% natural land cover was given a score of -3, indicating the poorest water quality; whereas a watershed with 66% to 75% natural land cover was given a score of +3, indicating the best water quality).

- ***Hydrology*** – The hydrology function scores for Factor 2 were based on percentage impervious surface within each HUC 10 watershed. Current condition impervious surface percentages range from 1% to 31%; future condition percentages range from 1% to 77%. Points for the hydrology function scores were assigned within a range of -3 to +3 along an inverse linear scale commensurate with percentage impervious surface (e.g. a watershed with 35% to 31% impervious surface was given a score of -3, indicating the most disturbed hydrology; whereas a watershed with 5% to 0% impervious surface was given a score of +3, indicating the least disturbed hydrology.

American River

Approximately 12,060 acres, or about 18%, of the 53,360-acre American River watershed is located within the Plan Area. This watershed comprises 3.2% of the entire Plan Area and is located in the northern portion of the Plan Area. A little more than half of the watershed contains non-habitat land cover types, which primarily includes high-density development and mine tailings. The remaining undeveloped land consists of valley grassland, mine tailing riparian woodland, mixed riparian woodland, blue oak woodland, and savanna and mixed riparian scrub. Aquatic resources account for only approximately 130 acres, or about 1%, of the American River watershed. Impervious surfaces cover approximately 3,080 acres, or 26%, of the watershed within the Plan Area.

The American River watershed includes documented occurrences for 10 of the 30 Covered Species, including: Boggs Lake hedge-hyssop (*Gratiola heterosepala*), tricolored blackbird (*Agelaius tricolor*), Cooper's hawk (*Accipiter cooperii*), Swainson's hawk (*Buteo swainsoni*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), vernal pool fairy shrimp (*Branchinecta lynchi*), vernal pool tadpole shrimp (*Lepidurus packardi*), white-tailed kite (*Elanus leucurus*), burrowing owl (*Athene cunicularia*), and northern harrier (*Circus cyaneus*). However, about 58% of the American River watershed has been influenced by human activities with over half of the watershed dominated by the aforementioned non-habitat land covers. Subsequently, in combination with making up only 3% of the Plan Area, the portions of the American River watershed within the Plan Area do not support a high overall percentage of the Covered Species occurrences (2%) in the Plan Area.

Current conditions – Due to the low percentage of Covered Species occurrences, the American River watershed has a score of -3 for its habitat function. It has a moderate percentage of natural land cover, resulting in a water quality score of +1. It has a relatively large amount of impervious surface, resulting in a hydrology function score of -2.

Future conditions – The American River watershed will have less than 1% Covered Species occurrence and thereby has a score of -3 for its habitat function. It will have a mid-level percentage of natural land cover, resulting in a water quality score of 0. It will contain a large amount of impervious surface, resulting in a hydrology function score of -3.

Deer Creek

The Deer Creek watershed bisects the Plan Area, extending from the northeastern edge to halfway into the Plan Area. Of the 82,980 acres of the watershed, 46,810 acres (56%) are within the Plan Area. A large majority (93%) of the watershed contains "habitat" land covers, which includes agriculture. Terrestrial land covers (32,980 acres and 70% of the watershed), consisting primary of valley grassland (25,450 acres and 54% of the watershed), account for the majority of the watershed. Other terrestrial land covers include blue oak savanna and woodland (14% of the watershed), mixed riparian woodland, mixed riparian scrub, and mine tailing riparian woodland and valley oak riparian (0.02% of the watershed). Approximately 20% (9,940 acres) of the watershed consists of lands used for agricultural purposes and 7% (3,300 acres) fall under the non-habitat land cover type. The remaining 2% of the watershed (1,070 acres) consists of aquatic resources such as streams and creeks, open water, and vernal pools. Impervious surfaces cover approximately 370 acres, or only 1%, of the watershed within the Plan Area.

The Deer Creek watershed includes documented occurrences for 16 of the 30 Covered Species, including: Boggs Lake hedge-hyssop, Sacramento Orcutt grass (*Orcuttia viscida*), Sanford's arrowhead, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, valley elderberry longhorn beetle, vernal pool fairy shrimp, vernal pool tadpole shrimp, western pond turtle, western spadefoot, and white-tailed kite. This watershed contains 6% of the known occurrences for these 16 Covered Species, and contains a substantial percentage of occurrences for two of the Covered Species, including 49% of the Sacramento Orcutt grass records and 20% of the ferruginous hawk records. Covered species have been recorded throughout the watershed, with the majority occurring along hydrological features and within aquatic or terrestrial habitat. A cluster of vernal pool species records occur along the border of Deer Creek and Morrison watersheds east of the intersection of Grant Line Road and Keifer Boulevard.

Current conditions – The Deer Creek watershed has a relatively low percentage of Covered Species occurrence, and therefore had a score of -2 for its habitat function. However, it has a high percentage of natural land cover, resulting in a water quality score of +3. It also has a low percentage of impervious surface, resulting in a hydrology function score of +3.

Future conditions – The Deer Creek watershed will have an increased percentage of Covered Species occurrence in the future, and therefore had a future score of +3 for its habitat function. It will also have a high percentage of natural land cover, resulting in a water quality score of +3. It will have a somewhat high percentage of impervious surface, resulting in a hydrology function score of -1.

Laguna Creek

The Laguna Creek watershed is approximately 98,150 acres, of which 75,350 acres are within the Plan Area, and comprises 20% of the Plan Area. It is located in the southeastern portion of the Plan Area and contains virtually all of the mapped land cover types in the Plan Area. The large majority (91%) of the Laguna Creek watershed is undeveloped. Combined, valley grassland, blue oak savanna, and blue oak woodland account for 61% (approximately 46,310) acres of the land covers in the watershed, and 68% of the "natural" land covers, including agriculture. Agriculture accounts for 24% (approximately 17,730 acres) of the land covers in the Plan Area. The Laguna Creek watershed also supports all of the aquatic cover types except wetland restoration, including approximately 2,820 acres of vernal pool, seasonal wetland, and swale, approximately 420 acres of streams/creeks, and almost 300 acres of open water. Non-habitat land cover types comprise only 9% of the watershed, with low-density development accounting for 61% of the non-habitat land cover types. Impervious surfaces cover approximately 2,010 acres, or only 3%, of the watershed within the Plan Area.

The Laguna Creek watershed includes documented occurrences for 23 of the 30 Covered Species, reflecting both its large size and diversity of land cover types. Covered species documented in the watershed include dwarf downingia), legenere, pincushion navarretia (*Navarretia myersii* ssp. *myersii*), Sacramento Orcutt grass, vernal pool fairy shrimp, Ricksecker's water scavenger beetle, vernal pool tadpole shrimp, mid-valley fairy shrimp, California tiger salamander, western spadefoot, western pond turtle, giant garter snake, Cooper's hawk, burrowing owl, loggerhead shrike, northern harrier, ferruginous hawk, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, western red bat, and Yuma myotis. This watershed has the highest percentage (26%) of known occurrences for Covered Species after the Morrison Creek watershed, including 17% of the vernal pool covered plant occurrences and 40% of the vernal pool invertebrate occurrences.

Current conditions – The Laguna Creek watershed has a relatively high percentage of Covered Species occurrence, yielding a habitat function score of +2. It also has a high percentage of natural land cover, resulting in a water quality score of +3, and a low percentage of impervious surface, resulting in a hydrology function score of +3.

Future conditions – The Laguna Creek watershed will have a high percentage of Covered Species occurrence in the future, yielding a habitat function score of +3. It will also maintain a high percentage of natural land cover, resulting in a water quality score of +3. Its percentage of impervious surface will increase, however, resulting in a hydrology function score of +1.

Lower Cosumnes

The Lower Cosumnes River watershed is 47,310 acres, entirely located within the south-central portion of the Plan Area. This watershed consists primarily of terrestrial and agricultural land covers, accounting for 81% of the land covers in the watershed. The terrestrial category is dominated by valley grasslands (14,610 acres), which accounts for approximately 31% of the total terrestrial land cover in the watershed. Agricultural areas total 21,220 acres and are the largest land covers in the Lower Cosumnes River watershed. Approximately 7% (3,510 acres) of the watershed is aquatic land covers, including seasonal wetlands, open water, freshwater marsh, vernal pools, wetland restoration, streams and creeks and swales. Approximately 12% (5,710 acres) of the watershed is non-habitat land cover dominated by low-density development (3,990 acres) and high-density development (1,260 acres). Impervious surfaces cover approximately 1,650 acres, or only 3%, of the watershed.

The Lower Cosumnes River watershed includes documented occurrences for 19 of the 30 Covered Species, including dwarf downingia, legenere, Sanford's arrowhead, vernal pool fairy shrimp, mid-valley fairy shrimp, Ricksecker's water scavenger beetle, valley elderberry longhorn beetle, California tiger salamander, giant garter snake, western pond turtle, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, and white-tailed kite. This watershed contains 10% of the Plan Area's known occurrences of Covered Species.

Current conditions – The Lower Cosumnes River watershed has a relatively low percentage of Covered Species occurrence, which gives it a habitat function score of -2. It has a mid-range percentage of natural land cover, resulting in a water quality score of 0. It has a low percentage of impervious surface, yielding a hydrology function score of +3.

Future conditions – The Lower Cosumnes River watershed will have some Covered Species occurrences in the future, and therefore has a future habitat function score of +3. It will continue

to have a mid-range percentage of natural land cover, resulting in a water quality score of 0. It will have a slightly increased amount of impervious surface compared to current conditions, which yields a hydrology function score of +1.

Lower Dry Creek

The Lower Dry Creek watershed is located along the southern edge of the Plan Area. Approximately 50% of the watershed is located within the Plan Area. The watershed has very little non-agricultural development. Of the 18,570 acres in the watershed, approximately 56% are terrestrial land covers and 38% are agricultural land covers. Valley grasslands dominate the terrestrial land cover in the watershed, comprising 14,610 of the 16,880 acres mapped as terrestrial. The large majority (92%) of agricultural areas are cropland and vineyards. Aquatic and non-habitat land covers each comprise about 3% of the remaining acreage within the watershed. Impervious surfaces cover approximately 140 acres, or only 1% of the watershed within the Plan Area.

The Lower Dry Creek watershed includes documented occurrences for 9 of the 30 Covered Species, including legenere, pincushion navarretia, vernal pool fairy shrimp, vernal pool tadpole shrimp, California tiger salamander, western spadefoot, northern harrier, Swainson's hawk, and tricolored blackbird. Overall, the watershed only contains 2% of the Covered Species occurrences, but it does contain 33% of the pincushion navarretia occurrences (16 of 49) and 19% of the California tiger salamander occurrences (6 of 29).

Current conditions **–** Due to the low percentage of Covered Species occurrence, Lower Dry Creek has a habitat function score of -3. However, it has a relatively high percentage of natural land cover, which gives it a water quality score of +2. And its low percentage of impervious surface gives it a hydrology function score of +3.

Future conditions **–** The Lower Dry Creek watershed will have less than 1% Covered Species occurrence in the future, which gives it a habitat function score of -3. It will still have a relatively high percentage of natural land cover, resulting in the same water quality score of +2. It will have slightly more impervious surface, resulting in a hydrology function score of +2.

Lower Mokelumne River

Although the Lower Mokelumne River watershed is more than 66,200 acres in size, only 3% of the watershed is located in the far southwest corner of the southern Plan Area and it accounts for only 0.5% of the Plan Area. The small portion of this watershed located within the Plan Area is primarily made up of agricultural land covers, specifically croplands. The remaining acreage

includes mixed riparian scrub and woodland, aquatic land covers, and some residential areas. Impervious surfaces cover approximately 30 acres, or 1% of the watershed within the Plan Area.

