13 ALTERNATIVES TO AVOID OR REDUCE TAKE

The federal Endangered Species Act (ESA) requires that Habitat Conservation Plan (HCP) applicants identify alternative actions that were considered to reduce the level of take to federally listed species and to provide a rationale for why those alternatives were not chosen. The Endangered Species Consultation Handbook (USFWS and NMFS 1998) identifies two alternatives commonly used in HCPs: (1) an alternative that would reduce take below levels anticipated for the proposed project, and (2) an alternative that would avoid take and hence not require a permit from the U.S. Fish and Wildlife Service (USFWS). Because the ESA only requires that alternative approaches be based on take of federally listed wildlife species covered by an HCP, this chapter provides a description of alternative take scenarios that were considered to avoid or reduce take of federally listed species covered under the South Sacramento Habitat Conservation Plan (SSHCP or Plan). Because take of federally listed plant species are not prohibited under the ESA and because this Plan requires Covered Activities fully avoid take of Sacramento Orcutt grass (*Orcuttia viscida*) and slender Orcutt grass (*Orcuttia tenuis*), this chapter does not address these plants. The identification and discussion of project alternatives required by the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) are presented in the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) that has been prepared for the SSHCP.

13.1 Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

As discussed in Chapter 3, vernal pool fairy shrimp (*Branchinecta lynchi*) and vernal pool tadpole shrimp (*Lepidurus packardi*) spend their entire life cycles within ephemeral wetlands, including vernal pools and swales. However, adjacent upland habitats such as valley grasslands are also considered essential habitat for the two shrimp species because vernal pools and swales require supporting hydrology (e.g., adequate runoff to supply the pools, intact perched aquifer). As discussed in Chapter 6, surveys suggest that vernal pool fairy shrimp and vernal pool tadpole shrimp are relatively well distributed throughout the Plan Area. They are considered to be potentially present in any area that contains vernal pools and swales with adjacent upland habitat adequate to supply runoff to the pools and swales.

Take of vernal pool fairy shrimp and vernal pool tadpole shrimp could be avoided if Covered Activities do not cause direct or indirect effects to the vernal pool ecosystem. A “no take” alternative for vernal pool fairy shrimp and vernal pool tadpole shrimp would therefore need to include avoidance of modeled habitat in the vernal pool ecosystem.

This “no take” alternative for vernal pool fairy shrimp and vernal pool tadpole shrimp was considered but deemed infeasible by the Plan Permittees. Complete avoidance of the vernal pool ecosystem would preclude implementation of city and County of Sacramento (County)

General Plans by disallowing much of the planned development within the Urban Development Area (UDA). The UDA is defined as that portion of the Plan Area that is also within the County's Urban Service Boundary (USB), city spheres of influence, and city boundaries. The UDA is where most Covered Activities will be permitted and where most new growth is planned to occur. The "no take" alternative was rejected as it is inconsistent with the purposes of the SSHCP (Chapter 1) in that it would preclude implementation of Land Use Authority Permittee General Plans.

Another alternative that was considered is to reduce take by requiring that all development projects within vernal pool recovery areas (i.e., Mather Core Recovery Area and Cosumnes/Rancho Seco Core Recovery Area) avoid impacts to vernal pools and swales. While this "reduced take" alternative would allow for some additional development to occur within the UDA over the "no take" alternative, it would still preclude a significant amount of development from occurring within a majority of the area identified within city and County General Plans for urbanization. Similar to the "no take" alternative, this "reduced take" alternative was also rejected as it would be inconsistent with the purpose and need of the SSHCP. It would preclude implementation of Land Use Authority Permittee General Plans.

In addition, both the "no take" and "reduced take" alternatives are biologically inferior to the Preserve System approach proposed under the SSHCP. Both of these alternatives likely would require on-site avoidance and minimization only of occupied vernal pools and swales (as documented by protocol-level presence/absence surveys) and immediately adjacent upland habitat. This piecemeal type of avoidance of spatially discrete resources typically results in small, isolated preserves that become degraded over time due to various adverse indirect edge effects (e.g., non-native species, pollutants). Such habitat fragmentation and isolation also disrupts dispersal of individuals within and among vernal pool complexes via natural dispersal mechanisms (e.g., wind, overland flows, and animals), potentially resulting in reduced genetic exchange and various related effects such as genetic drift, reduced genetic diversity, reduced likelihood of colonizations (i.e., the "rescue" effect), and, thus, higher likelihood of local extirpations. The ecosystem value of these small, fragmented preserves will also be reduced because management will be more difficult and expensive, sometimes even impossible.

