Final

Santa Clara Valley Habitat Plan

Santa Clara County, California

Volume 2 of 4:
Chapter 4, Impact Assessment and Level of Take
Chapter 5, Conservation Strategy
Chapter 6, Conditions on Covered Activities and Application Process

County of Santa Clara
City of San José
City of Morgan Hill
City of Gilroy
Santa Clara Valley Water District
Santa Clara Valley Transportation Authority

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Prepared for:

City of Gilroy
City of Morgan Hill
City of San José
County of Santa Clara
Santa Clara Valley Transportation Authority
Santa Clara Valley Water District

Prepared by:

ICF International
620 Folsom Street, Suite 200
San Francisco, CA 94107
Project Manager: David Zippin, Ph.D.
(415) 677-7179
david.zippin@icfi.com

Chapter 4

Impact Assessment and Level of Take

4.1 Introduction and Approach

This chapter addresses the effects of the covered activities described in Chapter 2 *Land Use and Covered Activities* on covered species and natural communities. Direct impacts are assessed quantitatively; indirect impacts are assessed qualitatively. The cumulative effects of projects in or near the study area and impacts on critical habitat are also analyzed.

The approach to analyzing impacts was by necessity a programmatic one. Because the Plan is large in geographic scope, broad in the range of activities covered, and long in terms of the duration, the impact assessment represents approximate impacts rather than precise numbers. Therefore, the acres of impacts presented in this chapter represent total impacts allowable under the Plan. Fees will be paid, in part, based on actual impacts to land cover types as determined during Plan implementation.

The impact analysis was based on the seven major categories of covered activities described in Chapter 2 and listed below.

- Urban Development.
- In-stream Capital Projects.
- In-stream Operations and Maintenance.
- Rural Capital Projects.
- Rural Operations and Maintenance.
- Rural Development.
- Conservation Strategy Implementation.

4.2 Definitions

The terms below are defined for the purposes of this Plan.

Impacts are those actions affecting biological resources, specifically undeveloped land cover types and covered species, in the permit area. Impacts can be direct or indirect; they can also be cumulative.

Direct impacts are defined as activities or projects that remove or alter land cover types, or covered species habitat, populations, or occurrences (or portions of thereof). Direct impacts are caused by the project and occur at the time and place of project implementation (e.g., ground disturbance, inundation). Direct impacts can be either permanent or temporary (see definitions of permanent and temporary impacts immediately below).

Permanent impacts are direct impacts that permanently remove or alter a land cover, or that affect a land cover for more than one year during covered activity implementation and/or more than one year after completion of the covered activity (e.g., creating a new road through grassland). Permanent impacts also include indirect impacts to wetlands that result in a permanent (i.e., more than one year after completion of the covered activity) change to wetland functions (e.g., development around a wetland that reduces the surface water supply to a wetland that subsequently results in a reduction in the size of the wetland). Impacts that result in reduction of long-term viability of a plant occurrence are also considered permanent.

Temporary impacts are direct impacts that alter land cover for less than one year and that allow the disturbed area to recover to pre-project or ecologically improved[1] conditions within one year (e.g., prescribed burning, construction staging areas) of completing construction. For the purposes of this Plan, all impacts associated with covered activities that have a duration exceeding one year or that take more than one year to restore immediately following construction will be considered permanent.

Indirect impacts are defined by USFWS as "those that are caused by the proposed action and are later in time, but are still reasonably certain to occur" (50 CFR 402.02). Indirect impacts in the context of this Plan also include those impacts that occur at the time of the proposed action but beyond the footprint of a project or activity (i.e., beyond the area of land cover disturbance). While more difficult to detect and track, indirect impacts can undermine species viability or habitat quality, especially if multiple indirect or direct impacts work cumulatively to impair the species or to degrade the habitat. Indirect effects that would result from activities permitted by this Plan are listed in **Table 4-1**. This table summarizes the major categories of indirect impacts that could affect each covered species.

Cumulative impacts result from the proposed actions' incremental impact when viewed together with past, present, and reasonably foreseeable future actions. Cumulative impacts are defined under both the ESA and NEPA. HCPs do not require a discussion of cumulative effects as analyzed under NEPA. However, as stated in the HCP handbook, "the applicant should help ensure that those considerations required of the Services by Section 7 have been addressed in the HCP" (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1996:3–15). Accordingly, the Plan addresses the cumulative effects of public or private activities that could result from individually minor but collectively

[1] *Ecologically improved* means that the site functions ecologically better than the functions present on the site prior to ground disturbance.

significant actions that take place over time. Cumulative effects of all projects with a federal nexus will be analyzed under NEPA and will not be addressed in the Plan in accordance with the ESA regulatory guidelines.

The following section discusses specific impact mechanisms for each of the major categories of covered activities.

4.3 Impact Mechanisms

In the following discussion, impact mechanisms are grouped for the purposes of analysis and in accordance with the description of covered activities presented in Chapter 2. Unlike Chapter 2, which provides details on the activities themselves, this section provides a description of how these groups of covered activities affect land cover and habitat for covered species. These descriptions provide an overview of the direct and indirect effects that are likely to result from the categories of covered activities. Impact estimates by acres of land cover affected or miles of stream are discussed in Section 4.5 *Effects on Natural Communities/Land Cover* and Section 4.6 *Effects on Covered Species*. Conditions on covered activities that will reduce the impacts described below are presented in Chapter 6 *Conditions on Covered Activities and Application Process*. Avoidance and minimization measures in this Plan (Chapter 6) are designed to minimize injury or death of all covered species during construction and to avoid injury or death of San Joaquin kit fox, western burrowing owl, tricolored blackbird, and least Bell's vireo.

4.3.1 Urban Development

Urban development is one of the primary impact mechanisms considered in this Plan, accounting for approximately 60% of all impacts assessed in this Plan. The major impact of new urban development is conversion from undeveloped to developed land cover types. In addition to the net loss of undeveloped land cover in the permit area, such conversion may further isolate remaining natural habitat within the planning limit of urban growth, rendering it less suitable or unsuitable for covered species. Riparian and in-stream impacts may also occur as a result of urban development; however, these impacts are described and assessed under the categories of In-Stream Capital Projects and In-Stream Operations and Maintenance Activities.

Urban development is assumed to result in permanent direct impacts because it is assumed that complete conversion of natural land cover types would occur at project sites in urban areas. Accordingly, no temporary direct impacts on land cover are expected to result from this impact type within the planning limits of urban growth.

Urban development will have indirect effects on biological resources in protected open space within and outside the planning limits of urban growth, including the Reserve System. One significant indirect impact is nitrogen deposition on the

local serpentine grassland community resulting from increased traffic associated with new development. The predicted increase in local and regional vehicular traffic may also result in increased disturbance of covered species in the permit area and loss of covered species from vehicular collisions. An assessment of the impact of nitrogen deposition on natural communities and covered species is presented in Section 4.5.2 *Indirect Effects*.

By increasing the extent of impermeable surfaces, urban development contributes to increased runoff, especially during storm events. Such increases can result in greater levels of scour and/or incision of local creeks, increased sediment loads, alterations of downstream hydrology, and decreased groundwater recharge. Also, addition of new development may increase the amount of pollutants such as grease, oil, and lawn pesticides that can be 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, such as in Coyote Valley. This can affect drinking water quality. In addition, if shallow, "perched" water tables occur, this groundwater can be discharged to surface water as part of summer stream flow (such as in the lower Guadalupe River or lower Uvas Creek). However, design guidelines (see Chapter 6) require construction in urban and rural areas to manage runoff so that existing runoff conditions (i.e., rate of runoff) are maintained and to reduce pollutants entering local streams. High runoff temperature may also result in an increase of in-stream water temperatures when runoff enters local streams. Increased impermeable surfaces may also inhibit natural percolation of stormwater into groundwater basins which may lead to a drawdown in ground water levels. Changes from reduced percolation of runoff are expected to be relatively minor as SCVWD operates several groundwater recharge basins and also extracts water to support local water supplies.

Indirect beneficial impacts to local streams may occur as recycled water is increasingly utilized for urban uses (e.g., landscaping) in place of surface and groundwater. This may result in temporary reductions of in-stream withdrawals, although by the end of the permit term it is likely that all water resources (local, imported, and recycled) will be fully utilized. Increased discharges from water treatment plants may also help to supplement in-stream flows from reservoir releases to support aquatic covered species.

Several other indirect impacts may be expected as urban development increases the human population of the permit area. General use of the study area, including units of the Reserve System where certain types of recreation are allowed, will increase. Increased human use within the permit area may have adverse effects on biological resources in the form of collection and harassment of native species, introduction or spread of diseases, competition from or predation by nonnative species, trash dumping, higher noise levels, increased light pollution at night, spills of hazardous materials, water quality degradation from road runoff, and increased frequency of wildfire ignitions (**Table 4-1**). Incidental take associated with legal recreational uses is only extended to the Local Partners for the indirect effects of allowable recreational uses (take caused by actions of

individual recreationalists is not covered). The level of incidental take of recreational use is assumed to be too minimal to measure and thus is not accounted for in the impact assumptions described below in Section 4.4 *Impact Assessment Methods*. Recreational impacts are greatly minimized by Condition 9, described in Chapter 6, *Conditions on Covered Activities and Application Process*. Impacts are mitigated through the conservation strategy as a complete package that includes conservation associated with contributions to recovery of covered species.

Human population growth can exacerbate the introduction or spread of nonnative species. Nonnative aquatic wildlife is known to have serious impacts on native amphibian populations. For example, aquarium species released in the wild may introduce new diseases to wild amphibian or fish populations. Feral cats pose a serious threat to native birds, especially those that nest on or near the ground, as well as to native reptiles. They can also cause a shift in small mammal populations from native to nonnative species. Ornamental plants and native cultivars[2] may spread to adjacent protected areas and outcompete and displace native 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.

The final locations of Plan reserves are not known, but some reserves are expected to be near or adjacent to urban areas. The Plan conservation strategy includes measures to minimize some of the foregoing indirect effects through actions such as development of design guidelines that reduce impacts from development on natural lands. Additionally, outreach programs for the public, especially landowners, renters, and developers, will educate the local populace on these threats and on ways that they can help minimize them. Despite these measures, it is assumed that indirect effects will occur. Most of the indirect impacts of urban development will occur along or near the boundary between new urban development and new reserves. Because the urban areas are relatively consolidated, this boundary zone will be a comparatively small portion of the total Reserve System. **Table 4-1** lists the major categories of these indirect impacts; these impacts may be particularly pronounced at the urban-wildland interface.

4.3.2 In-Stream Capital Projects

Several types of projects will have impacts on in-stream resources. These are discussed below. While some trail construction will occur across streams or in riparian areas, the majority of trails will be designed to avoid these sensitive areas. Accordingly, impact mechanisms for trail construction are discussed in Section 4.3.4 *Rural Capital Projects.*

[2] Native cultivars are plants cultivated from native species and bred for specific characteristics; they have lost the original genetic diversity of the species or population from which they were derived.

Flood Protection Capital Projects

Final designs of flood protection projects described in Chapter 2 are not known at this time. However, conceptual designs have been developed for several projects including Berryessa, mid-Coyote, and upper Penitencia. In addition, SCVWD has completed flood protection projects on the lower Guadalupe River (Santa Clara Valley Water District 2002), the Guadalupe River in downtown San José (Santa Clara Valley Water District 2001), and the upper Guadalupe River (Santa Clara Valley Water District 1999a, 1999b). Conceptual project elements, as well as completed project designs, were used to inform the impact mechanisms described below.

In accordance with SCVWD's Clean, Safe Creeks and Flood Protection Plan, the projects identified for coverage under this Plan include design elements to preserve sensitive natural communities using a mix of setback levees and floodwalls, minimize the use of concrete, protect riparian and wetland environments with revegetation mitigation projects, protect water quality and limit turbidity using sediment control structures, and provide recreational access.

Flood protection projects in the study area are implemented by SCVWD. SCVWD seeks to balance flood control requirements with the habitat needs of riverine and riparian species. This goal is reflected and supported by the Clean, Safe Creeks and Flood Protection Plan, described in Chapter 2, which is focused on four outcomes for projects in local streams: providing flood protection, protecting water quality, enhancing and restoring in-stream and riparian ecosystems, and providing recreational access. Whenever possible (e.g., undeveloped land is available along the outside of the existing levee) and economically feasible (i.e., funding for implementing a large levee reconstruction can be secured), environmentally sensitive design treatments such as levee setbacks and naturalized structural improvements are used instead of channelizing streams in concrete. An example of such an approach is proposed for Berryessa Creek, where banks of the existing channel will be set back and an in-channel floodplain developed to allow the creek more "elbow room" to allow meandering and natural stream hydraulics. Such methods help offset impacts from increased runoff (described above) by reducing flow velocity and increasing roughness, especially during storm events.

However, flood protection projects will sometimes result in some permanent impacts associated with the use of hardscape where naturalized alternatives are not feasible, as well as some temporary impacts associated with construction. The type and severity of both permanent and temporary impacts will vary considerably depending on the scope of specific projects.

Permanent and temporary impacts, both direct and indirect, are expected to occur during implementation of flood protection projects. Riverine and riparian habitat may be permanently affected both during and after construction. Review of the upper and downtown Guadalupe River EIRs reveals a 27% and 50% total impact (i.e., both permanent and temporary), respectively, on riparian and in-stream habitat during project construction (Santa Clara Valley Water District 1999a, 1999b, 2001). Based on these past impact evaluations, and input from SCVWD

engineers regarding current conceptual plans for future projects, some permanent loss of land cover is expected during implementation of covered activities. These permanent losses to land cover types excluding streams are anticipated to average 20% of the total project footprint. Temporary impacts to land cover are anticipated to be approximately an additional 20% of the total project footprint. Permanent impacts will be assessed for loss of natural land cover types that are impacted longer than the time allowed for temporary impacts (defined in Section 4.2 *Definitions*). However, site design for flood protection projects often includes elements to replace and/or improve habitat on site as part of SCVWD's goal of balancing flood protection and habitat value. SCVWD may receive restoration credit for such actions as described in Chapter 9, Section 9.4.1 *Habitat Plan Fees* subheading *Aquatic Restoration or Creation Provided in Lieu of Wetland Fee*. Permanent land cover loss may be attributed to installation of hardscape on the channel bed and banks; installation of levee walls, access roads, and outlet and inlet structures; off-channel detention basins; maintenance road construction; and increased recreational use. Impacts associated with off-channel detention basins fall outside of in-stream areas but within the planning limit of urban growth and as such, impacts are assumed as part of the urban development analysis. Access roads associated with flood protection projects may also be designed for use as recreational trails. Because permanent, direct impacts to land cover associated with such trails are already accounted for through the design of access roads, no additional permanent impacts are anticipated. However, it is possible that indirect and temporary impacts may occur through recreational use (e.g., increased harassment resulting from recreationists or dogs). In addition, changes in sediment transport and deposition within the channel due to channel realignment and changes in channel substrates may occur. Loss of in-stream complexity due to installation of hardscape or channel straightening could lead to increased scour along earthen channels.

Direct, temporary impacts of flood protection projects are most likely to occur during construction when use of heavy equipment may entail loss of vegetation for access, and increased turbidity, in-stream temperature, dust, and noise. Most, if not all, flood protection projects are likely to require dewatering of portions of the channel during construction. These activities will result in temporary reduction in habitat quality and/or loss of habitat, including potential impacts to covered avian species using riparian habitat for nesting. However, most temporary construction impacts can be avoided or minimized through the appropriate use of avoidance and minimization measures (see Chapter 6). Temporary impacts are also likely to occur at staging areas used during construction. Existing developed areas such as access roads or adjacent parking lots will be targeted for use as staging areas. If such areas are not available, highly disturbed ruderal areas will be selected. Staging will not be established in sensitive areas such as stream beds, riparian, or serpentine areas.

Indirect impacts on groundwater may occur if the channel bed is altered to prevent infiltration of flows (e.g., through installation of concrete). The construction of new levees could also prevent streams from naturally meandering, which could lead to channel incision and erosion. Continued use of groundwater recharge ponds and construction of new ponds as described in Chapter 2 may help offset any changes to groundwater levels that could occur

due to installation of flood protection projects. Installation of flood protection projects is not expected to result in significant changes to in-stream flow or velocity. The effects of straightening channels are better understood today than in the past, and new flood control structures will be designed to mimic natural flow conditions as closely as possible. Where hardened elements are required, appropriate flow dissipation devices will be incorporated into the design to prevent flows from increasing to the point that fish cannot move upstream or are washed downstream. In addition, as described above, flow bypass channels may be installed to reduce excessively high flows during storm events that cause erosion in earthen channels.

Levee Reconstruction

Direct, permanent impacts will occur when levees are reconstructed and then maintained in accordance with FEMA and Corps guidelines. Since the events of hurricane Katrina, FEMA and the Corps have tightened rules on how levees must be maintained for flood protection purposes. SCVWD currently conducts vegetation management on these levees under the Stream Maintenance Program and vegetation management follows the Corps guidelines.

It is expected that once reconstructed, levees will be maintained under the Stream Maintenance Program free of all vegetation with the exception of grasses and non-woody shrubs. Therefore, all non-ruderal vegetation is assumed to be permanently lost once reconstruction is complete. SCVWD will avoid areas that were developed for mitigation of previous projects. Most levees will be reconstructed in the same footprint as existing levees. However, where space allows (i.e., where development does not encroach up to the outer edge of the levee), there may be opportunities to set back the levees and create a wider floodplain area that is permitted to support trees and other riparian vegetation.

Direct, temporary impacts may occur during levee construction similar to those associated with flood protection project construction. Similarly, the proper use of avoidance and minimization measures can greatly avoid and minimize construction-related temporary impacts.

Indirect impacts associated with levee reconstruction may include a reduction of in-channel cover and/or woody debris that occurs over time due to a reduction in streamside riparian vegetation. Reconstruction of levees is not expected to result in changes to in-stream flow or velocity because levees will be reconstructed similar to their original designs.

Canal Reconstruction, Realignment, and Decommissioning

SCVWD anticipates needing to fully reconstruct or decommission all of its water conveyance canals over the course of the permit term. Canals may be reconstructed in place, replaced with a pipeline installed within the alignment of

the existing canal footprint, replaced within different alignment that is also within a public right-of-way, or decommissioned. Reconstruction or replacement with a pipeline will require ground disturbance and complete vegetation removal within the entire footprint of the canal. Reconstructed canals may allow some vegetation to reestablish in or along the canal; however, for the purpose of the impact analysis, complete loss of vegetation is assumed. Canals will not be flowing at the time of construction, thus there would be limited impacts to streams that are connected to the canals are expected as a result of reconstruction. Small, discontinuous wetlands may occur in canals that are fed by perennial seeps and springs. These wetlands and some covered species may be affected by canal reconstruction or installation of a pipeline and these affects will be considered impacts where they occur. Canal decommissioning may also have construction-related adverse effects when hardscape and other infrastructure are removed. However, removal of such infrastructure will also allow existing canals to return to a more natural state; thus resulting in long-term beneficial effects.

Direct impacts associated with canal reconstruction or installation of a pipeline would be similar to those direct impacts described for other construction projects including temporary increases in noise and dust. Implementation of avoidance and minimization measures described in Chapter 6 would reduce the potential for these types of indirect temporary impacts.

Decommissioning of a canal entails removal of unnecessary concrete and other materials from the site and allowing the canal to return to a more natural state. It is likely that decommissioning would enhance canals for natural resource management purposes, but credits for such enhancement are not assumed in the impact analysis. Minor indirect temporary impacts maybe associated with concrete removal activities. Canals will be dry at the time of removal activities, thus no impacts to streams that are connected to the canals are expected as a result of decommissioning.

Three Creeks HCP In-Stream Capital Projects

The primary capital project associated with the proposed Three Creeks HCP is retrofit of five of SCVWD's six dams in the north portion of the permit area. These projects include the development of borrow sites to support dam retrofits as well as associated infrastructure to provide supplemental flows during a dewatering event. As such, the impact mechanisms associated with dam repair and seismic retrofit are described independently of the proposed Three Creeks HCP in the following section *Dam Seismic Safety Retrofit.* A supplemental water supply is proposed as part of the Three Creeks HCP Conservation Program. Impact mechanisms associated with this activity are discussed in Section 4.3.3 *In-Stream Operations and Maintenance*.

Three Creeks HCP Conservation Program

The proposed Three Creeks HCP includes a suite of activities to enhance conditions for steelhead trout and Chinook salmon, while maintaining use of local watersheds to meet the water supply needs of northern Santa Clara County. The Three Creeks HCP Conservation Program includes nine main components that will receive take coverage under this Plan.

- Geomorphic Rehabilitation
- Almaden Reservoir Fish Passage
- Gravel Enhancement Program
- In-Stream Habitat Enhancement
- Fish Passage Enhancement
- Reservoir and Recharge Re-Operation
- Upper Penitencia Creek Management Program
- Supplemental Flow Program
- Monitoring Program

Geomorphic rehabilitation, Almaden Reservoir fish passage, gravel enhancement, in-stream enhancement, and the fish passage enhancement program are discussed below. Reservoir and recharge re-operation, Upper Penitencia Creek management, supplemental flows, and monitoring are described in Section 4.3.3 *In-Stream Operations and Maintenance* subheading *Three Creeks HCP Conservation Program*.

Geomorphic Rehabilitation

The criteria for geomorphic rehabilitation ensure that affected reaches of the channels below the reservoirs will be substantially modified and improved in terms of factors such as channel sinuosity and riffle-pool habitat. Implementation of the proposed rehabilitations requires substantial construction. New channel will be graded, large woody debris will be added, and the channel will be replanted. During this process, the existing channel and most of the riparian habitat along the channel will be disturbed. During construction, flow will be bypassed around the construction site and there may be short term loss of stream habitat, including increased temperature in the water that is bypassed around the project site.

Geomorphic rehabilitation will sometimes occur within the current active channel and will have the beneficial effects of permanently separating pond habitats from riverine habitats and replacing existing slow-moving ponded areas with stream riffle-run-pool-run complexes.

Almaden Reservoir Fish Passage

SCVWD proposes to provide steelhead with passage to upstream habitat that is currently blocked by Almaden Dam as part of the proposed Three Creeks Conservation Program. SCVWD has not yet identified a preferred alternative to

providing passage over Almaden Dam; however, SCVWD is currently considering a range of alternatives from trap and truck to construction of a fish ladder.

One of the goals of this program is to isolate juvenile salmonids emigrating downstream from the reservoir to reduce the potential for predation by exotic, predatory species living in the reservoir. As such, a juvenile collection facility may be constructed just upstream of the reservoir. Construction of this facility will require both on- and off-channel disturbance. Off channel disturbance will result in ground disturbance and permanent loss of some land cover types, as well as potential indirect impacts similar to those described in this chapter for other development projects. On-channel activities may result in a small amount of permanent stream loss where a diversion dam and fish screen are placed. Construction of the diversion dam will occur during the summer when natural inflows are at their lowest. Any remaining flows will be diverted around the project site as required by avoidance and minimization measures described in Chapter 6.

A trap and truck operation will have the least effect on covered species. This approach will utilize existing roads for moving fish from downstream of the dam to the upstream end of the reservoir. To trap adults, a collection facility at the base of Almaden Dam would be required. This activity could require a portable collection system placed in the channel. Access to the channel and staging for placement of the system may result in some permanent impacts to the stream bank and any riparian vegetation present. Access will be sited to avoid sensitive habitat to the extent feasible. This approach does not result in any changes to flows.

Construction of a fish ladder is likely to have the greatest effect on non-developed land cover types, including streams. Because the design of the project is not known, it is assumed that the ladder would not be designed as part of the existing dam infrastructure and would instead be constructed largely on non-developed land cover types. Depending on the level of separation of juvenile steelhead from the reservoir pool, a facility may be required to bypass fish around the dam and around the reservoir. If implemented, this facility would likely be constructed around the perimeter of the reservoir in non-developed land cover types. Ground disturbance impacts would be similar to other construction projects. Temporary construction impacts such as noise and dust may be more significant depending on how much excavation is required to construct the ladder and new access road. Operation of the fish ladder will require some amount of water to be released from the reservoir and possibly provided by supplemental sources to provide flows sufficient to encourage migration of adults and simply to fill the fish ladder, thus allowing fish passage. This may result in a small increase in downstream flows when the ladder is operational.

For the purposes of the impact analysis, it is assumed that up to 30 acres of non-developed land cover types may be permanently impacted, as well as up to 50 feet of stream lost where collection facilities at the base of the fish ladder are placed in the stream. Up to 5 acres of temporary construction impacts may also

occur on non-developed land cover types, and up to 30 feet of temporary stream impacts.

Gravel Enhancement Program

Gravel traps will be constructed below the high-waterline of the reservoir. Because reservoirs provide little or no habitat for the covered species, this is not considered an impact. Some minor permanent effects to surrounding terrestrial land cover may result from the construction of new access roads between the perimeter road of the reservoir and the reservoir itself. Temporary impacts associated with gravel extraction will be minimized because excavation will occur in the summer when the stream is dry and the reservoir level has dropped below the location of the gravel trap (i.e., the gravel trap will be dry). Existing access roads will be utilized to transport gravel excavated from these traps. Placement of excavated and processed gravel in downstream reaches could increase turbidity. To minimize the severity and extent of increased turbidity, gravel will be cleaned prior to being deposited downstream of reservoirs. Gravel placement will avoid the California red-legged frog and foothill yellow-legged frog breeding seasons, if possible.

If the new gravel augmentation service yard is constructed on an already developed site, no new permanent impacts are anticipated. If the new service yard is constructed on disturbed lands (i.e., urban development land cover types that provide some habitat value to Plan species), construction will result in a conversion of these land cover types to a fully developed land cover type (e.g., urban-suburban or developed agriculture). Temporary construction impacts will be similar to those described above for development regardless of the land cover type on which the project is constructed.

In-stream Habitat Enhancement

Cover enhancement includes localized installation of in-stream cover elements such as boulders, large woody debris, or biotechnical treatments along stream banks. These activities may create temporary disturbance to stream bank, bed, and adjacent riparian habitat. Short reaches of channel may require dewatering that includes bypassed flow around the construction site. If exotic vegetation removal is conducted, there may be a temporary loss of some canopy or stream-side understory vegetation function until newly planted vegetation matures. Temporary impacts are expected to be similar in scale to the temporary impacts incurred with maintenance of the water supply facilities in channels below reservoirs, but are not expected to recur at a given site (i.e., once a site is enhanced, it will not likely be targeted for enhancement again in the future).

Fish Passage Enhancement

In-stream impediments to fish passage may be modified or removed to improve habitat connectivity. Impacts may occur as the result of construction activities required to improve passage (e.g., removal of a culvert or reconfiguration of an in-channel weir). If sites support flow during construction, avoidance and minimization measures described in Chapter 6 will be implemented to protect water quality downstream of the site. Depending on the projects, some ongoing

maintenance similar to that of the water supply facilities in the channels below the reservoirs may be required.

Dam Seismic Safety Retrofit

Four of the major dams operated by SCVWD in the study area (**Figure 2-6**), two County Park dams, and one City of San José dam may need to be retrofitted in accordance with DSOD and FERC regulations for dam safety and design change. Several direct impacts would result from dam reconstruction, many of which are similar to the direct impacts described above for other in-stream capital improvement projects.

Direct temporary impacts related to dam reconstruction are anticipated to be minimal due to implementation of avoidance and minimization measures and mitigation measures. However, some temporary impacts are expected during staging of construction equipment and with the installation of a flow bypass during construction. In addition, there is also the potential for direct impacts (including noise, dust, and light [if construction activity continues at night]) on tricolored blackbirds, burrowing owls, California red-legged frogs, foothill yellow-legged frogs, California tiger salamanders, and western pond turtles. Implementation of Condition 15 *Western Burrowing Owl* and Condition 17 *Tricolored Blackbird* would help alleviate some of these impacts.

Dam reconstruction projects will be conducted to respond to existing and future safety requirements as required by DSOD and FERC, not to a need to increase reservoir capacity for expanded water supply.

SCVWD Dams

Borrow Sites

As described in Chapter 2, potential borrow sites[3] for dam reconstruction includes the following options.

- The upstream delta of the reservoir.
- The reservoir basin.
- Existing quarries.
- New quarries (a) in the reservoir basin, (b) in the canyon below the dam, or (c) in the alluvial plains within the Habitat Plan permit area.

Alluvial borrow extraction will be focused on areas where alluvial materials may be obtained without impacting wetlands, stream channels, existing or proposed Habitat Plan reserves, and the habitats of Bay checkerspot butterfly, California

[3] These are potential borrow sites located within the permit area of the Habitat Plan. Take associated with borrow sites located in the portion of the Three Creeks HCP permit area that does not overlap with the permit area of the Habitat Plan are possible but are not covered activities under the Habitat Plan and would require authorization through the Three Creeks HCP or another regulatory mechanism.

tiger salamander, or California red-legged frog. This has placed emphasis on obtaining borrow from agricultural and other disturbed or barren habitats, from existing quarries, and from the reservoir area below the maximum reservoir pool elevation. Rockfill excavation at Anderson Dam is assumed to be within the reservoir pool areas below the high water line and would be extracted once the reservoir is dewatered for the retrofit.

In all cases, the analysis has assumed that earthfill borrow sites will be excavated to a maximum depth of 40 feet, resulting in permanent loss of all habitat. Borrow sites may be converted to recharge areas or may fill naturally if groundwater levels are high. Alluvial areas affected would primarily be agricultural (Anderson, Calero, and Almaden) but some natural habitats will be affected. Species effects for alluvial sites tend to be low, reflecting the disturbed nature of the habitats below the dams. The functional value of agricultural lands most likely to be used for alluvial borrow at Anderson, Calero, and Almaden dams is primarily movement and foraging. Species impacts associated with the other types of land cover are likely to be greater, and the potential for impacts to covered plants increases proportionally.

Direct impacts include permanent loss of land cover, potential loss of individuals of covered species during construction and material hauling, and fragmentation of habitat at the landscape level. Noise, dust, and light related effects, previously described for nighttime retrofit activities, are likely to occur as a result of night time borrow extraction. Implementation of avoidance and minimization measures described in Chapter 6 are expected to reduce potential indirect impacts.

Dewatering Events

Dam seismic safety retrofit will likely require reservoir draining, construction in the dry reservoir, and reservoir refilling to the point at which the reservoir is re-operated according to applicable rule curves (collectively referred to as a dewatering event). The impacts associated with each of these actions are described below.