The Lower Mokelumne River watershed only contains three documented occurrences of one Covered Species: Sanford's arrowhead. This species is located on the boundary of the Plan Area within the Mokelumne River. Similar to the Lower Dry Creek watershed, the lack of occurrences of Covered Species within this watershed may be attributed to large amounts of land that have been converted for agricultural purposes. In addition, only a very small portion of the watershed is actually located within the Plan Area. Due to its small size within the Plan Area, the Lower Mokelumne watershed includes less than 1% of the modeled habitat for Covered Species.

Current conditions – Lower Mokelumne River has a habitat function score of -3 due to its low percentage of species occurrence. It has a relatively low percentage of natural land cover, resulting in a water quality function score of -2. However, its low percentage of impervious surface yields a hydrologic function score of +3.

Future conditions – Lower Mokelumne River watershed will still have a habitat function score of -3 due to its low percentage of species occurrence. It will have an even lower percentage of natural land cover, resulting in a water quality function score of -3. However, it will maintain its low percentage of impervious surface and will still have a hydrologic function score of +3.

Morrison Creek

The Morrison Creek watershed is located within the northern half of the Plan Area. Of the 82,790 acres that comprise this watershed, 85%, or 70,320 acres, are located within the Plan Area, almost entirely inside the Urban Development Area (UDA). This is the second largest watershed in the Plan Area, second only to the Laguna Creek watershed. Because it is located in the urbanizing portion of Sacramento County, approximately 45% of the watershed has already been developed and contains non-habitat land covers, primarily high-density development. Agriculture accounts for about 7% of the watershed. Terrestrial (44%) and aquatic (4%) land covers account for the remaining land covers in the Morrison Creek watershed. Valley grassland accounts for about 96% of the terrestrial land cover. This watershed also supports all of the aquatic cover types, including approximately 890 acres of vernal pools, 430 acres of swale, and 230 acres of seasonal wetlands, which are embedded in the valley grasslands. Laguna Creek (north) is a significant east–west landscape feature that plays a prominent role in conservation. Impervious surfaces cover approximately 18,260 acres, or 26%, of the watershed. Along with the American River (26% impervious surfaces) and Sherman Lake-Sacramento River (31% impervious surfaces) watersheds, the Morrison Creek watershed has one of the three highest percentages of impervious surfaces in

the Plan Area. Reflecting both its large size and more urbanized character, it also has by far the highest amount of impervious surface acreage in the Plan Area, with Snodgrass Slough having the second highest amount at approximately 7,670 acres.

The Morrison Creek watershed includes documented occurrences for 26 of the 30 Covered Species despite substantial urbanization. Covered species documented in the watershed include Ahart's dwarf rush, Boggs Lake hedge-hyssop, dwarf downingia, legenere, pincushion navarretia, Sacramento Orcutt grass, slender Orcutt grass, Sanford's arrowhead, vernal pool fairy shrimp, vernal pool tadpole shrimp, mid-valley fairy shrimp, Ricksecker's water scavenger beetle, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, western spadefoot, giant garter snake, western pond turtle, American badger, and western red bat. This watershed has the highest percentage (33%) of known occurrences for Covered Species in the Plan Area, including 50% of both the covered vernal pool plants and vernal pool invertebrate occurrences. Due to the large area of vernal pools (almost 900 acres and second only to the Laguna Creek watershed), swale, and seasonal wetlands, vernal pool flora and fauna are the most important biological resources in the watershed.

Current conditions **–** Because Morrison Creek contains the highest percentage of Covered Species occurrences, it has a habitat function score of +3. It has a moderate percentage of natural land cover, yielding a water quality function score of +1. It has a relatively large amount of impervious surface, giving it a hydrologic function score of -2.

Future conditions **–** Morrison Creek will have a much lower percentage of Covered Species occurrences in the future, however, it will still maintain a small percentage and therefore has a future habitat function score of +3. It will continue to have a moderate percentage of natural land cover, yielding a water quality function score of +1. It will have an increased percentage of impervious surface, giving it a hydrologic function score of -3.

Sherman Lake–Sacramento River

The Sherman Lake-Sacramento River watershed is located in the extreme western portion of the Plan Area, with approximately 29% located within the Plan Area. The watershed intersects the Plan Area in four separate locations that together comprise about 5% of the Plan Area, including a large area along the northern portion of the Plan Area, a small area in the northwest corner of the Plan Area, and two areas along the western portion of the Plan Area. The Sherman Lake-Sacramento River watershed in the Plan Area is dominated by human activities. Together, non-habitat and agricultural land cover types account for 91% of the land covers in the watershed. Of these two land cover types, high-density development and cropland contain the largest acreages

at 5,360 and 5,440 acres, respectively, accounting for 58% of the total land covers in the watershed within the Plan Area. The Sherman Lake-Sacramento River watershed contains all of the aquatic land cover types mapped within the Plan Area, but in small amounts ranging from 2 to 40 acres and totaling only 110 acres. Terrestrial land covers, primarily valley grassland, comprise the remaining acreage, but only totaling 1,450 acres, or 8% of the land cover in the watershed within the Plan Area. Impervious surfaces cover approximately 5,690 acres, or 31%, of the watershed, which is the highest percentage of the watersheds in the Plan Area.

The Sherman Lake-Sacramento River watershed includes documented occurrences for 10 of the 30 Covered Species, including Sanford's arrowhead, vernal pool fairy shrimp, burrowing owl, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, and western red bat. Overall, the watershed accounts for accounts for only 1% of the Covered Species occurrences in the Plan Area. The large majority (91%) of the Sherman Lake-Sacramento River watershed is developed or agriculture, which is reflected in the relatively small number of Covered Species with occurrences in the watershed compared to several of the other watersheds.

Current conditions – Sherman Lake-Sacramento River has the lowest scores (-3) for all three functions, as a result of its low percentage of Covered Species occurrence, its low percentage of natural land cover, and its high percentage of impervious surface.

Future conditions – Sherman Lake-Sacramento River watershed will continue to have low scores (-3) for all three functions in the future.

Snodgrass Slough

Snodgrass Slough is the third largest watershed in the Plan Area behind the Laguna Creek and Morrison Creek watersheds and is entirely contained within the western portion of the Plan Area. About 54% of the watershed is agriculture, of which, about 66% is croplands; croplands cover about 35% of the entire watershed. Non-habitat land cover types, dominated by high-density development, account for 22% of the watershed. Terrestrial habitat, dominated by valley grassland (78%), mixed riparian scrub and woodland and woodland restoration, covers about 16% of the watershed. The Snodgrass Slough watershed accounts for the highest acreage of aquatic land cover within the Plan Area. Approximately 4,220 acres of the watershed supports all of the aquatic cover types mapped within the Plan Area, and represents 24% of the aquatic habitat in the Plan Area. Impervious surfaces cover approximately 7,670 acres, or 15%, of the watershed. While this watershed has a relatively smaller proportion of impervious surfaces compared to American River and Morrison Creek at 26% and Sherman Lake-Sacramento River at 31%, it has a substantially higher level of impervious surfaces than the remaining watersheds, which range from 1% to 3%.

The Snodgrass Slough watershed includes documented occurrences for 19 of the 30 Covered Species, including dwarf downingia, legenere, Sanford's arrowhead, vernal pool fairy shrimp, vernal pool tadpole shrimp, mid-valley fairy shrimp, giant garter snake, western pond turtle, burrowing owl, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, greater sandhill crane, Swainson's hawk, tricolored blackbird, white-tailed kite, American badger, and Yuma myotis. This watershed contains 13% of known occurrences for Covered Species in the Plan Area, third only to the Morrison Creek (35%) and Laguna Creek (26%) watersheds.

Current conditions **–** Snodgrass Slough has a moderate to low percentage of Covered Species occurrences, resulting in a habitat function score of -1. It has a relatively low percentage of natural land cover, which gives it a water quality score of -2. It has a mid-range percentage of impervious surface, yielding a hydrologic function score of 0.

Future conditions **–** The Snodgrass Slough watershed will have less than 1% of Covered Species occurrences in the future, resulting in a habitat function score of -3. It will have a slightly low percentage of natural land cover, which gives it a water quality score of -1. It will have a relatively low percentage of impervious surface, yielding a hydrologic function score of +2.

Upper Cosumnes

The Upper Cosumnes River watershed is located in the east-central portion of the Plan Area, which encompasses about 51% (32,000 acres) of the watershed. The majority of the watershed in the Plan Area (21,220 acres, or 66%), consists of terrestrial habitat dominated by valley grassland. Agricultural areas comprise about 11% and aquatic areas comprise about 5% of the watershed in the Plan Area. Non-habitat land cover, primarily low-density development, covers the remaining 18% of the watershed. Impervious surfaces cover approximately 340 acres, or only 1%, of the watershed.

The Upper Cosumnes River watershed includes documented occurrences for 14 of the 30 Covered Species, including legenere; Sanford's arrowhead; vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, western spadefoot, Cooper's hawk, ferruginous hawk, loggerhead shrike, northern harrier, Swainson's hawk, tricolored blackbird, white-tailed kite, and western red bat. This watershed contains 9% of documented occurrences of Covered Species within the Plan Area. Most notably, the watershed contains 153 of the 156 known occurrences (98%) of valley elderberry longhorn beetle, with the largest concentration of occurrences along the Cosumnes River just south of Rancho Murieta.

Current conditions **–** Upper Cosumnes has a relatively low percentage of Covered Species occurrences, which gives it a habitat function score of -2. However, it has a high percentage of

natural land cover, and a low percentage of impervious surface, yielding respective water quality function and hydrologic function scores of +3.

Future conditions **–** The Upper Cosumnes watershed will have a greatly increased percentage of Covered Species occurrences in the future, which gives it a habitat function score of +3. It will continue to have a high percentage of natural land cover, yielding a water quality score of +3. It will have a slightly increased percentage of impervious surface, which will result in a hydrologic function score of +1.

HUC 10	Effect on Function Scores		
	Habitat	*Water Quality*	*Hydrologic*
American River	-3	+1	-2
Deer Creek	-2	+3	+3
Laguna Creek	+2	+3	+3
Lower Cosumnes	-2	0	+3
Lower Dry Creek	-3	+2	+3
Lower Mokelumne River	-3	-2	+3
Morrison Creek	+3	+1	-2
Sherman Lake-Sac River	-3	-3	-3
Snodgrass Slough	-1	-2	0
Upper Cosumnes	-2	+3	+3

Table 3

HUC 10	Effect on Function Scores		
	Habitat	*Water Quality*	*Hydrologic*
American River	-3	0	-3
Deer Creek	+3	+3	-1
Laguna Creek	+3	+3	+1
Lower Cosumnes	+3	0	+1
Lower Dry Creek	-3	+2	+2
Lower Mokelumne River	-3	-3	+3
Morrison Creek	+3	+1	-3
Sherman Lake-Sac River	-3	-3	-3
Snodgrass Slough	-3	-1	+2
Upper Cosumnes	+3	+3	+1

2.1.3 Factors 3 and 4 – Primary and Secondary Adjacent Land Cover

For the purposes of this analysis, adjacent land cover types within the Plan Area were assigned to one of four classes:

- **Class IA:** Vernal pool valley grassland.
- **Class I:** Ephemeral streams, freshwater marsh, open water, seasonal wetland, streams/creeks, swale, vernal pool, wetland restoration, aqueducts, blue oak savanna, blue oak woodland, mine tailing riparian woodland, mixed riparian scrub, mixed riparian woodland, valley grassland, valley oak riparian woodland, and woodland restoration.
- **Class II:** Cropland, irrigated pasture-grassland, orchards, vineyards, eucalyptus woodland, and recreation/landscaped.
- **Class III:** Disturbed, high-density development, low-density development, major roads, mine tailings.

Class IA only includes vernal pool valley grassland land covers, and these are considered to be indicative of the highest quality, contiguous vernal pool complexes within the Plan Area. Therefore, aquatic resources adjacent to Class IA land covers have increased habitat, water quality, and hydrologic scores, with a particular emphasis on habitat. Class I land covers generally enhance or have positive impacts on the function of aquatic resources. Habitat, water quality, and hydrologic function scores were therefore increased for aquatic resources with Class I primary adjacent land covers. (see Table 4).