Under the SSHCP, preserves established for vernal pool fairy shrimp and vernal pool tadpole shrimp will be large and interconnected by habitat linkages, and thus will maintain the ecosystem processes necessary for conserving these species that would be more difficult under the "no take" and "reduced take" alternatives (see Sections 7.6.2.9 and 7.6.2.11). In addition to providing biologically superior preserves and habitat linkages, the SSHCP requires implementation of fully funded monitoring and management programs in perpetuity. An advantage of the SSHCP is that monitoring and management will be comprehensive and backed by local government entities implementing the Plan, thus providing a greater level of certainty that management and monitoring

will continue in perpetuity and will occur consistently on all SSHCP established preserves and habitat linkages within the Plan Area (see Chapter 8, Monitoring and Management Programs, and Chapter 10, Project Application Process). While the "no take" and "reduced take" alternatives would avoid a greater acreage of vernal pools and swales, both alternatives would lack key components that the SSHCP offers to enhance and manage the vernal pool fairy shrimp and vernal pool tadpole shrimp in perpetuity.

13.2 Valley Elderberry Longhorn Beetle

As discussed in Chapter 3, the valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) occurs in several land cover types in the Plan Area that support its host plant (elderberry), including mine tailing riparian woodland, mixed riparian woodland, and mixed riparian scrub. It has been documented along the Cosumnes River/Deer Creek riparian corridor and along Dry Creek east of the City of Galt. Exit holes have also been documented within the Mine Tailing Riparian Woodland in Rancho Cordova on the Aerojet property (Talley et al. 2007) just outside the Plan Area and along the Cosumnes River near Rancho Murieta (Talley 2003).

Many factors have contributed to the decline of this species, although the effects of many potential environmental stressors are poorly understood (USFWS 1984). Over the past 150 years, approximately 90% of the riparian habitat in California has been lost to development or other human activities (USFWS 1984, 2006).Levees, dams, and other structures or activities that alter the hydrology of riparian areas may directly destroy riparian habitat or indirectly cause loss of riparian forests and elderberry shrubs. Habitat fragmentation also may threaten valley elderberry longhorn beetle because isolation of small patches of riparian forest may prevent genetic flow among occupied patches, thus effectively isolating metapopulations (Collinge et al. 2001). Furthermore, small habitat patches bordered by development may not be adequately protected from adverse edge effects such as urban runoff, pollutants, and invasive species, including Himalayan blackberry (*Rubus discolor*). Also, fogging of riparian areas by mosquito abatement districts or the California Department of Public Health to control mosquitoes may adversely affect the valley elderberry longhorn beetle.

Take of valley elderberry longhorn beetle could be avoided if Covered Activities do not directly impact riparian habitats that support occupied elderberry shrubs (as determined by focused surveys for beetles or exit holes). A "no take" alternative for valley elderberry longhorn beetle would therefore need to include avoidance of all riparian sites supporting occupied elderberry shrubs.

This "no take" alternative for valley elderberry longhorn beetle was considered but deemed infeasible by the Plan Permittees. Although focused surveys for valley elderberry longhorn beetle have not been conducted throughout the Plan Area, the SSHCP assumes that habitat

patches supporting elderberry shrubs that have characteristics predictive of beetle occupancy (i.e., certain shrub densities and shrub sizes, number of stems, and range of branch sizes (Talley et al. 2007)), are widespread in riparian portions of the Plan Area. While most urban development Covered Activities would occur outside of the riparian areas that provide suitable habitat for the valley elderberry longhorn beetle, complete avoidance of occupied habitat patches would preclude implementation of several Covered Activities. Covered Activities that could directly permanently or temporarily impact habitat for the valley elderberry longhorn beetle include major transportation projects and other infrastructure projects (e.g., recycled and wastewater pipelines) that cross riparian zones at stream crossings, operation and maintenance of transportation and flood control facilities and water delivery systems, and construction and operation and maintenance of recreational facilities (e.g., trails). The "no take" alternative could preclude or severely restrict one or more of these Covered Activities. The "no take" alternative was therefore rejected as it is inconsistent with the purposes of the SSHCP and would conflict with mandates for human health and safety (e.g., flood control).

In addition, the "no take" alternative is biologically inferior to the Preserve System approach proposed under the SSHCP. The "no take" alternative would require on-site avoidance and minimization only of riparian habitat patches supporting host plants occupied by the valley elderberry longhorn beetle. This piecemeal type of avoidance of spatially discrete resources typically results in small, isolated preserves that become degraded over time due to various adverse indirect edge effects (e.g., non-native species, dust, pollutants). Such habitat fragmentation and isolation also disrupts dispersal of individuals between disjunct riparian patches, potentially resulting in reduced genetic exchange and various related effects such as genetic drift, reduced genetic diversity, reduced likelihood of colonizations, and, thus, higher likelihood of local extirpations.