Table 2-4 shows the maximum covered release flows resulting from reservoir draining during a dewatering event[4]. Due to the unique characteristics at each dam site, a reservoir-specific dewatering plan will be developed and submitted to the Wildlife Agencies for review and approval prior to the first dewatering event for each reservoir (see Chapter 8, Section 8.7.3, subheading *Additional Review* for details of this process). This dewatering plan will specify the timing, frequency, and duration of reservoir releases associated with dewatering events. Since the level of detail is not known at this time, the maximum covered reservoir release flows shown in **Table 2-4** are provided as anticipated worst-case scenario for impact evaluation based on the professional judgment of the SCVWD. If at the time a dewatering plan is developed SCVWD determines the flow releases will be higher than those in **Table 2-4**, additional consultation with

[4] Pulse flows implemented for the benefit of anadromous fish species (see Section 2.3.4) may be greater than the flows anticipated for draining of a reservoir as part of a dewatering event. These higher flows are also covered by this Plan.

the Wildlife Agencies will required and additional mitigation may also be required.

Although up to 18 dewatering events are covered under this Plan, SCVWD will only undertake a dewatering event if absolutely required to maintain dam safety. In addition, the dewatering plan will identify avoidance and minimization measures that will reduce the potential effects of draining a reservoir. A key avoidance and minimization measure that SCVWD anticipates including in most, if not all, dewatering plans is a ramping schedule for flows. Ramping flow releases (i.e., slowly building up to a maximum release flow over a specified amount of time) when beginning reservoir draining will help avoid washing covered species downstream. Ramping down flows at the end of draining will help avoid drying back the channel faster than covered amphibian and reptile species can move to new locations to avoid stranding.

After accounting for avoidance and minimization of draining impacts, draining the reservoir may have residual adverse impacts to covered species. Reservoir dewatering will initially result in higher reservoir releases affecting the stream downstream of the reservoir. Extended periods of high flow will affect a significant portion of the channel downstream from the affected reservoir. Increases in flow may affect California red-legged frog egg masses or juveniles if flows are released in early spring before these species have had the opportunity to move out of streams. Foothill yellow-legged frogs may also be affected by high flows; however, this species is more likely to be found in the upper watershed (above dams). Consistent high flows, if started early enough in the year and continued through late spring, may facilitate breeding by providing a reliable water source and may also reduce the potential for stranding. High flows are not expected to affect western pond turtle breeding as this species tends to lay its eggs in uplands away from the active channel.

The Implementing Entity will monitor the effects of flow regulation (including dewatering events) on California red-legged frog, western pond turtle, and foothill yellow-legged frog populations that occur in streams hydrologically affected by existing dams in the permit area (Chapter 7, Section 7.3.3 S*pecies-Level Actions*). This monitoring data will inform the adaptive management process and help to minimize effects on these downstream populations. Results will be reported to the Wildlife Agencies within 60 days of the conclusion of each dry season and wet season dewatering event. Based on these results, the Wildlife Agencies may require an adjustment in the maximum reservoir release flows in **Table 2-4**. During reservoir drawdown, exotic fish and other aquatic species contained in the reservoir may enter the downstream channel in large numbers, resulting in increased predation on aquatic covered species. While these exotic species already exist below the dams, increased numbers of exotic species may increase the level of predation. Potential impacts associated with exotic species will be reduced with implementation of avoidance and minimization measures for dewatering described in Chapter 6 that may be incorporated into the dewatering plan.

Once the reservoir is drained, releases from the reservoir will be limited to bypassed inflow collected at an upstream location and flow from groundwater

seepage. Bypassed flows would be released into the stream immediately below the footprint of the project; therefore, no complete drying out of the channel immediately below the project footprint is expected. There may be some local runoff from tributary watersheds and from domestic irrigation, and in some locations the channel may be fed by upwelling of groundwater, but in all but the wettest years, perennial flow is not common. It is expected that, without supplemental water sources, much of the channel below the dewatered reservoir will go dry and remaining wetted portions would be of poor habitat quality. A supplemental flow system may be installed as part of the proposed Three Creeks HCP Conservation Program at Anderson and Calero Main dams. For reservoirs where supplemental flows are not provided, this impact could potentially affect the area in the channel from the base of the dam to the first confluence with another stream that is fed by a different reservoir. Watershed level impacts will be avoided through measures described in Chapter 6 that only allow one reservoir per watershed to be dewatered at one time.

Loss of water in channels downstream of dams is likely to affect amphibians and reptiles covered by this Plan, and may also affect riparian vegetation along creeks below dams. For the past 10–15 years, dry-back of channels below reservoirs has been minimized to avoid species impacts. Some seasonal dry-back has occurred on Uvas and Llagas creeks, but has been almost entirely avoided on Coyote Creek and Guadalupe River with the exception of approximately 600 feet on Guadalupe Creek in the summer of 2007 due to drought conditions. Thus, covered amphibians and reptiles are not accustomed to seasonal fluctuations in flows, particularly in the northern watersheds of the study area. Some stream segments in the study area below reservoirs currently dry out on an annual basis and reduced flows during a dewatering event may be similar to natural drought conditions. During such times, it is likely that adults of these species will move away from dry streams in search of water in nearby areas. Because dewatering events are generally only expected to last one season, riparian vegetation is not likely to be substantially altered during dewatering. Impacts may be more severe during an extended dewatering event (up to 3.5 years for seismic safety retrofit at Anderson Dam and 2.5 years for all other dams) if occurring during a drought. Immediately below dams, vegetation will still benefit from the natural drainage of the watershed which will be bypassed around the dam. Further downstream, runoff from urban areas is often considerable and enough to keep flow in the channel throughout the year.

Maintaining the reservoir free of water during construction will eliminate the majority of aquatic habitat upstream of the dams around the reservoir perimeter for aquatic covered species, including western pond turtles. Covered species using this area would be required to seek other habitats, which will be limited and which will affect their ability to re-establish following dewatering and repair of the reservoir facilities. Under the worst-case scenario, inflow may be non-existent for several months of the construction period, probably the months of July, August, and September when evapotranspiration is highest and ambient air and water temperatures are also high.

Construction activities occurring in the reservoir during dewatering will implement avoidance and minimization measures as described in Chapter 6, Condition 4 *Stream Avoidance and Minimization for In-Stream Projects*.

During refilling of the reservoir, outflow may also be constrained. First, the reservoir will not make releases until the reservoir has reached the level of the lowest outlet gate. Second, early in the refilling, water quality requirements may limit releases to maintain suitable quality of bypassed flows. Third, SCVWD will endeavor to re-fill the reservoir for both water supply and sustained-flow considerations. Winter flows may be constrained, affecting the length of transition time back to sufficient storage for intended operability. In a dry period, a drained reservoir may not be re-operated according to applicable rule curves until up to 2.5 years from the time reservoir draining is initiated. A dewatering event that takes longer than 2.5 years, with the exception that Anderson Reservoir is covered up to 3.5 years for a dewatering event associated with a seismic safety retrofit, is not a covered activity and SCVWD would initiate consultation with the Wildlife Agencies.

Covered species are unlikely to move into dewatered reservoirs as these sites will, in general, be continuously disturbed until refilling starts. If a project-specific situation arises where impacts to covered species could occur, the potential impact would be identified in the dewatering plan and species surveys as described in Chapter 6 would be required.

County Parks Dams

As discussed in Chapter 2, County Parks dams are much smaller than SCVWD dams, thus, while many of the construction impacts will be the same as those described for SCVWD dams, the scale is much smaller.

Sandywool Lake is located along a small tributary (less than 0.75 miles) to Arroyo de los Coches. Engineered channels allow natural flow from above Sandywool Lake to bypass the lake and continue in the tributary to its confluence with Arroyo de los Coches. Sandywool Lake is used for irrigation and is not managed for water supply to the tributary, thus, the channel below the lake is typically only supplied with natural flows. Dewatering the lake is not expected to affect this tributary or local riparian vegetation.

Grant Lake is not located on a stream, but it does have a drainage connection to Arroyo Aguaque Creek, a tributary to Upper Penitencia Creek. Dewatering Grant Lake is not expected to affect the water supply for local streams.

Borrow sites will be sited in the California annual grassland land cover type or in other already disturbed areas. Whenever possible, borrow sites will be used to create habitat for covered species (e.g., a pond for California tiger salamander). In these cases, development of borrow sites will result in the conversion of one land cover type (e.g., grassland) to another land cover type (e.g., pond). Areas around the borrow site may be temporarily disturbed during borrow site

construction. Location of borrow sites will be within County parks, but exact locations are unknown at this time.

City of San José Dams

As discussed in Chapter 2, Cherry Flat Dam is much smaller than SCVWD dams, thus, while many of the construction impacts will be the same as those described for SCVWD dams, the scale is much smaller.

Cherry Flat Reservoir is located on Upper Penitencia Creek, almost at the top of the catchment; the watershed above the reservoir is 2.4 acres. This reservoir is not currently managed to support fish flows in Penitencia Creek, although it is managed to maintain minimal flows through Alum Rock Park (approximately 0.5 cubic feet per second [cfs]) during summer months. SCVWD has a release point from a pipeline that provides most of the flow in this channel based on SCVWD operational needs, including flows to support fish. Dewatering the lake may reduce the 0.5 cfs summer flows.

The borrow site for this project will avoid sites in areas designated as high or medium priority for conservation in this Plan. Areas around the borrow site may be temporarily disturbed during borrow excavation. Borrow sites will be subject to Wildlife Agency review and approval during implementation of the Plan (Section 8.7.3 *Wildlife Agency Responsibilities*).

Dam Instrumentation Project

As described in Chapter 2, the Dam Instrumentation Project includes the installation of piezometers, inclinometers, survey monuments, real-time monitoring systems, seepage collection systems, reservoir level gauges, and seismographs related to the maintenance of dams in the permit area. Implementation of these activities will result in permanent and temporary impacts associated with installation of equipment and subsequent maintenance. All activities associated with the Dam Instrumentation Project will occur within the same areas as will be affected under the Dam Maintenance Program (described below).

In-Channel Groundwater Recharge Facilities

SCVWD plans to re-operate the Ford Road Groundwater Recharge Pond and the Church Avenue Groundwater Recharge Pond. Both ponds were previously constructed but the Ford Road facility has been out of use and the Church Avenue facility has been operated at reduced capacity. The Ford Road reoperation includes expansion of the site to include up to three additional new ponds. This action would result in the conversion of existing land cover types to the pond land cover type, although these new ponds will be managed to support water supply operations and will not likely support use by covered species. As

described in Chapter 2, Ford Road Pond will be supplied by flows from a new pipeline that receives flows from a new diversion upstream of Ford Road Ponds at Metcalf Road. This new diversion will also provide flows to the Coyote Percolation Pond after it is separated from the main channel as part of the proposed Three Creeks HCP Conservation Program. Church Avenue Pond is supplied by an in-channel diversion which may require rehabilitation.

New construction or rehabilitation of in-channel diversions will affect the stream bank and riparian vegetation surrounding the diversion structure. The new structure will permanently impact riparian land cover types while the rehabilitated structure will be temporarily disturb riparian land cover types where the diversion is rehabilitated. The footprint of the diversion is not expected to change in size, thus impacts to riparian vegetation at the diversion are expected to be temporary during construction. Additional permanent impacts resulting from re-operation of the ponds includes conversion of the dried out pond bed (currently characterized by golf course/urban parks and grain/row-crop/hay/pasture land cover types) to pond land cover type.

Re-operation of the Ford Road and Church Avenue groundwater recharge ponds is not expected to affect in-channel flows. Ford Road pond is being re-operated and expanded in anticipation of reduced in-channel recharge that is expected to occur when the currently on-channel Coyote and Ogier percolation ponds are separated from Coyote Creek. Construction and operation of Ford Road ponds will allow SCVWD to maintain the same level of water diversion to the groundwater basin. As described in *In-Stream Operations and Maintenance* subheading *Proposed Operating Rules for Water Supply Facilities in the Uvas and Llagas Watersheds* (National Marine Fisheries Service et al. 2009), Church Avenue ponds will divert flows from Llagas Creek when reservoir capacity allows, consistent with anadromous fish flow and on-channel recharge requirements. If, when these projects are ready to be implemented, SCVWD identifies a potential change in downstream flows due to re-operation that may adversely affect covered species, additional consultation with the Wildlife Agencies will required.

New Bridge Construction and Replacement/ Rehabilitation

It is estimated that all existing bridges in the permit area will need to be replaced approximately once within the Plan's permit term. Rebuilding all existing bridges, as well as constructing new bridges, will result in impacts on natural communities and covered species. New and rehabilitated bridges will be designed to federal and state guidelines at the time of construction. Conditions on covered activities described in Chapter 6 encourage the use of free-span bridges; however, wide crossings on major roads will likely require construction of pilings in creek beds. Installation of pilings, piers, and/or footings may contribute to roughness in the stream and slow flows in the vicinity of the pilings. Sediments and vegetation may become trapped on the upstream side of the piling, potentially causing further disruptions to flow. Also, scour may occur

immediately downstream of pilings and contribute to channel erosion and downstream sedimentation. In such cases, conditions described in Chapter 6 will be applied to assess the potential effects of a specific bridge design and to implement design elements that will reduce potential negative effects. Reconstruction projects may entail expansion of the existing footprint up to twice as wide as the existing footprint to account for increased traffic demand or new safety requirements such as pedestrian and bicycle access and wide shoulders for emergency access. Such expansion will result in permanent and temporary impacts on terrestrial and aquatic land cover types.

The amount of habitat loss will depend on whether the project is new construction or rehabilitation of an existing structure. Use of standard construction mitigation measures (e.g., proper management of dewatering activities) and avoidance and minimization measures will help to reduce or prevent temporary impacts on water quality during construction.

The County of Santa Clara Roads and Airports Department anticipates one of its road connection projects will require a new bridge across Llagas Creek. A new bridge across Gavilan Creek will also be required for a VTA road extension project. Approximately 75% of new bridges will be related to private development and will be intended for access use by residents in those areas. New bridges constructed in County parks or for access to parts of the Reserve System will be carefully managed for proper use on newly accessible lands. Construction of new bridges outside the planning limits of urban growth may result in indirect impacts associated with increased access to areas that are currently less accessible, including reserve lands that support natural land cover types and/or covered species. As described above in Section 4.3.1 *Urban Development* increased use of open space that is facilitated by new creek crossings may result in impacts on land cover and covered species related to introduction of nonnative species, general use, and illegal activities such as trash dumping. However, indirect impacts related to bridge reconstruction are anticipated to be minimal. Reconstructed bridges are not anticipated to encourage additional traffic beyond that expected on the basis of existing and planned land use patterns.

Streamside Trails and Crossings

As discussed in Chapter 2 and above under *Flood Protection Capital Projects*, SCVWD plans to develop stream-side trails along existing maintenance roads and along new maintenance roads installed as part of flood protection projects. In addition, County Parks and the cities also plan to develop new trail projects, some of which will occur in in-stream areas. Direct impacts from establishing trails along existing maintenance or access roads would have minimal, if any, new direct impacts to land cover as the trail would be placed along an existing road. New trails outside of existing roads or trails would have new impacts to vegetation removed for project construction. Impacts may also occur where new signage is installed. However, whenever possible, signage will be installed in disturbed areas.

Indirect impacts related to development of trails are largely related to ongoing use of trails. Expanding access to stream side areas exposes the stream and riparian areas to higher levels of use which may result in increased pollutants in the stream such as trash, trampling of vegetation, and vandalism. Most of the stream side trails developed in the permit area will be along streams maintained by SCVWD for flood control purposes. The majority of these maintained streams are located in urban or suburban valley floor areas. Trails in the Reserve System and outside of urban or suburban areas will be sited outside of the riparian corridor thus reducing the opportunity for these types of indirect impacts to streams (see Chapter 6, Section 6.4.2, subheading *Condition 4 Stream Avoidance and Minimization for In-Stream Projects* and **Table 6-3**).

4.3.3 In-Stream Operations and Maintenance

Many operations and maintenance activities in streams may have direct and indirect impacts on natural land cover types and covered species. A discussion of the operations and maintenance activities that may cause impacts is provided below.

Facility and Stream Maintenance

Direct impacts of in-stream operations and maintenance activities may result from maintenance of facilities such as bridges, culverts, dams, trails, and roads in the riparian zone. Impacts may also occur during maintenance of streams used for flood control and associated infrastructure such as access roads. Stream maintenance activities may include sediment removal, bank stabilization, levee maintenance, access road maintenance, and vegetation clearing, including fire break maintenance and rodent control, if such action becomes necessary (rodent control measures will be minimized under the Plan).

County Parks and the Cities of Gilroy and Morgan Hill also conduct some in-stream maintenance on their properties. In-stream operations and maintenance activities conducted by cities focus mostly on maintenance of trails and overhanging riparian vegetation. In-stream maintenance activities conducted by County Parks are similar to activities conducted by SCVWD under the Stream Maintenance Program, but with reduced frequency and on a smaller scale. County Parks attempts to replace culverts with in-kind materials and in the same footprint as the existing culvert. However, new and reconstructed culverts are required to be in compliance with conditions in Chapter 6 which may require some design modifications. These Local Partners may also conduct small-scale bank stabilization and sediment removal projects.

Direct impacts associated with in-stream operations and maintenance occur while accessing project sites (e.g., natural land cover is removed to reach a gage or bank stabilization site) or as a result of implementing an operations and maintenance project (e.g., sediment removal). Additionally, maintenance of facilities such as repair and installation of fencing or a monitoring gage may

require vegetation removal in order to access the project site; such vegetation removal would constitute temporary impacts on natural land cover types in the immediate vicinity.

Maintenance of in-stream infrastructure, including trails in riparian areas and bridges, has the potential to result in direct temporary and permanent impacts. However, all project proponents are required to implement the conditions on covered activities described in Chapter 6, including implementation of avoidance and minimization measures.

Direct temporary impacts associated with facility maintenance potentially include increased noise or dust during activities utilizing heavy equipment for mowing or resurfacing roads. Staging areas will be temporarily disturbed by workers and construction equipment. In such cases, application of avoidance and minimization measures would reduce these impacts.

Sediment Removal and Mercury Remediation

As described in Chapter 2, minor mercury remediation projects may be undertaken by Local Partners incidental to sediment removal projects. Sediment removal in stream reaches downstream of abandoned mercury mining operations has the potential to release mercury into the water column and to allow mercury to move downstream of project sites if work is conducted in an active channel. In local streams, mercury may be converted by bacteria into methylmercury, which is highly toxic. Methylmercury may be taken up by insects and other invertebrates which, in turn are consumed by fish and other organisms up the food chain. Over time, methylmercury may bioaccumulate in fish and may cause reduced fertility, impaired growth and development, and abnormal behavior. However, conditions on covered activities require dewatering prior to commencement of work that may contain mercury in the sediment. No indirect effects of sediment disposal are anticipated, because removed sediments are tested for mercury and, if required, are disposed of in a proper receiving facility.

Reservoir Operations under DSOD Interim Storage Restrictions

Reservoir operation under DSOD interim storage restrictions could affect the implementation of the proposed Three Creeks HCP Conservation Program target flows or future operating rules for Uvas and Llagas watersheds, particularly efforts to modify reservoir release schedules to address flow and temperature issues. Over the last 12 years of DSOD storage restrictions, SCVWD has been generally successful in avoiding dry-back of channels. As noted above under *Dewatering Events*, for the past 10–15 years, dry-back of channels has been limited to some seasonal dry-back on Uvas and Llagas creeks, but has been almost entirely avoided on Coyote Creek and Guadalupe River.

However, increased storage restrictions would further reduce reservoir storage. Lower reservoir storage requires that summer flow regimes will be lower than under the proposed Conservation Program and dry back of the affected channels will occur earlier. This may result in stranding of California red-legged frog or foothill yellow-legged for embryos and tadpoles during dry back. During summer, SCVWD does not have water rights to detain natural flows in the reservoir. These flows are by-passed around the reservoir to help maintain a wetted channel, even though it may not reach the requirements of Conservation Program flows. During wet years, by-passed flows are greater and alternative flows from tributaries or groundwater upwelling also help to maintain a wetted channel below dams.

In addition to natural flows (from by-pass or groundwater upwelling), SCVWD anticipates installing supplemental water supply systems at the base of Anderson and Calero Main dams as part of the Conservation Program. Once functional, these systems can be used to meet Conservation Program flow targets (and therefore a wetted channel) during implementation of DSOD interim storage restrictions.

As described above, the Implementing Entity will monitor the effects of flow regulation on California red-legged frog, western pond turtle, and foothill yellow-legged frog populations that occur in streams hydrologically affected by existing dams in the permit area and report to the Wildlife Agencies.

SCVWD expects that it will be able to meet most conservation flows described for the proposed Three Creeks HCP Conservation Program under DSOD restrictions at all times, with perhaps the exception of during a drought. Stream reaches that are dry for more than one year as a result of DSOD storage restrictions will be considered permanently impacted for the purposes of this Plan. Because SCVWD does not anticipate this situation occurring, the impacts of an extended dewatering were not considered in the stream impact caps set for this Plan (**Table 4-2**). If streams are dry for more than one year as a result of DSOD storage restrictions, SCVWD will begin a separate consultation process with USFWS and CDFG and may be required to provide additional mitigation beyond that required by the Habitat Plan. These effects will be minimized through conditions described in Chapter 6 and mitigated through payment of fees (see Chapter 9, *Costs and Funding*) and the Conservation Strategy (Chapter 5).

Reservoir and Recharge Pond Operations

Effects of reservoir and recharge pond operations are discussed together because operations are conducted in tandem, thus effects of one are also the effects of the other. SCVWD operates eight dams and several in-channel and off-channel groundwater recharge ponds within the permit area to support the water supply needs of Santa Clara County. Operation includes flow management, diversion, delivery, and storage. Operation of these facilities focuses largely on timing reservoir releases to supply water to treatment plants and recharge basins. Several covered species may utilize habitat in streams downstream of SCVWD dams. Species models (**Appendix D**) indicate that California tiger salamander is

known to occur downstream of Anderson and Uvas dams in or near to Coyote Creek and Uvas-Carnadero Creek, respectively. California red-legged frog is known downstream of Anderson and Coyote dams on Coyote Creek, and Uvas dam on Uvas-Carnadero Creek. Foothill yellow-legged frog is known to occur on or near to Uvas-Carnadero Creek downstream of Uvas dam. Finally, western pond turtle is known to occur below Anderson and Almaden dams. All of these occurrences are in the near east and west foothills of the study area, and none of these species are known to occur along streams in heavily urbanized areas with the exception of California tiger salamander which has three occurrences on Communications Hill in San José and one occurrence along Coyote Creek in urban San José.

Direct and indirect impacts may occur through several mechanisms including changes in hydrology and sediment transport, lifecycle disruptions, and introduction of exotic species. In addition, impacts may be exacerbated if DSOD interim storage restrictions are increased to the maximum amount covered under this Plan (see Chapter 2, **Table 2-5**). Each of these impact mechanisms is described below.

Flow

The purpose of reservoirs and recharge basins is to store water for improved management of long-term water supply needs. The capture and storage of flows results in changes to the natural hydrology of the watershed in. Reservoir and associated recharge operations generally alter local hydrology by reducing stream flow during the wet season when flows would be higher under natural conditions and by increasing stream flow during the dry season when flows would be lower under natural conditions. Flows are reduced during the wet season as reservoirs and recharge basins both capture available water, particularly early in the season. During the dry season when channels would normally have very low flows, flows are above normal as SCVWD releases water from its reservoirs to maintain water in recharge basins and to meet water supply needs. As such, the channel below dams remains wet for more of the year than may be expected under natural conditions. This regulation of flows may be beneficial to covered frog species that utilize habitat below dams due to a more reliable breeding habitat. However, consistent with natural drought conditions, during or immediately following dry years, the volume of flows released may be altered so that target storage levels in reservoirs and recharge basins may be restored. Large release delays, the reduction in release magnitude, and recharge diversions may reduce habitat due to inadequate flows.

During operation as described above, there may be times of rapid increases or decreases in flows; however, SCVWD does generally ramp flows to reduce potential impacts. This may occur due to unplanned maintenance needs (e.g., blow-off of a pipeline, dewatering of a recharge pond, filling a recharge pond). Rapid decreases in flow may result in stranding of eggs and larvae of California red-legged frog. The potential for increased flows are greatest November through April when eggs and tadpoles are most vulnerable to changes in habitat. The potential for decreased flows may occur at any time of the year. Adults may

also be affected, but have more mobility to combat such environmental changes. However, individuals forced to move out of cover in search of new cover may temporarily be exposed to a higher risk of predation. Foothill yellow-legged frogs are thought to be extirpated below major dams in the study area and would therefore not likely be affected by changes in flows due to dam operations.

Flows are also altered by the operation of diversions and in-channel recharge areas. Through the use of inflatable and flashboard dams, in-channel areas are periodically ponded so that flows can be diverted to off-channel recharge areas or infiltrated into the groundwater basin. Ponding has a number of related impacts including the following.

- Emergent and submergent vegetation is flooded, may be covered by fine sediments, and may die off affecting availability of vegetation appropriate for attaching covered species egg masses.
- Cover is reduced for all covered aquatic species.
- At times when the pond would be drained, backwater pockets within the pond basin may create stranding conditions for frogs—adults or larvae.
- All covered amphibians and reptiles may be affected by higher rates of predation due to low velocity flows and lack of cover.
- The diversion ponds support populations of nonnative fish and amphibians which may prey on native amphibians and turtles.

Condition 5, *Avoidance and Minimization Measures for In-Stream Operations and Maintenance*, described in Chapter 6, will minimize these effects.

Sediment Transport

Reservoirs capture sediment and debris that would otherwise reach the channel below the dams. In particular, reservoirs capture sands and gravels. In addition, large woody debris such as trees and large rock accumulate behind the dam and do not reach the downstream channel. At the same time, a portion of the very fine sediment entering the reservoir remains in suspension and passes through the reservoir into the downstream channels. The result is a combination of altered hydrology and altered sediment transport which affects downstream habitat quality.

The combination of gravel embeddedness and flow changes in the channels below the dams also affects food production and transport. Fine sediment embeddedness inhibits the development of the benthic macroinvertebrates. In addition fine sediments accumulate in low velocity runs and long pools and reduce the general productivity of the aquatic system. Low food production and transport associated with gravel embeddedness and fine sediment accumulations may affect amphibian eggs and juvenile California red-legged frogs, foothill yellow-legged frogs, and western pond turtles (although the presence of exotic species in the affected reaches of channel may preclude viable populations of these covered species in the areas affected).

Increased fine sediments may also cover and thus affect egg laying substrate for amphibians including California red-legged frog. Increases in fine sediment may also affect turbidity (discussed below).

In-channel percolations ponds trap fine sediments during the dry season. Large winter storm events, or the removal of in-channel diversion dams to allow salmonid passage, wash the fine sediments from the in-channel ponds and increase turbidity downstream. Depending on timing, this release of sediment may partially cover egg masses of covered amphibians along the margins of the channels.

Water Quality

Water quality is affected by reservoir releases and recharge pond and pipeline releases. The operation of these systems can result in changes to turbidity, dissolved oxygen, creation of methyl mercury. Operations also affect sediment transport, but this is discussed in the preceding paragraphs.

Reservoirs have a substantial impact on turbidity, both through changes to sediment transport (discussed above) and algal production. Both reservoirs and in-channel ponds behind diversion dams create heat and nutrient sinks. This combination leads to substantial algal production. High levels of algae result in high turbidity as well as fluctuations in dissolved oxygen. Increased turbidity may inhibit foraging of covered amphibians.

Other causes of increased turbidity include overflow and scheduled releases to channels from reservoirs, recharge ponds, and pipelines. These releases may increase turbidity at and downstream of the release points. These releases may coincide with or be independent of storm events. Scheduled releases from ponds or pipelines do not generally cause extensive turbidity increase except during the first release after an extended period of time during which sediments built up in a pipeline or pond. Suspended sediments from such releases would be anticipated to settle out of the water column within 300–1,000 feet, depending on flow rate.

High levels of algae may also affect dissolved oxygen levels. Given the right conditions, nightly dissolved oxygen levels can drop to levels stressful to covered amphibians. This may be observed during larval and tadpole stages; however, covered amphibians will most likely be able to breathe air by the summer when the effect is most apparent. This is most likely to affect areas of slow-moving pools and runs in downstream reaches and in the in-channel diversion ponds.

Dissolved oxygen levels may also be affected by other aspects of reservoir operation. During normal reservoir operations, water may be released from the cold water pool (hypolimnion) with very low dissolved oxygen levels. These releases affect a short reach downstream, as the flow rapidly aerates as it moves downstream. SCVWD studies indicate that this effect may extend about 100–300 yards downstream of the release point. This reduces the suitability of this reach for all aquatic species. Some dams have facilities for ensuring oxygenation of release water.

Metallic mercury enters reservoirs in runoff from local soils containing mercury and from airborne pollution. Once in the reservoir, mercury sinks to the bottom and, when the reservoir stratifies and produces anoxic conditions, microbes convert the metallic mercury to methyl mercury, which is toxic to fish, wildlife, and humans. Releases from the hypolimnion release methyl mercury which may be taken up by plants and animals downstream, thus accumulating in the food chain. This has the potential to affect covered amphibians.

Covered Species Movement

In-channel structures (dams, diversion facilities, drop structures, and stream gauge weirs) create barriers to upstream and downstream movement of covered amphibians and reptiles. Movement of amphibians may be particularly impeded during low-flow periods. Movement constraints inhibit species ability to disperse and expand ranges. In-channel ponds behind diversion dams also present barriers to movement because these areas are often populated by exotic species that prey on covered species. The effect may be less pronounced at smaller structures that do not preclude adult individuals from utilizing the riparian zone to move through a reach.

Exotic Species

Water supply operations that bring non-local water into the study area (i.e., imported water supplies) introduce and distribute exotic (nonnative) species on an on-going basis, alter habitats in a manner that increases exotic species' competitive advantages over native species, and allows exotic species to prey on native species. Off-channel recharge ponds that are accessible to the general public, through legal or illegal access, also provide a mechanism to introduce exotic species (e.g., through the dumping of pets like bullfrogs). Informal monitoring of percolation ponds by SCVWD has shown that these ponds typically do support large populations of exotic species and very infrequent use by covered species (D. Arnold pers. comm. c). Any new individuals added to these ponds by the general public would contribute to a reservoir population of invasive species and could result in the spread of some invasive species (e.g., bullfrogs, nonnative turtles, and fish) into more natural habitat of covered species breeding ponds within dispersal distance. Conditions described in Chapter 6 that require exotic species to be dispatched when ponds are drained for maintenance purposes could help to reduce local populations of exotic species.

In-channel recharge ponds provide habitat for exotic species such as bullfrogs and bass, which both compete with and prey on California red-legged frogs, foothill yellow-legged frog, and western pond turtles. This reduces the successful occupation of the inundated reaches by covered species using local streams to support various life stages and may also act as a reservoir population that spreads into less affected stream reaches.