Class II land covers are characterized by open space with a moderate level of disturbance. The land covers may include crop species or exotic landscape species, but the open space provides some habitat value. Habitat function scores were neutral (0) for aquatic resources with Class II primary adjacent land covers. The open space associated with Class II land covers facilitate infiltration and reduce the flashiness of the local hydrograph; however, Class II land covers are generally associated with altered hydrological regimes (e.g. straightened canals and ditches); therefore, hydrologic function scores were also considered neutral (0) with Class II primary adjacent land covers. Since most land uses in Class II are non-point sources of natural and human-made pollutants such as excess sediment, nutrients, fertilizer, herbicide, and insecticide laden run-off from agricultural land scores decreased for aquatic resources with Class II primary adjacent land cover.

Class III land covers are urban and developed. This land cover provides little habitat value and generates urban runoff, creating sources of pollutants such as lawn fertilizers, chemicals, oil and grease. Habitat and water quality function scores were therefore greatly reduced (-3) for aquatic

resources with Class III primary land cover types. Urban areas are also generally characterized by fairly intensive hydrologic modification. Therefore, hydrologic scores were also reduced (-2) for aquatic resources with Class III primary adjacent land cover.

Table 4

Factor	Effect on Function Scores		
	Habitat	*Water Quality*	*Hydrologic*
Primary Adjacent Land Cover			
Class IA	+2	+1	+1
Class I	+1	+1	+1
Class II	0	-1	0
Class III	-3	-3	-2

When more than one land cover type is adjacent to a PJWA, the adjacent land cover with the greatest linear feet of shared border with the PJWA being evaluated is the primary adjacent land cover. The land cover with the second greatest linear feet of shared border with the PJWA being evaluated is the secondary adjacent land cover. Secondary land covers are assumed to have the same type of effect on jurisdictional wetlands and waters as primary land cover types, but to a lesser extent and were scored (weighted) closer to neutral for all land cover types (see Table 5).

Table 5

Factor	Effect on Function Scores		
	Habitat	*Water Quality*	*Hydrologic*
Secondary Adjacent Land Cover			
Class IA	+1	0	0
Class I	0	0	0
Class II	0	-1	0
Class III	-2	-2	-1

If there was only a primary land cover and no secondary land cover, the corresponding secondary land cover score was used for Factor 4 (e.g. if the PJWA was only surrounded by Class I land covers, the Factor 3 scores would be +1 for habitat, +1 for water quality, and +1 for hydrologic; and the Factor 4 scores would be 0 for habitat, 0 for water quality, and 0 for hydrologic). Both Factor 3 and Factor 4 scores were used in all cases, to avoid higher scores for features solely based on the fact that more than one adjacent land cover exists.

2.1.4 Factor 5 – The Aquatic Resource Type

The aquatic resource type factor is based on the rationale that certain aquatic resources generally have more importance in terms of habitat, water quality, and hydrologic function than other types. Therefore, based on a landscape level assessment of the aquatic resources within the Plan Area, functional scores were increased for aquatic resources that have recognizable potential to support covered wildlife and plant species or assists in benefitting the continued existence of any threatened or endangered species; importance to improve or maintain water quality; and facilitate groundwater recharge and/or store floodwaters (see Table 6).

Table 6

Land Cover Type	Effect on Function Scores		
	Habitat	*Water Quality*	*Hydrologic*
Ephemeral Streams	0	0	0
Freshwater Marsh	+2	+1	+1
Streams/Creeks	+1	+2	+2
Mixed Riparian Scrub	+1	0	0
Mixed Riparian Woodland	+1	0	0
Mine Tailing Riparian Woodland	-1	-1	-1
Open Water	0	-1	0
Swale	+1	0	0
Seasonal Wetlands	+1	+1	+1
Vernal Pool	+2	0	0

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3 RESULTS

3.1 Very Low, Low, Moderate, and High-Condition Ranking

The function scores for each aquatic resource were ranked very low, low, moderate, or high based upon the range of scores possible resulting from the sum of all factors (range of -28 to +24). Cutoffs for each condition ranking were determined by assessing natural breaks in the data and distributing the scores roughly evenly in the four different condition bins. The condition breakdowns are as follows: aquatic resources scored between -28 and -14 are considered of "very low" condition, those scored between -13 and -1 are considered "low" condition, those scored between 0 and 12 are considered "moderate" condition, and those scored between 13 and 24 are considered "high" condition. The final total ranking is intended to provide a planning level overview of which mapped aquatic features within the Plan Area provide the highest functions and services and support analysis of trends in the location of higher or lower quality features.

3.2 Summary of Functional Assessment Results

The results of the functional assessment analysis and quality ranking for each aquatic resource mapped in the Plan Area is provided in Appendix A. Within the Plan Area under current conditions, there are a total of 24,255 acres of aquatic resources. 8,280 acres (34.1%) are ranked as high quality, 12,218 acres (50.4%) are ranked as moderate quality, 3,651 acres (15.1%) are ranked as low quality, and 107 acres (0.4%) are ranked as very low quality (Table 7).

Table 7

Wetland or Non-Wetland Waters	Land Cover Type (Common name)	High	Moderate	Low	Very Low	Total
		Acres				
Wetland Waters	Vernal Pools	3067.47	1312.96	157.02	0	4537.45
	Freshwater Marsh	988.01	1697.21	268.85	0	2954.07
	Mine Tailing Riparian Woodland	67.59	363.78	183.39	26.31	641.07
	Mixed Riparian Scrub	112.04	820.23	297.70	44.72	1274.69
	Mixed Riparian Woodland	520.87	3710.31	1554.85	18.75	5804.78
	Seasonal Wetland	1395.77	1019.33	184.65	0	2599.75
	Swales	944.33	302.17	4.98	0	1251.48
Non-Wetland Waters	Open Water	298.33	1206.30	821.06	15.94	2341.63
	Streams/Creeks (Intermittent and Perennial)	840.91	1758.42	177.03	1.03	2777.39
	Streams/Creeks VPIH (Ephemeral)	44.30	27.38	1.51	0	73.19
Total		**8279.62**	**12218.11**	**3651.03**	**106.74**	**24255.50**

Within the Plan Area under impacted conditions, there are a total of 22,644 acres of aquatic resources. 8,308 acres (36.7%) are ranked as high quality, 10,953 acres (48.4%) are ranked as moderate quality, 3,354 acres (14.8%) are ranked as low quality, and 28 acres (0.1%) are ranked as very low quality (Table 8).

Table 8
Summary of Functional Assessment Results under Impacted Conditions

Wetland or Non-Wetland Waters	Land Cover Type (Common name)	Cowardin Class	Remaining Aquatic Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres				
Wetland Waters	Freshwater Marsh	PEM1	1267.52	1378.039	181.55	0	2827.11
	Mine Tailing Riparian Woodland	R2/R3	130.97	240.96	50.93	0	422.86
	Mixed Riparian Scrub	R2/R3	218.25	665.29	324.23	5.42	1213.18
	Mixed Riparian Woodland	R2/R3	877.72	3332.73	1403.50	6.73	5620.68
	Seasonal Wetland	PEM2	1162.51	1107.77	231.78	0	2502.05
	Swale	R2/R3	575.38	415.57	26.36	0	1017.25
	Vernal Pools	PEM2	2988.20	1078.65	72.26	0	4139.10
Non-Wetland Waters	Open Water	POW	413.55	855.84	903.64	15.47	2188.50
	Perennial or Intermittent Streams/Creeks	R3UB	674.29	1832.19	154.70	0	2661.19
	Streams/Creeks (VPIH) ephemeral	R4SB	0	46.12	5.48	0	51.60
		Total	**8308.38**	**10953.10**	**3354.43**	**27.62**	**22643.52**

Within the Plan Area under future conditions, there are a total of 24,257 acres of aquatic resources. 9,671 acres (39.9%) are ranked as high quality, 11,204 acres (46.2%) are ranked as moderate quality, 3,354 acres (13.8%) are ranked as low quality, and 28 acres (0.1%) are ranked as very low quality (Table 9).

Table 9
Summary of Functional Assessment Results under Future Conditions

Wetland or Non-Wetland Waters	Land Cover Type (Common name)	Cowardin Class	Future Condition of Resources				Total
			High	*Moderate*	*Low*	*Very Low*	
			Acres				
Wetland Waters	Freshwater Marsh	PEM1	1425.32	1427.58	181.55	0	3034.46
	Mine Tailing Riparian Woodland	R2/R3	130.97	240.96	50.93	0	422.86
	Mixed Riparian Scrub	R2/R3	257.12	688.08	324.23	5.42	1274.85
	Mixed Riparian Woodland	R2/R3	1178.62	3434.15	1403.50	6.73	6023.0
	Seasonal Wetland	PEM2	1318.72	1132.62	231.78	0	2683.12
	Swale	R2/R3	839.22	419.08	26.36	0	1284.67
	Vernal Pools	PEM2	3362.52	1093.38	72.26	0	4528.16
Non-Wetland Waters	Open Water	POW	413.55	856.32	903.64	15.47	2188.98
	Perennial or Intermittent Streams/Creeks	R3UB	742.03	1866.12	154.70	0	2762.85
	Streams/Creeks (VPIH) ephemeral	R4SB	2.63	46.12	5.48	0	54.23
		Total	**9670.72**	**11204.40**	**3354.43**	**27.62**	**24257.17**

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APPENDIX D

Re-establishment and Establishment Guidelines

APPENDIX D
Re-establishment and Establishment Guidelines

1 INTRODUCTION

The United States Army Corps of Engineers (USACE) and the US Environmental Protection Agency (EPA) define restoration as, "the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/ historic functions to a former or degraded aquatic resource" (USACE and EPA 2008). Restoration includes both rehabilitation, which repairs natural/historic functions to a degraded aquatic resource, and re-establishment, which returns natural/historic functions to a former aquatic resource. Establishment (i.e., creation) is defined as, "the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site." Re-establishing is always preferable to establishment because the likelihood of success is far greater where some aquatic resource characteristics are already present or were historically present. Additionally, because the establishment of wetland and other waters on upland and/or deepwater sites will result in a net decrease in upland and/or deepwater habitat, this should only occur when there are no existing or available sites with re-establishment opportunities. Even highly degraded and disturbed re-establishment sites are preferable to establishment sites. Nevertheless, it is expected that a portion of mitigation acreage under the South Sacramento Habitat Conservation Plan (SSHCP) will occur as wetland and other waters establishment due to a lack of available restoration sites outside the Urban Development Area (UDA).

This appendix explains the SSHCP protocols for establishment and restoration of wetlands and other water ecosystems. These protocols are based on the USACE's Mitigation Guidelines for the Clean Water Act (CWA) 404 Program and the United States Environmental Protection Agency's (EPA) *Principles for Ecological Restoration of Aquatic Resources* (EPA 2000). They are meant to provide applicants with a basic outline for planning, designing, implementing, and managing restoration or establishment projects. In so doing, the protocols are meant to ensure that wetland projects will be viable in perpetuity, and will adequately compensate for impacted habitat. This section will also provide standards that are specific to each of the 10 aquatic resources land cover types, including restoration and establishment methods, monitoring requirements, criteria against which success will be measured, and remedial steps for projects that do not meet the basic success criteria. It is recognized that ecosystem restoration and establishment is an evolving science, and that this document represents current understandings and expectations in the field. Therefore, the application of these protocols will allow adjustments in an adaptive manner to reflect the best available science of wetland and stream establishment and re-establishment, monitoring, and performance standards that can improve the long-term viability of restoration and establishment projects.

The following methodology describes the process by which determinations were made regarding the potential for establishment and re-establishment acreage amounts to occur within the Plan Area.

Assumptions

Irrigated pasture and croplands are considered the only habitats where removal of the current land use and re-establishment of topography may result in re-established wetlands. Irrigated pasture is considered particularly suitable for re-establishment of wetlands because the hardpan is likely intact. Croplands, depending on the crop, may also retain the hardpan. Both land uses occur where wetlands may have historically occurred.