Under the SSHCP, there would be no net loss of riparian habitat from Covered Activities, preserves supporting riparian habitat with elderberry shrubs would be established, stream setbacks would be established in select riparian areas, and additional acreage of suitable habitat for the valley elderberry longhorn beetle would be re-established or established per USFWS Conservation Guidelines for the Valley Elderberry Longhorn Beetle (USFWS 1999), thus resulting in a net increase in suitable habitat for the species. The re-establishment and establishment strategy, in concert with no net loss of existing riparian acreage and established preserves, will help protect the ecosystem processes necessary for conserving valley elderberry longhorn beetle in the Plan Area. Assembly of preserves and habitat re-establishment/ establishment beyond the existing compensatory mitigation required by the U.S. Army Corps of Engineers (USACE) and California Department of Fish and Wildlife (CDFW) under existing Section 404 and Section 1600 regulations, respectively, likely would not occur under a "no take" alternative. Therefore, a "no take" alternative would make it more difficult to protect ecosystem processes.

In addition to providing biologically superior mitigation for riparian habitat impacts resulting from Covered Activities, the SSHCP requires implementation of fully funded monitoring and management programs in perpetuity. An advantage of the SSHCP is that monitoring and management will be comprehensive and backed by local government entities implementing the Plan, thus providing a greater level of certainty that management and monitoring will continue in perpetuity and will occur consistently on all SSHCP established preserves within the Plan Area (see Chapter 8, Monitoring and Management Programs, and Chapter 10, Project Application Process). While the "no take" alternative could avoid a greater number of currently occupied habitat patches, this alternative would lack key components that the SSHCP offers to enhance and manage the valley elderberry longhorn beetle in perpetuity.

13.3 California Tiger Salamander

California tiger salamander (*Ambystoma californiense*) uses seasonal wetlands such as vernal pools for breeding and nearby upland habitats such as valley grassland, blue oak savanna, and blue oak woodland for refugia and dispersal. Based on existing occurrence data for the SSHCP, California tiger salamanders are limited to the southeastern portion of the Plan Area outside of the UDA. Their distribution generally extends north from the San Joaquin/Sacramento County boundary to just south of the Cosumnes River and from the Amador/Sacramento County boundary east to the City of Galt.

Impacts to California tiger salamander have largely occurred from agricultural conversion of habitat and low-density development associated with rural agricultural residential developments. More recently, this species has also become increasingly threatened by higher-density urban development within its range. Direct impacts include the fill of breeding or refugia habitat that is near or contiguous with breeding locations. Some road expansion and maintenance projects also likely directly and indirectly impact California tiger salamander by creating barriers to movement and causing direct mortality by vehicle strikes.

Take of California tiger salamander could be avoided if Covered Activities do not directly impact breeding sites and adjacent and nearby upland habitat used for refugia and/or dispersal. A "no take" alternative for California tiger salamander would therefore need to include avoidance of all occupied breeding sites and sufficient upland habitat adjacent to and near occupied sites to maintain both the hydrology of the breeding sites and provide for refugia and dispersal. Avoidance of California tiger salamander habitat would include eliminating impacts to all breeding sites located in the southeastern portion of the County and a minimum 1.5-mile buffer around those wetland resources. Because the species' distribution in the Plan Area is entirely outside of the UDA on agriculturally zoned land, avoidance of take could only be achieved by prohibiting agricultural activities on suitable habitat. The SSHCP only covers agricultural activities on SSHCP preserves for the benefit of Covered Species. Therefore, there

is no mechanism available to the SSHCP to implement this alternative. In addition, the County has identified this area for agricultural use within its General Plan and has adopted a Right-To-Farm Ordinance. Prohibition on all agriculture activities in this area would thus require legislative action, making a "no take" alternative infeasible. Therefore, this "no take" alternative was rejected.

Another "no take" alternative considered for California tiger salamander is to eliminate rural transportation projects in California tiger salamander modeled habitat. Rural transportation project Covered Activities in California tiger salamander modeled habitat primarily consist of shoulder widening undertaken to improve roadway safety. Because these Covered Activities involve improvements of existing roadways, it is not possible to realign these projects to avoid California tiger salamander habitat. Although direct impacts to California tiger salamander habitat from road widening likely would be small and not substantially reduce available upland habitat, these roadway improvements may increase the risk of mortality from vehicle strikes that result from expanding roadway widths and increased traffic volumes. This "no take" alternative was rejected because roadway improvements are considered important safety measures and eliminating them as Covered Activities is not consistent with the purposes of the SSHCP, could jeopardize human health and safety, and precludes implementation of locally adopted General Plans.