Proposed Operating Rules for Reservoirs

New operating rules for the reservoirs in the northern portion of the permit area may be implemented as part of the proposed Three Creek HCP. New operating rules for Uvas and Chesbro reservoirs may be established through an informal consultation with NMFS and CDFG, a new HCP process, or through formal consultation with NMFS pursuant to Section 7 of the ESA. Implementation of new operating rules for reservoirs are anticipated to include modifications of reservoir releases that would change the area of wetted channel. The focus of these operating rules is to provide enhanced flow conditions and manage cold water habitat for listed fish species. However, changes to releases may also affect species covered under this Plan including California red-legged frog, foothill yellow-legged frog (if it occurs below reservoirs), and western pond turtle. Anticipated changes in operations will reduce early dry-season release rates and increase late dry-season release rates. The effect will be to dry back the downstream reach of the wetted channel earlier than would occur under baseline operations conditions.

In the process, some foothill yellow-legged frogs and California red-legged frogs may become stranded below the zone of sustained flow. This is an early dry-back impact; the channels in question would often be expected to dry back under baseline conditions, because of the high percolation rates in the recharge zone. Any effects are therefore related to the early action to reduce flows. Dry-back may occur before juvenile California red-legged frogs have the ability to leave the channel. In dry years, when the sustainable flow is low, ponded habitat to support frog tadpoles would generally not be available.

As described above, the Implementing Entity will monitor the effects of flow regulation on California red-legged frogs, western pond turtles, and yellow-legged frog populations that occur in streams hydrologically affected by existing dams in the permit area and report to the Wildlife Agencies.

Recharge Pond Maintenance

Maintenance of recharge basins will range from routine management of vegetation and debris to dewatering and sediment removal to complete re-configuring of a recharge site on a periodic basis. Sediment removal and reconfiguration require dewatering and substantial disturbance of the pond. Vegetation may be entirely cleared from the edges of the pond and sediment scraped from the bottom of the pond, removing any submerged vegetation in the pond. This type of maintenance has been ongoing at SCVWD recharge ponds prior to implementation of the Plan. Some ponds retain vegetation around the edges during and after maintenance that may provide refugia for covered species during pond maintenance. Other ponds are maintained devoid of vegetation and are unlikely to support covered species before, during, or after maintenance. Although regular maintenance inhibits the development of quality habitat, some recharge ponds are known to support western pond turtles. Western pond turtles using these sites may be temporarily affected by loss of habitat during

maintenance activities, or may be permanently extirpated from the site in cases where suitable habitat is entirely removed. In addition, western pond turtles could be injured or killed by maintenance activities.

Maintenance of in-channel recharge ponds may compact soils in and adjacent to the channel. Depending on the site and time, this may injure or kill amphibians utilizing upland refugia and/or amphibian egg masses. These effects will vary by time of year and extent of activity.

Maintenance will require earthmoving activity and disturbance of soil. If there is precipitation during the construction period or before vegetation is fully established on the affected land, there may be construction-related runoff to the riparian/aquatic habitats at and downstream of the construction site. Runoff from the construction zone may raise suspended sediment levels and increase turbidity resulting in suspended sediments being mobilized and discharged to the channel. In addition, dust may be generated by construction which will disperse beyond the construction area. Finally, proximity of construction equipment to the stream channel may result in fuel, lubricant, and other chemical spills to leak into the channel. Application of avoidance and minimization measures identified in Chapter 6 will greatly reduce the potential for sediment runoff during construction.

Dam and Reservoir Maintenance

Dams and reservoirs operated by SCVWD, County Parks, and the City of San José require routine and corrective maintenance to ensure their proper inspection, functioning, and safety. SCVWD operates 8 dams, as well as Coyote Percolation pond in the permit area. County Parks maintains six dams, one at Sandywool Lake and five at Grant Lake. The City of San José maintains Cherry Flat dam.

Dam and reservoir maintenance activities may include infrastructure maintenance including roads, repair or replacement of dam components and stream flow equipment, vegetation clearing on the dam face, and removal of rodent burrows. Direct impacts associated with activities such as road maintenance and vegetation management are similar to those identified above including permanent and temporary loss of vegetation around facilities.

The net effect of dam face maintenance is to permanently clear the face and abutments of dams of all deep rooted vegetation that could impair the integrity of the dam face or inhibit regular inspection of the dam face for leaks and seepage. While the frequency and extent of covered species use of dam faces is not well quantified, there is a potential for covered species such as California red-legged frog, California tiger salamander, and western pond turtle to use this habitat under current conditions.

SCVWD Dam Maintenance Program

SCVWD's Dam Maintenance Program is a covered activity under both the Habitat Plan and the proposed Three Creeks HCP. The Dam Maintenance Program describes activities conducted by SCVWD to operate, maintain, and repair water supply facilities including dams, appurtenant structures, and downstream recharge facilities. These activities include the activities discussed above, but also extend to burrow management on the dam face and sediment removal from the reservoir basin.

SCVWD requires that all burrowing animals are to be removed and burrows filled. The effect of these activities is to make the habitat permanently unsuitable for covered species, including covered plant species. Routine and corrective dam maintenance requires filling of burrows to prevent seepage from causing internal dam erosion, which can lead to dam failure. Burrow management involves both efforts to reduce the populations of burrowing animals such as ground squirrels and excavation and re-compaction of any burrows that are found on the dam face and abutments. Therefore, this activity could potentially affect covered species that may be using the burrows as refugia.

Reservoirs require sediment management to maintain reservoir function (e.g., removal of sediment that blocks inlets), and to provide a source of native gravels for downstream aquatic habitat enhancement. This activity requires sediment extraction and hauling at the upstream end of the reservoir and sorting, cleaning, drying, stockpiling at the new gravel augmentation facility described in Section 2.3.3 *In-Stream Capital Projects*. Extraction and hauling require the use of heavy construction equipment.

SCVWD has identified a footprint for each of its dams in which regular dam maintenance will occur. For the purposes of the impact analysis, it is assumed that all natural land cover types will be permanently removed from dams.

Direct and indirect impacts associated with a dewatering event for maintenance purposes and for provision of supplemental water supplies are the same as those discussed in *Dam Seismic Safety Retrofit*, however, impacts may occur at a reduced scale, as full dewatering of the reservoir is not always needed for maintenance activities.

Non-Routine Stream Maintenance

Most in-stream maintenance in the study area is performed by SCVWD and is currently covered under that agency's Stream Maintenance Program. However, as discussed in Chapter 2, some activities, such as those taking place in serpentine habitats, are considered non-routine and are excluded from the Stream Maintenance Program. Specific non-routine stream maintenance activities covered by this Plan include extensive, one-time vegetation management in the lower Llagas Creek flood control channel, repair and maintenance of canals

(including in serpentine areas), winter season work in canals, invasive vegetation management, maintenance of stream gage and rain gage facilities.

Vegetation management in lower Llagas Creek is expected to reduce overall vegetation in the channel by approximately 50% in perpetuity (once vegetation is initially removed, long-term maintenance to the 50% level will be covered by the Stream Maintenance Program permits). Invasive vegetation management is intended to result in a permanent reduction of invasive vegetation but an increase in native plant species as the site allows.

Repairs to canals including bank stabilization, sediment removal, and vegetation management not otherwise permitted by the Stream Maintenance Program (e.g., in serpentine vegetation areas and during the wet season) are covered under this Plan. Bank stabilization activities may result in both permanent and temporary impacts depending on the size of the project and approach to stabilization used. For example, if rock rip-rap or concrete is required, any natural land covers at the site would be permanently removed. If, however, the repair can be made using compacted earth, then the site would be re-seeded and the site would likely return to pre-project conditions the following growing season. Vegetation management in serpentine communities is likely to result in the permanent loss of such vegetation. Wet season work may result in water quality issue in the canals or the streams to which they connect. Distance to the closest stream and the nature of the canal in the intervening reach will affect the degree to which this potential effect is observed. For example, if the canal is vegetated downstream of the project site, then sediment may be filtered or settled out before reaching the stream connection. Implementation of avoidance and minimization measures described in Chapter 6 will help reduce such potential effects.

Other projects covered under this category are expected to result in temporary reductions in vegetation at project sites.

Three Creeks HCP In-Stream Operations and Maintenance

The proposed Three Creeks HCP describes activities associated with reservoir operations and maintenance, and recharge operations and maintenance. These types of activities will also occur at Uvas and Chesbro dams which are not covered under the Three Creeks HCP but are covered under the Habitat Plan. As such, impact mechanisms for these types of activities are discussed for the entire Habitat Plan study area in the following sections.

Three Creeks HCP Conservation Program

As discussed above, the proposed Three Creeks HCP includes a suite of activities to enhance conditions for steelhead trout and Chinook salmon, while maintaining use of local watersheds to meet the water supply needs of northern Santa Clara

County. The following actions include components of the Three Creeks HCP Conservation Program that are in-stream operations and maintenance activities.

Reservoir and Recharge Re-Operation

The proposed Three Creeks HCP Conservation Program includes modifications of reservoir and groundwater recharge operations to enhance flow, temperature, and water quality conditions in the channels downstream of reservoirs to promote better fish habitat. These activities will be implemented at Coyote Creek, Upper Penitencia Creek, and Alamitos Creek (Almaden Reservoir and the Alamitos Diversion).

These actions are intended to mimic natural conditions in support of salmonids. They are also expected to have beneficial effects on covered species for this Plan. More natural flow patterns, including large flushes of water, may clear fine sediments from stream channels and vegetation, thus improving egg laying substrate for amphibians. In addition, flow management is expected to support benthic macroinvertebrates which form the base of the stream system food chain.

Upper Penitencia Creek Management Program

The Upper Penitencia Creek Management Program requires specific timing of water supply operations including reservoir releases. These types of activities are discussed above under *Proposed Operating Rules for Reservoirs*. This activity may also require replacement or removal of existing infrastructure. This type of activity could result in impacts similar to those described above for minor construction activities in streams. Potential impacts may include permanent and/or temporary impacts to riparian vegetation and ground disturbance.

Supplemental Flow Program

SCVWD has developed a program to provide supplemental flows to the base of Anderson and Calero Main dams to ensure that the conservation strategy flow targets for summer flow targets can be reliably met under a variety of conditions, such as implementation of DSOD Interim Storage Restrictions, short-term equipment failures, and scheduled and unscheduled maintenance that requires reservoir dewatering. Temporary pipelines will be installed prior to the initiation of a dewatering event and when supplemental flows are required. Temporary pipelines will be removed when supplemental flows are no longer needed.

The source of supplemental flows varies from reservoir to reservoir and provision of flows may require installation of a temporary pipeline, use of trucked water, bypass of flows from upstream of the reservoir, use of imported water, or installation and use of a new groundwater pumping system including new pipelines. Imported or recycled water will only be used if it can meet temperature and water quality criteria. Although uncommon, it is possible that imported water contain exotic fish or other invasive species. While many of these exotic species already exist below the dams, increased numbers of exotic species may increase the level of predation on covered species.

New infrastructure installed to provide supplemental flow will be installed along existing roads and pipelines within the disturbed footprint, or within the Dam Maintenance Program area of routine maintenance. Therefore, no additional

impacts to land cover are expected as a result of supplemental flow infrastructure installation.

Monitoring Program

SCVWD will conduct monitoring of species covered by the proposed Three Creeks HCP. The monitoring program will include the same types of activities described below in Section 4.3.7 *Conservation Strategy Implementation*, subheading *Activities within the Reserve System*.

4.3.4 Rural Capital Projects

Rural capital projects (those capital projects occurring outside the planning limits of urban growth) are likely to have the same types of direct, ground-disturbing impacts as development within the planning limits of urban growth. However, like rural development, the severity of impacts associated with rural capital projects is likely to be greater than impacts associated with urban projects because urban projects typically occur in areas that are already degraded. A discussion of direct and indirect impacts associated with the major types of rural capital projects covered by this Plan is presented below.

Rural Transportation Projects

Most of the road projects covered by this Plan are expansions or improvements of existing roads, highways, and intersections. Additionally, VTA plans to install a parallel set of tracks alongside the existing Caltrain route from San José to Gilroy. The County has identified three new roads in the permit area outside of the planning limits of urban growth: a connection of DeWitt Avenue to the West Edmundson Avenue / Sunnyside Avenue intersection near Morgan Hill, a connection on Center Avenue between Omar Avenue and Buena Vista Avenue northeast of Gilroy (requires a new stream crossing), and a connection between Center Avenue and Hill Road across Maple Avenue immediately south of Morgan Hill. VTA is planning to construct one new connector road as part of the U.S. 101 Improvement Project (Monterey to SR 29). This road would be an extension of Santa Teresa Boulevard from Castro Valley Road to U.S. 101 at the SR 25 interchange and requires a new stream crossing. This connector road is just outside of Gilroy's planning limit of urban growth. These projects are anticipated to have permanent, direct impacts on natural land cover types, and therefore on covered species.

Implementation of these projects would result in permanent impacts on land cover within the footprint of each project. Indirect impacts may also occur as a result of expanded roads. In the absence of designs to minimize these effects, wider highways and freeways, already difficult for wildlife to navigate, will intensify road crossing hazards for wildlife and result in increased vehicular strikes. The disruption of wildlife movement results in increased habitat and population fragmentation by creating more extensive and obstructive barriers between populations and habitats. Expanded roads that support a higher volume

of traffic may also result in increased runoff of car waste (e.g., oil, grease, radiator fluid) and debris (e.g., tires, litter, car parts), which may be hazardous to wildlife. Increasing the total amount of roads, even dirt roads, can lead to increased sediment in the watershed from concentration of hillslope and surface runoff, which causes higher peak flows and contributes to bank erosion. In addition, expanded roads can create substantial noise and physical disturbance that may disturb or disrupt covered species far from the road. Finally, as discussed above in Section 4.3.1 *Urban Development* increases in vehicular traffic will result in increased nitrogen deposition in areas adjacent to roadways.

Road expansion projects adjacent to cultivated agricultural areas are expected to have less severe direct and indirect effects than road projects adjacent to natural land cover types because the habitat value of cultivated agriculture is lower. Measures to avoid and minimize the impacts of covered transportation projects, including design measures for new and expanded rural roads, are described in Chapter 6.

South County Airport Expansion

Permanent and temporary direct impacts related to the proposed expansion of the South County Airport as identified in the South County Airport Master Plan are similar to impacts of other capital projects that result in the conversion of non-developed land–cover types to developed uses.

Indirect impacts associated with expansion of the South County Airport include increased noise due to higher usage. Lighting improvements proposed in the master plan may also have indirect impacts on covered species if bright lights are used at night. However, the South County Airport is located in a rural residential area just west of U.S. 101. While ruderal and annual grassland habitats on this project site and in surrounding areas support foraging habitat for many raptor species, the indirect impacts associated with increased noise and/or lights are expected to be minimal. Though suitable habitat for western burrowing owl is present in and around the South County Airport, there are no recent occurrences of western burrowing owls breeding at the site. If the species colonizes the airport, expanded operations may have indirect effects through increased lighting and noise. These potential indirect effects are not anticipated to preclude use by burrowing owls, as demonstrated by the continued use by this species of the San José International Airport nearby, which has much greater levels of aircraft activity and generates much more lighting and noise than would be generated by the South County Airport expansion. Should this species be documented at the site prior to airport expansion, the conditions on covered activities, described in Chapter 6, would be employed to minimize effects.

Expansion of the airport runway is not anticipated to result in increased bird strikes; however, increased use of the airport (i.e., more flights) may result in increased bird strikes. Approximately 100 new hangars were completed at the South County airport in 2005. The master plan identifies a potential future increase in the number of hangars, tiedowns, and fixed base operators that can be accommodated at the airport. Such expansion is likely to lead to increased use of

the airport as a result of more pilots choosing to base their planes at the airport as the population and the abundance of commercial and industrial activities around the airport grow. The extent to which bird strikes may increase is unknown at this time. As noted in Chapter 2, the NEPA/CEQA environmental compliance documents for the proposed master plan have not yet been prepared. However, the number of aircraft based at the South County Airport has almost doubled in the past 3 years, and a significant change in the number of bird strikes has not been recorded. Moreover, there have been no reported bird strikes at the airport in the last 8 years (Honaker pers. comm.). It is anticipated that the potential for increased bird strikes will be evaluated in the environmental compliance documents and avoidance measures identified if it is determined that an increase in bird strikes is likely to occur.

Kirby Canyon Landfill Development

Direct, permanent impacts associated with the Kirby Canyon Landfill development in Fill Areas 3 and 4 include loss of natural land cover types in the footprint of the fill areas and of supporting facilities including roads and sedimentation basins. Temporary impacts may occur in areas where the ground is disturbed during landfill operation activities but revegetated to pre-project or ecologically improved conditions within the time allowed for temporary impacts.

Indirect impacts associated with noise and light are not expected to increase over the current level since the Plan assumes that the amount of waste deposited to the landfill (also called the “disposal rate”) will remain consistent with current operations. Indirect impacts could occur if the landfill lining fails, and water that has come in contact with waste (called “leachate”) enters the natural ground or surface water system. However, considerable technological efforts are used to prevent leachate from coming into contact with groundwater, and potential impacts are both regularly monitored and addressed by state over-sight agencies. Overall, landfill design and construction methods are sufficiently advanced that a significant indirect effect is unlikely to occur. If it does occur, the mechanism to stop and repair the impact is in place through agency regulation (i.e., the Regional Water Quality Control Board). This Plan does not authorize take associated with a failure of the landfill lining.

Off-Channel Groundwater Recharge Ponds

Several water supply projects are planned in the permit area during the permit term. These include the development of groundwater recharge sites on the valley floor in the Coyote Valley and around San Martin; and infrastructure, such as access roads and conduits, required to support these projects. Implementation of these projects would result in permanent impacts on land cover within the footprint of each project (i.e., loss of undeveloped land cover types to new structures). As is true of other capital projects, some temporary impacts outside the project footprint are expected during construction due to access and staging

needs. Direct impacts of operating new off-channel groundwater recharge basins include potential entrainment of covered aquatic species in outtakes from creeks.

Increases in the number of groundwater recharge sites may result in an increase in groundwater levels, and thus there is a potential to affect local streams by increasing in-channel flows. This effect is only expected to be observed during winter and spring when surface water is most available and SCVWD is actively working to recharge groundwater basins. Any increase in in-channel flows may help to offset the reduction in winter flows resulting from the operation or reservoirs and recharge ponds described in Section 4.3.3 *In-stream Operations and Maintenance* subheading *Reservoir and Recharge Pond Operation*. However, changes to groundwater levels due to recharge that occur within the same hydrologic unit (e.g., the south county Pajaro River basin) may result in no net change in average groundwater levels over time if the recharge and extraction are occurring at equal levels. This will likely be the situation in an average water year. Wet water years may experience high levels of recharge with reduced pumping and stream flows could increase (consistent with the natural process of a wet water year). Dry water years may result in reduced availability of water supplies, and thus less groundwater recharge will occur, more consistent with existing conditions where no recharge ponds currently exist.

Indirect effects of groundwater recharge basins may result from new ponds supporting nonnative predators of covered species. This potential affect could be exacerbated if the new ponds provide habitat to covered species (e.g., vegetation around ponds) and recreational access to the general public. As discussed above, ponds that allow recreational access may be targets for illegal dumping of invasive species (e.g., bass or red-eared slider turtles) that could prey upon covered species using the ponds.

It is unlikely that these projects would result in unanticipated population growth, because these projects are planned to meet currently anticipated demands.

Other indirect impacts may result from the construction of new access roads in areas of little development. As discussed above, new roads in rural areas can cause habitat fragmentation and obstruction of wildlife movement corridors. However, these factors are unlikely to be an issue for three of the four proposed groundwater recharge ponds, because the ponds are located on the valley floor in Morgan Hill and San Martin in an area that is already urbanized or rural residential. The fourth pond is planned for the Coyote Greenbelt in an agricultural area. Because this area is already developed for agriculture and has development both to the north and south of it, it is likely that existing roads may be used to access the site and that habitat and connectivity will not be further affected.

Park Facility and Trail Construction

The cities, County, and Open Space Authority will construct new park facilities and trails in the permit area within the permit term of the Plan. Each of the three cities has developed a master plan for parks and trails within respective planning

limits of urban growth. The County has also developed master plans for each of its parks for which new facilities and trails are proposed (see Section 2.3.5 *Rural Capital Projects* for a full list of master plans).

Major components of developing new parks include the construction of a park entrance (if one does not exist), access roads, staging areas, parking areas, and new trails. Construction of these facilities will have permanent and temporary direct impacts similar to those of other capital projects (i.e., permanent conversion of land cover beneath the footprint of the project, with temporary impacts occurring in a buffer zone around the project site). Ground disturbance due to construction would likely increase the spread of nonnative species, especially in areas not previously disturbed. New trails will be sited to avoid streams and adjacent riparian vegetation whenever possible in accordance with the conditions identified in Chapter 6. However, some new trails will require creek crossings that may result in removal of riparian vegetation and construction of bridges. While some temporary impacts on streams are likely to occur during project construction, many impacts can be avoided through implementation of avoidance and minimization measures and other mitigation measures. In addition, permanent impacts on streams can be avoided through use of appropriate design of crossings (e.g., free-span bridges).

New trails may also require construction materials (e.g., rock, soil, clay) that are taken from borrow sites. Specifically, County Parks anticipates using up to 3 acres for development of borrow sites. This amount of borrow would be used across all parks throughout the permit term. Whenever possible, borrow sites will be located so that they can be used to create habitat for covered species (e.g., a borrow site can be used as a created pond for California tiger salamander). In these cases, development of borrow sites will result in the conversion of one land cover type (e.g., grassland) to another land cover type (e.g., pond). Areas around the borrow site may be temporarily disturbed during borrow site construction.

New park facilities will include parking areas, both unpaved and paved, and new trailhead facilities for multiple trail uses which may also include construction of restrooms, fencing, railing, boundary controls, kiosks, and access roads to the trailheads. Whenever possible, these facilities will be developed in existing disturbed areas and are sited to avoid sensitive land covers. Streams and riparian land covers will be avoided entirely. However, some direct loss of non-developed land covers is expected.

Development of new large recreational facilities such as golf courses will have similar impacts as described for urban development. County Parks anticipates that development of such large facilities will occur in valley floor areas in urban or rural residential settings, thus these facilities are more likely to affect urban and agriculture natural communities as opposed to other less developed natural communities and land covers.

In addition to developing new recreational facilities, County Parks anticipates conducting restoration and resource management activities on lands that are not included in the Reserve System. Restoration and resource management projects

on these lands will have similar impacts to those described below under Section 4.3.7 *Conservation Strategy Implementation*.

Indirect impacts related to development of trails and new trailhead facilities are largely related to ongoing anticipated use of trails and facilities, as well as to inappropriate use of trails (e.g., off-trail hiking, illegal dumping). Indirect impacts related to public use of regional parks and open space as described above in Section 4.3.1 *Urban Development* may result from improved trail access to new open spaces, including areas in the Reserve System. These impacts may be minimized through supervision of regional trail use, education of open space users, and restricted or managed access to open space. Indirect impacts may also be related to increased noise in areas where trail head facilities are located, increases in the amount of trash that escape into natural areas and into local streams, and increased use by pets which may harm or harass covered species. Development of fishing ponds and stock ponds may increase the presence of nonnative species like bullfrogs and red-eared sliders that predate on and compete with covered species.

Up to 40 wells or spring boxes may be constructed in County parks. These wells and spring boxes have the potential to indirectly impact seeps, springs, stream flow, and riparian vegetation health. If a well is placed in such a manner that it draws down groundwater levels along a reach of stream, that reach may experience reduced flows. Reduced flows can occur either from a reduction in groundwater supporting the streamflow or from the more rapid percolation of flows from the upper watershed into the channel substrate, filling the space once occupied by groundwater. Reduced flows may degrade aquatic habitat or prevent riparian vegetation from obtaining adequate water. Lowering of the groundwater table could also result in the drying up of seasonal wetlands or seeps. The wells and spring boxes installed in County parks are not expected to have an effect on groundwater level due to the low level of extraction required to support ponds and because wells will be sited to avoid impacts to aquatic land covers. Wells that are found to result in adverse effects to adjacent streams will be decommissioned and sited elsewhere.

A beneficial effect of developing trails in suburban or urbanizing areas, such as the Coyote Valley, is that trails (e.g., Coyote Creek trail within the Coyote Creek Parkway) have been documented to facilitate nocturnal movement of wildlife such as American badgers, bobcats, Tule elk and other species within the riparian corridor and eventually across the valley floor.

4.3.5 Rural Operations and Maintenance

Rural infrastructure requiring maintenance includes trails, roads, buildings, and park trailhead facilities. Maintenance activities are generally expected to have minimal permanent or temporary direct impacts because the vast majority of these activities occur within the disturbed roadbed or shoulder or in other areas that have been previously disturbed.

Utility Maintenance

Existing utility lines, including pipelines, will likely require maintenance and possibly replacement during the permit term. Most of these lines will be underground and may require excavation to access the lines. Direct impacts include ground disturbance resulting from excavation, access, and staging. All natural areas disturbed by utility maintenance activities will be returned to pre-project or ecologically improved conditions in the time allowed for temporary impacts and in accordance with the conditions in Chapter 6 or the impact will be considered permanent. Indirect impacts associated with this activity are similar to those of other ground-disturbing work; such impacts can be avoided and minimized with use of appropriate avoidance and minimization measures described in Chapter 6.

Facility Maintenance

Facility maintenance refers to maintenance of existing facilities such as buildings, roads, trails, parking lots, airport property, and so on. A large component of this maintenance is vegetation management. Vegetation management along road shoulders and rights-of-way may have the potential to disturb a narrow strip of habitat for covered species and possibly to injure or kill individuals that occur in this habitat. Impacts can be associated with accessing areas, clearing vegetation in order to perform maintenance activities, or managing vegetation to prevent overgrowth and for fire prevention and management. Impacts may also be associated with application of fertilizers or pesticides that are commonly applied to landscaped areas or turf maintained for public parks, play fields, and golf courses. Over application of fertilizer and pesticides may result in these substances washing off the target vegetation and entering local streams where it may cause indirect impacts including algal blooms or mortality of non-target species, including covered aquatic species. Impacts related to vegetation management may be permanent or temporary (e.g., trees completely removed may not reestablish, while mowed vegetation will likely regrow in a short time). Maintenance work involving minor grading or soil disturbance could cause increased sediment discharge into watercourses. However, implementation of standard avoidance and minimization measures should help reduce temporary impacts of such activities.

SCVWD maintains off-channel groundwater recharge ponds. Direct impacts on wetland vegetation around the perimeter of the ponds may result from accessing basins for sediment removal or to clear the areas around intake and outlet structures. Impacts may also occur from annual dry-cycling (when the pond is drained and maintained in a dry condition) which can eliminate aquatic species and standing biomass. This maintenance would adversely affect covered species using the pond; however, it is also beneficial as it eliminates any exotic species or vegetation using the pond. Elimination of exotics also helps slow the spread of exotic species from ponds into surrounding natural areas. These impacts are expected to be minimal and would equal approximately 20 square yards at each facility. Facilities would be maintained approximately once every year (J. Abel

pers. comm.). SCVWD also maintains 39 rain gages throughout the permit area, mostly in the upper watersheds and away from streams. Maintenance activities focus on vegetation clearing to maintain the catch of the gages. In addition, some vegetation clearing may be required to access gages from roads or trails.

The County of Santa Clara conducts maintenance of its facilities including, but not limited to, medical facilities, correctional facilities, shelters, shooting ranges. Some of these activities may directly affect non-developed land covers or result in indirect effects similar to other effects described in this section (e.g., temporary loss of natural land covers, temporary increases in light and noise pollution).

County Parks conducts maintenance of infrastructure such as trails, roads, parking lots, and offices that may include treatments such as mowing for fuel breaks. Such maintenance could result in direct temporary impacts, especially if work is conducted on trails through sensitive land cover types. However, as a natural resource management agency, County Parks implements avoidance and minimization measures and strives for zero impact in all its operations. Any impacts on upland land cover types resulting from operations and maintenance in County parks is likely to be minimal.

Vegetation management conducted during the migratory bird breeding season could result in the loss of habitat for migratory covered birds such as western burrowing owl, least Bell's vireo, or tricolored blackbird. The Habitat Plan requires that vegetation management occur outside the migratory bird nesting period, or surveys will be conducted before clearing to avoid these impacts (see Chapter 6, Section 6.3, subheading *Condition 1 Avoid Direct Impacts on Legally Protected Plant and Wildlife Species*).

Rodent, pest, and invasive plant species abatement activities may be conducted for facilities maintenance. Animal traps, pesticides, and herbicides may be used to control rodents, pests, and invasive plant species. Pesticides and herbicides have strict handling and application requirements; however, potential indirect effects include potential effects on non-target species by applied chemical treatments. For example, pesticide placed for rodents could affect California tiger salamanders seeking refuge in rodent burrows. These potential effects will not be covered under the Section 10(a)(1)(B) permit.

Pond Maintenance

Pond maintenance outside the Reserve System will be implemented consistent with the covered activity description in Chapter 2 and conservation actions for pond maintenance in Chapter 5. Impacts will be consistent with those described below in Section 4.3.7 *Conservation Strategy Implementation* subheading *Activities within the Reserve System*.

SCVWD Pipeline Maintenance Program

SCVWD developed an EIR for the Pipeline Maintenance Program that identifies direct permanent and temporary impacts of a variety of activities, including staging, off-road access, pipeline drainage, excavation, and repair. Impacts may affect aquatic resources and riparian or upland natural communities. Direct impacts associated with staging are similar to other staging impacts described above. Off-road access may cause temporary impacts on upland vegetation around accessed pipelines or on riparian vegetation where creek access points are established so that blow-off (pipeline drainage) can be directed to local watercourses. Off- road access may also result in direct mortality or injury of covered species. These effects will be minimized because SCVWD will use existing access roads wherever possible and will limit off-road travel to disturbed areas. Off-road travel will avoid sensitive communities such as wetlands and known occurrences of covered plants. Blow-off may cause disturbed soil and vegetation at blow-off locations, increased flows in the receiving channel, and channel erosion. Excavation may be required to access buried pipelines in upland or riparian areas.

SCVWD will utilize avoidance and minimization measures to reduce the level of impact caused by these covered activities (see Chapter 6).

Indirect impacts associated with the Pipeline Maintenance Program include temporary increases in dust and noise around project areas. Off-road vehicle travel could also result in the spread of nonnative invasive plants. Other indirect impacts may result from temporarily altered flows downstream of the site where pipeline water is discharged. Changes in flow could result in impacts similar to those described in Section 4.3.1 *Urban Development*. However, the scale of impact would likely be much smaller due to the frequency of maintenance (no more than 10 blow-offs per year and maintenance of up to five pipelines per year) and the implementation of avoidance and minimization measures. Additional indirect impacts could occur if blow-off water is a different temperature than stream flow, causing a temperature fluctuation in the stream.