Orchards and vineyards are not suitable for wetland restoration because the lands have been deep-ripped to support the agricultural uses.

Valley grasslands may be suitable for establishment of wetlands, but only outside of 250 feet of an existing wetland feature so as not to create any indirect effects to the wetland per U.S. Fish and Wildlife Service (USFWS) protocol.

Only land in the Plan Area is considered for re-establishment or establishment.

It is assumed that parcels 20 acres in size or less will be too expensive to acquire and too small to support successful re-establishment or establishment.

It is assumed that existing preserves will not be suitable for re-establishment or establishment as this may risk damaging protected resources and easements may prohibit re-establishment or establishment.

Based on California Department of Fish and Wildlife recommendations, it is assumed that between 15% and 30% of land that is assumed to be suitable habitat will be available for acquisition.

Up to 8% of a site can be re-established or established with wetlands. This is based on the density of wetlands found in Valley Grassland cover type throughout the Plan Area. Wetlands include vernal pools, swales, seasonal wetlands, freshwater marsh, streams and open water. Wetland density within the Plan Area was derived from the acreage of wetlands within the Valley Grassland cover type as this is the only upland cover type that is reflective of historic natural conditions. All other upland cover types have been heavily modified.

Methodology

Identify all Cropland, Irrigated Pasture, and Valley Grassland cover types in the SSHCP Plan Area. This forms the “base map.”

Using the parcel layer, remove all parcels from the base map that are less than 20 acres in size.

Using the existing preserve layer, remove all parcels from the base map that are already protected.

Using a buffer file, remove all lands from the base map that are within 250 feet of a vernal pool, swale, and stream/creek (VPIH) land cover type.

Calculate range of how many Cropland, Irrigated Pasture, and Valley Grassland acres are available for potential re-establishment or establishment, assuming 15% to 30% of the base map can be acquired.

Calculate range of how many wetland acres can be re-established or established based on 8% density.

Conclusions

The base map sums to 210,509 acres.

After removing lots smaller than 20 acres in size and already preserved lands, the map sums to approximately 135,455 acres.

After removing areas within 250 feet of existing VPIH land covers, the map sums to approximately 85,690 acres.

It is estimated that further investigation into the historical agricultural practices on some of the potential re-establishment or establishment sites will reveal past deep-ripping. Sites that have been deep-ripped will not have an intact perched aquafer, which is necessary to support most wetland cover types. There are some questions as to whether or not the perched aquifer in soils that have been deep-ripped can be repaired. Orchards and vineyards are not considered suitable candidates for re-establishment or establishment because deep-ripping has typically occurred where they were established. It is also understood that acquiring potential re-establishment or establishment sites is dependent on a willing buyer and willing seller agreement. Therefore, it is not probable that all identified potential wetland re-establishment or establishment sites can be acquired for re-establishment or establishment. It is estimated that between 15% and 30% of potential re-establishment or establishment sites will be successfully negotiated for acquisition and will be capable of supporting re-establishment or establishment efforts. Therefore, it is assumed that between 12,854 and 25,707 acres may be available for wetland re-establishment or establishment.

Wetland re-establishment and establishment guidelines set forth in this study limit the percent of land that can be re-established and established to 8% of the site. The remaining 92% is required as upland

habitat, which supports the hydrology of the wetland. Therefore, it is estimated that between 1,028 and 2,057 acres of wetlands can be re-established or established within the Plan Area.

The SSHCP impacts analysis forecasts that approximately 1,200 acres of wetlands will be impacted. Because we assume that the Plan Area can provide between 1,028 and 2,057 acres of wetland re-establishment and establishment, the re-establishment/establishment ratio under the SSHCP is set at 1:1.

2 GUIDELINES

The restoration and establishment process has several stages: site selection, site evaluation, project design, project implementation, project monitoring, and project management. General protocols for each of these stages are as follows:

2.1 Site Selection

The National Resource Council (NRC) stipulates that "site selection for wetland conservation and mitigation should be conducted on a watershed scale in order to maintain wetland diversity, connectivity, and appropriate proportions of upland and wetland systems needed to enhance the long-term stability of the wetland and riparian systems" (NRC 2001). Protected upstream and upland areas provide a safeguard against the negative edge effects of future development. Therefore, restoration and establishment sites that are contiguous to existing preserves or lands protected by conservation easements will have priority over wetland restoration or establishment sites outside of a comprehensive preserve system. All restoration and establishment sites must be under permanent conservation easement or have preserve status.

Consideration will be given to a site's position within the watershed, its function within the watershed, and the potential impacts of restoration or establishment on existing proximate wetland and other aquatic resource habitats within the same watershed. Restoration or establishment sites that can benefit the watershed in which they are situated will have priority over those with little to no impact; sites with no potential impact on the watershed in which they are situated will have priority over those with potential negative impacts. Sites with potential negative impacts to the watershed or nearby habitat will be avoided.

Wetlands and other waters that have retained functional hydrodynamics or degraded and former wetlands whose hydrodynamics can be re-established through passive restoration tend to be more fiscally and environmentally sustainable than those where functional hydrodynamics must be engineered or created. Active hydrodynamic restoration methods, like grading and excavation can severely damage the substrate and encourage the spread of invasive plant species. "Hard" engineering solutions, such as irrigation and pumping systems, are costly and cannot readily adapt to seasonal and annual fluctuations in rainfall and water level. Hence, restoration and establishment sites that do not require active intervention to remediate wetland or other waters hydrodynamics will have priority over other sites. No restoration or establishment projects that use irrigation as a primary or long-term water source are permitted.

Soil type and permeability are also important considerations, as they dictate a site's ability to retain water and support vegetation. Highly permeable soils are not likely to retain enough water to function as a wetland or other water ecosystem, except where water tables or water inflow

rates are high. Factors such as soils pH, nutrient content, climate, parent material, relief, organisms, and the overriding influence hydrologic regime, will influence whether wetland-appropriate vegetation struggles or thrives. Therefore, restoration and establishment sites with soil types known to support wetland hydrology and vegetation will have priority over other sites.

Additionally, restoration and establishment site selection will consider the potential effects of habitat restoration on nearby County airport operations. Pursuant to Title 33 of the Code of Federal Regulations (CFR) Section 332.3, compensatory mitigation projects should not be located where they will increase risks to aviation by attracting wildlife to areas where aircraft–wildlife strikes may occur (e.g., near airports). Thus, those sites that are less likely to increase wildlife hazard attractants within a County airport's approach and departure airspace will be given priority over other sites.

Lastly, because a central goal of mitigation is to offset unavoidable adverse impacts to wetlands, streams, and other aquatic resources to maintain a diverse assortment of wetland types, functions, landscape settings, and geomorphic settings, sites that have unique or rare topographical, geomorphic, vegetative, biotic, or functional characteristics will have priority over other sites.

In summary, the Implementing Entity will prioritize restoration and establishment sites that:

- Are contiguous to existing preserves or lands under conservation easements;
- Can withstand re-establishment or establishment projects without adverse impacts to the watershed or habitat in which they are situated;
- Do not require active intervention to remediate wetland or other waters' hydrodynamics;
- Have appropriate soil types, composition, and permeability;
- Do not attract wildlife within the approach and departure airspace of County airports, and
- Have unique or rare characteristics.

Once a restoration or establishment site is selected, a reference site will be identified. Reference sites should be in-kind and as proximate to the restoration or restoration site as possible. The site being mitigated for can be used as the reference site if it is reasonably proximate and similar to the restoration or establishment site, and if it has not been destroyed prior to the start of the restoration or establishment project. Reference sites should not be chosen randomly, but rather so that collectively they represent the diversity of species and plant communities that exist on the sites that are going to be destroyed.

2.2 Site Evaluation

Once the restoration or establishment site and the reference site are selected, an interdisciplinary team of experts will survey the site. This team will include the Implementing Entity and at least one Monitoring Biologist (MB). The MB will be a professional botanist, biologist, or restoration ecologist familiar with California flora and fauna, and experienced with wetland or other waters re-establishment or establishment projects; alternatively, the MB can be a firm specializing in the re-establishment or establishment of wetlands and other waters. This person or firm will be contracted to perform the baseline evaluation (in addition to the monitoring responsibilities detailed in Section 2.5).

The baseline evaluation will actually consist of two surveys: one in wet season (January to February) and one in the flowering period (March through May). Each survey should note the following, using either metrics on or descriptions of:

- Topography and slope;
- Water quality (turbidity, nutrient levels, presence of toxins, etc.);
- Subsurface water flow rate, direction, depth, and duration;
- Surface water flow rate, direction, depth, and duration;
- Soil/substrate type, permeability, moisture levels, and erosion;
- Dominant vegetation type, location, density, and elevation;
- Presence and location of invasive species;
- Presence and location of listed species;
- Aquatic function (if any);
- Historical and current uses of the site; and
- Historical and current uses of neighboring land that may affect the project outcome.

Surveys of plant and animal species specific to particular wetland or other water types may need to occur within a more specific time frame or multiple times over the course of the survey period for the results to be accurate and reliable. These particular survey requirements will be detailed within the restoration and establishment guidelines of each wetland and other water type.

The reference site should be surveyed at the same time and using the same methods and metrics as the restoration or establishment site.

2.3 Project Design

Project design depends upon the desired outcome of each project. The overarching goal for all mitigation projects under the SSHCP is an ecosystem strategy approach to re-establish or establish sustainable and functioning ecosystems that match the characteristics and functions of the ecosystems they replace within a system of conservation areas and reserves so that species dispersal mechanisms remain functional. However, depending on project-specific constraints and opportunities, this may be too broad or constraining. Therefore, the Implementing Entity and MB will use the baseline evaluation findings to set project-specific goals and to design the project with the aim of meeting those goals. As part of the project design, the team will also generate an implementation plan that describes how the design will be implemented. Lastly, the team will generate a monitoring and management plan, which will include project-specific outcomes, criteria against which progress toward meeting those objectives can be measured, and the monitoring methods that will be used to measure those criteria.

In general, passive restoration design is preferable to active restoration, as it is less invasive and the result is self-sustaining. Passive restoration involves removing the source of degradation (e.g., cattle grazing, culverts, etc.) and allowing natural process to gradually return the site to a functioning wetland or other water ecosystem. However, passive restoration design will not meet the goals of every restoration project, especially on severely degraded sites, and passive designs cannot be used for establishment projects. Therefore, it is expected that some projects will utilize active restoration and establishment project designs.

The USACE South Pacific Division's *Final 2015 Regional Compensatory Mitigation and Monitoring Guidelines* (USACE 2015) recommend the following considerations for mitigation planning: A mitigation plan for wetland compensatory mitigation projects should consider the NRC's operational guidelines for restoring ecologically self-sustaining wetlands (NRC 2001). This succinct document provides some useful guidelines on factors to consider in planning wetland compensatory mitigation. In addition, examination of existing compensatory mitigation sites has provided information that can be used to ensure the success of proposed compensatory mitigation sites. In general, compensatory mitigation sites should be designed with the following in mind.

General Design Recommendations for Compensatory Mitigation

- Ensure an adequate buffer subject to minimal or no human disturbance is established and protected adjacent to any aquatic resources in the compensatory mitigation site.
- Integrate macro- and micro-topographic features to create a diversity of hydrologic and geomorphic conditions, plant communities, and animal habitat.

- Design the compensatory mitigation project to mimic a local reference site of similar class and landscape position that provides the desired habitat features and functionality.
- Incorporate mitigation plantings of species native to the local area.
- Avoid or minimize impacts to special-status species and other biological resources.

Design Recommendations for Wetland Compensatory Mitigation

- Select compensatory mitigation sites with natural, self-sustaining sources of hydrology (surface water, groundwater, and precipitation). The use of engineered structures such as pumps, water control structures, or diversions is strongly discouraged. Securing water rights and/or understanding the risks of existing or future water diversions are critical elements.