The two "no take" alternatives are biologically inferior to the approach proposed under the SSHCP. The "no take" alternatives would require on-site avoidance only of occupied breeding sites and adjacent and nearby upland habitats for California tiger salamander. This avoidance would not result in establishment of preserves. The SSHCP establishes a large, landscape-level preserve in the southeastern portion of the Plan Area to provide adequate habitat to support the California tiger salamander's full life cycle, including breeding sites and upland refugia and dispersal habitat (see Section 7.6.2.14).

In addition, the SSHCP requires implementation of fully funded monitoring and management programs in perpetuity. An advantage of the SSHCP is that monitoring and management will be comprehensive and backed by local government entities implementing the Plan, thus providing a greater level of certainty that management and monitoring will continue in perpetuity and will occur consistently on all SSHCP established preserves and habitat linkages within the Plan Area (see Chapter 8, Monitoring and Management Programs, and Chapter 10, Project Application Process). While the "no take" alternative could avoid a greater number of currently occupied habitat patches, this alternative would lack key components that the SSHCP offers to enhance and manage the California tiger salamander in perpetuity.

13.4 Giant Gartersnake

Giant gartersnake (*Thamnophis gigas*) uses several land cover types for foraging, including seasonal wetlands, freshwater marsh, open water, and streams/creeks and uses mixed riparian scrub and valley grassland for aestivation. Giant gartersnake uses upland habitat for breeding, aestivation, dispersal, and refugia in close proximity to aquatic habitat for foraging. Occurrence records for giant gartersnake in the Plan Area are concentrated in the southern and southwestern portions of the Plan Area (Figure 3-18), indicating it is absent from the northwestern, northern, and eastern portions of the Plan Area. The distribution of giant gartersnake in the southern and southwestern portions of the Plan Area is limited by the extent of perennial waters.

Giant gartersnake is threatened by habitat loss and degradation, including urban development, conversion of habitat to agricultural uses, and in-stream capital improvement projects and associated ongoing operations and maintenance. Although some giant gartersnake populations have persisted at low population levels in artificial wetlands associated with agricultural and flood-control activities, many of these altered wetlands are now threatened by urban development. Impacts from these activities could result in a loss of breeding, aestivation, and foraging habitat and/or result in habitat fragmentation, causing populations to become increasingly isolated.

Take of giant gartersnake could be avoided if Covered Activities do not directly impact occupied breeding, foraging, refugia, and dispersal areas in the southwestern and southern portions of the Plan Area. Avoidance of giant gartersnake habitat therefore likely would require eliminating impacts to all streams within the southwestern and southern portions of the Plan Area, plus a minimum 0.25-mile buffer on either side of streams to preserve adjacent upland and seasonal wetland resources. Like California tiger salamander, a vast majority of the giant gartersnake occurrences in the Plan Area are outside of the UDA on agriculturally zoned land. And as with California tiger salamander, avoidance of upland habitat could only be achieved by prohibiting agricultural activities on modeled habitat. Any prohibition on agriculture activities would be extremely difficult to implement and would conflict with General Plan policy, making a "no take" alternative outside of the UDA infeasible.

Within the UDA, a small portion of the giant gartersnake's range includes Laguna Creek and its tributaries. Take of giant gartersnake habitat inside the UDA could be avoided or reduced by eliminating or restricting capital improvement projects within Laguna Creek's floodplain, including flood control projects, water supply, drainage, sewer, roadway improvements, and related operations and management. This "no take" or "reduced take" alternative is infeasible because not undertaking some of these projects would put human health and safety at risk and would preclude implementation of locally adopted General Plans. The "no take" and

"reduced take" alternatives both within and outside of the UDA therefore were rejected because they are infeasible.

The "no take" and "reduced take" alternatives for giant gartersnake are biologically inferior to the Preserve System approach proposed under the SSHCP. Both alternatives would require on-site avoidance only of occupied habitats. This on-site avoidance would not involve establishment of preserves. The SSHCP helps to establish and consolidate large preserves in the southwestern and southern portions of the Plan Area near Badger Creek and will connect to the Stone Lakes National Wildlife Refuge, providing preserve areas large enough to support the gartersnake's full life cycle, including foraging, breeding, refugia, and dispersal habitat (see Section 7.6.2.16).

In addition, the SSHCP requires implementation of fully funded monitoring and management programs in perpetuity. An advantage of the SSHCP is that monitoring and management will be comprehensive and backed by local government entities implementing the Plan, thus providing a greater level of certainty that management and monitoring will continue in perpetuity and will occur consistently on all SSHCP preserves (see Chapter 8, Monitoring and Management Programs, and Chapter 10, Project Application Process). While the "no take" and "reduced take" alternatives could avoid a greater number of currently occupied habitat patches, these alternatives would lack key components that the SSHCP offers to maintain giant gartersnake in the Plan Area in perpetuity.

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