4.3.6 Rural Development

Rural development, or exurban development, is loosely described as low-density development at or beyond the rural-urban fringe (Glennon and Kretser 2005). Direct and indirect impacts related to rural development are similar to those discussed above in Section 4.3.1 *Urban Development*. Many important causes of habitat loss and fragmentation stem from changes of land use on private lands, especially conversion of agricultural lands to residential development (Theobald 2003). Development of homes and associated structures (e.g., roads, garages, barns, stables, vineyards) and non-residential development (e.g., telecommunications facilities, agricultural structures, rural commercial development, recreational use areas) in rural areas, including ranchland, will have direct impacts on natural land cover types in areas where structures and infrastructure are built. While the footprint of development per acre may be

lower, the impact of habitat fragmentation is higher in rural areas than in urban areas, because the existing landscape is generally less disturbed prior to project construction. From an ecological perspective, this dispersed pattern of development effectively maximizes the individual influence of each home on the land (Lenth et al. 2006).

Moreover, private roads and driveways are often required to access rural homes; such roads further fragment the landscape and potentially degrade movement corridors for covered species. New roads can also create new hazards or barriers to other native species that depend on long-distance dispersal and movement for survival (e.g., American badger, Tule elk, black-tailed deer, bobcat, mountain lion). Finally, roads and other linear projects create dispersal corridors for nonnative plants. Exurban development tends to result in an increase in generalist wildlife species commonly found in urban areas (e.g., opossum, skunk, coyote, American crow), and a decrease in specialized or human-sensitive species (Glennon and Kretser 2005; Lenth et al. 2006). Such trends decrease the health of natural communities and could result in harm of covered species. Cumulatively, these rural development projects fragment the landscape and make it more likely that wildlife populations will become segmented and isolated.

Impacts from light pollution and noise may also be more significant when introduced into areas where they did not previously exist. Noise from vehicle traffic can disrupt nesting birds and typical movement patterns of terrestrial animals. New sources of light in formerly unpopulated areas can affect the ability of some species—especially birds, bats, and many species of insects—to navigate at night.

In addition to residential development, industrial private development projects include the Z Best Composting facility, the Pacheco Pass Landfill, and Freeman Quarry. The County has identified three public projects that may require ground disturbance: James Ranch and Holden Ranch (separate facilities but physically adjacent), the Muriel Wright Center, and the Mariposa Lodge and Sheriff's Firing Range (separate facilities but physically adjacent). These activities would also result in conversion of natural or semi-natural land cover types to developed land cover types and result in similar impacts as described for other rural development projects. The Mariposa Lodge and Sheriff's Firing Range facilities are located in serpentine bunchgrass grassland and implementation of this project is expected to affect up to 27.5 acres of this land cover type.

Indirect impacts on natural land cover and covered species may result from an increase in impermeable surfaces; as described above in Section 4.3.1 *Urban Development* such increases can result in impacts on streams. Additional indirect impacts on streams could result from the use of septic systems. If leach fields are sited too close to waterways, the nutrient-rich liquid exiting the septic tank may travel into the waterway and cause abundant algal growth, degrading water quality. Leach field seepage may also alter the native vegetation if nutrient-rich water reaches the surface. Within the study area, water quality impacts may arise from the use of pesticides and/or fertilizers on small "hobby" orchards or vineyards, or from horses or other livestock that are kept close to streams. Similarly, new agricultural facilities, such as commercial stables, equestrian

event facilities, and wineries, may also produce waste that is rich in nutrients or other potential pollutants for local streams. In addition, exposed soils common to vineyards and equestrian or livestock enclosures are potential sources of erosion and sediment input to streams. This is exacerbated in cases where vineyards are developed in steep terrain. Existing County ordinances, as well as strict NPDES permits overseen by the Regional Boards, require many avoidance and minimization measures targeted at protecting water quality in local streams.

Existing land use restrictions and requirements also substantially limit the footprint and extent of rural development. For example, almost all of the areas intended to be incorporated into the Reserve System (see Chapter 5) are large land holdings designated as Hillside or Ranchland land uses under the County General Plan. In these areas, the maximum development density allowed is one residence per 20 to 160 acres, based on the average slope of a parcel. Subdivision of sites designated Hillside or Ranchland seldom occurs and this pattern is not expected to change during the permit term due to the physical challenges of development in most of the study area. Under County policies, most subdivision proposals for Hillside parcels are required to cluster future development and preserve a minimum of 90% of the site as open space. If suitable (as determined by the Implementing Entity), these large set-asides could be incorporated into the Reserve System. County policies and regulations also require that grading be minimized in Hillside and Ranchland areas through the site design process, which emphasizes compact development. These land-use restrictions help to minimize the effects of rural development on covered species and natural communities.

4.3.7 Conservation Strategy Implementation

Activities related to the implementation of the conservation strategy that may result in impacts are separated into two groups: activities that will occur within the Reserve System and activities that will occur outside the Reserve System. Both groups of activities are described below.

Activities within the Reserve System

Activities within Plan reserves are expected to have a net benefit on all covered species (see Chapter 5 *Conservation Strategy*); nevertheless, some conservation actions may have temporary or limited permanent adverse impacts on covered species, resulting in take. In other cases, activities that are designed to benefit one or more covered species may harm another set of covered species. However, the Plan Reserve System is designed to be large and diverse enough to ensure that the net effect of all reserve activities is beneficial to all species across the system.

Some habitat enhancement, restoration, and creation activities may temporarily and adversely affect wildlife habitat. For example, planting emergent vegetation in stock ponds could temporarily disturb amphibians occupying the pond.

Periodic dredging of ponds to maintain pond capacity and habitat quality may also have temporary adverse effects on pond species. The cleared bank conditions that precede establishment of native riparian plants can also trigger rapid establishment of weedy or undesirable aggressive species if these species are not controlled at the site. Man-made livestock pond removal will be only undertaken if removal improves the functional values of the site or if the pond is a safety hazard. If such actions are taken, the Implementing Entity will replace the pond lost with a new pond in another location in the Reserve System consistent with the requirements of the conservation strategy. Naturally formed ponds will not be removed.

Another example of habitat enhancement actions that may temporarily and adversely affect wildlife habitat is road removal. Road removal will only be undertaken if the benefits are determined to outweigh the adverse effects. For example, it may be appropriate to remove a road that is poorly sited such that it is contributing to localized erosion. It may not be appropriate to remove a road that is not causing other adverse impacts. In such cases, instead of removal, a road may simply be closed off from access.

Monitoring and research activities required by the Plan (see Chapter 7 *Monitoring and Adaptive Management Program*) may also disturb wildlife. For example, in order to determine the presence of some covered species (e.g., California red-legged frog tadpoles), individuals must be handled by a qualified biologist. Such handling constitutes harassment—a form of take—under ESA and requires authorization. All biologists conducting monitoring under the Plan (i.e., Implementing Entity staff or their consultants) will be covered for their monitoring activities should any take occur. See Chapter 6, Section 6.8.5 *Item 5: Results of Applicable Species Surveys and Monitoring* for details on biologist certification to conduct monitoring activities. Translocation activities, which must be coordinated with and approved by the Wildlife Agencies, could also cause take through injury or loss of individuals due to capture, handling, transportation, release, and/or the inability of the individual to find new shelter.

Terrestrial management activities may also disturb or inadvertently harm covered species. For example, fuel breaks must be created in key areas of the Reserves to minimize the risk of wildfire and to protect structures and adjacent lands. Creating and maintaining these fuel breaks may have minor adverse effects on grassland-dependent species such as western burrowing owl and Bay checkerspot butterfly. Prescribed burns will be designed to provide long-term net benefits to natural communities and covered species. However, these burns may result in take of some covered species during the burn. For example, burns in serpentine grassland may adversely affect serpentine covered plants or take Bay checkerspot butterfly larvae. Prescribed burns in annual grassland may temporarily adversely affect western burrowing owl (although burns may also provide new sources of prey to these species, such as insects escaping flames and smoke). Wildfires may have similar adverse effects on covered species as prescribed burns, but these effects may be more severe due to the greater size and intensity of wildfires.

The conservation strategy calls for installation of up to 49 wells to support ponds in the Reserve System. Potential indirect effects related to the installation of

groundwater wells were previously described in Section 4.3.4 *Rural Capital Projects* subheading *Park Facility and Trail Construction*. The groundwater wells installed to support ponds in the Reserve System are not expected to have an effect on groundwater level due to the low level of extraction required to support ponds and because wells will be sited to avoid impacts to aquatic land covers. Wells that are found to result in adverse effects to adjacent streams will be decommissioned and sited elsewhere.

Recreational or management facilities built and maintained within the Reserve System could result in a small amount of habitat removal. Facilities will be sited and built to avoid or minimize their effects on covered species, but a small amount of take may nevertheless occur. The Permittees are covered for incidental take of covered species resulting from public use within the permit area, inside or outside of the designated Reserve System, provided that usage is consistent with park management plans and the guidelines of this Plan. Although the permits do not cover incidental take for private individuals, recreational activities allowed on reserves are expected to have some minor impacts on covered species. Heavily used trails would result in some permanent indirect impacts on wildlife habitat connectivity. Since wildlife is most active at dawn and dusk or at night, disruptions of wildlife movement are not anticipated to be significant. Trails can fragment otherwise intact landscapes and can also facilitate predator movements and invasion by nonnative animals (e.g., feral cats, dogs, pigs). Trails are often a source of invasion by nonnative plant species that are transported into the reserve by trail users. As described in Chapter 5 *Conservation Strategy* recreational uses will be limited to low-intensity activities such as hiking, wildlife observation, horseback-riding and non-motorized bicycling. Any new trails will be carefully sited and maintained to minimize the disturbance of habitat and wildlife, as well as sited and maintained to avoid disturbance of cultural and archaeological resources within reserve areas. Despite these restrictions, some take in the form of harassment associated with recreational activities is expected to affect covered species that are sensitive to human disturbance.

Implementation of the Plan conservation strategy could also affect covered plants through habitat enhancement or restoration and creation which could result in removal of or degradation to species habitat. Plant populations in the Reserve System could also be temporarily affected by management activities such as prescribed burning or livestock grazing although the long-term effects of these activities are expected to be positive. The Plan also includes many types of monitoring which can occasionally have impacts on individual plants in the form of trampling or soil disturbance. In all of these cases, the benefits from Plan implementation are expected to greatly outweigh any negative effects of implementation on the covered plants.

In addition to the conservation actions described above, it will also be necessary for the Implementing Entity to install or replace infrastructure in the Reserve System including signage, fences and gates, field facilities, dirt roads, paved roads, vehicle bridges, and culverts in order to conduct required management and monitoring activities. These activities would have permanent impacts similar to other covered activities. Temporary construction impacts are likely as well. All

facilities within the Reserve System will be sited on already disturbed areas to the extent possible and in areas that minimize effects on covered species. All activities will comply with the conditions on covered activities in Chapter 6.

Activities outside the Reserve System

The Plan proposes to conduct stream and riparian restoration and other conservation actions, including removal of invasive weeds (e.g., *Arundo donax*), that will occur outside the Reserve System. As discussed in Chapter 5 (Section 5.2.3 *Reserve System*), these actions will require agreements to be reached with landowners regarding the installation and maintenance of the conservation actions. The Plan also calls for management of western burrowing owl, and the possible creation of a Coyote ceanothus occurrence outside of the Reserve System.

Stream and riparian restoration activities may result in temporary direct impacts during construction including loss of vegetation during restoration project construction, or removal of invasive weeds. All areas that experience reduced vegetative cover during construction will be replanted and monitored, in accordance with Chapter 7, to ensure that riparian vegetation reestablishes as part of the restoration project. As with implementation of conservation actions inside the Reserve System, these conservation actions are expected to have a net benefit on covered species that utilize stream and riparian habitats.

Burrowing owl management actions could occur on managed lands outside the Reserve System. These activities will likely occur on sites that have been previously impacted (e.g., capped landfills) as well as at sites that are more natural in nature (e.g., foothill grasslands). Burrowing owls prefer nesting sites with ample burrows, low slopes, and short grass. As such, a key management action will be to mow or graze management sites. It is not expected that this management will affect many other covered species as burrowing owl nesting habitat does not extensively overlap with habitat of other Plan covered species. However, if areas in the foothills are managed for owls, there is the potential for these sites to be also used by California tiger salamander or California red-legged frog for refugia. These species, as well as burrowing owl, may be temporarily affected by management activities due to presence of people, livestock, or equipment.

The Plan allows for the creation of new Coyote ceanothus populations outside the Reserve System. Coyote ceanothus is a large, woody shrub that often grows in dense, monotypic stands. Because of the possibility that a new creation could displace serpentine grasslands, siting of a created occurrence will minimize the potential for displacement of habitat for other covered species. The Implementing Entity will develop a plan with the Wildlife Agencies for the occurrence creation. The plan will include measures to avoid other covered species.

Monitoring for covered species and natural communities will also occur outside the Reserve System in the situations described above. Some monitoring actions

may result in temporary harassment of covered species in order to identify, measure, or tag individuals.

Neighboring Landowner Assurances

Because the conservation strategy aims to increase populations of covered species through habitat enhancement, restoration, and creation, certain species may disperse out of the Plan reserves where active management is undertaken and onto neighboring private lands. This Plan includes a Neighboring Landowner Assurances program to protect landowners in the permit area near reserves from the regulatory consequences of special-status species dispersing onto their property. Private lands within 1 mile of the Reserve System that are actively used for agricultural purposes (e.g., crop production) will receive take coverage under the Plan. The rationale for the 1 mile radius is described below. Coverage for nonagricultural lands is unnecessary because take coverage is already provided for urban and rural development; see Chapter 2.

Coverage will be provided to agricultural operations only for take beyond the baseline condition that existed prior to the establishment of the neighboring Reserves and only for ongoing and routine agricultural activities[5] on lands enrolled in the Neighboring Landowner Assurances program. Participation in this program is voluntary and landowners will be able to opt in for coverage. Coverage under the Neighboring Landowner Assurances program expires when the permits expire. See Chapter 10, Section 10.2.7 *Assurances for Private Landowners* for additional details of this program.

The impacts associated with the dispersal of covered species onto neighboring lands are anticipated to be very limited and restricted to species that meet the criteria listed below.

- Species that are expected to increase in numbers on the Reserves.
- Species that are likely to spread onto neighboring lands as populations increase.
- Species for which there is a reasonable likelihood of take from routine, ongoing agricultural activities.

The Neighboring Landowner Assurances program will extend coverage only for three species: western pond turtle, California red-legged frog, and California tiger salamander.

Although California tiger salamander, California red-legged frog, and western pond turtle are capable of dispersing further than one mile, a one mile buffer was chosen to account for typical dispersal range of these species. Covered species are expected to disperse or move more than 1.0 mile but this radius accounts for the most likely area of effect into neighboring lands.

[5] See Chapter 2 for a definition of ongoing and routine agricultural activities.

Based on the landowner participation in other counties with approved HCPs that have similar programs (e.g., San Joaquin County), it is assumed that up to 10% of eligible lands will enter into neighboring land agreements, or no more than 2,040 acres. Of this, it is assumed that most of the potential impacts will occur on land cover types that support farming (agricultural and grassland land cover types) which are used by California tiger salamander, California red-legged frog, and western pond turtle for non-breeding or dispersal habitat, not as breeding or primary habitat. The estimated range of acres impacted represents between 0.1% and 0.6% of modeled habitat for the species covered in the Neighboring Landowner Assurances program.

Adverse effects from allowable agricultural activities on western pond turtle, California red-legged frog, and California tiger salamander could result from rodent control, active farming practices, vehicle and machinery travel, runoff from fields, or disturbance to adjacent streams or wetlands. The habitat for these three species is typically of low quality (and non-breeding), so the magnitude of impacts is expected to be low or very low.

Like Safe Harbor Agreements offered by USFWS, the Neighboring Landowner Assurances program does not allow take of species present before the Reserve was established; rather, coverage is restricted to species that disperse onto lands after the creation of the neighboring reserve. Take granted through the Neighboring Landowner Assurances program may slightly reduce the beneficial effects of the conservation strategy. The Neighboring Landowner Assurances program is described in detail in Chapter 10 *Assurances*.

4.4 Impact Assessment Methods

Implementation of covered activities will result in some incidental take of covered species. To meet regulatory requirements, to properly mitigate effects, and to distribute fees equitably, the amount of take must be discussed and, if possible, quantified. The allowable amount of take from permanent and temporary direct impacts is quantified by estimating impacts on land cover (methods for impact estimation are described below) (**Table 4-2** and **Table 4-3**, respectively). The total impacts by land cover type shown in these tables are the allowable impacts under the permits and the primary way in which impacts will be tracked during implementation to ensure permit compliance. Impacts to plant populations will also be tracked to ensure permit compliance, as described below under *Effects on Plant Occurrences*.

Figure 2-6 and **Figure 2-7** show where many of the capital improvement projects proposed for coverage under this Plan are occurring. The amount of take is also described by estimating permanent and temporary direct impacts on modeled habitat for covered species (**Table 4-4**) and on plant occurrences (**Table 4-6**). If species habitat is not modeled, then land cover proxies are developed. The amount of take from indirect impacts is discussed qualitatively. A discussion of how the impact estimates were derived is provided below in Sections 4.4.1 *Direct Effects* and 4.4.2 *Indirect Effects*.

Because of the broad geographic and temporal scope of the Plan, the impact assessment has been conducted at a programmatic level. The impact numbers presented in this Plan are intended to reflect approximate losses and impacts rather than a precise quantification of impacts on land cover types. Total allowable impacts as described and quantified in the Plan (see **Tables 4-2, 4-3, 4-4, and 4-6**) represent the limit, or cap, on total impacts allowable under the Plan. Once these impact levels are reached, no further take is permitted pursuant to the Plan. Covered activities described in Chapter 2 do not have project-specific impact limits, although activities must be implemented consistent with the conditions described in Chapter 6. The Implementing Entity tracks impacts during Plan implementation to ensure that no covered activities are conducted beyond the capped impacts. As covered activities are implemented, specific impacts will be more accurately quantified. In general, project-specific impacts will be quantified in conjunction with the CEQA process and/or the development permit application process with a local jurisdiction (see Chapter 6). The goal of the impact analysis is to identify practical and appropriate impact assumptions to ensure the Local Partners full coverage for implementing covered activities throughout the permit term and to adequately fund the conservation strategy.

4.4.1 Direct Effects

As described in Chapter 2, the covered activities are broad in scope and address the needs of all Local Partners. To quantify direct impacts on land cover types and streams, covered activities were grouped as they are in Chapter 2. These categories are Urban Development, In-Stream Capital Projects, In-Stream Operations and Maintenance, Rural Capital Projects, Rural Operations and Maintenance, Rural Development, and Conservation Strategy Implementation. Two additional categories—In-Stream Construction and Rural Construction—were added to address temporary, one-time impacts associated with construction of identified capital projects. In-Stream and Rural Construction impacts were identified for the area immediately adjacent (i.e., the area immediately surrounding the project area) to capital project footprints to account for the staging of project construction. As previously defined in Section 4.2 *Definitions*, temporary staging areas would result in temporary impacts to land cover; and will be returned to pre-project or ecologically improved conditions within the time allowed for temporary impacts. Major individual and collective projects or activities with the potential for significant impacts were identified for each category. Smaller-scale activities such as vegetation management and monitoring are captured in the analysis of operations and maintenance impacts. Covered activities that affect very small areas (less than 0.1 acres) were not individually assessed. These activities are still covered under this Plan; however, impacts related to these activities are assumed to be absorbed by the impact estimates developed for larger covered activities. Examples of such covered activities include off-trail monitoring and management activities conducted as part of the conservation strategy implementation.

In addition to grouping activities by the nine identified categories, impact mechanisms within each category were analyzed as either permanent or

temporary. While the impacts from covered activities have both permanent and temporary aspects (see Section 4.3 *Impact Mechanisms*), in most cases the associated impacts are largely either temporary or permanent. To facilitate the analysis and because parsing temporary and permanent impacts within categories would have a minimal effect on the results due to the programmatic nature of the analysis, only the dominant impact type is considered in each category.

Categories identified as having permanent impacts to land cover and species habitat are Urban Development, In-Stream Capital Projects, Rural Capital Projects, Rural Development, and Conservation Strategy Implementation. These categories were identified as permanent because they generally include the construction of structures that would result in permanent loss of the land cover on which they are built. Conservation Strategy Implementation falls into this category because of the permanent impacts associated with constructing new facilities such as fire/access roads, trails, visitor centers, and kiosks.

Categories identified as primarily[6] having temporary impacts to land cover and species habitat are In-Stream Operations and Maintenance, In-Stream Construction, Rural Operations and Maintenance, and Rural Construction. Operations and maintenance and construction impacts were considered temporary because operations and maintenance and construction activities were assumed to affect natural land cover types for a limited time and because these sites would return to pre-project or ecologically improved conditions within the time allowed for temporary impacts. Examples of temporary impacts include mowing and construction staging, which generally take place adjacent to a project footprint. Three exceptions to this grouping specifically called out in the Section 4.3, *Impact Mechanisms,* are SCVWD's Dam Maintenance Program, SCVWD's water supply operations and maintenance, and SCVWD's one-time vegetation management in lower Llagas Creek. Areas maintained under the Dam Maintenance Program and for water supply operations and maintenance (e.g., diversions structure and stream gage maintenance) will be maintained at such a level that the impacts will effectively result in a permanent loss of vegetation. Similarly, once vegetation in lower Llagas Creek is initially reduced, it will then be maintained under the Stream Maintenance Program. The initial reduction in vegetation is therefore more accurately a permanent reduction. Both of these covered activities are assessed as permanent impacts under the In-Stream Capital Project category.

Impacts on streams were identified in all impact categories as appropriate (i.e., for all projects that may have in-stream impacts). A permanent impact on a steam results from a loss of natural structure or function. Examples of activities resulting in permanent stream impacts include installing hardscape in the channel, culverting the channel, constructing a new bridge over the channel, or reducing channel complexity (e.g., removing riffle, runs, or pools). Examples of temporary stream impacts include dewatering, removal of in-stream vegetation so

[6] The assumption that operation and maintenance activities would result primarily in temporary effects was made for the purposes of estimating impacts for the Plan. The nature of impacts, whether temporary or permanent, will be determined on a project-level basis through the application process described in Chapter 6, where the frequency, duration, and nature of the impact will be documented.

that in-stream habitat is affected, and other actions that temporarily reduce stream function and habitat value.

Impacts to known occurrences of plants are assessed by plant occurrence and location. Methods and assumptions used for estimating impacts to covered plant species are described below.

Baseline Land Cover

To estimate impacts resulting from implementation of covered activities over the course of the permit term, it was first necessary to identify the baseline conditions on which the impacts are assumed to occur (i.e., the anticipated composition and distribution of land cover at the time the Plan is implemented). Establishing a baseline helps to ensure that the amount of permanent impacts estimated in this Plan, particularly within the planning limits of urban growth where impacts are assessed by land use, are appropriately scaled (i.e., to ensure impact are not overestimated). Working with each of the cities and the County, parcels currently permitted for development or anticipated to be permitted by the time of Plan implementation[7] were excluded from the impact analysis and therefore considered part of the baseline conditions. Assumptions used to define the impact analysis baseline land cover are made only for the purpose of estimating an accurate level of take proposed for coverage under the Plan; these assumptions have no bearing on whether an activity may be covered or not. Project proponents for parcels assumed to already have permits may seek coverage under this Plan if the activity is covered, take coverage is available, and if the proponent follows the application requirements described in Chapter 6 (such coverage would be tracked and counted against allowable impacts).

Other parcels and sites were excluded from the impact analysis on the assumption that the existing land cover on these sites would not change substantially within the permit term or that the site was not zoned for urban development. Covered activities may still be implemented in these areas but these covered activities will not substantially change the land cover type (e.g., operations and maintenance activities). Areas excluded for the purposes of identifying baseline conditions are listed below.

- Parcels currently permitted for development or anticipated to be permitted by the time of Plan implementation[8].
- Land use categories Rural Parks and Open Space, Urban Parks and Open Space, Agriculture, Ranchland/Woodland, and Water within the planning limits of urban growth (impacts are assumed to occur on these land uses outside the planning limit of urban growth).

[7] *Permitted* means a local land-use permit such as a building permit or grading permit. Some projects may not yet have endangered species permits, but they could not be covered by this Plan because they would obtain their local approvals before the Plan is completed.

[8] These parcels were only removed for the land cover impact analysis to ensure that land cover impacts were not over estimated. These parcels were not removed for the species and critical habitat analyses.

- Wastewater treatment ponds in Gilroy.
- The Norman Y. Mineta San José International Airport.
- The Reid Hillview Airport.
- State Parks lands.

Effects on Land Cover and Streams

Various methods were used to quantify impacts on land cover and streams. An attempt was made to use a consistent approach; however, impacts of covered activities identified in *Urban Development*, *Rural Development*, and *Conservation Strategy Implementation* were calculated using a different method than most of the impact analyses. The sections below describe the methods utilized.

For all analyses, results were only considered to be impacts if the activity affected *natural* land cover types (i.e., land covers not already developed) or Agricultural and Developed natural community land cover types that may have some habitat value. Developed land cover types considered to hold some habitat value are Rural-residential, Golf courses/Urban parks, Barren, and Ornamental woodland. Non-assessed land cover types are the Agriculture developed/covered agriculture, Urban-suburban, Reservoir, and Landfill types.

General Method

The analyses for In-Stream Capital Projects, In-Stream Operations and Maintenance, Rural Capital Projects, and Rural Operations and Maintenance were conducted in the same general manner. Wherever possible, the impacts of specific covered activities on land cover were modeled using GIS software. The general approach was to utilize a GIS overlay of project footprints or infrastructure on the mapped land cover and assess affected acres. To assess construction and operations and maintenance impacts, buffers were applied to GIS-mapped infrastructure or projects. The assumption is that some amount of surrounding acreage would be the target area for operations and maintenance and construction activities, such as vegetation management and staging, respectively. The same approach was used to assess miles of stream affected by covered activities.

Where GIS data were not available, assumptions were developed to describe the activity and estimate impacts. This process generally entailed describing the acres of impact likely to result from a specific activity, then distributing the acres of impacts across the land cover types likely to be affected by the activity. For example, to conduct the bridge construction/reconstruction analysis, existing bridge length and width information was used to quantify the amount of existing bridge that would need to be replaced within the permit term. An assumption for the amount of bridge expansion that would be required based on changing safety standards was also applied. Impacts of bridge construction were assumed to

affect only the riparian corridor and associated stream. Accordingly, the acres of impact were assigned proportionally to the riparian land cover types within the jurisdiction in which the activity was occurring (e.g., bridge reconstruction impacts in San José were assumed to affect riparian land cover types in proportion to the percent of riparian land cover types in San José).

To identify miles of stream impacts where GIS data were not available, assumptions were developed on the basis of the activity or project description, known or approximated number of stream crossings, and assumptions on crossing width. For example, stream impacts for most bridge projects were estimated based on total number of replaced bridges multiplied by an average assumed bridge width.

Overall, 30% of all estimated permanent impacts were calculated outside of GIS. Of this 30%, 57% of the estimated impacts are attributed to rural development. Approximately 25% of total estimated permanent stream impacts were calculated outside of GIS. For temporary impacts, approximately 41% of all estimated impacts were calculated outside of GIS. Approximately 5% of estimated temporary stream impacts were calculated outside of GIS.

Tables 4-5a through 4-5f provide a summary of the methods and key assumptions used to conduct the impact analysis. These tables are not intended to be exhaustively inclusive of all covered activities. Rather, these tables show how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in these tables. Impacts of these minor activities are assumed to be addressed sufficiently by the approach taken in the impact analysis. Although these tables quantify impacts by project and by each Permittee, this was done for estimation purposes only. Compliance with this Plan will not be measured according to the estimated impacts for each project or Permittee, but rather by total land cover/habitat type impacted by the covered activities as a whole.

Method for Urban Development

The analysis for urban development did not attempt to discern the impact of individual, separate activities, but rather assumed that all areas within the planning limits of urban growth for the three cities with current land use designations of urban development or rural residential development (as identified in **Figure 2-2**, *Land Use Categories*) would be fully affected (i.e., converted to a developed land cover). This assumption does not preclude covered activities from occurring on land uses for urban parks, agricultural, or woodland and ranchland; however, it is assumed that the majority of impacts inside the planning limits of urban growth will occur in areas with urban development land uses. This method also assumes that land uses inside planning limits of urban growth will remain approximately the same over the course of the permit term. As is shown in **Figure 2-2**, the majority of current land use is already urban development with some rural development. This approach will likely result in an overestimate of impacts because some of the Biological Goals and Objectives for

plants include commitments to preserve existing populations (e.g., Coyote ceanothus, Metcalf jewelflower) that are located within the San José, Morgan Hill, or Gilroy planning limits of urban growth. There are two exceptions to the assumption that all current land use designations of urban development or rural residential development will be fully affected. First, in-stream areas (Plan-identified streams, including channel bed and banks, and any adjacent riparian land cover types) were excluded from the Urban Development impact analysis and were assessed under In-Stream Capital Projects or In-Stream Operations and Maintenance on a project-by-project basis. Second, impacts occurring in the City of San José Coyote Valley Urban Reserve and the South Almaden Valley Urban Reserve; the City of Morgan Hill Southeast Quadrant; and the City of Gilroy Hecker Pass Specific Plan are assumed to be developed consistent with rural development. Impacts associated with urban development and its effects on watershed health and hydrology were assessed through an impervious surface analysis. This analysis is discussed in Section 4.4.2 *Indirect Effects*.

Method for Rural Development

The method for calculating impacts of rural development was different than that used for other impact categories because the location and amount of rural development is difficult to predict. In addition, parcel sizes of rural development are highly variable, and the impacts of a single home are often not limited to the footprint of the home and access road. The analysis for rural development was based on the following key assumptions.

- Impact footprints of rural development in the future will be approximately one-third smaller than the footprints evident from aerial photo analysis conducted in 2007.
- The pace of rural development during the permit term will continue at approximately half of the average pace evidenced between 1995 and 2004.
- Rural development could occur anywhere in County jurisdiction consistent with County General Plan and zoning restrictions.

To refine the analysis, County planning staff identified development zones where rural residential development is expected to occur within the permit term. Six zones were identified on the basis of similar development patterns, parcel sizes, topography, and other landscape characteristics (**Figure 4-1**). Rural development was estimated for all areas in unincorporated Santa Clara County in the permit area outside open space (Type 1, 2, or 3) and excluding parcels within the planning limits of urban growth, unbuilt parcels approved for development, the South County Airport, reservoirs, SCVWD percolation ponds, and landfills.