Design Recommendations for Stream Compensatory Mitigation

- Ensure the main channel through the compensatory mitigation site is free to migrate laterally over its active and terrace floodplain.
- Ensure channel geometry (plan, profile, and cross-section) of the compensatory mitigation site is appropriate for the watershed location and physical/hydrological condition.
- Use local, native materials as fill material to the extent practicable.
- Use bioengineering techniques to the extent practicable.
- Establish/restore and protect riparian areas next to the stream channel.

Additionally, project designs must address the three fundamental components of wetland ecosystems: hydrology, substrate, and vegetation. According to the NRC's Committee on the Characterization of Wetlands (NRC 1995):

> The states of the three factors that characterize wetlands are… recurrent, sustained saturation (the hydrological criterion), physical and chemical conditions in the substrate that reflect recurrent, sustained saturation (the substrate criterion), and the presence of organisms that are specifically adapted to recurrent and sustained saturation of the substrate (the biologic criterion).

2.3.1 Hydrology

The project design should describe how topography and hydrology of the site will be altered (if at all) to re-establish or establish the appropriate hydrodynamics and hydroperiod for the wetland or other water ecosystem. The design should also explain what aquatic function is expected to result from this change.

This component of the project design should utilize natural hydrologic patterns whenever possible, and avoid depending on hard engineering to achieve the desired hydrology. Soft engineering is always preferable to hard engineering, as it is more natural and self-sustaining, requires minimal maintenance, and is more cost-effective. As explained in Section 2.1, grading, excavation, pumping, and irrigation are undesirable and should be avoided. Irrigation is never acceptable as a primary or long-term water source.

2.3.2 Substrate

The project design should describe how (if at all) the soil or substrate will be amended or translocated to re-establish or establish the appropriate level of saturation and nutrient/organic matter content for the wetland or other water ecosystem. The project design should utilize existing soil and substrate whenever appropriate for the wetland or other water type being re-established or established. To avoid the spread of invasive species, soil and/or substrate translocated from off site should be sourced from sites free of invasive species.

2.3.3 Vegetation

The project design should describe how (if at all) the site will be vegetated or revegetated. Substrate, plants, and seeds collected from the site can be used to revegetate and repopulate the site after hydrology is re-established or established. When no native seed bank exists, site-suitable plant species should be procured from as local a source as possible. Off-site plant, seed, and substrate collection should come from local sites free of invasive species. Commercial seeds for native plants can be substituted if no local seed banks are available. Project designs, especially active designs, should use variation to allow for adaptive management. When designs include excavation or grading, they should provide appropriately heterogeneous topography. When designs include revegetation, they should create varying plant elevations and emergence levels. Such variations enable flexibility in case of extreme weather events and other unpredictable factors that can affect the project.

In summary, the Implementing Entity will design restoration and establishment projects that:

- Are based on foreseeable constraints and information derived from the baseline evaluation;
- Strive to meet project-specific goals, outcomes, and success criteria;
- Specify monitoring frequency and management protocols;
- Are passive, whenever possible;
- Address the water, substrate, and biota that compose the wetland or other water type;

- Utilize existing hydrological patterns, topography, soil, substrate, native vegetation, and/or local seed banks, whenever possible; and
- Create variation to allow for experimentation and adaptive management.

2.4 Implementation

The implementation plan must provide a timeline for the project implementation, and must describe all avoidance and minimization measures that the Implementing Entity will take during implementation of the project. These measures are described in detail in Chapter 7 Conservation Strategy of the SSHCP.

2.4.1 Timing

Implementation will occur either before or after the breeding and aestivation seasons of species present at the restoration or establishment site. The Implementing Entity will also time the implementation so that revegetation occurs during the appropriate growing season. If the planned implementation season arrives with unexpectedly poor conditions (e.g., drought, flood, etc.) the Implementing Entity will postpone project implementation until better conditions emerge, up to one calendar year or 18 months.

2.4.2 Avoidance and Minimization

Prior to entering the restoration or establishment site all boots, tools, truck tires, truck beds, and any other equipment should be washed and disinfected to limit the spread of invasive species and disease. If invasive species are already present at the re-establishment or establishment site prior to implementation, and the project design involves eradicating such species, the Implementing Entity will use mowing, hand weeding, and other natural methods to do so. Herbicides and pesticides will be avoided.

When the project design involves excavation or grading, the Implementing Entity will salvage appropriate native soils, substrate, and plant materials from the re-establishment or establishment site, whenever possible. Seeds with viable embryos should be collected by hand, with scissors, or with clippers, and stored under cool and dry conditions. Substrate should be harvested using a hammer or backhoe to loosen blocks that are at least 6 inches deep, and stored on greenhouse flats wrapped in damp fabric.

All tools should be removed from the site after implementation, except those needed for monitoring purposes.

2.5 Monitoring

A monitoring schedule will be developed as part of the project design process (see Section 2.3). Monitoring should occur with the highest frequency during and immediately after implementation. These surveys should include the same metrics and descriptions as the baseline evaluation.

Long-term monitoring should include an annual Biological Inspection, and more detailed quantitative and qualitative surveys every 5 years. The Biological Inspection will consist of one or more walk-through surveys that note:

- Hydrology;
- Vegetation composition;
- Presence and location of invasive species;
- Wildlife presence; and
- Condition of habitat features, including changes and/or pending needs.

Surveys should include photo documentation where useful. Summary reports of monitoring results should be submitted to the Implementing Agency by the end of each monitoring year.

The Monitoring Biologist (MB) is responsible for all near- and long-term monitoring of the re-establishment or establishment site. Ideally, the same MB will perform both the baseline evaluation (detailed in Section 2.2) and project monitoring for the duration of the monitoring period. However, a change of the MB can be made in consultation with the Implementing Agency, and with the Implementing Entity's approval at the time of change. The exiting MB will give a tour and introduction of the site to the entering MB.

Duties of the MB include, but are not limited to:

- Monitoring site function, hydrology, and erosion control;
- Monitoring water quality;
- An annual Biological Inspection of the site; collecting data and preparing reports based on this Inspection;
- Monitoring presence, vigor, location, and density of vegetation and biota;
- Evaluating the accumulation of thatch and recommending removal, when necessary;
- Evaluating the presence of newly introduced, non-native, or exotic plant species, and recommending removal, when necessary;

- Recommending allowable activities on the site, e.g. educational activities, tours, grazing, etc.; and
- Recommending remedial or corrective actions, to be implemented by the Implementing Entity.

2.6 Management

The Implementing Entity is responsible for the near- and long-term management and maintenance of the restoration or establishment site. Long-term management is necessary to ensure that the restoration or establishment project is viable as a wetland or other water habitat in perpetuity. The Implementing Entity's management duties will include, but not be limited to:

- Maintaining fencing and signage;
- Coordinating trash removal;
- Removing thatch and dead vegetative matter to reduce fire hazard;
- Removing and/or managing exotic and invasive plant species, when necessary;
- Coordinating grazing schedules, when applicable;
- Coordinating the annual Biological Inspection by the MB;
- Reviewing monitoring data and performing general inspections; and
- Implementing remedial or corrective action when necessary.

The Implementing Entity will coordinate with the MB to determine when and where remedial or corrective action is necessary and feasible.

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EIS/EIR APPENDIX J

Draft Aquatic Resources Protection Ordinance

SCC NO. _____

AN ORDINANCE OF THE SACRAMENTO COUNTY CODE RELATING TO AQUATIC RESOURCES PROTECTION

The Board of Supervisors of the County of Sacramento, State of California, ordains as follows:

SECTION 1. Chapter 16.135, Sections 16.135.010 through 16.135.110, is added to Title 16 of the Sacramento County Code to read as follows:

16.135.010 Findings, Purpose and Intent.

A. The Board of Supervisors finds that due to urban and agricultural development only a fraction of the aquatic resources that historically dominated the SSHCP Plan Area landscape remains today.

B. The Board of Supervisors finds that a regional conservation approach is needed to protect existing aquatic resources within the South Sacramento Habitat Conservation Plan's (SSHCP's) Plan Area and to streamline the permitting processes for development and infrastructure projects in the Plan Area.

C. The Board of Supervisors recognizes that the avoidance, minimization and compensatory mitigation of aquatic resources provides several important functions and services, such as flood storage, wildlife habitat, mitigation of storm water and pollutants, filtration for drinking water, and prevention of storm damage to buildings and upland areas.

D. The Board of Supervisors wishes to avoid or minimize impacts of future activities on SSHCP Plan Area aquatic resources and to ensure "no-net-loss" of aquatic resources and aquatic functions by re-establishing or establishing aquatic resources within the Plan Area as compensatory mitigation when unavoidable impacts to aquatic resources occur.

E. The Board of Supervisors wishes to facilitate development consistent with the County General Plan and to ensure that there is enough mitigation available to accommodate aquatic resource mitigation requirements and to ensure that habitat mitigation remains economically feasible within the region.

F. The purpose and intent of this Chapter is to achieve no-net-loss of aquatic resource function and services and to enact efficient aquatic resource permitting consistent with the requirements of the federal Clean Water Act (Sections 404 and 401), California Fish and Game Code Section 1600 and the Porter-Cologne Water Quality Control Act (Porter-Cologne).

H. This Chapter regulates all aquatic resources within that portion of the unincorporated County that is south of U.S. Highway 50, east of the Sacramento River levee and County Road J11, west of the Sacramento County line with El Dorado and Amador Counties, and north of the Sacramento County line with San Joaquin County, as depicted in Figure 1, "Plan Area".

16.135.020 Definitions.

"Aquatic Resources" means wetland waters (i.e. vernal pools, swales, freshwater marsh, other seasonal wetlands, etc.) Non-wetland waters (i.e. ponds, lakes, streams, rivers, drainages, ditches, etc.), and riparian (i.e. mixed riparian scrub, mixed riparian woodland, etc.).

"Aquatic Resources Impact Permit" means a permit required for any activity permanently or temporarily impacting an Aquatic Resource.

"Avoidance" means avoiding the permanent and/or temporary impact altogether by not taking a certain action or parts of an action.

"Compensatory Mitigation" means the restoration (re-establishment or rehabilitation), establishment (creation), enhancement, of aquatic resources for the purposes of offsetting unavoidable adverse permanent and/or temporary impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

"Compensatory Mitigation Ratio" means the amount of Compensatory Mitigation that must be provided to offset an acre or fraction thereof of permanent and/or temporary impact.

"County" means the County of Sacramento.

"Director" means the Director of the Department of Community Development.

"Enhancement" means the manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

"Establishment" means the manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area and functions.

"Habitat" means the place or environment where a plant or animal naturally lives and grows (a group of particular environmental conditions), and as defined in the South Sacramento Habitat Conservation Plan. Habitat may be occupied (i.e. individuals or a population of species are or have recently been present) or unoccupied.

"Impact" – See "Permanent Impact" and "Temporary Impact."

"Minimization" means to reduce permanent and/or temporary impacts by limiting the degree or magnitude of the action and its implementation.

"Open Water" means a permanent water impoundment that is mostly free from masses of underwater vegetation at very shallow depths.

"Permanent Impact" means the permanent loss of an Aquatic Resource resulting from the adverse effects of grading, filling, excavation, dredging, or changing of drainage of an Aquatic Resource.

"Plan Area" means that portion of the unincorporated County that is south of U.S. Highway 50, east of the Sacramento River levee and County Road J11, west of the Sacramento County line with El Dorado and Amador Counties, and north of the Sacramento County line with San Joaquin County, as depicted in Figure 1, "Plan Area".

"Re-establishment" means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

"Rehabilitation" means the manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

"Riparian" means a transitional area between terrestrial and aquatic ecosystems, which is distinguished by gradients in biophysical conditions, ecological processes, and biota, typically adjacent to perennial, intermittent and ephemeral streams, lakes, and estuarine-marine shorelines.

"Setback" means an upland, wetland, and/or riparian area that protects and/or enhances aquatic resource functions associated with wetlands and streams from disturbances associated with adjacent land uses.