Amount of Rural Development

The estimated annual rate of new home construction in rural areas was based on the average number of residential development permits issued by the County within each development zone from 1995 to 2004 (10 years). The average of 40 permits per year was then applied throughout the permit term for a total of 2,000 permits granted over the 50-year permit term. This amount was then

adjusted downward by just over 50% to account for changing patterns in rural development and the coverage areas on the valley floor (see **Figure 2-5**). In addition, permits were assumed to be distributed throughout each of the development zones, with a greater proportion of the permits assumed to be granted in the valley floor areas. County planning staff verified that each development zone had the capacity to support the projected development. This assessment was based on the number of vacant parcels (parcels with no existing buildings as of the 2005–2006 Assessor's roll) and slope (parcels with greater than 50% slopes were excluded). Where capacity did not exist in a zone, excess development was reallocated to other likely zones.

The estimate of permits for nonresidential construction sites (e.g., greenhouses, agricultural structures, telecommunication towers, rural commercial development) was based on the average number of permits issued from 1995 to 2006 (12 years). This average of 7.5 permits per year was applied to the 50-year permit term and then also adjusted downward.

In addition, six specific rural development projects (three County projects, two landfill expansion projects, and one quarry expansion project) were delineated in GIS and impacts calculated based on an overlay with the land cover layer. Impacts were aggregated with other Rural Development impacts. (The Kirby Canyon landfill project is considered a rural capital project, not rural development, so impacts were not included in this category.)

Footprint of Rural Development

To translate the number of home sites predicted during the permit term to an estimate of land cover and species impacts, an average footprint of homesites was developed through air photo interpretation. The actual footprint of each homesite was digitized on screen in ArcView on the basis of substantial disturbances visible on the same color orthophotos used to map land cover (see Chapter 3). The landscape features listed below, when occurring as part of a homesite, were considered part of the direct impact footprint of rural development because they contained little or no habitat value for covered or other native species.

- Homes.
- Outbuildings.
- Driveways and parking areas.
- Landscaping and other active outdoor use areas such as lawns.
- Recreational vehicle trails.
- Vineyards or orchards.
- Heavily grazed or disturbed areas with bare soil.
- Barns, stables and corrals.
- Dirt roads.

The final impact footprint of each homesite was identified as all contiguous features listed above, plus a 50-foot buffer. This buffer incorporates a space around the area of direct impacts most likely to be affected by general maintenance and use of the space around homes such as landscaping, gardens, livestock enclosures, small outhouse structures, and defensible space as required by state fire codes. This area around the home is also subject to indirect impacts such as light, noise, and runoff.

To refine the methodology, several groups of test parcels were selected in the Santa Cruz Mountains and the Diablo Range and visited in the field. Once it was determined, based on field testing, that methods were being applied consistently, 1,199 parcels within the available developable area were randomly selected for the sampling (28% of all available parcels). The parcels were stratified between each side of the Santa Clara Valley and the valley floor to ensure a geographically representative sample. Of these, 693 parcels had no visible home sites so were discarded. The final sample consisted of 506 parcels that were digitized. Final parcel sizes and locations varied widely in the study area, consistent with actual patterns.

Based on this random sample, the median impact footprint[9] of rural home sites was 2.6 acres in the valley floor and Almaden zones and 3.3 acres in the near hills and remote hills zones (**Figure 4-1**). These impact footprints were adjusted downward to 2 acres per development permit to account for changing development patterns (R. Eastwood pers. comm.). The average impact footprint for nonresidential development was estimated to be 1.9 acres.

This approach does not account for the impacts of rural development on landscape linkages or wildlife connectivity. Some larger rural development projects may degrade landscape linkages or impede wildlife movement. Because of the uncertain location of these large rural development projects, their specific effects on wildlife connectivity cannot be evaluated at this time. However, the Plan has incorporated mechanisms to evaluate these effects during implementation and ensure that the conservation goals and objectives of this Plan related to landscape linkage and wildlife connectivity are still met. They will be met through land acquisition of key landscape linkages before development occurs (see Chapter 5, Section 5.3.1 *Land Acquisition and Restoration Actions*), or through project redesign (see Chapter 6, Section 6.4.4, subheading *Condition 7 Rural Development Design and Construction Requirements*).

Calculating the Impacts of Rural Development

To estimate the impact of rural development on land cover, the total number of expected housing units and commercial development sites over the permit term within each development zone was multiplied by the median impact footprint within each zone. These impacts were then distributed across all land cover types determined to be available for development in proportion to the occurrence

[9] The median value was chosen as the best measure of central tendency of the data because of the strong influence of a few data points with very large footprint estimates. This approach was used for the impact analysis estimate only. Fees on rural residential development will be assessed the fee based on their actual project footprint, as defined in Chapter 9.

of each land cover type within each development zone. Land cover types determined to be available for impact are all those land cover types in the permit area except the cases listed below.

- Parcels excluded from the baseline conditions described above.
- Parcels within the planning limits of urban growth.
- The South County Airport[10].
- Open space types 1, 2, and 3.
- SCVWD groundwater recharge ponds.
- Reservoirs.
- Landfills.
- Areas within the stream setback zone described in Chapter 6 (note that stream and associated riparian land cover impacts were calculated separately from the land cover analysis and are discussed below).

This distribution included urban-suburban, landfill[11], reservoir and developed agriculture land cover types (the four land cover types determined to have no habitat value and for which no fee is required [see Chapter 9]) as it is assumed that some new rural development will occur in these land cover types. This method may over- or underestimate effects on some land cover types (e.g., chaparral is more abundant on steep slopes where rural development is less likely to occur). However, a simpler approach was preferred over a complex model with many more assumptions due to the programmatic nature of this impact analysis. Acres of impact for each land cover type were then summed across each development zone to determine total impacts. In addition to the impacts calculated using this method, the County is requesting an additional 78 acres of impact allowance for development of new or expansion of existing County facilities (e.g., Mariposa Lodge, James and Holden Ranches, and Muriel Wright Center).

To estimate miles of stream affected by rural development it is assumed that one out of every 10 residential developments permitted would result in an average of 20 feet of linear stream impacts, primarily from construction of an access road (R. Eastwood pers. comm.). To estimate acres of riparian vegetation affected by rural development it is assumed that each creek crossing (one per 10 residential developments) is 40 feet wide (outer edge of riparian corridor to outer edge of riparian corridor) and that the entire area under the crossing represents a permanent loss of riparian vegetation. Multiplying 20 feet (linear feet of stream affected per crossing) by 40feet by one-tenth the number of anticipated rural residential developments and converting to acres yields a maximum impact estimate for permanent impacts on riparian land cover types due to rural

[10] While rural development (e.g., construction of homes) is not expected to occur on airport lands, the airport expansion is a covered activity. These impacts were estimated using a site-specific approach informed by the airport's master plan.

[11] Note that Kirby Canyon Landfill fill areas 1, 2, and 5 were exempted from the baseline data; accordingly, impacts from rural development would not be distributed to this area.

development. Note that total riparian land cover impacts may be higher if riparian land cover types occur outside the stream setback area and impacts are identified through the land cover analysis described above. While this analysis captures direct impacts to streams, it does not address indirect impacts such as degradation of water quality due to increased development. These types of impacts are assessed through the impervious surface analysis discussed below in Section 4.4.2 *Indirect Effects*. Rural development will be subject to the conditions identified in Chapter 6, including keeping crossings to the minimum amount required per development and avoiding riparian vegetation whenever possible.

Method for Rural Development within the Planning Limits of Urban Growth

The City of San José anticipates some development will occur inside the city limits but outside the planning limit of urban growth. In addition, the Coyote Valley and South Almaden Valley Urban Reserves were removed from the urban development impact analysis, as were Morgan Hill's Southeast Quadrant and the Gilroy's Hecker Pass Specific Plan. For the purposes of the impact analysis, the City of San José assumes three sites will be permitted each year of Plan implementation (A. Danielsen pers. comm.) in areas inside city limits but outside the planning limit of urban growth, and not including the urban reserves. The Coyote Valley and South Alamaden Valley urban reserves are assumed to be developed at rates consistent with the rural development impact analysis for the County in the valley floor rural development zone. This development may occur in the Near East Hills, Near West Hills, Valley Floor, and Almaden Valley rural development zones. Average size of development identified for these areas (2 acres) as part of the rural development analysis was utilized for this analysis as well. Total acres of estimated impacts were calculated and distributed proportionately across land cover types inside the San José city limits but outside of the planning limit of urban growth, but excluding the following lands.

- Parcels excluded from the baseline conditions of the Plan.
- Open space types 1, 2, and 3.
- SCVWD groundwater recharge ponds.
- Reservoirs.
- Landfills.
- Areas within the stream setback zone described in Chapter 6 (note that stream and associated riparian land cover impacts were calculated separately from the land cover analysis and are discussed below).

Stream impacts were calculated using the same method as rural development in the county described above.

Method for Conservation Strategy Implementation

The analysis for Conservation Strategy Implementation was based on those activities expected to occur in the Reserve System as identified in Chapter 2, Chapter 5, and Chapter 9. Estimates were informed by current land management activities of agencies such as the Santa Clara County Open Space Authority that are assumed to be similar to the land management practices that will be applied to the Reserve System. Once an estimate of acres of impacts was developed, the impacts were distributed across the land cover types most likely to be affected by these actions. Capital projects in the Reserve System were assumed to have both permanent and temporary impacts. Temporary impacts were associated with construction activities. With the exception of utility line maintenance in the Reserve System, no additional impacts were assessed for operations and maintenance activities as it is assumed these impacts are very small. See **Tables 4-5g and 4-5h** for the methods and assumptions used for this impact analysis.

No permanent or temporary impacts are identified for conservation actions either because these activities are assumed to have a net benefit on all covered species (see Chapter 5 *Conservation Strategy*) or because these activities result in impacts that are too small to quantify. Grasslands converted to other land cover types as a result of restoration or creation actions will not be counted as an impact. In addition, the grassland removed will not be counted toward the overall preservation goals for grasslands.

Method for Three Creeks HCP

The draft Three Creek HCP (April 2009) provides an impact analysis of all activities covered under that plan. This Plan integrated the impact analysis methods, data, and/or impact numbers developed for the draft Three Creeks HCP to ensure consistency of impact evaluation between the two Plans.

Impact Caps on Serpentine Bunchgrass and Wetlands

Three land cover types (serpentine bunchgrass grassland, coastal and valley freshwater marsh, and seasonal wetland) have impact caps that were informed by the impact analysis, but that were set lower than what was estimated by the impact analysis. The reduction in impacts is intended to account for avoidance and minimization that is required by the conditions on covered activities and because the Plan's fee structure provides financial incentive to avoid these land cover types. Setting impact caps on these land cover types ensures that impacts are not over-estimated and that the conservation strategy is developed consistent with the impacts actually expected to occur.

Effects on Covered Species Habitat

For covered species with modeled habitat, impacts were assessed based on the intersection of covered activities and covered species modeled habitat. This method uses habitat models that identify the location and amount of habitat assumed to be suitable for each species (see **Tables 3-5 and 3-6** and species model descriptions in **Appendix D**). Estimates of incidental take are based on the habitat models developed for 16 of the 19 covered species. As described in Chapter 3, these estimates of suitable habitat are likely to be somewhat inflated (i.e., conservative) because (1) habitat models may overestimate the actual extent of suitable habitat, and (2) not all suitable habitat is occupied by the subject species. Therefore, species habitat is used as a proxy for species occurrence because of the limitations of survey data. Impacts to Bay checkerspot butterfly were capped lower than estimated impacts to account for avoidance of modeled habitat that may be possible for projects where siting is flexible (e.g., rural development).

For covered plants, impacts were also assessed at the occurrence level (assumed to be equivalent to populations; discussed in the above section) because of the stability of plant occurrence locations (i.e., plants move very slowly). For three plant species, sufficient information was not available to create habitat models. In these cases, worst-case assumptions were used regarding the amount of suitable habitat removed by covered activities. Both methods are described in more detail below.

Effects on Habitat of Modeled Species and Critical Habitat

For the 16 species with habitat distribution models, maximum allowable temporary and permanent impacts on modeled habitat acreages as shown in the models were identified (**Table 4-4**). Critical habitat is designated for three of the covered species (Bay checkerspot butterfly, California tiger salamander, and California red-legged frog) (**Figures 4-4 through 4-6**). Maximum total allowable impacts in critical habitat for these three species are provided in **Table 4-9**. For covered activities with a GIS overlay, the impact analysis was conducted by intersecting the GIS overlay with the modeled habitat of each species (**Appendix D**). For covered activities without GIS data, the following steps were used to identify impacts.

- **Step 1:** GIS was used to identify the acres of habitat for each modeled species and for critical habitat within each of the County-defined development zones (**Figure 4-1**). These zones were used in the Rural Development impact analysis. Rural Development constitutes a large proportion of the non-GIS covered activities, and the zones identified for rural development activities also reflect the general location of many other covered activities not tied to exact locations.
- **Step 2:** Acres of impacts for non-GIS covered activities were estimated within each development zone for each covered activity assessed (see **Table 4-5a through 4-5h**) by applying a weight factor that would result in a

higher or lower percentage of covered activities being attributed to one zone or another. For example, it is expected that most of the impacts associated with implementation of the conservation strategy will occur in the remote east hills and so a higher percentage of estimated impacts for those activities are attributed to the remote east zone than to the valley floor zone. Impacts were estimated by zone according to the general location of the activities.

- **Step 3:** Impacts by development zone were assumed to affect each species in proportion to the amount of the modeled habitat for that species found in that zone.

GIS was used to calculate approximately 63% of species-specific permanent impacts and approximately 60% of species-specific temporary impacts. GIS was used to calculate approximately 32% of critical habitat permanent impacts and approximately 74% of critical habitat temporary impacts. The remainder of the species and critical habitat impacts were developed based on assumptions non-GIS calculated impact distribution and habitat or critical habitat distribution.

Effects on Habitat of Non-Modeled Species

Plants without Models

Habitat models could not be developed for Tiburon paintbrush, Coyote ceanothus, and Santa Clara Valley dudleya because the microhabitat requirements of these species occur at a finer scale than the Plan mapping. For example, Santa Clara Valley dudleya occurs on serpentine rock outcrops, which often occur as scattered patches that are only several square feet in size. In addition, there are few known occurrences of most of these species in the study area (**Table 4-6**), except for Santa Clara Valley dudleya, making the model verification more difficult.

In the absence of models, estimates of temporary and permanent impacts to these species were based on impacts to the number of known occurrences that could be impacted by covered activities, as described above (**Table 4-6**). As a general guide and “worst-case” analysis of potential habitat, effects are also cited to land cover types that are broadly associated with each of these plant species.

Effects on Plant Occurrences

In addition to the impacts to covered plant species habitat described above, it was important to examine as accurately as possible impacts to individual plant occurrences. The potential impacts to plant occurrences from covered activities, and the total allowed impacts to each species were determined by the following methods.

Potential direct effects on plant occurrences were analyzed based on occurrence data in the California Natural Diversity Database (CNDDB), records from SCVWD’s Biodiversity Monitoring Program, and data collected on the United Technologies Corporation property (T. Marker pers. comm.). Impacts were

assessed for covered activities for which GIS data were available. Covered activities with significant impacts (i.e., over 100 acres) for which specific location data are not known include rural development, County Parks capital improvement projects, and dam seismic safety retrofit borrow sites. In addition to the methods described here, impacts to specific plant occurrences from the SCVWD Dam Maintenance Program were provided by SCVWD. These were determined by site surveys during their EIR preparation and detailed analysis of the footprint of dam maintenance activities.

It is important to make a distinction between impacts that reduce the long-term viability of an occurrence and impacts that do not reduce the long-term viability of an occurrence. This analysis assumed that in most cases, occurrences that overlapped with the footprint of covered activities would result in complete loss of the occurrence. However, there will be some temporary or partial impacts to occurrences where the occurrence may recover in subsequent years and long-term viability is not affected. This possibility is discussed in Chapter 4, Section 4.4.1, subheading *Partial Permanent Impacts to Plant Occurrences* below and Condition 20 (Chapter 6). The "potential impacts" and "impact limits" defined and discussed in this section refer in all cases to the reduction of long-term viability of a covered plant occurrence.

For the purposes of this Plan, an occurrence of an annual plant species will be assumed to retain long-term viability and will not require replacement in the Reserve System if the decline in population size and percent cover from pre-project conditions is less than 25% over a monitoring period of at least 5 years (i.e., cumulative change over 5 years), unless site-specific conditions otherwise suggest substantial declines in population viability. The population size of annual covered plants may fluctuate more than 25% annually due to environmental variation such as rainfall. If extreme or unusual climate conditions affect the species, then monitoring will be extended 1 or 2 years, as appropriate to assess impacts and success (see Condition 20, Chapter 6).

An occurrence of a perennial plant species will be assumed to retain long-term viability and will not require replacement in the Reserve System if the decline in seedling recruitment and density from pre-project conditions is less than 25% over a monitoring period of at least 3 years, unless site-specific conditions otherwise suggest substantial declines in population viability (see description of Condition 20 in Chapter 6).

Specifically, potential impacts were assessed by first creating a GIS overlay of the location of covered activities (i.e., the planning limit of urban growth and covered capital projects illustrated in **Figure 2-6** and **Figure 2-7**) with the plant occurrence data for all covered plant species. Next, this data and CNDDB occurrence data, were used to determine which occurrences of each species would be impacted by each activity. Finally, total potential impact numbers were determined. The results of this analysis are summarized in **Table 4-6** and discussed for each species in more detail later in this chapter. The impact limits in this table will be tracked during implementation to ensure permit compliance.

After the total potential impacts were calculated, actual impact limits were determined for each species. The impact limit was determined based on a number of factors, including (but not limited to) the overall species range and distribution, number of known occurrences, recent frequency with which new populations have been discovered, and rarity status.

In this section, impacts are discussed in terms of numbers and percentages of occurrences as well as estimates of absolute numbers of individuals where such estimates are feasible (impacts on modeled habitat is discussed in Section 4.6.8 *Serpentine Plants* and 4.6.9 *Non-Serpentine Plants* below). For annual plant species, discussion of absolute numbers is difficult as the populations can fluctuate widely from year to year due to environmental variation (e.g., rainfall). Some occurrences in the CNDDB include estimates of numbers of individuals, however, many occurrences do not or the estimates are from only one year. Additionally, in the rare cases where there are multiple years' data, these numbers often vary widely (e.g., from hundreds in one year to thousands in another for just one occurrence).

As shown in **Table 4-6**, the Plan does not allow for the reduction of long-term viability of Tiburon Indian paintbrush and Coyote ceanothus. For more details on these impacts, including a discussion of permanent and temporary impacts to modeled habitat, see the discussion on each species later in this chapter.

It is expected that new occurrences of many of the covered plants will be discovered both within the impact areas and the Reserve System. In many cases, it is warranted to allow additional impacts to covered plants beyond the occurrences known at this time. Limits on take of some covered plant species can be increased up to the limit shown in the final column of **Table 4-6**. **Table 5-16** identifies the total number of occurrences in the study area[12] and the number of new occurrences that must be protected in the Reserve System before these additional impacts can occur. The species selected for additional limits and the limits set were determined based on two criteria.

- Future survey efforts in the permit area are likely to reveal that there are more occurrences of the species than are currently known.
- There are more occurrences known in the study area at the time of permit issuance than the Recovery Plan de-listing criteria or, for non-listed species, more than the long-term conservation criteria (U.S. Fish and Wildlife Service 1998)[13]. For species without de-listing or long-term conservation criteria, there must be more than 20 occurrences throughout the species' range.

Based on these criteria, all covered plants except three qualify for an increase in allowable impacts during Plan implementation if additional occurrences are found and protected. No additional impacts to Coyote ceanothus, Tiburon Indian

[12] Plant occurrences in the expanded burrowing owl study area do not count toward the baseline necessary before additional impacts may occur.

[13] Santa Clara Valley dudleya de-listing criteria is 30 populations. Species with long-term conservation criteria are Mount Hamilton thistle (23 populations), smooth lessingia (10 populations), and most beautiful jewelflower (22 populations).

paintbrush, or Metcalf Canyon jewelflower are allowed under the Plan even if additional occurrences are found.

As with all other impacts to covered plant occurrences, new occurrences of the species must be protected in the Reserve System before the impacts occur and the protected occurrences must be in as good or better condition than the new occurrences impacted by covered activities ("condition" is defined in Chapter 5, Section 5.3.1 *Land Acquisition and Restoration Actions*). See Chapter 5 for protection requirements to allow additional take limits in **Table 4-6**. Created occurrences will not count toward this Stay-Ahead provision for plants due to the highly experimental nature of creation. For the purposes of this Plan, created plant occurrences will not be used to mitigate adverse effects but rather to contribute to the recovery. The only exception to this rule is Coyote ceanothus. Because it may not be possible to protect one occurrence of Coyote ceanothus in the timeline described in Section 5.4.11, a created occurrence may serve as a portion of the mitigation for this species (see Chapter 5, Section 5.4.11 *Coyote Ceanothus* for details).

Partial Permanent Impacts to Plant Occurrences

Certain covered activities could have permanent impacts to a portion of plant occurrences through construction, occasional operations and maintenance, and other short-term activities. If impacts resulting from covered activities do not reduce the long-term viability of the plant occurrence as described in Chapter 6, Section 6.6.2, subheading Condition 20 *Avoid and Minimize Impacts to Covered Plant Occurrences*, then it will be considered a partial impact on the occurrence and will not count toward the impact limits in **Table 4-6**. If the impacts do result in reduction of long-term viability of the occurrence, then it would be considered a permanent impact, and the impacts to the occurrence would count toward the maximum number of impacts to that species allowed under the Plan. For the purposes of this Plan, an "impact" to a plant occurrence results from the removal of an occurrence or the reduction of long-term viability of an occurrence (as defined in Chapter 6, Section 6.6.2, subheading *Condition 20 Avoid and Minimize Impacts to Covered Plant Occurrences*). Conditions on covered activities minimize the effects of covered activities on covered plants, and include monitoring actions and success criteria to determine the effects on long-term viability (see Chapter 6, Section 6.6.2, subheadings *Conditions 19 Plant Salvage when Impacts are Unavoidable* and *Condition 20 Avoid and Minimize Impacts to Covered Plant Occurrences*).

4.4.2 Indirect Effects

Unlike direct impacts, which are estimated quantitatively, indirect impacts are assessed qualitatively except for nitrogen deposition and watershed impervious surfaces for which quantitative analyses were run. In most cases the indirect impacts on species are summarized in **Table 4-1** and discussed in narrative form in the results sections below. As discussed above, estimates of direct effects on

land cover types have been quantified conservatively (i.e., somewhat overestimated). These conservative estimates are intended, in part, to incorporate many of the indirect effects of the covered activities listed in **Table 4-1** and ensure that the conservation strategy provides enough conservation to offset these indirect impacts.

Impervious Surfaces

Impervious surfaces are materials of natural or anthropogenic sources that prevent the infiltration of water into soil. Impervious surfaces can affect the flow, sedimentation load, and pollution composition of stormwater runoff. An increase in impervious surfaces on a landscape is directly related to increases in human activity through the development of structures and infrastructure such as buildings, streets, sidewalks, and parking lots.

Classification of watersheds and subwatersheds by the amount of impervious cover is an important component of developing land use and habitat planning goals. Although presence of riparian vegetation and wetlands can mitigate the impacts of impervious cover, a watershed with high impervious cover is generally not able to support a high-quality stream system. A strong negative relationship between biotic integrity, land use, and riparian conditions begins to occur at approximately 10% imperviousness. Stream degradation occurs at relatively low levels of imperviousness (10–20%) (Chester and Gibbons 1996).

According to the Center for Watershed Protection (2003), an initial guide to evaluating urban/suburban stream quality is: (1) sensitive streams (0–10% imperviousness) typically have good water quality, good habitat structure, and diverse biological communities if other stresses are absent; (2) impacted streams (10–25% imperviousness) show clear signs of degradation; (3) non-supporting streams (>25% imperviousness) have a highly unstable flow and poor biological condition.

The Plan includes an analysis of the expected increase in impervious surfaces due to urban development and other covered activities. This analysis provides an indication of the magnitude of change of impervious surfaces in the watershed and therefore how covered aquatic species and other native aquatic species might be affected.

For the purposes of the Plan, the important metric is the change in impermeability between existing conditions and conditions in the study area at the conclusion of Plan implementation. To assess this change, the quantity of impervious surface in each of the study area's major watersheds was calculated, both upstream and downstream of reservoirs, using the existing land cover classification developed for the Plan (**Figure 3-10**). An impervious surface assumption for each land cover was derived (**Table 4-7**) from the Center for Watershed Protection research (Cappiella and Brown 2001), based on impervious cover classifications from eight geographic locations in the United States. That group's research has shown that the amount of impervious cover on a developed parcel is generally very similar for a particular zoning category no matter where

it is located. The literature also notes there are no nationally applicable or standard coefficients that account for the variability in forest, shrub, and herbaceous cover and turf cover coefficients.

Method for Calculating Impervious Surface

The calculation used for determining impervious surface cover is shown below.

ALC * IC = AIC

where:

ALC = acres of land cover

IC = impervious assumption for each land cover

AIC = impervious area in acres

This equation was first applied to existing land covers to calculate the current impervious surfaces (in acres) for each subwatershed (Coyote, Guadalupe, Llagas, Uvas, and Pacheco). **Figure 4-2** shows the watersheds assessed in this analysis. To account for interim projects (those projects entitled for development in advance of Plan implementation), it was assumed that interim projects located inside the planning limit of urban growth would be developed to the urban-suburban land cover type and that interim projects located outside the planning limit of urban growth would be developed to the equivalent of the rural-residential land cover. These assumptions are reflected in the existing conditions of the impervious surface analysis.

The results of the impact analysis described in Section 4.4.1 *Direct Effects* were used to identify the acres of each type of land cover anticipated to exist at the conclusion of Plan implementation. To do this, each covered activity analyzed for the impact analysis was assigned a new land cover type that is assumed to be present after covered activity implementation. The majority of impacts are associated with urban or rural residential development. For these two covered activities, all impacted areas inside of the planning limit of urban growth were assumed to become the Urban-Suburban land cover type, and all areas impacted by rural development were assumed to become the Rural Residential land cover type. Land cover type conversions were assigned to the remainder of covered activities based on the assumed land cover type present after covered activity implementation.

Next, covered activities were assigned to watersheds where they are assumed to be implemented. As described above, the impact analysis required both GIS analyses and use of assumptions to describe the activity and estimate impacts (see **Tables 4-5a through 4-5f** for details). For those activities mapped in GIS, location by watershed and land cover type assumed for post-implementation were calculated using GIS. For those activities where the exact location of the activity is not known in GIS, assumptions were developed to assign the activity to a watershed.

Once land cover types by watershed for post-covered activity implementation were established, the above equation was again applied to calculate the amount of impervious acres within each subwatershed. The results are shown in **Table 4-8**.

There are several other partial watersheds in the study area (i.e., Alameda, Calabazas, South Santa Clara Valley, San Thomas, Santa Cruz Mountains, and Watsonville watersheds) that were not included in this analysis. As a result, approximately 23,000 acres of the study area were excluded. In addition, because covered activities were either assessed in GIS or were distributed to watershed according to assumptions on where the covered activity would occur, not all impacts were assessed through this analysis as they either will or are assumed to occur in non-assessed watersheds. This may result in a small underestimation of changes in study area imperviousness.

Nitrogen Deposition

Indirect impacts of increased nitrogen deposition on natural communities and covered species are anticipated to result from urban development and rural development covered under the Plan. These covered activities would result in increased air pollutant emissions from passenger and commercial vehicles and other industrial and nonindustrial sources. Emissions from these sources are known to increase airborne nitrogen, of which a certain amount is converted into forms that can fall to earth as depositional nitrogen. It has been shown that increased nitrogen in serpentine soils can favor the growth of nonnative annual grasses over native serpentine species (Weiss 1999). These nonnative species, if left unmanaged, can overtake the native serpentine species, including dwarf plantain (*Plantago erecta*), the host plant for larval Bay checkerspot butterfly. Nonnative plants may also compete with native plants for water, nutrients, light, and sites for germination, crowding out covered plants (e.g., Metcalf Canyon jewelflower, most beautiful jewelflower, and fragrant fritillary). California grasslands are believed to be among the most sensitive to nitrogen deposition (Fenn et al. 2010). Coyote ceanothus may also be affected by competition with nonnative species, but because this covered species is a woody plant, the effects of such competition are likely to be less severe than the effects on native herbaceous species. To assess the degree to which nitrogen deposition will increase as a result of Plan implementation, a nitrogen deposition study was conducted (see **Appendix E**).

Summary of Methods

Nitrogen deposition was analyzed using several modeling approaches in order to estimate the sources that contribute to deposition in the study area. In order to estimate contributions from individual roadways and to assess the increase in deposition due to increases in traffic, Gaussian models for a limited domain were applied to receptors centered on serpentine habitat that supports populations of the threatened Bay checkerspot butterfly. Modeling with Gaussian models, while

not providing an estimate of overall deposition, provides an estimate of deposition from individual roadways and the expected increases in deposition from those roadways in the future. The much more complex Community Multiscale Air Quality modeling system (CMAQ) was also used to simulate the study area's more complex nitrogen transport processes, and, using the Particle and Precursor Tagging Methodology source apportionment technique, to estimate contributors to deposition on a broader scale. Modeling with CMAQ also provides estimates of expected increases in deposition in future years.

4.5 Effects on Natural Communities/Land Cover

4.5.1 Direct Effects

Temporary and permanent impacts of each covered activity on each land cover type are summarized in **Tables 4-2 and 4-3**.

In most cases the data provided and assumptions made were reasonable worst-case assumptions of future project impacts. The actual impacts of specific projects over the permit term of 50 years may vary from the assumptions described in **Tables 4-5a–h** and total impacts will likely be less than the maximum allowable impacts in **Tables 4-2 and 4-3**.

In-stream impacts calculated for projects without exact footprints distribute all impacts across riparian land covers in proportion to the land cover type's occurrence in the study area. This approach may overestimate actual impacts because riparian land cover may not be present everywhere a project is conducted, particularly in urban areas. Moreover, actual in-stream impacts may be somewhat lower than those calculated because of flexibility in implementing avoidance measures (e.g., building clear-span bridges to avoid streams, building in sites where no riparian vegetation exists).

Stream impacts may be overestimated because miles of impact were calculated on the basis of project footprints. Some capital projects, such as flood-control projects that do not include concrete or riprap, will be able to avoid or minimize impacts on streams.

Estimated impacts on rare or sensitive land cover types do not account for project-by-project avoidance that will be applied to comply with the conditions detailed in Chapter 6 or other regulations such as CEQA. For example, recreational facilities such as buildings, outhouses, trails, and trailhead facilities, can usually be sited away from sensitive land covers. Consequently, impacts on serpentine grassland, serpentine chaparral, valley oak woodland, and knobcone pine woodland may be overestimated. While the areal extent of the impact footprint of these projects may not change, judicious siting may reduce the impacts on sensitive land cover types.

4.5.2 Indirect Effects

Impervious Surfaces Analysis Conclusions

The results are shown in **Table 4-8**. Through comparison of existing and future watershed imperviousness, it is possible to estimate the level of impact on watershed health that implementation of covered activities may have on each subwatershed, as measured by imperviousness.

This imperviousness analysis does not take into account any stormwater management activities that would decrease run-off in the study area (e.g., cisterns or retention ponds). These types of requirements are currently integrated into the San Francisco Bay Regional Board NPDES permits and will be incorporated into new Central Coast Regional Board NPDES permits in the future. As such, this analysis may overestimate the increase in run-off into local streams that may degrade water quality. See Chapter 6, Section 6.4.1, subheading *Condition 3 Maintain Hydrologic Conditions and Protect Water Quality* for more details on stormwater management in the study area.

Nitrogen Deposition Analysis Conclusions

Indirect impacts of continued nitrogen deposition on natural communities are anticipated to result from urban development and rural development covered under the Plan. Serpentine land cover types are the focus of preservation and enhancement actions to offset the effects of nitrogen deposition (among other impacts). However, several other land cover types in the study area have been identified as sensitive or potentially sensitive to nitrogen deposition (Weiss 2006): Northern mixed and serpentine chaparral, mixed oak woodland, foothill pine-oak woodland, mixed evergreen forest, and redwood forest are known to be sensitive to nitrogen deposition. According to this report, California annual grassland, valley oak woodland, blue oak woodland, coast live oak forest and woodland, freshwater marsh, seasonal wetland, and pond may be sensitive to nitrogen deposition.

Baseline Deposition

Emissions for the base year Gaussian modeling were based on traffic counts for highways and roads in 2005. For CMAQ modeling, base year emissions were acquired from the Bay Area Air Quality Management District (BAAQMD). Estimates of baseline deposition based on observations of nitrogen dioxide (NO_2) concentration and modeling using CMAQ both give estimates of total nitrogen deposition of about 6 kg-N/ha/y, which is consistent with other studies such as Weiss (2006).

Changes in Nitrogen Deposition during the Permit Term

Reliable future year emissions were not available when the CMAQ modeling was conducted. As such, future year emissions were extrapolated from the base year based on population growth. Using this assumption, contribution of mobile source emissions in the habitat area are estimated to increase by about 0.6 kg-N/ha/y in 2035 over the base year and by another 0.5 kg-N/ha/y in 2060. The San José contribution to nitrogen deposition in the habitat areas is estimated to be 38% in 2035. Gaussian modeling of major roadways near the habitats indicates an increase in nitrogen deposition of about 0.25 kg-N/ha/y in 2030 over the base year (a 4% increase in total deposition). The increase in 2060 relative to 2030 could be from 0.4 kg-N/ha/y to more than 1 kg-N/ha/y (at the Hale Avenue site) depending on location (a 7% to 17% increase in total deposition).

Based on the CMAQ modeling, should increases in NO_X emissions occur in proportion to growth within the study area, within Santa Clara, and within the region, total average nitrogen deposition in the area around and including the habitat areas could increase to 8 kg-N/ha/y in 2035 (a 33% increase) and almost 10 kg-N/ha/y in 2060 (a 66% increase). Gaussian modeling indicates that, when emissions are extrapolated based on projected growth, contributions to nitrogen deposition from major roadways could increase by almost a factor of two by 2030 and by an even larger amount by 2060.

As described above, the modeling shows that increases in NO_X emissions result in increased nitrogen deposition. As such, it may be fair to assume a similar correlation between a reduction in NO_X emissions and a reduction in nitrogen deposition. In 2011 the BAAQMD released future year projections through 2025. These projections show a decrease in NO_X emissions from approximately 449 tons/day in 2008 to 360 tons/day in 2025 (a reduction of 89 tons/day). There appears to be a slight increase in NO_X emissions between years 2022 and 2025. These new projections indicate that the future year nitrogen deposition rates extrapolated in this analysis are over-estimated and suggest that there may be a decrease in current rates of nitrogen deposition. However, NO_X emissions, and therefore nitrogen deposition, are not expected to cease entirely. In addition, emissions containing other nitrogen compounds (e.g., NH_3 [ammonia]) may also contribute to nitrogen deposition. As cited in Fenn et al. (2010), a recent study shows that 25% of the nitrogen emissions from light duty vehicles in three California cities are in the form of NH3, and in newer cars the proportion is greater (Bishop et al. 2010 as cited in Fenn et al. 2010). The BAAQMD (2010) reports 52 tons/day of ammonia emissions in the Bay Area as of 2008. Leading sources of ammonia emissions include landfills, wastewater treatment, and refineries (19.8%); light-duty motor vehicles (17.4%); livestock (15.5%); commercial refrigeration (wineries, breweries, and cold storage warehouses; 15.4%); human respiration and perspiration (13.8%); and domestic animal waste (9.0%).

Fenn et al. (2010) report a critical load (the load at which undesirable effects are observed) for California serpentine grasslands of 6 kg-N/ha/y. This load is equal to the current estimates for nitrogen deposition rates in the study area (see *Baseline Deposition* above). While this rate may be expected to drop based on

the BAAQMD report of reduced NO_X emissions, it is uncertain how the reduction will be offset by increases in other nitrogen sources, or what level of reduction would be required to reverse the current adverse effects of nitrogen deposition. Additionally, studies from grasslands in other regions of North America have shown that significant impacts to biodiversity in grassland communities can occur from the accumulation of even low levels of nitrogen deposition (Fenn et al. 2010).

Contributors to Deposition

The amount that various sources contribute to deposition was assessed with different modeling approaches. The most complete of these methods was the use of the PPTM tagging approach in CMAQ. In the base year, the CMAQ PPTM simulation attributes 30% of the total nitrogen deposition to mobile sources within the study area. Another 16% of the nitrogen deposition comes from stationary sources in the study area. Therefore, 46% of nitrogen deposition on the habitat areas comes from existing development and vehicle traffic generated locally within the study area. The remainder of Santa Clara County contributes 17% of the nitrogen deposition while the remaining Bay Area counties account for about 11% of the deposition. The CMAQ simulation indicates that the remaining 26% of the N-deposition comes from anthropogenic emissions in the remainder of the modeling domain (i.e., most of the remainder of California other than Bay Area counties and a portion of Nevada), initial and boundary concentrations (i.e., effects from outside of the modeling domain), and biogenic emissions within the Bay Area counties.

Impacts of nitrogen deposition from Morgan Hill and Gilroy were not explicitly identified in the modeling, but are part of the contribution referred to as the remainder of Santa Clara County. In the emissions inventory used to prepare emissions for CMAQ, municipalities are not identified separately from the county in which they are located. Estimates of emissions for Morgan Hill and Gilroy were made based on the overlap of boundaries of these cities with grid cells in the modeling domain. Based on these estimates, Gilroy contributes 2% of the Santa Clara County NO_X emissions, Morgan Hill contributes 3%, San José contributes 79%, and the remainder of Santa Clara County contributes the remainder of the NO_X emissions (16%). It is reasonable to assume that the impacts from Gilroy and Morgan Hill would be roughly in proportion to their emissions. Of the 17% contribution to nitrogen deposition noted for the remainder of Santa Clara County, therefore, we could expect Gilroy to make up about 1.5% (9% of 17%) and Morgan Hill to make up about 2.7% (16% of 17%).

The contribution of emissions outside of the study area but within Santa Clara County are estimated to grow from 1.1 kg-N/ha/y in the base year to 1.5 kg-N/ha/y in 2035 and 1.7 kg-N/ha/y in 2060. The contribution of emissions from all other Bay Area counties are estimated to grow from 0.7 kg-N/ha/y in the base year to 0.9 kg-N/ha/y in 2035 and 1.0 kg-N/ha/y in 2060.

See **Appendix E** for the complete nitrogen deposition analysis.

4.6 Effects on Covered Species

This section describes the potential direct and indirect effects on covered species under the Plan. The amount of incidental take of covered species has been estimated in accordance with the methods described in Section 4.4 *Impact Assessment Methods*. Estimates of incidental take are based on the habitat models developed for 16 of the 19 covered species. These estimates are likely to be inflated for two reasons: habitat models may overestimate the actual extent of suitable habitat (see species profiles in **Appendix D** for details on each model); and suitable habitat may not be occupied by the subject species. For three of the covered species, sufficient information was not available to create geographically explicit (i.e., GIS-based) habitat models. In these cases, worst-case assumptions were used regarding the amount of suitable habitat removed by covered activities.

The major direct impacts on most covered species will result from habitat loss associated with urban and rural development. For wildlife species, the determination of direct and indirect effects on covered species is based on the habitat disturbed for each species. For covered plants, effects are determined both in terms of habitat and effects on known occurrences. **Tables 3-5 and 3-6** and the species accounts (**Appendix D**) provide additional information on specific biological needs for each covered species, including the links between species life-history needs and land cover types used in the analysis. Impacts are described below for groups of species that are subject to similar impact mechanisms. Maximum allowable impacts on covered species for which habitat models have been developed are provided in **Table 4-4**. Maximum allowable permanent and temporary impacts to land cover types and natural communities are provided in **Table 4-2** and **Table 4-3** respectively. Maximum allowable permanent impacts to plant occurrences are provided in **Table 4-6.** Compliance monitoring will document species habitat and plant occurrence impact limits, as well as land cover type and natural community impact limits. Therefore, there will be some overlap in impact accounting (e.g., 1 acre of impact may count both against the serpentine grassland cap and the Bay checkerspot butterfly habitat impact cap).

Descriptions providing additional specificity on the type and location of covered activities anticipated to impact each species are provided; however, these descriptions do not preclude other covered activities from impacting the covered species in different locations. As long as the activity is covered under the Plan, impacts to each covered species are permitted up to the maximum allowable impacts provided in **Table 4-4** and **Table 4-6**.

As discussed in Chapter 1, California State Parks lands are excluded from the permit area. Because of this exclusion, all of the land cover-related analyses in the Plan are based on the study area less State Parks lands unless otherwise noted. The size of the study area less State Parks lands is 460,205 acres. All percentages of impacts discussed below were calculated relative to the 460,205 acre permit area excluding State Parks.

4.6.1 Bay Checkerspot Butterfly

Bay checkerspot butterfly populations within the study area have been studied for many years and are relatively well understood. Serpentine grassland on both sides of the Santa Clara Valley provide habitat for this species. The population along Coyote Ridge, by far the largest in size and area, is critical to the persistence of the species. Because the only extant populations occur within the study area, maintaining and managing serpentine grassland habitats is important for the continued existence of this species.

Bay checkerspot butterfly habitat units are divided into two broad categories: core and satellite. The definitions for core and satellite habitat units are adapted from the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998). Core habitat units are "moderate to large areas of suitable habitat that support persistent Bay checkerspot populations." Satellite habitat units are "generally smaller and contain less high-quality habitat than core areas, and may occur some distance from core areas." The status of the core and satellite habitat units is identified as occupied, potential, historic, or unknown. For habitat units defined as "occupied," species is known to occupy the patch at least in some years. Where individuals were present historically, but now the site is unoccupied and likely no longer suitable, the habitat unit is defined as "historic." If the site has not been surveyed thoroughly or surveyed in the last ten years, habitat unit was classified as "unknown." Otherwise suitable patches of serpentine grassland within the dispersal distance of known populations were considered "potential" habitat units if land use management practices such as livestock grazing could improve conditions for the species.

Direct Effects

Most, but not all, serpentine bunchgrass grassland is considered species habitat (see **Appendix D**, *Modeled Habitat Distribution in Study Area*). As such, most covered activities that remove or alter serpentine grassland habitats are potentially detrimental to this species. Expansion of urban areas or rural residential development is most likely to result in the majority of impacts on this species. For example, suburban and rural residential development could remove suitable habitat—and possibly individuals—along Coyote Ridge and in the Santa Cruz Mountains. In addition, changes in land use or management of serpentine grasslands could also adversely affect the Bay checkerspot butterfly. Changes in land use that are often associated with expansion of urban areas or rural residential development could also be detrimental to the long-term viability of these populations.

A permanent impacts cap of 550 acres is applied to impacts to the serpentine bunchgrass land cover type (**Table 4-2**), the key habitat land cover type for Bay checkerspot butterfly. An additional 91 acres of temporary impacts to serpentine bunchgrass grassland is anticipated and is the maximum impact allowed (**Table 4-3**). Up to 300 acres of permanent impacts and 54 acres of temporary

impacts to Bay checkerspot butterfly modeled habitat mapped (see **Appendix D** and **Table 5-7**) as "occupied" or "potential" are authorized under this Plan (**Table 4-4**), all of which is also serpentine bunchgrass grassland[14]. Impacts to modeled habitat mapped as "historic/unoccupied" and "occupancy unknown" are not subject to this cap because these units:

- are either no longer occupied and have little or no chance of occupancy in the future due to habitat degradation and fragmentation ("historic/unoccupied" units);
- are very small and far from core habitat units and therefore would, at best, support very small populations in only some years (Communications Hill 2 and Valley Christian High School); or
- are surrounded by urban or urbanizing development and are expected to decline in suitability or be lost as covered activities are implemented (Communications Hill 1 and 2, San Martin/Hayes Valley, Southwest Anderson Reservoir, and Valley Christian High School).

Impacts to Bay checkerspot butterfly habitat is further limited to 3% of the unprotected portion (everything except Type 1 open space) of any core or satellite habitat unit targeted for conservation[15] (as defined in **Table 5-7**), with one exception. The exception is the Kirby/East Hills core habitat unit which has an 11% allowance to accommodate the Kirby Landfill expansion of 80 acres. See Chapter 6, Section 6.5, subheading *Condition 13 Serpentine Avoidance and Minimization* for details on serpentine avoidance requirements applied to covered activities.

Impacts are predicted to occur in 12 of the 22 habitat units of Bay checkerspot butterfly in the study area, which constitutes the known range of the species to date. These impacts are distributed across core occupied habitat (**Table 5-7**), satellite occupied habitat, satellite potential habitat, satellite habitat with occupancy unknown, and satellite habitat with historic occurrences. Impacts to critical habitat are detailed in Section 4.7 *Effects on Critical Habitat* below.

A discussion of population trends and key features of the population dynamics of the Bay checkerspot butterfly is presented in **Appendix D**. In **Appendix D**, population estimates for most of Coyote Ridge are presented. Based on this data, the most important core habitats are topographically diverse areas near the ridge top. The higher elevation ridge top and adjacent north slopes and canyons have favorable combinations of high topographic diversity, including large expanses of north-facing slopes, and the coolest and wettest parts of Bay checkerspot butterfly habitat.

The conservation strategy for the Bay checkerspot butterfly includes the acquisition, in fee title or conservation easement, and management of a

[14] The maximum allowable impact to serpentine bunchgrass grassland that is also Bay checkerspot butterfly habitat is 300 acres, leaving 250 acres of allowable impact to serpentine bunchgrass grassland that is not Bay checkerspot butterfly habitat.

[15] These caps do not apply to habitat units in Type 1 open space because loss of habitat will be extremely limited in permanently protected open space (i.e., limited to trail construction and management activities).

substantial portion of the core habitats on Coyote Ridge and the Silver Creek Hills (see Chapter 5, Section 5.4.1 *Bay Checkerspot Butterfly* for details). This acquisition will include most of the core habitat along the ridge tops, which provides high quality habitat for Bay checkerspot butterfly and have historically (since 1984) supported the densest populations of Bay checkerspot butterfly (see **Appendix D**). The lower elevation areas are warmer and drier, and slopes tend to be south and west-facing, with small areas of north-facing slopes in canyons. As a result, these areas have been occupied by far lower densities of Bay checkerspot butterfly than on the ridge top.

All impacts to Bay checkerspot butterfly core and satellite habitat units are expected to be small except for the Kirby Landfill site, as discussed above, and the Pound Site. The proposed development on the Pound Site, approximately 27 acres to accommodate the Mariposa Lodge/Sheriff's Firing Range project, would occur in lower quality habitat in and near developed sites and on dry, south-facing slopes. The ridge tops in this unit support some of the highest quality habitat for Bay checkerspot butterfly and will be avoided for the reasons stated above. Impacts of individual covered activities in core or satellite habitat units are expected to be small (less than 10–20 acres each) because of the limitations on land use development in the County and San José (the two jurisdictions where this habitat occurs) and the requirement to minimize impacts to serpentine bunchgrass grassland (Chapter 6, Section 6.5, subheading *Condition 13 Serpentine and Associated Covered Species Avoidance and Minimization*).

The Kirby Landfill expansion will remove up to 80 acres (11%) of currently unprotected habitat for this species in the Kirby/East Hills core habitat unit. The areas lost to the landfill are primarily south and west-facing slopes, with pockets of north-facing slopes in the canyon. The crests of the north-facing slopes of the developed area have been patchily occupied by Bay checkerspot butterfly, but densities were much lower (100–300 larvae/ha) in 2001 than those along the ridge top (3,000–10,000+/ha) in the 267-acre Butterfly Trust Reserve, which encompasses some of the best quality habitat on Coyote Ridge (S. Weiss pers. comm.). The loss of these 80 acres represents far less than 11% of the prime Bay checkerspot butterfly habitat in the Kirby/East Hills habitat unit. Loss of this habitat is not expected to affect the persistence of the population in this area because it is of relatively low quality and the extent of habitat acquisition and management that will be accomplished through this Plan. Approximately 44% of this unit is already permanently protected.

Impacts to historic/unoccupied Bay checkerspot butterfly habitat units are expected at Communications Hill. Communications Hill 1 and Communications Hill 2 support 230 acres and 25 acres of marginal habitat for the species respectively, all of which is expected to be lost as a result of urban development at that site and habitat fragmentation. Although the species was present at this site historically, it is no longer there due to the site's isolation from core areas and the loss and fragmentation of habitat to date. As previously indicated, loss of serpentine bunchgrass grassland at these two historic/unoccupied habitat units will not count toward the Plan's 300-acre modeled primary habitat impact cap for Bay checkerspot butterfly; however, these impacts will count toward the Plan's 550 acre serpentine bunchgrass grassland impact cap.

The conservation actions for serpentine grassland and serpentine covered species are discussed in detail in Chapter 5. Several aspects of this conservation strategy are relevant to the impacts of nitrogen deposition described below, because these strategies will influence the ways in which excess nitrogen affects covered species. All serpentine grassland incorporated into the Reserve System (both new lands and existing protected areas) will employ proven management techniques such as livestock grazing and prescribed burning. Both techniques can remove excess nitrogen from the community and reduce relative cover of nonnative grasses, maintaining populations of native plants such as dwarf plantain, one of the host plants for Bay checkerspot butterfly, and other serpentine plants (Weiss 2006). Appropriate grazing in some serpentine grasslands, such as Coyote Ridge, has been successful at maintaining high-quality Bay checkerspot butterfly habitat despite elevated nitrogen deposition levels (Santa Clara Valley Transportation Authority 2006). Accordingly, it is expected that management techniques can be used in the future to substantially reduce the adverse effects of increased nitrogen deposition on serpentine grassland communities and thus on Bay checkerspot butterfly and covered serpentine plants.

The most significant threat to the Bay checkerspot butterfly continues to be nitrogen deposition and lack of management to minimize the effects of nitrogen deposition. Key management techniques include livestock grazing, mowing with string cutters, hand-pulling, prescribed fire, and spot applications of herbicide. The ability to conduct long term grazing is central to habitat management. All of these conservation actions are important to maintain and improve Bay checkerspot butterfly habitat but some may have short-term adverse effects. Mowing, hand pulling, and prescribed fire all occur after the Bay checkerspot butterfly has entered diapause in deep soil cracks and under rocks (May–June). Proper use of prescribed fire will have minimal direct negative impacts on Bay checkerspot butterfly populations. Similarly, proper and limited use of herbicide will have minimal direct negative effects on the species. For example, herbicide applications using a graminicide “Envoy” have proven highly effective and are limited to high priority infestations immediately along roads and cover less than 10 acres in any given year.

Recreational trail access creates local disturbance from trail construction, foot traffic, maintenance, and occasional off-trail use. Most likely trail routes will follow existing roads. Additional well designed and maintained trails that will be constructed in the Reserve System will pose minimal threats to healthy Bay checkerspot butterfly populations, even in the smaller satellite populations such as Tulare Hill. Direct effects associated with recreation will be minimized with the implementation of conditions on recreation (see Chapter 6, Section 6.4.6, subheading *Condition 9 Prepare and Implement a Recreation Plan*).

The diversity of serpentine grassland depends on disturbance from many sources, including gophers, cattle, surface erosion, and landslides. The existing grazing regimes provide far more extensive disturbance on an ongoing basis than do the existing or proposed management and recreational uses, and the size and diversity of Coyote Ridge can readily absorb these impacts. Localized

disturbances are usually rapidly recolonized by diverse native plants, including Bay checkerspot butterfly host and nectar plants.

Indirect Effects

Indirect effects to Bay checkerspot butterfly are expected to result from increased vehicular use (i.e., nitrogen emission deposition, vehicular strikes), increased emissions and deposition from stationary sources of nitrogen, conservation strategy implementation, and other covered activities. Each of these categories of indirect effects is discussed below.

Nitrogen Deposition

Covered activities that facilitate increased vehicular use or electricity generation in the study area will contribute to on-going nitrogen deposition on Bay checkerspot habitat, especially on Coyote Ridge. The effects of different nitrogen sources were modeled for the study area and the region (see Section 4.4.2 *Direct Effects* subheading *Nitrogen Deposition*, and **Appendix E** for details). New major point sources of nitrogen deposition that could adversely affect serpentine communities and associated covered species could not be adequately analyzed at this time (e.g., new power plant, large diesel generator, or other facilities). To address this, the Wildlife Agencies will have additional review and approval authority over new major point sources of nitrogen that could adversely affect serpentine natural communities and associated covered species (see Chapter 8, Section 8.7.3 *Wildlife Agency Responsibilities*). Nitrogen deposition (N-deposition) in Bay checkerspot butterfly habitat comes from a mix of the regional plume from all upwind sources, including emissions and deposition from stationary sources, and local plumes from road traffic, primarily along U.S. 101. The deposition from any one road is small relative to the regional plume except on habitat within 660–990 feet (200–300 meters), and is primarily the effects of vehicular NH_3 and NO_2 emissions (CH2M Hill 2004). Large point sources (i.e., stationary sources) like the Metcalf Energy Center also have small incremental effects. Regional mobile and area sources that are closer to the Bay checkerspot butterfly habitat have larger effects than those from more distant counties; Santa Clara County sources within the study area are estimated to provide 63% of the current deposition (**Appendix E**).

Nitrogen deposition levels are high enough across the study area that all serpentine grassland is at risk, but some areas have higher loads than others. The "critical load" for N-deposition in serpentine grassland, where nonnative grasses have difficulty invading completely, is 5-6 kg-N/ha/yr, as measured with passive samplers (CH2M Hill 2004; Fenn et al. 2010). Tulare Hill and the lower slopes of Coyote Ridge, near U.S. 101, have the highest deposition (15–20 kg-N/ha/yr), and the ridge top above Kirby Canyon receives 10–15 kg-N/ha/year. The reduced N-deposition at the ridge top is a function of its distance from immediate sources (U.S. 101) and its position above the inversion layer on many mornings. In contrast, deposition at Jasper Ridge and at Edgewood County Park (both in

San Mateo County) 1,300 feet from U.S. 280 are 4–5 kg-N/ha/yr. Impacts to Bay checkerspot butterfly habitat resulting from development are most likely to occur at the bottom of slopes, where nitrogen deposition is highest (and therefore habitat quality is lowest).

On-going nitrogen deposition will continue to give nonnative species the ability to dominate native serpentine grasslands, systematically supplanting suitable habitat for covered serpentine plant species and for Bay checkerspot butterfly. It is not possible to precisely determine the nature of the effects of on-going nitrogen deposition on serpentine grassland. While it is likely that on-going nitrogen deposition will favor the growth of nonnative annual grasses over native serpentine species, the resulting change in community composition and habitat quality will depend on several factors. Proportional impacts resulting from on-going deposition will be lower in high pollution zones where impacts may already be acute; similarly, they will be higher in low pollution areas (Weiss 2006). Some of the serpentine grasslands in the study area, such as Tulare Hill and Kirby Canyon, already experience elevated nitrogen deposition levels (CH2M Hill 2004).

With continued N-deposition as a result of growth in the study area and the region, effective grazing management becomes critical to maintaining Bay checkerspot butterfly populations. N-deposition to Bay checkerspot butterfly habitats in Santa Clara County may be above the critical load (as defined above) well into the future, despite efforts to reduce vehicle emissions. It has proven possible to manage the effects of N-deposition on serpentine grasslands in the highest deposition areas on Tulare Hill and low elevation slopes of Coyote Ridge though grazing (S. Weiss pers. comm.). As discussed elsewhere, a flexible grazing regime that seeks to remove a maximal amount of grass each year compensates for high spatial and temporal variability in annual grass production, driven by weather and N-deposition.

The effects of N-deposition on serpentine grasslands and the Bay checkerspot butterfly are well documented (e.g., Weiss 1999). In the absence of grazing, increased growth of annual grasses and thatch build-up lead to decreased cover of host plants, nectar sources, and all native forb species over the course of 1–3 years (Weiss et al. 2007). This habitat shift has been observed every time grazing has been removed in the South Bay, including in the Silver Creek Hills, Santa Teresa Hills, Kirby Canyon Landfill, and in smaller exclosures (Weiss et al. 2007). Losses of host plants and nectar sources lead to population crashes, and ultimately local extinctions. These local extinctions have been observed at Edgewood County Park in San Mateo County. In contrast, grazed areas maintain high native cover and support Bay checkerspot butterfly populations as weather and local topography permit.

The impact of on-going deposition will also depend on the management of specific serpentine grasslands (Weiss 2006). Grazing and burning of grasslands, an important component of the Habitat Plan conservation strategy, are likely to be effective at controlling nonnative species and, consequently, maintaining the relative cover of native serpentine species, including the Bay checkerspot butterfly host plants (Weiss 1999, 2006).

Vehicular Strikes

Covered activities that facilitate increased vehicular use in the study area will also contribute to an increase in vehicle strikes of Bay checkerspot butterfly. Increased traffic on existing roads is likely to result in higher vehicular strikes. However, the proportional impact of this level of mortality on population dynamics of this species is very small within large core populations such as on Coyote Ridge. Vehicular strikes have a greater impact on adult butterflies dispersing between habitat patches. Existing roads where an increase in vehicle traffic is expected as a result of covered activities and where vehicle strikes with Bay checkerspot butterfly are most likely due to road location, road configuration, and traffic patterns are:

- U.S. 101
- Metcalf Road
- Silver Creek Valley Road
- Monterey Highway
- Santa Teresa Boulevard (expected to be widened during the permit term)
- Dirt ranch roads through or near Bay checkerspot butterfly habitat.
- Roads in residential developments adjacent to butterfly habitat (e.g., Silver Creek Hills, residential areas along Basking Ridge Avenue).

Increased development in open areas between Bay checkerspot butterfly habitat (e.g., Coyote Valley) will also create new hazards and barriers to movement for this species.

Conservation Strategy Implementation

Indirect effects to the Bay checkerspot and its associated habitat will be similar to those described previously in Section 4.3.7 *Conservation Strategy Implementation.* Implementation of the conservation strategy will increase access to bay checkerspot habitat and may result in increased take. Harm could result from reserve visitors trampling habitat, littering, and collecting nectar and larval host plants. Visitors may also harass adult butterflies during the flight season. However, effects associated with increased access to Bay checkerspot habitat will be greatly reduced by the Plan's conditions on recreation (see Chapter 6, Section 6.4.6, subheading *Condition 9 Prepare and Implement a Recreation Plan*). These effects will be minor and temporary, especially when compared to the net benefits gained from the Reserve System and the educational benefit afforded to the community through limited access to portions of the reserves.

Other Covered Activities

Indirect effects of other covered activities will be largely avoided by implementation of conditions on covered activities (see Chapter 6, including subheading *Condition 13 Serpentine and Associated Covered Species Avoidance and Minimization*). Conditions placed on construction practices will limit construction dust and erosion. Populations next the Kirby Canyon landfill do not appear to be affected by dust, much of which occurs during the dry season when Bay checkerspot butterfly are in diapause. Erosion is a natural part of the butterfly habitat; nonetheless, conditions on covered activities will avoid erosion impacts. Use of hazardous chemicals will be avoided throughout the Reserve System, including core habitats, except for precisely targeted herbicide applications under the conservation strategy and adaptive management program.

4.6.2 California Tiger Salamander, California Red-Legged Frog, Western Pond Turtle

Several species of amphibians and reptiles utilize riverine habitats as discussed above but also use a wide variety of seasonal wetlands, marshes, ponds, and upland habitats during different times of the year. Ponds and wetlands in the study area provide breeding habitat for California tiger salamander, and breeding and year-round habitat for California red-legged frog and western pond turtle. All these species are affected by surrounding land uses because they also need sufficient upland habitat near breeding streams and other aquatic habitats (e.g., ponds, wetlands) to accommodate year-round uses (e.g., refugia, dispersal). For example, western pond turtles need upland habitat an average of 92 feet from breeding sites but up to 1,391 feet for nesting and overwintering (see species account for citations). Pond turtles also require sufficient basking sites in the water for year-round use (Crump 2001; Davis 1998).

The human-influenced water regime often does not facilitate successful breeding (e.g., if seasonal wetlands dry up prematurely, or if waters that were historically seasonal become perennial). Moreover, these water regimes often support nonnative species such as bullfrogs and predatory fish that eat young frogs and salamanders.

Direct Effects

Covered activities that adversely affect seasonal wetlands, marshes, ponds, streams, or surrounding upland areas may directly affect these species. Individuals could be killed or injured by construction activities. Moreover, the removal or alteration of habitats upland of potential breeding sites may not allow individuals to complete their life cycles or move to other seasonal habitats. Activities that result in the loss of ground squirrel populations (e.g., rodent control) or in the removal or excavation of rodent burrows could result in the direct loss of individuals utilizing upland refugia. Covered activities that remove

vegetation from the edges of wetlands and riparian corridors or vegetation removal within aquatic habitats will reduce habitat heterogeneity and adversely affect these species. Covered activities that isolate breeding pools from adjacent upland habitats will reduce the overall productivity of these species. Isolation of many breeding sites could cause extirpation of local populations. Increased vehicular traffic following road widening or creation of new driveways/access roads within dispersal habitat for reptiles and amphibians will increase the number of individuals that are killed or injured on roadways.