"Stream" means a perennial, intermittent, or ephemeral course of water that has a bed and bank and with a definable ordinary high water mark.

"Temporary Impact" means the grading, filling, excavation, dredging, or changing of drainage of an Aquatic Resource where the Aquatic Resource is restored to pre-construction contours and elevations after construction, and revegetated, as appropriate.

"Vernal Pool" means a type of seasonal wetland habitat that is characterized by a specific set of physical parameters and a unique assemblage of highly specialized endemic plants and animals; a seasonal body of standing water that typically forms in the spring from direct precipitation, with occasional contributions from other sources, dries out completely in the hotter months of summer, and refills in the autumn; pools free of fish that provide important breeding habitat for many terrestrial or semi-aquatic species such as Branchiopods, frogs, and salamanders.

"Watershed" means a drainage basin that is defined by a 10-digit hydrologic unit code as defined by the Federal Standard for Delineation of Hydrologic Unit Boundaries.

"Wetland" means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include freshwater marsh, vernal pools, swales and similar areas.

"Aquatic Resources Delineation" means identifying the amount and boundaries of Aquatic Resources, including wetlands, using U.S. Army Corps of Engineers (USACE) mapping standards and USACE minimum standards for delineations.

16.135.030 Applicability.

All proposed projects within the Plan Area that permanently and/or temporarily impact an Aquatic Resource shall require an Aquatic Resources Impact Permit from the County. No person, company, or agency shall permanently or temporarily impact Aquatic Resources as set forth in this Section except as consistent with this Chapter.

A. An Aquatic Resources Impact Permit must be obtained:

1. In conjunction with any County issued discretionary permit.

2. Before an activity is performed that impacts Aquatic Resources, if no construction or building permit is required.

B. Exemptions. In general, this Chapter requires permits for permanent and temporary impacts to aquatic resources. However, certain activities are exempt from

permit requirements. The following activities and associated uses shall be exempt from the provisions of this Chapter:

1. Exempt Maintenance Activities.

a. Maintenance of drainage ditches (does not include new construction of drainage ditches); construction and maintenance of irrigation ditches; maintenance of structures like dams, dikes and levees; and construction and maintenance of stock ponds or farm ponds.

b. Discharges associated with facilities that are appurtenant and functionally related to irrigation ditches are included in the exemption (e.g. siphons, pumps, headgates, wingwalls, weirs, diversion structures, etc.).

c. Maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, bridge abutments or approaches, and transportation structures. Maintenance does not include any modification that changes the character, scope, or size of the original fill design. Emergency reconstruction must occur within a reasonable period of time after damage occurs in order to qualify for this exemption.

d. If a maintenance activity would involve any modifications to the original fill design, including the location of the fill, the type of material to be used, the amount of material used, etc., then the activity does not qualify for the maintenance exemption.

2. Exempt Farming, Ranching, and Mining Activities.

a. Established (ongoing) farming and ranching activities such as plowing, seeding, cultivating, minor drainage, and harvesting for the production of food, fiber, or upland soil and water conservation practices are exempt. This exemption pertains to "normal farming" and harvesting activities that are part of an established, ongoing farming operation. Examples of normal farming practices include but are not limited to planting different crops as part of an established rotation, introduction of a new cultivation technique such as discing between crop rows for weed control and discharges associated with ongoing rotations of rice. Activities that bring an Aquatic Resource into farm production where the Aquatic Resource has not previously been used for farming are not considered part of an established operation, and therefore are not exempted. An example includes the conversion of grazing land to cropland that results in impacts to Aquatic Resources.

b. Construction and maintenance of permanent and temporary farm roads or temporary mining roads.

Temporary roads must be constructed and maintained in accordance with best management practices to assure that flow and circulation patterns and chemical and biological characteristics of Aquatic Resources are not impaired and that the reach of the Aquatic Resources is not reduced, and that any adverse effect on the aquatic environment are minimized. These BMPs which must be applied to satisfy this provision shall include those detailed BMPs described in the State's approved program description pursuant to the requirements of 40 CFR 233.22(i)d.

i. Roads established within farming or mining operations shall be held to the minimum feasible number, width, and total length consistent with the purpose of specific farming or mining operations, and local topographic and climatic conditions;

ii. Road fill shall be bridged, culverted or designed to prevent the restriction of expected flood flows;

iii. The fill shall be properly stabilized and maintained during and following construction to prevent erosion;

iv. Discharges shall be made in a manner that minimizes construction equipment in Aquatic Resources outside of the fill area;

v. Vegetative disturbance shall be kept to a minimum;

vi. Construction and maintenance of crossing shall not disrupt the migration or other movement of aquatic life;

vii. Borrow material shall be taken from upland sources where feasible;

viii. The discharge shall not take, or jeopardize the continued existence of, a threatened or endangered species, or adversely modify or destroy the critical habitat of such species;

ix. Discharges into breeding and nesting areas for migratory waterfowl, spawning areas, and Aquatic Resources shall be avoided;

x. The discharge shall not be located in the proximity of a public water supply intake;

xi. The discharge shall not occur in a component of the National Wild and Scenic River System;

xii. The discharge of material shall consist of suitable material free from toxic pollutants in toxic amounts; and

xiii. All temporary fills shall be removed in their entirety and the area restored to its original elevation.

3. Construction of temporary sedimentation basins.

a. This exemption applies to the construction of temporary sedimentation basins on a construction site which does not permanently impact Aquatic Resources.

b. Construction site means any site involving the erection of buildings, roads, and other discrete structures and the installation of support facilities necessary for construction and utilization of the structures. Also includes any other land areas which involve land-disturbing excavation activities, including quarrying and other mining areas, where an increase in the runoff of sediment is controlled through the use of temporary sedimentation basins.

C. Interpretation.

1. When there is a conflict between any provisions of this Chapter or any other regulations adopted by the County, that providing the most protection to aquatic resources shall apply.

2. If there is any question as to whether a proposed activity qualifies for an exemption, coordination with the County shall occur and results documented in writing.

3. Compliance with this Chapter does not constitute compliance with other federal, state and local regulations, and permit requirements (for example, Section 106 of the National Historic Preservation Act, USACE Section 404 permits, National Pollutant Discharge Elimination System (NPDES) permits, Section 401 Water Quality Certification, or Porter-Cologne Water Quality Control Act). The project proponent is responsible for complying with all requirements, apart from the provisions of this Chapter.

D. Recapture Provision.

1. Exemptions do not apply when impacts related to activities change the use of the Aquatic Resource and reduce the reach, or impair the flow or circulation of

Aquatic Resources. This "recapture" provision involves a two-part test that results in an activity being considered not exempt when both parts are met:

a. Does the activity represent a "new use" of the Aquatic Resource; and

b. Would the activity result in a "reduction in reach/impairment of flow or circulation" of Aquatic Resources?

c. Consequently, any impact that results in the destruction of the Aquatic Resource character of an area (e.g., it converts to uplands due to new or expanded drainage) is considered a change in the Aquatic Resource, and by definition, a reduction of their reach and is not exempt.

16.135.040 Aquatic Resource Impact Permits.

A. General.

1. An Aquatic Resource Impact Permit is required for any development activity that is not exempt pursuant to Section 16.135.030(B) and that permanently and/or temporarily impacts Aquatic Resources.

2. All Aquatic Resource Impact Permits require approval of a compensatory mitigation plan in accordance with the provisions of Section 16.135.040(J) unless the compensatory mitigation plan requirement is waived under the provisions of Section 16.135.040(J)(3).

B. Standards. Aquatic Resource Impact Permit applications shall comply with all state, local and federal laws, including those related to sediment control, pollution control, floodplain restrictions, storm water management, and on-site wastewater disposal.

C. Pre-Permit Consultation. Any person applying for an Aquatic Resource Impact Permit is encouraged, but not required, to meet with the Director during the earliest possible stages of project planning in order to discuss Aquatic Resource impact avoidance, minimization, compensation, and the required contents of a compensatory mitigation plan before significant commitments have been made to a particular project design. Pre-permit consultations and planning will help project proponents create projects which will be more quickly and easily processed.

D. Permit Applications. Applications for Aquatic Resource Impact Permits shall be made to the Director on forms furnished by the Director. Unless the Director waives one (1) or more of the following information requirements, applications shall include:

1. Aquatic Resources delineations and setback width designations pursuant to Sections 16.135.050 and 16.135.080;

2. A site plan for the proposed activity overlaid on an aerial photograph at a scale no smaller than one inch equals one hundred feet (1" = 100', a scaling ratio of 1:1200) showing the location, width, depth and length of all existing and proposed structures, roads, storm water facilities, sewage treatment, installations, stockpiling areas and borrow sites;

3. The exact sites and specifications for all development activities proposed within Aquatic Resources and Setbacks, including:

Timing of construction activity;

Type of equipment;

Type of fill material and cubic yards of each type of fill;

Type and location of permanent and/or temporary impacts to Aquatic Resources.

4. A compensatory mitigation plan meeting the requirements of Section 16.135.040(J).

E. Permit Processing. To the extent practicable and feasible, the processing of Aquatic Resource Impact Permits will be consolidated with other County permits or approvals which affect activities in Aquatic Resources, such as subdivision, grading, site plan, and building permit approval, so as to provide a timely and coordinated permit process.

F. Permit Issuance. The Director shall issue final approval of the Aquatic Resource Impact Permit authorizing commencement of the activity subject to the following conditions:

1. Submittal and approval of documentation for a project-scale assessment of the effects of a project on Aquatic Resources, including mapping (USACE-verified jurisdictional determination) and a description of the functions and services of the mapped areas' Aquatic Resources; and

2. Submittal and approval of on-site project alternatives information demonstrating efforts that first avoid, and then minimize permanent and temporary effects to Aquatic Resources and;

3. Submittal and approval of an alternative that minimizes permanent and temporary impacts to Aquatic Resources and associated functions and services to the greatest extent practicable, if a complete avoidance alternative is not practicable as determined by the Director, Documentation of this Determination of Environmentally Equivalent or Superior Alternative (DEESA) shall be recorded by the Director. See Section 16.135.60(A)(2) for DEESA procedure; and

4. Submittal and approval of a determination of compliance with SSHCP terms and conditions; and

5. If compensatory mitigation is required then the following conditions must also be met:

a. Either the submittal and approval of a permittee-responsible compensatory mitigation plan pursuant to Section 16.135.040(J); and

b. The recording of a conservation easement as required by Section 16.135.080(C)(2) and (4); and

c. The posting of financial assurance as required by Section 16.135.080(H); or

d. Proof of payment into an in-lieu fee program approved by the USACE and that contains the impact site within its service area; or

e. Proof of compensatory mitigation through payment into a conservation or mitigation bank approved by the USACE and that contains the impact site within its service area.

G. Permit Duration. The Aquatic Resource Impact Permit shall be valid for the period specified in the Aquatic Resource Impact Permit.

H. Aquatic Resource Impact Permit Financial Assurances.

1. Financial Assurance Estimates. The project proponent shall submit itemized cost estimates for the required financial assurances including cost estimates associated with performance assurance and maintenance assurance. The Director may adjust the estimates to ensure that adequate funds will be available to complete the specified compensatory mitigation upon forfeiture. In addition the cost estimates must include a contingency as follows:

a. Estimates for bonds shall be multiplied by one hundred fifty percent (150%);

b. All other estimates shall be multiplied by one hundred ten percent (110%).

2. Waiver of Financial Assurances. The Director may waive the requirement for one or both financial assurances if:

a. The project proponent demonstrates that it paid into an in-lieu fee program approved by the USACE that contains the impact site within its service area; or

b. The project proponent used a conservation or mitigation bank that is approved by the USACE and that contains the impact site within its service area.

3. Types of Financial Assurances. The Director shall accept the following forms of financial assurances:

a. An escrow account secured with an agreement approved by the Director;

b. A bond provided by a surety for estimates that exceed five thousand dollars ($5,000);

c. A deposit account with a financial institution secured with an agreement approved by the Director;

d. A letter of commitment from a public agency; or

e. Other forms of financial assurance determined to be acceptable by the Director.