No more than 52 acres of pond and 40 acres of wetland habitat will be permanently affected by covered activities, relative to a total of approximately 1,110 acres of pond habitat and 583 acres of wetland habitat throughout the study area (4.7% of pond and 7% of wetland habitat of the totals in the study area). In addition, no more than 9.4 stream miles will be permanently affected by covered activities, relative to the total of 2,392 miles of stream in the study area (0.4% of the total stream miles in the study area).

Permanent impacts on California tiger salamander modeled breeding habitat will not exceed 77 acres (7% of total modeled breeding habitat in the study area) and temporary impacts will not exceed 14 acres (1% of total modeled breeding habitat in the study area). Permanent impacts on California tiger salamander non-breeding modeled habitat will not exceed 12,855 acres (4% of total non-breeding modeled habitat in the study area) and temporary impacts will not exceed 1,529 acres (less than 1% of total modeled breeding habitat in the study area) (**Table 4-4**).

Permanent impacts on California red-legged frog modeled primary habitat will not exceed 299 acres (3% of total modeled primary habitat in the study area) and temporary impacts will not exceed 116 acres (1% of total modeled primary habitat in the study area). Permanent impacts on California red-legged frog modeled secondary habitat, which includes areas for refugia and dispersal, will not exceed 12,937 acres (4% of total modeled refugia habitat in the study area) and temporary impacts will not exceed 1,489 acres (less than 1% of total modeled secondary habitat in the study area) (**Table 4-4**).

Permanent impacts on western pond turtle modeled primary habitat will not exceed 1,824 acres (2% of total modeled primary habitat in the study area) and temporary impacts will not exceed 440 acres (less than 1% of total modeled primary habitat in the study area). Permanent impacts on western pond turtle modeled secondary habitat will not exceed 7,825 acres (3% of total secondary habitat in the study area) and temporary impacts will not exceed 986 acres (less than 1% of total secondary habitat in the study area) (**Table 4-4**).

Most of the impacts to California tiger salamander, California red-legged frog and western pond turtle occur due to conversion of habitat to developed land cover types within the San José, Morgan Hill and Gilroy planning limits of urban growth. Geographic specificity is provided below for impacts to modeled habitat in the Santa Cruz Mountains, valley floor, and Diablo Range for impacts calculated in GIS (see Section 4.4 *Impact Assessment Methods*). Impacts to

California tiger salamander and California red-legged frog critical habitat are detailed below (see Section 4.7 *Effects on Critical Habitat*).

Impacts to California red-legged frog, California tiger salamander and western pond turtle habitat in the Santa Cruz Mountains are expected to be limited to the Santa Cruz foothills. Impacts to California red-legged frog modeled primary and secondary habitat are expected to occur from dam seismic retrofit on all dams located in the Santa Cruz Mountains and implementation of flood protection projects in Uvas and Gavilan Creeks. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at the Calero, Guadalupe, and Vasona dams. Development within the planning limit of urban growth of Gilroy, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure is expected impact modeled secondary habitat adjacent to modeled primary habitat in the Santa Cruz foothills, especially along Uvas Creek and its lower tributaries.

For California tiger salamander, development within the Gilroy and Morgan Hill planning limits of urban growth, rural development, bridge construction/reconstruction, and construction/reconstruction of County Park facilities and infrastructure is expected to mainly impact modeled upland habitat, with impacts to modeled breeding habitat concentrated on the west side of Uvas Creek and the west side of the City of Morgan Hill. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at Calero and Calero-Fellows Dike.

Impacts to western pond turtle modeled primary and secondary habitat in the Santa Cruz Mountains are expected to be limited to the foothills. Impacts to western pond turtle modeled primary and secondary habitat are expected to occur from dam seismic retrofits on dams in the Santa Cruz Mountains, and implementation of flood protection projects in Uvas and Gavilan Creeks. Dam and reservoir maintenance is anticipated to impact potential habitat at Guadalupe and Vasona Creeks below dams. Development within the planning limit of urban growth of Gilroy, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure is expected impact both modeled primary and secondary habitat, with impacts to concentrated on the west side of Uvas Creek. Impacts locations from Rural Development, all Rural CIP, and all In-Stream CIP cannot be specified at this time. Two western pond turtle known occurrences are expected to be impacted by Gilroy urban development on the west side of Uvas Creek within the Santa Cruz Mountains.

Impacts to California red-legged frog, California tiger salamander, and western pond turtle habitat on the valley floor are expected to occur within the San José, Morgan Hill, and Gilroy planning limits of urban growth. Impacts to California red-legged frog modeled primary and refugia habitat are expected to occur from flood protection projects, vegetation management on lower Llagas Creek, and road upgrades/construction in East Little Llagas Creek. Development within the planning limit of urban growth of Morgan Hill, Gilroy, San José, rural development, bridge construction/reconstruction, and road improvements may impact California red-legged frog secondary habitat adjacent to primary habitat.

Impacts to California tiger salamander breeding and upland habitat are expected to occur on the valley floor within the San José, Morgan Hill, and Gilroy planning limits of urban growth. Impacts to breeding habitat are expected to occur to along Upper and lower Llagas Creek, while impacts to upland habitat are expected to occur north and south of West Branch Llagas Creek, between the Uvas and Llagas Creeks throughout the Prince Valle Drain and Lower Miller Slough. All breeding habitat and most upland habitat with the Morgan Hill planning limit of urban growth are expected to be removed. This is expected to include the removal of one known occurrence on the northwest side of the Morgan Hill planning limit of urban growth from urban development. Development within the San José planning limit of urban growth, rural development, bridge construction/reconstruction, and road improvements are expected to impact upland habitat along Guadalupe, Calero, Santa Teresa, Upper Penitencia, Lower Silver, and Coyote creeks (between Lower Silver Creek and just north of Upper Penitencia Creek).

Impacts to western pond turtle primary and secondary habitat are expected to occur from flood protection projects, vegetation management on lower Llagas Creek, and road upgrades/construction in East Little Llagas Creek. Development within the planning limit of urban growth of Morgan Hill, Gilroy, San José, rural development, bridge construction/reconstruction, and road improvements are expected to impact primarily secondary habitat. One western pond turtle known occurrence is expected to be impacted at the Vasona Reservoir.

Impacts to California red-legged frog, California tiger salamander, and western pond turtle in the Diablo Range are limited to the Coyote Watershed, primarily within the San José planning limit of urban growth. For California red-legged frog, this includes impacts to primary and refugia habitat from dam seismic retrofits at Anderson Dam, implementation of flood protection projects on Coyote, Mid-Coyote, Upper Penitencia, Fisher, Lower Silver, Upper Silver, Berryessa, Quimby, Sierra, South Babb, and Thompson creeks; and levee reconstruction on Berryessa, Thompson, Coyote, and Upper Penitencia Creeks. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at the Coyote dam. Development within the planning limit of urban growth of San José, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure are expected to impact the lower stream reaches that serve as California red-legged frog primary habitat and adjacent secondary habitat. This is expected to include impacts to two California red-legged frog known occurrences on Metcalf Creek and Coyote Creek.

San José urban development within the planning limit of urban growth, flood protection projects, and levee reconstruction are expected to impact California tiger salamander upland habitat adjacent to Sierra, Upper Penitencia, Upper Coyote, Upper Silver, Thompson, Fowler, and Quimby creeks. Dam and reservoir maintenance is anticipated to impact potential breeding and upland habitat at the Anderson Dam. Two California tiger salamander known occurrences are expected to be impacted. One is adjacent to Thompson Creek and the other is between Coyote and Thompson creeks.

The impact locations for western pond turtle are similar to those from California red-legged frog. Impacts to western pond turtle primary and secondary habitat are expected to occur from dam seismic retrofits at Anderson Dam, implementation of flood protection projects in Coyote, Mid-Coyote, Upper Penitencia, Fisher, Lower Silver, Upper Silver, Berryessa, Fisher, Quimby, Sierra, South Babb, and Thompson creeks; and levee reconstruction and maintenance in Berryessa, Thompson, Coyote, and Upper Penitencia creeks. Dam and reservoir maintenance is anticipated to impact potential habitat on Coyote Creek below Coyote and Anderson dams. Development within the planning limit of urban growth of San José, rural development, bridge construction/reconstruction, and construction of County Park facilities and infrastructure are expected to impact the lower stream reaches that serve as primary habitat and adjacent secondary habitat.

SCVWD manages flows and diversions to meet water supply objectives. As discussed in Section 4.3.3, dry-back conditions may occur due to fluctuations in seasonal operations. SCVWD generally attempts to avoid stranding of aquatic species when flows are reduced using a ramped schedule for flow reduction. When in-channel flow reductions are made, wildlife may be stranded in isolated pools or downstream reaches. While adult individuals may have time to move out of the area, flow reductions occurring early in the year may affect amphibian egg sacs established on stream margins.

Conversely, during dewatering events, consistent high flows, if started early enough in the year and continued through late spring, may facilitate breeding by providing a reliable water source and may also reduce the potential for stranding. High flows are not expected to affect western pond turtle breeding as this species tends to lay its eggs in uplands away from the active channel. To ensure that impacts to covered amphibian species are avoided and minimized during dewatering events, SCVWD will develop a dewatering plan for review and approval by the Wildlife Agencies prior to commencing a dewatering activity. See Chapter 6 for additional information on the possible issues addressed by the dewatering plan.

The year following a dewatering event, flows are expected to be lower than normal. This will likely reduce the availability of egg laying substrate for amphibians.

Dry-back of channels may also occur due to maintenance activities, although this occurrence is much less common. For example, it may be necessary to reduce reservoir releases when a recharge diversion requires repair. Rapid dry-back could also occur if bypass flow (flow that remains in the channel) at a diversion is blocked by debris or other system failure. However, repairs of downstream diversions are likely to be implemented while maintaining some flow in the channel. Even a catastrophic failure for diverting water at a downstream diversion would likely not trigger a rapid in-stream dry-back; however, receiving ponds may experience a reduction in water level. All planned repairs requiring channel dewatering would incorporate bypass flow.

Amphibian larvae and tadpoles may also be affected by changes in water quality associated with operation of reservoirs and groundwater percolation ponds. These potential effects are discussed in Section 4.3.3. Key issues are increased in fine sediments released from reservoirs or ponds that may cover egg sacs if releases are made early in the year. Increased turbidity from sediment and algae may inhibit foraging of adults if releases are made later in the year.

Indirect Effects

Indirect effects resulting from human population growth and increased urbanization is expected to constrain or eliminate stream, pond, and/or wetland habitats and increase water temperatures, while decreasing sediment transfer and dissolved oxygen. Changes in land use in areas adjacent to breeding sites can reduce the overall habitat quality of upland sites for California tiger salamander, California red-legged frog, and western pond turtle. The rate of natural movement of salamanders among breeding sites depends on the distance between the ponds or complexes of ponds and of the quality of intervening habitat (e.g., salamanders may move more quickly through sparsely covered and open grassland than they can through densely vegetation lands) (Trenham 1998). Loss of habitat connectivity may affect species disbursal movements. An increase in urban development adjacent to breeding habitat would facilitate an increase in predators (e.g., feral cats, raccoons, and skunks) that decrease breeding success and predate reptiles and amphibians. This predation may have a detrimental impact on local populations.

Increased runoff from impervious surfaces into wetland areas carries pollutants that are harmful to reptiles and amphibians, which are particularly sensitive to contaminants and other pollutants in the water. An increase of impervious surfaces within a watershed due to urbanization may result in changes to in-stream flow, temperature, and stream geomorphology. Increases in impervious surfaces can also result in increased water pollutants in local streams, particularly during “first flush” rain events. Herbicides, pesticides, and other toxic materials can cause diminished production or mortality of aquatic covered species. Fertilizers and other organic materials can cause algal blooms that decrease dissolved oxygen levels, while fine sediments may degrade breeding habitat. Changes in land use that reduce natural land cover and increase impervious surfaces in areas adjacent to riverine habitats can also lead to increased disturbance of species (e.g., reduced foraging and reproductive success) due to increased sources of noise, light, neighborhood runoff (e.g., fertilizers, oil), and introduced species.

Covered activities that occur in aquatic habitat (i.e., in-stream capital projects, in-stream operations and maintenance, and monitoring) could facilitate the spread of disease such as chytridiomycosis. Increased public access to habitat supporting California tiger salamander, California red-legged frog, and western pond turtle will increase the potential for harm and harassment, and may also result in increased pollution, predation, and introduction of nonnative species.

4.6.3 Foothill Yellow-Legged Frog

Riverine habitats within the study area are subject to human-influenced flows that do not reflect the region's historical water regime. Species that occur in these habitats are usually affected by changes in land use adjacent to the riparian corridor and by the development of permanent infrastructure within the natural floodplain.

Direct Effects

Foothill yellow-legged frogs are expected to be affected by projects implemented within the stream channel or that result in the removal of cobblestone substrate or riparian vegetation, particularly in reaches above reservoirs. Ground-disturbing activities, such as maintenance of stream banks, levees, and channel rights-of-way (e.g., bank repair, vegetation management), could increase erosion and sediment discharge that could disrupt breeding of foothill yellow-legged frogs. Projects that place structures in the channel (e.g., culvert installation) or that require stream access may crush individuals or create permanent pooling habitat where higher risk of predation exists for adults, metamorphs, and tadpoles. If pulse flows from reservoirs (to aid migration by juveniles and smolts of listed fish) are released during the foothill yellow-legged frog egg-laying period, they could dislodge egg masses, causing mortality. However, this is unlikely because pulse flows will be release in winter months (January, February, and March) and are intended to simulate natural flow conditions (see Chapter 5 for details). The timing of oviposition (laying of eggs) for foothill yellow-legged frog typically follows the period of high-flow discharge from winter rainfall and snowmelt (Jennings and Hayes 1994; Kupferberg 1996), thus, pulse flows are expected to occur in advance of oviposition.

Although foothill yellow-legged frogs are not currently known to occur downstream of many of the dams in the permit area, remnant populations may be affected by the operation and maintenance of SCVWD's dams. SCVWD manages flows and diversions to meet water supply objectives. As discussed in Section 4.6.2, dry-back conditions may occur due to fluctuations in seasonal operations. There are events that cause operations to fluctuate substantially and rapidly. For example, it may be necessary to reduce reservoir releases when a recharge diversion requires repair. When in-channel flow reductions are made, amphibians may be stranded in isolated pools or downstream reaches that rapidly dry back as flow rapidly declines and the area of wetted channel is decreased. SCVWD generally attempts to avoid stranding of aquatic species when flows are reduced using a ramped schedule for flow reduction. Flow reductions may affect egg masses established on stream margins as well as larval food availability.

Dewatering events could aid breeding by providing a reliable water source and may also reduce the potential for stranding or could impact breeding by scouring egg masses and reducing the algal food base for larvae. To minimize the impacts to foothill yellow-legged frogs, SCVWD will develop a dewatering plan for review and approval by the Wildlife Agencies prior to commencing a dewatering

activity. See Chapter 6 for additional information on the possible issues addressed by the dewatering plan.

Permanent impacts to foothill yellow-legged frog modeled primary habitat will not exceed 1.9 stream miles, or less than 1% of the total modeled habitat for the species within the study area. Temporary impacts are will not exceed 0.7 miles of stream (less than 1%) of modeled habitat. Permanent impacts on foothill yellow-legged frog modeled secondary habitat will not exceed 4.8 miles (less than 1% of total secondary modeled habitat in the study area) and temporary impacts will not exceed 1.3 miles (less than 1% of total modeled secondary habitat in the study area) (**Table 4-4**).

Geographic specificity of impacts to foothill yellow-legged frog is provided below in terms of expected impacts to modeled habitat in the Santa Cruz Mountains, valley floor, and Diablo Range for impacts calculated in GIS (see Section 4.4 *Impact Assessment Methods*).

Impacts to foothill yellow-legged frog in the Santa Cruz Mountains are expected to be limited to the Santa Cruz foothills. Impacts to modeled primary and secondary habitat are expected to occur from dam seismic retrofit at Uvas Dam, Chesbro Dam, Almaden Dam, Calero Dam, and Guadalupe Dam. Impacts from implementation of flood protection projects are expected in Uvas Creek (secondary habitat) and Gavilan Creek (primary and secondary habitat). Dam and reservoir maintenance is anticipated to impact potential habitat at Guadalupe Dam. One known occurrence is expected to be impacted along Uvas Creek, north of its confluence with Bodfish Creek.

Impacts to foothill yellow-legged frog on the valley floor are expected to be limited to modeled secondary habitat in-streams within the San José, Morgan Hill, and Gilroy planning limits of urban growth. Impacts to secondary habitat are expected to occur from implementation of flood protection projects in East Little Llagas, Jones, Lions, West Branch Llagas, West Little Llagas, Alamitos, Arroyo, Canoas, Los Gatos, Randal, and Ross creeks; levee reconstruction in Lower Llagas, Llagas West, Jones, Lions, West Branch Llagas, Alamitos, Guadalupe, Canoas, Randol, and Los Gatos creeks, and the Guadalupe River; vegetation management on lower Llagas Creek; and road upgrades/construction near East Little Llagas Creek. Development within the planning limits of urban growth of Morgan Hill, Gilroy, San José, rural development, bridge construction/reconstruction, and road improvements are expected to impact foothill yellow-legged frog secondary habitat.

Impacts to foothill yellow-legged frog in the Diablo Range are expected to be limited to the Coyote Watershed, primarily within the San José planning limit of urban growth. Impacts are primarily expected to be to secondary habitat and occur from dam seismic retrofits at Anderson Dam; implementation of flood protection projects on Coyote, Mid-Coyote, Upper Penitencia, Fisher, Lower Silver, Upper Silver, Berryessa, Quimby, Sierra, South Babb, and Thompson creeks; levee reconstruction and maintenance in Berryessa, Thompson, Coyote, and Upper Penitencia creeks. Development within the planning limit of urban growth of San José, rural development, bridge construction/reconstruction, and

construction of County Park facilities and infrastructure are expected to impact the lower stream reaches that serve as foothill yellow-legged frog secondary habitat.

Indirect Effects

Foothill yellow-legged frogs are expected to be indirectly affected by water flow and adjacent land uses within occupied watersheds.

Indirect effects on covered aquatic species are also derived from overall changes in impervious surface in the watersheds during the permit term. An increase of impervious surfaces within a watershed due to urbanization may result in changes to in-stream flow, temperature, and stream geomorphology. Increases in impervious surfaces can also result in increased pollutants entering local streams, particularly during "first flush" rain events. Herbicides, pesticides, and other toxic materials can cause diminished production or mortality of aquatic covered species. Fertilizers and other organic materials can cause algal blooms that decrease dissolved oxygen levels, while fine sediments may degrade breeding habitat. Changes in land use that reduce natural land cover and increase impervious surfaces in areas adjacent to riverine habitats can also lead to increased disturbance of species (e.g., reduced foraging and reproductive success) due to increased sources of noise, light, neighborhood runoff (e.g., fertilizers, oil), and introduced species.

Urban development and agriculture have historically been cited as the cause of degraded watershed health. However, a recent study implicates exurban land use as a significant contributor as well (Lohse et al. 2008). This study found that increases in exurban development within a watershed results in fewer observed areas of high quality in-stream habitat. In addition, the study indicates that exurban development may have a greater relative impact than urban development on stream conditions because exurban development generally occurs in areas that are less developed and have existing high quality habitat (Lohse et al. 2008).

Covered activities that occur in aquatic habitat (i.e., in-stream capital projects, in-stream operations and maintenance, and monitoring) could facilitate the spread of disease such as chytridiomycosis. Increased public access to habitat supporting foothill yellow legged-frogs will also increase the potential for harm and harassment. Increased public access to these areas may also result in increased pollution, predation, and introduction of nonnatives. These effects will be minimized through the implementation of conditions described in Chapter 6.

4.6.4 Western Burrowing Owl

Occupied nesting, potential nesting, and overwintering only habitats were modeled for the burrowing owl (see **Appendix D** for habitat requirements). Impacts to the species will differ depending on the type of burrowing owl habitat that is affected. Impacts to different types of burrowing owl habitat will require

different types of conservation actions to ensure the impacts are appropriately offset and that conservation of the species occurs. Impacts are discussed below for the three types of burrowing owl habitat. Impacts are also discussed below for individual owls that may occur in any of these habitat types.

As previously described in Chapter 1, take authorized by permits issued for this Plan that occur within the expanded study area for burrowing owl conservation will be the result of conservation strategy actions implemented for the burrowing owl. Take associated with any of the six other categories of covered activities described in Chapter 2 or conservation actions for species other than the burrowing owl are not covered by this Plan in the expanded study area for burrowing owl conservation.

Direct Effects

Occupied Nesting Habitat

Within the Habitat Plan study area and expanded study area for burrowing owl conservation, burrowing owl nesting habitat is limited to grassland, barren, and some agricultural land cover types, that are generally flat with an open view shed and active ground squirrel colonies (see **Appendix D** for habitat requirements). Most of the occupied nesting habitat is within the northern portion of the urban service area of the City of San José.

Based on what is known about the recent distribution of nesting burrowing owls in the study area (DeSante et al. 2007; Townsend and Lenihan 2007; California Natural Diversity Database 2012; Barclay 2007), and the propensity of burrowing owls to forage within 0.5 mile of nest sites during the breeding season (Haug and Oliphant 1990; Rosenberg and Haley 2004), there are an estimated 1,348 acres of occupied nesting habitat (defined as breeding sites and associated essential foraging habitat within 0.5 mile of nest sites) in the study area. This estimate excludes the expanded study area for burrowing owl conservation because the only covered activities that will occur there are those associated directly with burrowing owl conservation. A maximum of 198 acres (15%) of occupied burrowing owl nesting habitat could be lost to covered activities within the Habitat Plan study area. Temporary impacts will not exceed 20 acres (1%) of occupied nesting habitat in the Habitat Plan study area (**Table 4-4**). Areas that are considered burrowing owl nesting habitat but will not be impacted by covered activities include the San José International Airport. All of the expected impacts on occupied burrowing owl habitat from covered activities would occur within the City of San José as a result of urban development.

Potential Nesting Habitat

There is an estimated 63,751 acres of potential nesting habitat in the study area. A maximum of 4,000 acres (6%) of potential burrowing owl nesting habitat in the permit area may be permanently affected by covered activities. Temporary

impacts will not exceed 604 acres (less than 1%) of potential nesting habitat (**Table 4-4**). This is valley floor habitat that is outside of 0.5 mile of current nest locations but within 7.5 miles (documented movement distances of banded owls in Santa Clara County) of known nest locations (**Figure 5-11**). Impacts to potential nesting habitat will occur primarily as the result of rural residential development in unincorporated County areas, San José, Gilroy, or Morgan Hill. Additional impacts are expected on some types of agricultural lands on the valley floor, where agricultural lands are converted to other uses (housing or commercial).

Habitat Used Only for Overwintering

A maximum of 9,671 acres or 7% of modeled overwintering habitat in the Habitat Plan study area will be permanently affected by covered activities. Temporary impacts will not exceed 762 acres (less than 1%) of modeled overwintering habitat in the Habitat Plan study area (**Table 4-4**). Impacts to overwintering habitat will occur primarily as the result of rural residential development outside of the jurisdiction of San José, Gilroy, or Morgan Hill. Most of the impacts incurred on overwintering habitat will be under the jurisdiction of the County of Santa Clara. Additional impacts may occur as the result of roadway improvements (widening, bridge replacements) or stream maintenance in areas where burrowing owls have been documented using berms or levees along waterways.

Impacts on Individual Burrowing Owls

As described above, take authorization for burrowing owls is primarily limited to loss or degradation of the three kinds of habitat for the species (occupied nesting, potential nesting, and overwintering). All forms of take of individual owls are possible. Loss (death) or injury could occur from implementation of many covered activities if active burrows or nests are not avoided. However, the potential for this is avoided through the implementation of Condition 15, described in Chapter 6. Similarly, filling burrows used by owls when the owls are foraging off site could cause the owl to abandon the site and subsequently die off site if the owls are not able to find new shelter or are otherwise put in harm's way (e.g., excessive exposure leading to predation by other species). Vehicle strikes are also possible on construction sites, particularly when traffic occurs close to active burrows or nests.

Harm or harassment may occur from construction or operations and maintenance activities if these activities disrupt normal foraging or nesting behavior. In some instances, harassment could be so severe that it causes an owl to abandon its nest or its active burrow. The potential for this is minimized through the implementation of Condition 15, described in Chapter 6.

Capture, harm, and harassment may also occur from surveying, monitoring, and management activities within the Reserve System or on managed lands. For

example, active translocation of owls may be used as part of the conservation strategy (see Chapter 5). While allowed under the Plan, this handling activity would capture, harm, and harass owls temporarily while they are being moved. Unsuccessful translocation efforts conducted on an experimental basis may also result in the death of individuals. Impacts on individual burrowing owls will be minimized through the implementation of Condition 15, described in Chapter 6.

Since burrowing owls are protected by the MBTA, take of owls in the form of death or injury will not be allowed under the federal permit for any covered activity[16]. The NCCP permit serves as authorization by CDFG for take of owls consistent with this Plan under the Fish and Game Code.

Until the owl population in the South Bay Population reaches the population growth trend described in Section 5.4.6, the Plan does not cover take of individual owls, except for conservation strategy implementation or if an exception to the passive relocation prohibition is granted (see Chapter 6, Condition 15, subheading *Passive Relocation)*. Condition 15 and other avoidance measures described in Chapter 6 (e.g., adoption of speed limits on construction sites) will be used to avoid such impacts. Few exceptions to the passive relocation prohibition are anticipated. These provisions will maximize the possibility of success of the conservation strategy in Chapter 5 by initially preserving owls in the study area as much as possible.

Once the owl population in the South Bay Population reaches the population growth trend as described in Chapter 5, take of individual owls in all forms will be allowed under the Plan for all covered activities (avoidance and minimization measures described in Condition 15 will still be required with the exception that passive relocation will be allowed consistent with the process described in Chapter 6). Since the population is now in decline and because of the limitations of the population viability analysis (PVA) model, it is anticipated that at least a 10 year period is necessary for the conservation activities to have a positive effect and to detect that effect through monitoring and re-running of the PVA.

Once the target growth trend is reached and take of individual owls for all covered activities is allowed, the amount of allowable take will be determined annually by the Implementing Entity in partnership with the Wildlife Agencies based on owl monitoring data and population viability modeling. The amount of take annually will be the number of owls in excess of those needed to maintain the positive growth trend as determined by the PVA (**Figure 4-3**). Based on new data and modeling results, the Implementing Entity and the Wildlife Agencies may increase or decrease the allowable take each year to ensure that the biological goals and objectives of the Plan are met. If the positive growth trend is lost during implementation, take authorization would again be limited to all forms of take associated with the implementation of the burrowing owl conservation strategy or take associated with approved exceptions to the passive relocation prohibition.

[16] If burrowing owl is listed under the ESA, this Plan can at that point serve as a Special Purpose Permit under the MBTA.

Take of burrowing owls resulting from the expiration of temporary management agreements will only be authorized if the targeted population growth described in Chapter 5 is being met. The amount of take would be counted toward the annual take authorized for that year. The only exception to this rule is that take of owls associated with implementation of the conservation strategy may continue and is not counted towards the annual take limit.

Indirect Effects

Indirect effects resulting from human population growth, increased urbanization of the valley floor, and the continued build out of the three cities covered by the Plan are expected to reduce the quality of western burrowing owl nesting (occupied and potential) and overwintering habitat. The predominant indirect effects on burrowing owls are anticipated to beincreased harassment from people, increased vehicle-related disturbance (e.g., of nesting habitat near roads), increased vehicle strikes, isolation of individuals on vacant lots, predation by cats, and increased exposure to humans throughout the study area, including within the Reserve System.

4.6.5 Least Bell's Vireo

Least Bell's vireos breed in early successional riparian habitat during the spring and summer months. This habitat is the product of a dynamic riverine environment and is adversely influenced by human-altered riverine systems that minimize disturbance and disallow flooding.

Direct Effects

Because of the rarity of the species in the study area and the importance of maintaining all individuals that occur, this Plan does not authorize take in the form of direct injury or mortality. The Plan also does not authorize take of nests or eggs (these restrictions are in compliance with the MBTA and California Fish and Game code.) Covered activities may result in take in the form of harm and/or harassment, although these effects will be minimized with the avoidance and minimization measures described in Chapter 6 (see Condition 16 *Least Bell's Vireo*). Covered activities that result in the removal or alteration of riparian habitat within the study area will affect riparian obligate songbirds such as least Bell's vireo. Moreover, any activity that diminishes dynamic riverine events (i.e., floods) that cause natural disturbance and create early successional habitats will reduce the amount of breeding habitat available for this species. This species is not only affected by the amount of breeding habitat available but also by land uses adjacent to the riparian corridor. Impacts on the species will be minimized through the implementation of Condition 16, described in Chapter 6.

Covered activities will not exceed 72 acres of permanent impacts on primary least Bell's vireo modeled habitat, or 2% of the total 3,097 acres of modeled

habitat in the study area. Temporary impacts will not exceed 43 acres (1% of total modeled habitat) of modeled habitat (**Table 4-4**).

Geographic specificity of impacts is provided in terms of impacts to potential habitat calculated in GIS (see Section 4.4 *Impact Assessment Methods*). Impacts to modeled habitat are limited to the Santa Cruz Mountains foothill and the valley floor in the South County. Impacts to least Bell's vireo modeled primary habitat are anticipated to occur along riparian corridors from dam seismic retrofit at Uvas Dam and Chesbro Dam, flood protection projects in Uvas and Llagas Creek watersheds, vegetation management on lower Llagas Creek, and road projects along East Little Llagas Creek.

Indirect Effects

Least Bell's vireo is expected to be indirectly affected by water flows and adjacent land uses that alter associated riparian habitat within the study area. See Section 4.6.3 *Foothill Yellow-Legged Frog* subheading *Indirect Effects*, above, for a discussion of indirect effects on riverine natural communities and associated riparian corridors. In addition, breeding success can be reduced if adjacent land uses result in nonnative, or feral, nest predators (i.e., cats) or high numbers of parasitic brown-headed cowbirds.

4.6.6 Tricolored Blackbird

Tricolored blackbirds breed colonially in freshwater marshes and other wetland habitats with reeds, cattails, or other emergent or non-emergent wetland vegetation (such as blackberry). Further, this species needs foraging habitat adjacent to breeding sites to successfully nest and rear young.

Direct Effects

Because of the rarity of the species in the study area and its high breeding site fidelity, this Plan does not authorize the removal of historic[17] or active breeding habitat. No direct impacts are allowed to active colonies. Potential tricolored blackbird breeding sites will be directly affected by covered activities that result in the removal or permanent alteration of wetlands, marshes, and vegetated ponds. Conversion of lands from native or agricultural land cover to urban use will result in the degradation of foraging habitat for this species.