4. Acceptance of Work and Release of Financial Assurances.

a. Release of Performance Assurance. Upon request, the Director shall release the performance assurance when the following conditions are met:

i. Completion of construction and planting specified in the approved compensatory mitigation plan;

ii. Submittal of an as-built report documenting changes to the compensatory mitigation plan (if any) that occurred during construction;

iii. Field inspection of the completed site(s); and

iv. Provision of the required maintenance assurance.

b. Release of Maintenance Assurance. Upon request, the Director shall release the maintenance assurance when the following conditions are met:

i. Completion of the specified monitoring and maintenance program;

ii. Submittal of a final monitoring report demonstrating that the goals and objectives of the compensatory mitigation plan have been met.

c. Incremental Release of Financial Assurances. The Director may release financial assurances incrementally only if specific milestones and associated costs are specified in the approved compensatory mitigation plan and the document legally establishing the financial assurance.

5. Forfeiture. If the aquatic resource impact permit holder fails to perform or maintain compensatory mitigation in accordance with the approved aquatic resource

impact permit, the Director may declare the corresponding financial assurance forfeit pursuant to the following process:

a. The Director shall, by registered mail, notify the aquatic resource impact permit holder/agent that is signatory to the financial assurance and the financial assurance holder, of non-performance with the terms of the approved aquatic resource impact permit;

b. The written notification shall cite a reasonable time for the aquatic resource impact permit holder, or legal successor, to either propose alternative compensatory mitigation or to comply with provisions of the aquatic resource impact permit and state the County's intent to forfeit the financial assurance should the required work not be completed in a timely manner.

c. Should the required work not be completed timely, the County shall declare the assurance forfeit.

d. Upon forfeiture of a financial assurance, the proceeds thereof shall be utilized either to correct the deficiencies which resulted in forfeiture or, if such correction is deemed by the Director to be impractical or ineffective, to enhance other aquatic resources in the same watershed or, if deemed impracticable to do so, contribute to an established cumulative effects fund for watershed-scale habitat and aquatic resource conservation.

I. Appeal Process. An Aquatic Resource Impact Permit decision may be appealed to the Board of Supervisors.

J. Aquatic Resource Impact Permit Compensatory Mitigation Plans.

1. Compensatory mitigation plans are required for activities that permanently and/or temporally impact Aquatic Resources. Content requirements for the Plans that are not applicable to a project may be waived by the Director upon request of the project proponent.

2. The compensatory mitigation plan consists of two (2) parts: baseline information for the site and a conceptual compensatory mitigation plan. If off-site aquatic resource compensatory mitigation is proposed, baseline information for both the project site and mitigation site is required.

a. Baseline information shall include:

i. Aquatic Resources delineation as described in Section 16.135.050;

ii. Description and maps of land cover types and vegetative conditions at the site;

iii. Description and maps of hydrological conditions at the site;

iv. Description of soil conditions at the site based on an on-site analysis and available soils information from online or published sources such as the Natural Resources Conservation Service's soils maps;

v. A topographic map of the site; and

vi. A functional assessment or condition of the existing aquatic resources.

b. The contents of the compensatory mitigation plan shall be consistent with the USACE Regional Compensatory Mitigation and Monitoring Guidelines for the South Pacific Division (2015), Appendix D of the ARP, and include:

i. Title page

ii. Contributor page;

iii. Distribution page;

iv. Table of Contents;

v. Brief description of proposed compensatory mitigation project and proposed source of compensatory mitigation;

vi. Determination of goals and objectives of the proposed project. Specific criteria shall be provided for evaluating whether or not the goals and objectives of the compensatory mitigation project are being met. Such criteria may include water quality standards, survival rates of planted vegetation, species abundance and diversity targets, habitat diversity indices, or other ecological, geological or hydrological criteria;

vii. A description of all permanent and temporary impacts (acreage and linear ft.) that require compensatory mitigation under this Chapter;

viii. Description of site selection criteria such as watershed overview, landscape setting and position, and site specific information, including consistency with the site selection guidance provided in the ARP (Appendix D);

ix. Other baseline information such as: map showing locations of permanent and/or temporary impact and compensatory mitigation sites; map showing proposed preserves and setbacks; delineation of Aquatic Resources; functional/condition assessment, if appropriate; species of concern (federal and/or state); cultural resources; existing and planned land uses within and surrounding the proposed compensatory mitigation sites(s); existing site topography/elevations; aerial photos, land uses, site changes (deep ripping, impoundments, channel straightening or realignment); interviews with adjacent landowners, ranchers, land managers regarding locations of seeps, observations of flood events, trespassing/vandalism, opportunities for education and outreach.

x. Written specifications for the compensatory mitigation project shall be provided. The specifications shall include: the proposed construction sequence, grading and excavation details, water and nutrient requirements for planting, specification of substrate stockpiling techniques, and planting instructions, as appropriate. These written specifications shall be accompanied by detailed site diagrams, scaled cross-sectional drawings, topographic maps showing slope percentage and final grade elevations, and any other drawings appropriate to show construction techniques or anticipated final outcome;

xi. Discussion and map of plant material to be planted and planting densities;

xii. Preliminary drainage plan identifying location of proposed drainage facilities including detention structures and water quality features (e.g., swales);

xiii. Discussion of water sources for all aquatic resources on the site;

xiv. Project schedule;

xv. A monitoring and management program to measure the success of the compensatory mitigation project.

(a) The compensatory mitigation project shall be monitored for a period necessary to determine if the project is meeting its performance standards, and to determine if measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. Compensatory mitigation projects are required to have a minimum monitoring period of five years. For aquatic resources with slow development rates (e.g. vernal pools and riparian habitats) a monitoring period of more than five (5) years is required. Monitoring periods may be extended if performance standards are not being met. Before determining success there should be at least two

consecutive annual monitoring reports where all the performance standards are met without human intervention (e.g., artificial irrigation).

(b) Monitoring shall be designed to measure the performance standards outlined in the compensatory mitigation plan.

(c) A monitoring protocol shall be included outlining how the monitoring data will be evaluated by agencies that are tracking the progress of the project.

(d) Monitoring reports shall be submitted annually, or on a pre-arranged alternate schedule, for the duration of monitoring period.

(e) Monitoring reports shall analyze the results of monitoring, documenting milestones, successes, problems, and recommendations for corrective and/or contingency actions to ensure success of the compensatory mitigation project.

xvi. A contingency plan that identifies potential courses of action, and any corrective measures to be taken when monitoring or evaluation indicates project performance standards are not being met.

xvii. A monitoring and management program to measure and maintain the long-term sustainability of the compensatory mitigation project in perpetuity. Monitoring and management programs shall be consistent with established practices of the SSHCP and ARP and information collected in a manner that allows for seamless integration into the SSHCP database.

3. The preparation of a compensatory mitigation plan is not required if all required compensatory mitigation is achieved through the use of:

a. A conservation or mitigation bank approved by the USACE that contains the impact site within its service area; or

b. An in-lieu fee program approved by the USACE that contains the impact site within its service area.

16.135.050 Aquatic Resources Delineation.

A. Aquatic Resources Delineation Standards.

1. In conjunction with the submittal of an application for a discretionary permit, the Director shall determine the probable existence of Aquatic Resources on the parcel involved in the development permit application. If Aquatic Resources are believed to exist on a parcel, project proponents for all projects subject to this Chapter must prepare a Verified Aquatic Resources Delineation. All Verified Aquatic Resources Delineations shall be performed in accordance with the minimum standards set forth by the Sacramento District USACE and State Water Quality Control Board at the time of the delineation. All Aquatic Resources Delineations shall be submitted to the Director. The Director will in turn submit the Aquatic Resources Delineation to the USACE for verification.

16.135.060 Avoidance, Minimization and Compensation Standards.

A. Avoidance, Minimization and Compensation. Documentation must demonstrate that the following hierarchy of avoidance and minimization has been considered as part of an Aquatic Resources Impact Permit:

1. Avoid permanent and temporary impacts to Aquatic Resources. The proposed project shall first avoid, and then minimize, permanent and temporary impacts to Aquatic Resources to the greatest extent practicable. Those permanent and/or

temporary impacts that are unavoidable shall be mitigated such that the lost functions and services are replaced as set forth under the DEESA described below.

2. Minimize permanent and/or temporary impacts to Aquatic Resources if complete avoidance is infeasible. The Director must find that the project proponent has limited the degree or magnitude of impact to Aquatic Resources by using a site design that follows DEESA. The DEESA shall include the following information to be supplied by the applicant and reviewed by the Director:

a. A defined project area boundary.

b. A detailed project description that demonstrates: 1) why an avoidance alternative is not practicable; and 2) that the project minimizes direct and indirect effects to Aquatic Resources to the greatest extent practicable. This description shall include information regarding any Aquatic Resources on site that are being avoided.

c. Amount (acres and linear feet (if applicable) and cubic yards) of unavoidable permanent and temporary impacts to Aquatic Resources associated with the project.

d. A detailed description of project design features and how the project complies with mitigation measures as described in Chapter 5 of the South Sacramento Habitat Conservation Plan that reduce permanent and/or temporary impacts, including but not limited to: impact minimization, on-site stream realignment, Best Management Practices, Low Impact Design and Avoidance and Minimization Measures.

e. A description and amount of proposed compensatory mitigation. Compensatory mitigation must conform to the minimum mitigation ratios required by Section 16.135.070.

f. An analysis that demonstrates that, although the proposed project would not completely avoid permanent and/or temporary impacts to Aquatic Resources within the area subject to this Chapter with proposed design and compensation measures, the project would be environmentally equivalent or superior to that which would occur under a complete avoidance alternative without these measures, based on one or more of the following factors:

i. Effects on designated Critical Habitat and Core Recovery Areas.

ii. Effects on the abundance of Aquatic Resources.

iii. Effects on listed species.

iv. Effects on the diversity of Aquatic Resources.

v. Effects on habitat connectivity and functions.

vi. Effects on the condition of Aquatic Resources.

g. Compensate for permanent and temporary impacts to Aquatic Resources that will occur, after efforts to avoid and minimize have been exhausted. The Director must find that:

i. Unavoidable permanent and temporary impacts are compensated in accordance with Section 16.135.070; and

ii. The required compensatory mitigation is monitored and remedial action is taken when necessary to ensure the success of mitigation activities.

16.135.070 Compensatory Mitigation Standards.

A. Compensatory mitigation for permanent and temporary impacts to Aquatic Resources is based on the following ratios:

Land Cover Type	Compensatory Mitigation Ratio (Re-Establishment/Establishment)
Vernal Pool	1:1
Swale	1:1
Stream/Creek (VPIH)	1:1
Seasonal wetland	1:1
Freshwater marsh	1:1
Open water	1:1
Riparian	1:1
Mine tailing riparian woodland	1:1

B. Compensatory Mitigation Prioritization. When considering options for successfully providing the required compensatory mitigation, the type and location options shall be considered in the order presented in the Department of the Army, Corps of Engineers' Compensatory Mitigation for Losses of Aquatic Resources; Final Rule, 33 C.F.R. Part 332 § 332.3, paragraphs (b)(2) through (b)(6). However the preference hierarchy may be overridden when the required compensatory mitigation involves: larger, more ecologically valuable parcels; is subject to more rigorous scientific and technical analysis, planning and implementation; involves advanced site identification and planning; and utilizes significant investment of financial resources, for sites located to successfully replace lost functions and services, taking into account such watershed-scale features as aquatic habitat diversity, habitat connectivity, relationships to hydrologic sources, trends in land use, ecological benefits, compatibility with adjacent land uses, and in general and when practicable to meet the aforementioned considerations, in the same watershed. Therefore, any ILF Program adopted by the County consistent with the SSHCP Conservation Strategy and the ARP and approved by the USACE can be the preferred option for successfully providing required compensatory mitigation.

C. Compensatory Mitigation. Allowable types of compensatory Aquatic Resource mitigation are listed below, in the general order of preference.

1. Re-establishment
2. Rehabilitation
3. Establishment (Creation)
4. Enhancement

16.135.080 Setback Standards.

A. Minimum Wetland and Stream Setback Standards.

1. Refer to Chapter 5 of the South Sacramento Habitat Conservation Plan for minimum wetland and stream setback standards, which may be amended from time to time.

B. Stream Setback Exemptions. The setback standards of this Chapter do not apply where there is:

1. An existing Drainage Master Plan that was adopted prior to adoption of this Chapter; or

2. An existing Specific, Master, or Community Plan that was adopted prior to adoption of this Chapter.

C. Land Use Requirements within Wetland or Stream Setbacks.

1. Any discretionary review of a proposed project must ensure that sufficient area exists outside of the Wetland or Stream Setback to accommodate primary and accessory structures, paved areas, septic systems, and other uses or activities that might adversely affect the functioning of the Wetland or stream.

2. A conservation easement shall be recorded in a form approved by the Director as adequate to protect and maintain the Aquatic Resources and setback area consistent with the provisions of this Chapter. Conservation easements will run with the land in perpetuity and be binding on the property owner and successors.

3. Any lands proposed for development that include all or a portion of a wetland or stream setback will, as a condition of any subdivision map, provide for vegetation or re-vegetation of any portions of the setback that are not vegetated at the time of the application or that were disturbed by prior land uses. Vegetation will include native or natural tree and plant species as deemed acceptable by the Director.

4. For building lots that exist as of the date of adoption of this Chapter, but for which a building permit or a preliminary site plan approval has not been obtained or is no longer valid, the required minimum front, side, and rear structural setbacks may extend into the wetland or stream setback, provided that an easement is recorded that prohibits clearing or construction in the wetland or stream setback.

5. A permanent physical demarcation along the upland boundary of the wetland or stream setback shall be installed and thereafter maintained. Such demarcation may consist of fencing or other prominent physical marking that does not impede flood flows and must be approved by the Director. Signs, approved by the Director, shall be posted at an interval of one (1) per one hundred (100) feet, indicating that the setback area is a protected area. Signs must be perpetually maintained at locations along the outer perimeter of the wetland or stream setback.

D. Allowable Uses Within Wetland and Stream Setbacks:

1. Refer to Chapter 5 of the South Sacramento Habitat Conservation Plan for allowable uses within stream and wetlands setbacks, which may be amended from time to time.

E. Wetland and Stream Setback Waivers. A waiver of wetland and stream setbacks may be granted by the Director under one of the following conditions:

1. A lot existing as of the date this Chapter is effective for which there is insufficient room outside the wetland or stream setback for uses permitted by the underlying zoning and for which there is no other reasonable or prudent alternative to placement in the setback, including obtaining variances from setback or other requirements that would allow conformance with the setback requirements.

2. An economic hardship whereby a project proponent demonstrates to the Director's satisfaction that the subject property is not capable of yielding an economic return as a result of unique circumstances specific to the subject property, as follows:

a. An economic hardship related to or arising from the characteristics of the property due to the particular physical surroundings, shape, or topographical conditions of the property involved, rather than the personal situations of the project proponent or the result of any action or inaction by the project proponent or the owner or predecessors in title.

b. The necessity of acquiring additional land to locate development outside the wetland or stream setback will not be considered an economic hardship unless the project proponent can demonstrate that there is no adjacent land that is reasonably available or could be obtained, used, expanded, or managed to fulfill the basic purpose of the proposed activity.

c. The proposed project will serve an essential public health and safety need, as demonstrated to the satisfaction of the Director.

3. A project proponent may submit a written request for a wetland or stream setback waiver to the Director. The written request must include specific reasons justifying the waiver and any other information necessary to evaluate the proposed waiver request. The Director may require an alternative analysis that clearly demonstrates that no other feasible alternatives exist and that minimal permanent and temporary impact would occur as a result of the project or development.

4. In granting a request for a wetland or stream setback waiver, the Director may require project design features including site design, landscape planting, fencing, signs, and water quality best management practices to reduce adverse permanent and temporary impacts on wetlands and streams and other sensitive resources.

F. Nonconforming Structures.

1. Legally existing but nonconforming structures and uses of land within wetland or stream setbacks may be continued. Encroachment into the wetland or stream setback will only be allowed where previous allowable (i.e., permitted or otherwise legal) development or disturbance exists. Existing impervious surfaces within the wetland or stream setback that resulted from previous allowable disturbances or developments shall not be expanded. If a legally existing but nonconforming use has been discontinued for a period of more than 90 days, it shall not thereafter be re-established, with the exception of agricultural uses that are following prescribed best management practices for crop rotation. However, resumption of agricultural uses must be strictly confined to the extent of disturbance existing at the time of adoption of this Chapter.

2. Activities that change the use of the Aquatic Resource and reduce the reach, or impair the flow or circulation of Aquatic Resources are required to obtain an Aquatic Resources Impact Permit. See Section 16.135.030(B)(3)(b).

16.135.090 Alternatives For Compliance.

A. All of the provisions of this Chapter can be met by complying with an approved permit that satisfies all state and federal Clean Water Act requirements and Porter-Cologne Water Quality Control Act requirements.

1. The Permit must provide coverage within the Plan Area that is applicable to this Chapter; and

2. The Permit must require compensatory mitigation ratios that are equal to or greater than the ratios presented in this Chapter 16.135.070(A).

16.135.100 Enforcement.

A. The County shall have jurisdiction to enjoin any activities in violation of this Chapter.

B. In the event of a violation of this Chapter, the County shall have the power to order restoration of Aquatic Resources. If the responsible person, entity, or agent does not complete such restoration within a reasonable time following the order, the County shall have the authority to restore the affected aquatic resources to their prior condition and the person, entity, or agent responsible for the violation shall be held liable to the County for the cost of restoration.

C. In addition to other remedies provided for elsewhere in this Chapter, the Director may suspend or revoke Aquatic Resource Impact Permit(s) issued in accordance with this Chapter and associated development permits if the project proponent or permittee has not complied with any or all of the conditions or limitations set forth in the Aquatic Resource Impact Permit, has exceeded the scope of work set forth in the Aquatic Resource Impact Permit, or has failed to undertake the project in the manner set forth in the Aquatic Resource Impact Permit.

D. In the event that a violation of this Chapter occurs, the County will notify the US Army Corps of Engineers, US Environmental Protection Agency, US Fish and Wildlife Service, the Regional Water Quality Control Board, and California Department of Fish and Wildlife. Notification will be in the form of a one-page form that describes the nature and extent of the violation, with an aerial photo depicting the location of the violation.

16.135.110 Severability.

The Board of Supervisors of the County of Sacramento declares that should any section, paragraph, sentence, or word of this Chapter be declared for any reason to be invalid, it is the intent of the Board of Supervisors that it would have passed all other portions of this Chapter, independent of the provision declared invalid.

SECTION 2. This ordinance was introduced and the title thereof read at the regular meeting of the Board of Supervisors on _____, and on _____, further reading was waived by the unanimous vote of the Supervisors present.

This ordinance shall take effect and be in full force on and after thirty (30) days from the date of its passage, and before the expiration of fifteen (15) days from the date of its passage it shall be published once with the names of the members of the Board of Supervisors voting for and against the same, said publication to be made in a newspaper of general circulation published in the County of Sacramento.

On a motion by Supervisor _____, seconded by Supervisor _____, the foregoing ordinance was passed and adopted by the Board of Supervisors of the County of Sacramento, State of California, this ____ day of _____ 201__, by the following vote:

AYES: Supervisors,

NOES: Supervisors,

ABSENT: Supervisors,

ABSTAIN: Supervisors,

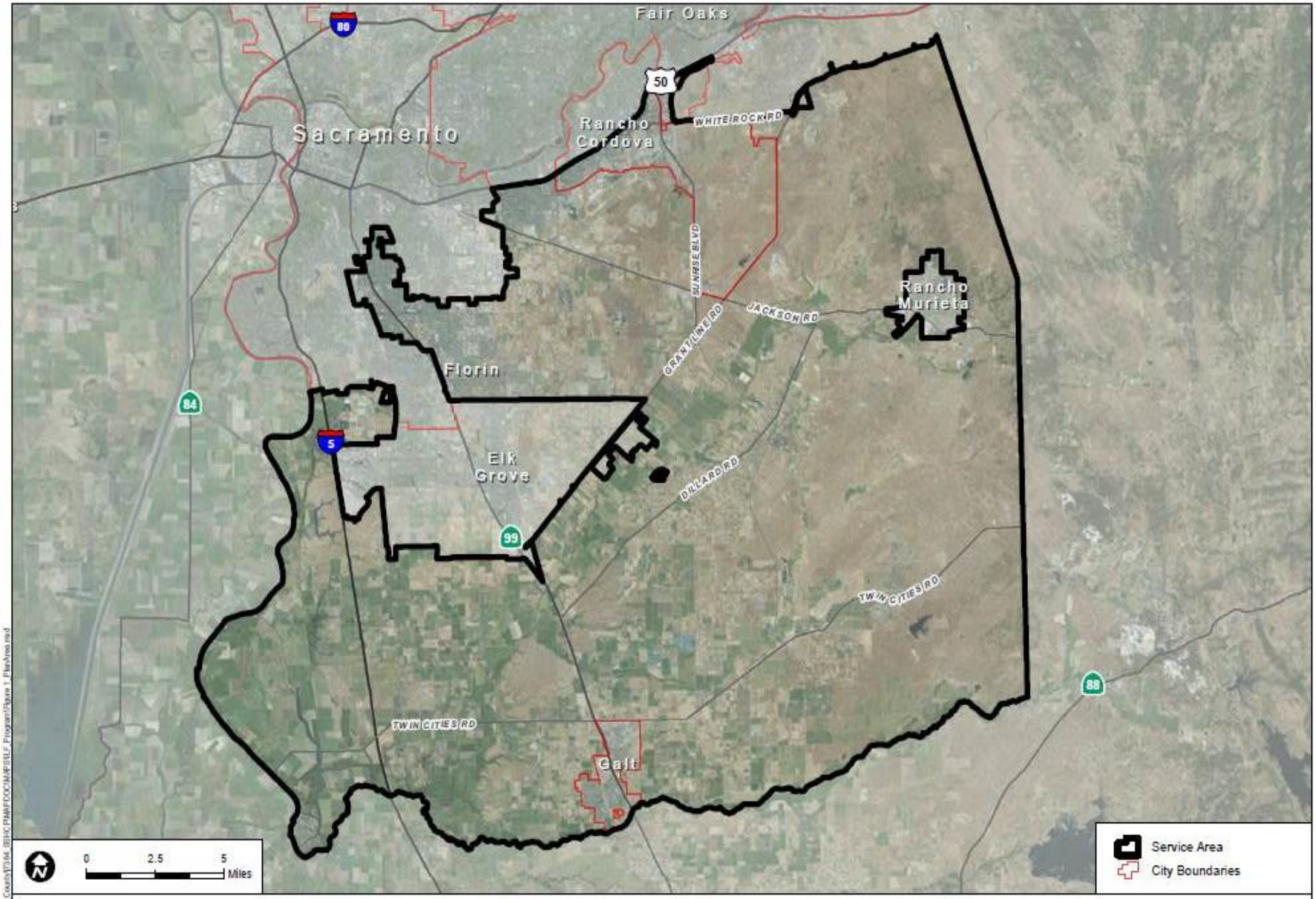
RECUSAL: Supervisors,
(PER POLITICAL REFORM ACT (§ 18702.5.))

_____
Chair of the Board of Supervisors
of Sacramento County, California

(SEAL)

ATTEST: _____
Clerk, Board of Supervisors

1048472



SOURCE: ESRI, County of Sacramento 2014

SOUTH SACRAMENTO HABITAT CONSERVATION PLAN

FIGURE 1

Service Area