Estimated impacts on tricolored blackbird habitat are shown in **Table 4-4**. Permanent impacts on tricolored blackbird modeled primary habitat and secondary habitat will not exceed 276 acres (3%) and 10,317 acres (8%) of

[17] If a pond or wetland has documented breeding within the past 5 years, it will not be directly impacted by covered activities. Best efforts will be used to determine historic use. Best efforts will include at a minimum, a CNDDB records search, discussion with local experts, and investigation of site for historic nesting materials.

modeled primary habitat and secondary habitat in the study area, respectively. Temporary impacts on tricolored blackbird modeled primary habitat and modeled secondary habitat will not exceed 93 acres (1%) and 768 (less than 1%), respectively.

Geographic specificity of impacts is provided in terms of expected impacts to modeled habitat calculated in GIS (see Section 4.4 *Impact Assessment Methods*). Impacts to tricolored blackbird modeled breeding habitat occur to stream reaches where impacts are expected to result from in-stream capital improvement, in-stream operations and maintenance, and road projects. Such covered activities include seismic retrofits, levee reconstruction, vegetation management on lower Llagas Creek, improvements to the Coyote Valley Parkway interchange, and road projects along East Little Llagas Creek.

The majority of the foraging habitat with San José, Morgan Hill, and Gilroy planning limit of urban growth is expected to be removed due to urban development. In the vicinity of Gilroy, this includes modeled foraging habitat adjacent to Uvas, West Branch Llagas, and Llagas creeks. Within the Morgan Hill planning limit of urban growth, all foraging habitat on the valley floor, as well as limited portions in the Santa Cruz foothills, is expected to be impacted. Within the San José planning limit of urban growth, impacts to modeled foraging habitat are limited to the Diablo foothills. This is expected to include modeled foraging habitat in the adjacent Canoas, Upper Silver, Fowler, Evergreen, Upper Penitencia, and Sierra creeks.

No impacts are allowed to active colonies (see Chapter 6, Section 6.6.1, subheading *Condition 17 Tricolored Blackbird*); however, it is anticipated that the colony located in Morgan Hill will likely relocate due to encroachment of development within foraging radius of the breeding site.

Indirect Effects

The indirect impacts on tricolored blackbird and other native bird species that utilize pond and wetland habitats will be similar to those discussed above in Section 4.6.4 *Western Burrowing Owl*. More specifically, the predominant indirect effects of covered activities on tricolored blackbird are increased harassment from people; vehicle-related disturbance (e.g., of breeding habitat near roads); increased urban predators (e.g., cats, skunks, raccoons); and increased exposure to humans throughout the action area, including within the Reserve System. Edge effects associated with roads and urban development include increased light and noise, which can disrupt breeding and foraging behavior and inhibit communication necessary for successful mating. Changes to existing roadbeds, bridges, and/or barriers and guardrails can change sound characteristics in certain habitats, interfering with acoustic communication for some birds.

4.6.7 San Joaquin Kit Fox

The last documented breeding activity of San Joaquin kit fox within the study area occurred in 1992. Breeding may occur in the southeastern portion of the study area, although it is expected to be rare. San Joaquin kit fox may move through the southeastern portion of the study area between areas of known breeding activity outside the study area. Suitable movement habitat for San Joaquin kit fox is defined as annual grassland and oak savanna contiguous with grassland in the Pacheco Creek Watershed. Secondary foraging habitat occurs in agricultural fields and row crops adjacent to grassland areas within this watershed.

Because habitat fragmentation is a significant threat to kit fox, preservation of contiguous tracts of suitable habitat is of primary importance. Ideally, contiguous habitat should be expansive enough to provide both foraging and movement habitat and ultimately to support a viable breeding population (i.e., support one or more kit fox home ranges) should the species expand its breeding range in the future. Known breeding populations north of the study area represent the northernmost extent of the species' range. Maintaining connectivity between those populations and other known breeding populations south of the study area is critical to maintaining genetic diversity in the population. The southern portion of the Plan area is critical to maintaining this linkage.

Direct Effects

Because of the rarity of the species in the study area and the importance of maintaining all individuals that occur, this Plan does not authorize take of San Joaquin kit fox in the form of injury or mortality. Take is authorized in the form of harm or harassment, although these effects will be minimized with the avoidance and minimization measures described in Chapter 6 (see Section 6.6.1, subheading *Condition 18 San Joaquin Kit Fox*).

Covered activities that occur along the Pacheco Creek corridor and in the portion of the study area south of Henry W. Coe State Park have the potential to affect San Joaquin kit fox. Any new rural development that occurs along the SR 152 corridor could fragment movement habitat and potentially affect movement patterns. Increased vehicular traffic following road widening or creation of new driveways or access roads within movement habitat may increase the risk of injury or death of kit fox on roadways (however, injury or death of kit fox by vehicular collisions is not authorized by this Plan). Any covered activities that require the excavation of burrows or removal of modeled habitat with existing California ground squirrel colonies have the potential to degrade kit fox habitat. Chapter 6, Section 6.6.1, subheading *Condition 18 San Joaquin Kit Fox* reduces the potential to injure or kill kit foxes that might be taking refuge in these burrows.

A maximum of 198 acres of modeled secondary kit fox habitat (less than 1% of modeled habitat), will be permanently removed or degraded and a maximum of 46 acres (less than 1% of modeled habitat) will temporarily affected by covered activities. A maximum of 28 acres of modeled secondary (low use) kit fox habitat (1% of modeled habitat), will be permanently removed or degraded and a maximum of 6 acres (less than 1% of modeled habitat) will temporarily affected by covered activities (**Table 4-4**).

Indirect Effects

Indirect effects resulting from human population growth in Gilroy and increased urbanization along U.S. 101 south and SR 152 east of Gilroy have the potential to affect kit fox movement through the study area through habitat fragmentation, and may also affect availability of foraging areas and cover. Growing traffic pressures on SR 152 increase the risk of vehicle/kit fox conflict. The presence of road kill attracts predators such as kit foxes and exposes them to increased risk of vehicle strike. Increased risk of fire associated with roads (e.g., accidents and tossed lighted cigarette butts) may also harm or kill kit foxes and temporarily remove habitat.

Recreational uses on Plan Reserves have the potential to disturb denning kit foxes. However, these activities will be prohibited or limited to avoid or minimize adverse impacts on the species (see Chapter 6). Increased noise and lights from urban areas and harassment from pets have the potential to affect kit foxes along the urban-wildland interface. Feral cats increase competition for food and introduce disease.

4.6.8 Serpentine Plants

This section describes the direct and indirect effects of the covered activities on covered plants that occur exclusively or primarily in serpentine grassland or serpentine chaparral land cover types. The direct effects are described for each species; indirect effects are described at the end of the section for all serpentine-associated covered plants because indirect effects are similar for the entire group.

Direct Effects

For each serpentine species listed below, direct effects on known occurrences and suitable habitat are discussed. The discussion includes information on the general location and population estimates of occurrences expected to be affected by covered activities, where these data are available. Population data are often incomplete or out of date due to inconsistent reporting to the state database (CNDDB). In addition, population sizes reported in one year may not accurately represent long-term averages. Almost all of the covered species discussed in this section are herbaceous annuals or perennials (all but Coyote ceanothus, which is a woody perennial). Both annual and perennial herbaceous plants experience

yearly fluctuations in population numbers due to factors related to climate, disturbance, and chance. For all of these reasons, the population data provided below should be considered as a general overview only. Surveys conducted during Plan implementation of affected and protected populations will yield more accurate population data to be used in tracking impacts, land acquisition, and adaptive management.

In addition to estimates of location and population size of potential impacts, the discussion below includes the maximum allowable occurrence impact limit for each species and the impacts on modeled or suitable habitat.

Tiburon Indian Paintbrush

Potential habitat for Tiburon Indian paintbrush exists in serpentine bunchgrass grassland within the study area. However, the two known extant occurrences in the study area appear to occur on a specific sub-type of serpentine soils (S. Weiss pers. comm.). Two of nine known extant occurrences of Tiburon Indian paintbrush occur within the study area (**Table 4-6**; California Natural Diversity Database 2012). Both of these are located along Coyote Ridge. One is on private land that may be protected as a mitigation site for expansion of the Kirby Canyon Landfill. The second occurrence is on a mitigation site for Bay checkerspot butterfly established by Waste Management, Inc for previous landfill development. Both occurrences are being monitored and managed by the Kirby Canyon Butterfly Trust; neither site is currently permanently protected.

Population estimates for this species exist for all except one of the occurrences. The total estimate of known populations reported in the CNDDB is 1,687 individual plants (from estimates between 1988 and 2006). More recent surveys, in 2009, of the two occurrences in the study area counted 1,203 individuals. This species will only be affected by the implementation of the conservation strategy. Management actions (i.e., prescribed burning and livestock grazing) on the one occurrence currently under temporary easement may result in temporary effects. These management actions however, will result in a net benefit to the species and impacts are considered minor and temporary. No additional impacts are allowed to the species, even if more occurrences are discovered during the permit term.

All serpentine bunchgrass grassland in the study area is considered potential habitat for this species. A permanent impacts cap of 550 acres (5.3% of the total in the study area) is applied to impacts to the serpentine bunchgrass land cover type. An additional 91 acres (less than 1%) of temporary impacts to serpentine bunchgrass grassland is anticipated and is the maximum impact allowed (**Table 4-3**).

Coyote Ceanothus

Coyote ceanothus is generally found growing on dry slopes in chaparral, grassland, and coastal scrub on serpentine soils. All three known occurrences of

Coyote ceanothus are located within the study area (**Table 4-6**; California Natural Diversity Database 2012). One of these occurrences is located northwest and southwest of Anderson Dam. This occurrence is the largest known. It is mostly on private land although a small portion of it occurs adjacent to Anderson Dam on SCVWD property and a small portion is located on Anderson Lake County Park. Much of the portion of the occurrence on SCVWD property is likely to be permanently impacted by a seismic retrofit of Anderson Dam or major maintenance of the dam. Because of the rarity of this species and the need to quantify the magnitude of the effects, additional analysis was conducted on this occurrence.

The size of the occurrence adjacent to Anderson Dam was estimated using data from previous surveys conducted by SCVWD botanists (2006 and 2007) combined with field surveys conducted on May 5 and 6, 2009. Field data were used to estimate the population density of Coyote ceanothus in three chaparral types mapped on high-resolution aerial photographs (from April 2006). The site includes unburned chaparral and an area of 100–200 acres that burned at varying intensities in 2003. The burn area supports a large population of young plants (most appeared to be 5–6 years old during 2009 surveys) many of which flowered for the first time in the spring of 2010 (U.S. Fish and Wildlife Service 2011).

The 2009 population estimate for this occurrence was 188,475 plants, the vast majority of which (99.5%, or 187,534) were 5–6 years old plants (J. Hillman pers. comm.). The young plants observed during May 2009 appeared to be healthy, and mortality from herbivory or other causes was not observed. The recent 5-year review indicates that many of the individual plants survived to reproductive maturity (U.S. Fish and Wildlife Service 2011). This survival rate is considered conservative because this species is highly adapted to post-burn reproduction and drought conditions and it is resistant to herbivory.

We used overlays of the maximum footprint of the Anderson Dam retrofit and the extent of the Dam Maintenance Program at this site (the boundaries of these projects mostly overlap, but not entirely) to estimate the number of individuals that could be impacted by covered activities. Based on this analysis, we estimate that 3,550 individuals (less than 2% of the total current population) will be affected. Almost all of the plants to be lost are from the 2003/04 crop. With a conservative survival rate for juvenile plants of 50%, the population could be reduced to 94,708 (= 187,534/2 + 941adults) by the time the covered activities occur (this assumes no recruitment into the population in the meantime, which is unrealistic). Dam seismic safety retrofit and activities associated with the Dam Maintenance Program would remove no more than 3.7% of the western portion of the Anderson population (= 3,550/94,708).

A portion of the same occurrence of Coyote ceanothus located east of Anderson Dam could be affected by dam operations following a seismic retrofit. Currently, Anderson Reservoir is operated under storage restrictions because of seismic safety concerns. Under current restricted operations there is only a small chance that the dam would spill and this site could be inundated. However, after the seismic retrofit the reservoir would return to “normal” operations under which

there would be a higher probability that water level of the reservoir would rise to the current vegetation line (approximately equal to spillway elevation) for a portion of the water year. The size of this portion of the occurrence is estimated at 300 individuals, up to 100 of which (33%) may be impacted when the normal reservoir levels are restored (J. Hillman pers. comm.). All of the impacted plants are seedlings or young plants up to 3 years old in 2009. Therefore, all of these individuals germinated on the reservoir shoreline while storage levels were below average.

In summary, up to 3,650 individuals of the occurrence on either side of Anderson Dam could be removed by covered activities, or up to 5% of the total population[18], whichever is smaller. This standard will be applied to the population as it existed during the 2009 surveys. It will not be applied to any new recruits that are a result of natural or artificial disturbance event such as fire.

Adverse effects to the other two Coyote ceanothus occurrences are not covered under this Plan. However, minor and temporary effects associated with management of these occurrences, if they are incorporated into the Reserve System, would be covered under this Plan since the net effect would be beneficial. No additional impacts are allowed to the species, even if more occurrences are discovered during the Permit term.

The other two occurrences are located on private property near Kirby Canyon Landfill and in Morgan Hill. A portion of the Morgan Hill occurrence is on the Morgan Hill serpentine conservation easement. Based on surveys conducted in 2010 these occurrences have approximately 150 and 600-650 individuals each (U.S. Fish and Wildlife Service 2011).

All serpentine bunchgrass grassland and mixed serpentine chaparral in the study area is considered potential habitat for this species. The maximum allowable permanent impact to serpentine bunchgrass grassland is 550 acres (5.3% of the total in the study area (**Table 4-2**). The maximum allowable temporary impact to serpentine bunchgrass grassland is 91 acres (less than 1%) (**Table 4-3**). The maximum allowable impact to mixed serpentine chaparral is 131 acres (3.5% of the total in the study area) for permanent impacts and 30 acres for temporary impacts (less than 1% of the total in the study area) (**Tables 4-2 and 4-3**).

Santa Clara Valley Dudleya

Santa Clara Valley dudleya is restricted to rocky outcrops in serpentine grassland and oak woodland. Land cover types in the study area that could support this species include serpentine/rock outcrop, serpentine bunchgrass grassland and, to a lesser degree, valley oak woodland, coast live oak woodland, and mixed oak woodland and forest. There are currently 207 known extant occurences in the study area and 209 throughout California (**Table 4-6**; California Natural Diversity Database 2012). Of the extant study area occurrences, two occur in

[18] An impact cap of 5% of the Anderson Dam occurrence (rather than the 3.7% estimated impact) is established to account for error in the estimate of the total population size.

protected open space. One hundred fifty eight (158) occurrences of the 209 known occurences are not yet recorded in the CNDDB. All but one of these non-CNDDB occurrences are on private property on Coyote Ridge (T. Marker pers. comm.), on County Parks parkland, and on Santa Clara Valley Water District land. Of the 209 known extant occurences, two are in the San Martin area.

Overall, impacts to this species from covered activities are anticipated to be relatively small. The largest impacts will likely be through habitat loss in serpentine bunchgrass grassland and serpentine rock outcrop land cover types. A maximum of 550 acres (5.3% of total in study area) of serpentine bunchgrass grassland and 22 acres (8.5% of total in study area) of serpentine rock outcrop will be permanently affected. A maximum of 91 acres (less than 1% of total in study area) of serpentine bunchgrass grassland and 2 acres (0.6% of total in study area) of serpentine rock outcrop will be temporarily affected (**Table 4-2**).

A maximum of 11 known occurrences (5% of extant occurrences in the study area; **Table 4-6**) have the potential to be impacted by covered activities if no additional occurrences are found during the permit term. Impacts are anticipated to occur from urban development within the planning limit of urban growth, SCVWD canal reconstruction, and from dam and reservoir maintenance and dam seismic safety retrofits in the vicinity of Almaden Dam and Coyote Reservoir.

There are population estimates for 10 of the 11 occurrences to be impacted. These estimates, based on observations between 1992 and 2008, range from 10 to 1,800 plants per occurrence. The total for all 11 is 3,700 (California Natural Diversity Database 2012; J. Hillman pers. comm.). Forty-seven occurrences documented in the California Natural Diversity Database (2012) (those affected by covered activities and those not) have population estimates that total approximately 72,500. Therefore, if all 11 occurences were impacted bycovered activities, this would impact far less than 5% of the known individuals of Santa Clara Valley dudleya. This is likely a large overestimate of impact because there are at least 158 occurrences without data that could include large populations. Therfore, actual impacts are likely less than 1%. New occurences of this species are discovered frequently (California Natural Diversity Database 2012) so it is highly likely that more occurrences will be discovered during Plan implementation. A maximum of three additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Based on this analysis, the impact on Santa Clara Valley dudleya from covered activities is not expected to have a long-term effect on the species' viability. This is due to the relatively small percentage of the population that will be affected, the low number of individuals affects, and the likelihood that more occurrences will be discovered and protected. The primary habitat of this species is serpentine/rock outcrop. Based on the impact analysis, up to 11% of this land

cover type will be permanently affected by covered activities. However, this proportion is likely an overestimate of impacts because Santa Clara Valley dudleya is often found on serpentine rock outcrops that were too small to be mapped. In addition, at least some of the occurences within the planning limit of urban growth are likely to prove undevelopable due to the harsh terrain of the rock outcrops on which they occur. Because many more outrcrops will be discovered and mapped within the Reserve System during Plan implementation, actual impacts are likely to be much less than 11% of available habitat.

Fragrant Fritillary

Primary habitat for fragrant fritillary is serpentine bunchgrass grassland and secondary habitat includes annual grassland, northern coastal scrub/Diablan sage scrub, and oak woodland. The study area contains eight of 59 known extant occurrences of this species (**Table 4-6**). Thirty-five (35) of the known occurrences have population estimates from the 1980s, 1990s and 2000s. These range from a low of one individual up to a high of 4,000 individuals, with a total of 16,383 (California Natural Diversity Database 2012).

A maximum of one occurrence in the study area (13% of known occurrences in the study area) that contained eight individuals during a 2000 survey (California Natural Diversity Database 2012) may be impacted by urban development (it is located within the planning limit of urban growth). In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Impacts to habitat can also occur from other covered activities. A maximum of 550 acres of modeled primary habitat and 2,729 acres of modeled secondary habitat (6% and 2% of modeled habitat, respectively) may be permanently affected. A maximum of 59 acres of modeled primary habitat and 655 acres of modeled secondary habitat, less than 1% of each of total modeled primary and secondary habitat, may be temporarily impacted (**Table 4-4**). Dam and reservoir maintenance could result in small permanent and temporary impacts to modeled species habitat.

Most Beautiful Jewelflower

Suitable habitat for this species includes primary habitat in serpentine bunchgrass grassland, serpentine rock outcrops/barren, and mixed serpentine chaparral. Secondary habitat includes non-serpentine rock outcrops. Of the 86 total known extant occurrences of this species known, 39 of them are located in the study area

(**Table 4-6**; California Natural Diversity Database 2012; J. Hillman pers. comm.). Up to six occurrences (7% of the total known) may be impacted by covered activities if additional occurrences are not discovered during the permit term. One of these is located within the planning limit of urban growth in Morgan Hill, northeast of Chesbro Reservoir, one is located within the expected impact area for SCVWD canal reconstruction, and four are located near Almaden, Anderson, and Chesbro dams and may be impacted by seismic retrofit and/or dam maintenance activities during the permit term.

In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of as good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Forty of the 86 known occurrences have population estimates. These range from 1 individual to 10,000; however, most estimates are in the low hundreds. These estimates were gathered between 1991 and 2008. The total estimate for all occurrences is 44,549. The six occurrences that will be impacted have a total population estimate of 1,076. Therefore, impacts to this species as a whole will be relatively small. In addition to the 86 recorded occurrences, there are 68 “jewelflower” occurrences on one private property that have not been identified to species, but are either most beautiful jewelflower or Metcalf Canyon jewelflower. This property will be acquired and included in the Reserve System. This also reduces the likely overall impact of covered activities on this species.

A maximum of 550 acres (4% of the total in the study area) of primary modeled habitat will be permanently affected by covered activities, and a maximum of 92 acres (less than 1% of the total in the study area) of primary modeled habitat will be temporarily affected (**Table 4-4**). No secondary habitat is anticipated to be impacted. Dam and reservoir maintenance and dam seismic safety retrofits could result in permanent and temporary impacts to habitat in the vicinity of the Coyote, Almaden, and Anderson dams.

Metcalf Canyon Jewelflower

Suitable habitat for Metcalf Canyon jewelflower includes serpentine bunchgrass grassland and serpentine rock outcrops. There are 11 known extant occurrences of Metcalf Canyon jewelflower, 10 of which occur within the study area (**Table 4-6**; California Natural Diversity Database 2012). There is one occurrence near Lexington Reservoir that is outside the study area. Of these 10, the maximum allowable permanent impact is two (20% of known occurrences) occurrences under the Plan (**Table 4-6**). No additional impacts are allowed to this species, even if more occurrences are protected during the Permit term. Population estimates are available for only four of the known occurrences; three

of these estimates date from 1989 and one from 2006. They are 27, 40, 1,000, and 5,000, for a total of 6,067 individuals (California Natural Diversity Database 2009).

CNDDB occurrence numbers 4 and 8 are expected to be impacted by SCVWD operations and maintenance activities on the Coyote Canal. Occurrence 8 was surveyed in 1989 and found to have 40 individuals. Occurrence 4 was surveyed in 1989 and found to include 5,000 individuals. Impacts to these occurrences are expected to be "partial impacts" as defined in Condition 20 of Chapter 6.

A maximum of 550 acres (7% of the total in the study area) of modeled primary habitat will be permanently affected, and a maximum of 62 acres (less than 1% of the total in the study area) of modeled primary habitat will be temporarily affected by covered activities (**Table 4-4**).

Smooth Lessingia

Suitable habitat for smooth lessingia includes serpentine bunchgrass grassland and serpentine rock outcrops. All 39 extant occurrences of smooth lessingia are located within the study area, which comprises the entire range of this species (**Table 4-6**; California Natural Diversity Database 2012). There are estimates for 22 of these occurrences and the numbers for some of them are quite high (10,000 for two and 57,400 for another). There are also lower numbers in the 100–200 range, but on the whole this species tends to have high numbers where it occurs. The total of the 22 occurrences with estimates is 101,629 individuals, and these estimates are mostly from 2003–2008, although there are three from 1996, 1999 and 2000 (California Natural Diversity Database 2012; J. Hillman pers. comm.).

Impacts from covered activities may occur on a maximum of six occurrences from SCVWD canal reconstruction, dam seismic safety retrofits, or dam maintenance activities to Almaden Dam, Anderson Dam, Calero Main Dam, and Chesbro Dam (**Table 4-6**) if no additional occurrences are discovered. Prior to impact, two occurrences must be protected for every permanent impact to one occurrence. Dam retrofits and maintenance activities will impact an estimated 6,000 individual plants (30 at Almaden Dam, 3,600 at Chesbro Dam, 175 at Calero Main and 5,800 near Anderson Dam), based on 2006 surveys conducted by SCVWD. Canal reconstruction is estimated to impact approximately 6,500 individuals, according to surveys conducted by SCVWD in 2008.

In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of three additional new occurrences (i.e., occurrence not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of as good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

Some covered activities may create partial impacts to smooth lessingia occurrences as defined in Chapter 6, Section 6.6.2, subheading *Condition 20 Avoid and Minimize Impacts to Covered Plant Occurrences*. If partial impacts occur, some of these may not count as a permanent impact and therefore would not require preservation of other occurrences to offset them. If partial impacts occur, the requirements in Condition 20 must be followed, including monitoring of the affected occurrence to ensure that the occurrence continues to be viable.

A maximum of 2 acres (less than 1% of the total in the study area) of serpentine/rock outcrop will be temporarily affected, and a maximum of 22 acres (8.5% of the total in the study area) will be permanently affected by covered activities. A maximum of 91 acres (less than 1% of the total in the study area) of serpentine bunchgrass grassland will be temporarily affected, and maximum of 550 acres (5.3% of the total in the study area) will be permanently affected by covered activities (**Tables 4-2 and 4-3**).

A maximum of 550 acres (5% of the total in the study area) of modeled primary habitat will be permanently affected, and a maximum of 68 acres (less than 1% of the total in the study area) will be temporarily affected by covered activities (**Table 4-4**).

Mt. Hamilton Thistle

Primary habitat for Mt. Hamilton thistle is serpentine seeps or serpentine soils or grasslands within 25 feet of riverine habitat. There are 48 known extant occurrences of Mt. Hamilton thistle throughout its range and 40 of them are in the study area (**Table 4-6**; California Natural Diversity Database 2012; J. Hillman pers. comm.). The maximum impact limit for this species is six occurrences (12% of known occurrences) if no additional occurrences are discovered during the permit term. This includes occurrences within the planning limit of urban growth, two that will be impacted by SCVWD canal reconstruction, and one that is adjacent to, and likely to be affected by, the seismic retrofit of Anderson Dam. The six impacted occurrences are all located east of U.S. 101. It is expected that at least one of the impacts to Mt. Hamilton thistle will qualify as a partial impact (as defined in Condition 20 of Chapter 6) and therefore would not count toward the total impacted occurrences for the species.

In addition, it is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Tables 5-16**. For each additional new occurrence impacted, new occurrences of good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts.

There are population estimates for 36 occurrences of this species, from as early as 1983 up to as recently as 2008. The range in population is from 1 to 4,500, and totals 28,962. There are estimates for all six potentially impacted occurrences, totaling approximately 9,500 individuals (California Natural Diversity Database 2012; J. Hillman pers. comm.).

Impacts to modeled habitat are limited to a maximum of 26 acres of permanent impacts (5% of the total habitat modeled in the study area) and 4 acres of temporary impacts (less than 1% of the total habitat modeled in the study area) (**Table 4-4**). Included in these impact limits are impacts associated with recharge operations, dam and reservoir maintenance and dam seismic safety retrofits, which were difficult to estimate because of the broad scale of Plan land cover mapping.

The Mt. Hamilton thistle is one of eight covered species addressed in the *Recovery Plan for Serpentine Species of the Bay Area* (U.S. Fish and Wildlife Service 1998). At the time the recovery plan was written, known occurrences of Mt. Hamilton thistle were distributed nearly evenly on the east and west side of U.S. 101. Many more occurrences have since been identified, most of which are located on the serpentines areas in and around Coyote Ridge on the east side of U.S. 101. It is for this reason that the Plan will focus conservation efforts for the Mt. Hamilton thistle on acquiring occurrences on the east side of U.S. 101 (J. Hillman pers. comm.).

Indirect Effects

One of the primary, and possibly the most critical, potential indirect effects to serpentine plants is nitrogen deposition, as described above, under Bay checkerspot butterfly Indirect Effects (Section 4.6.1 *Bay Checkerspot Butterfly*). Nitrogen deposition associated with use of local and regional roads has led to an increase in nitrogen availability in the nitrogen-depleted serpentine soils. In turn, this has led to an increased ability for nonnative plants, primarily nonnative annual grasses, to establish in the serpentine, and outcompete the covered serpentine endemic species.

Additionally, new trails and facilities associated with the Reserve System will increase public access to areas that had not previously been accessible. An increase in foot traffic in reserves may increase the risk of invasion by nonnative species and could facilitate opportunities for illegal collection of covered species.

Indirect effects could also occur from increased risk of wildfire in serpentine species' habitat. However, since most native plants in these habitats are adapted to a burn regime, this impact may not be detrimental to certain covered plant species.

4.6.9 Non-Serpentine Plants

Non-serpentine plant species covered by the Plan have a wide variety of habitat requirements and are distributed throughout the study area, though typically outside urban areas. The potential for covered activities to permanently remove individuals or habitat varies with the species. Because these species are often found in the low hills east of U.S. 101 or in the Santa Cruz Mountains, several of the issues discussed for serpentine plants and Bay checkerspot butterfly also apply to this suite of species. Direct effects for each species are discussed individually below; indirect effects are discussed at the end of the section for all the species together, as these effects generally impact the entire group similarly.

Direct Effects

Plant occurrences in habitats other than serpentine grassland could be affected by any of the Covered Activities; however, they are most likely to be affected by rural residential development. Rural residential development is expected to remove suitable habitat for these species, particularly in the Santa Cruz Mountains and in some of the low hills east of U.S. 101 that are unprotected. Moreover, the increase in infrastructure that is associated with rural development (e.g., roads, water conveyance) is expected to permanently remove suitable habitat and could kill individuals if they are not discovered prior to construction. Because most of these species occur in areas where the general land use is not likely to change during the permit term, long-term population viability should not be affected. Operations and maintenance activities that require accessing areas off established roadways could cause individuals to be crushed or habitat to be altered. If such activities require vegetation clearing or ground disturbance, they could remove suitable habitat for covered plant species. Additionally, Plan implementation activities, such as controlled burns and livestock grazing, could affect covered plant species. The Plan also includes many types of monitoring which can occasionally have impacts on individual plants in the form of trampling or soil disturbance. In both these cases, the benefits from Plan implementation are expected to greatly outweigh any negative effects of implementation.

For each non-serpentine species below, direct effects on known occurrences and suitable habitat are discussed. The discussion includes information on the general location and population estimates of occurrences expected to be affected by covered activities, where these data are available. Population data are often incomplete or out of date due to inconsistent reporting to the state database (CNDDB). In addition, population sizes reported in one year may not accurately represent long-term averages. All of the covered species discussed in this section are annuals. Annuals experience yearly fluctuations in population numbers due to factors related to climate, disturbance, and chance. For all of these reasons, the population data provided below should be considered as a general overview only. Surveys conducted during Plan implementation of affected and protected occurrences will yield more accurate population data to be used in tracking impacts, land acquisition, and adaptive management.

In addition to estimates of location and population size of potential impacts, the discussion below includes the maximum allowable occurrence impact limit for each species and the impacts on modeled or suitable habitat.

Loma Prieta Hoita

Suitable habitat for Loma Prieta hoita occurs in mixed oak woodland and coast live oak forest and woodland (primary habitat) and northern mixed chaparral/chamise chaparral and mixed serpentine chaparral (secondary habitat). Fourteen of 26 known extant occurrences of this species are located in the study area. No occurrences of this species will be impacted by covered activities if additional occurrences are not discovered during the permit term (**Table 4-6**). It is possible that newly discovered occurrences of this species could be impacted by covered activities during Plan implementation. A maximum of two additional new occurrences (i.e., occurrences not yet known) may be impacted by covered activities if additional new occurrences are protected according to the conditions described in Section 4.4.1 *Direct Effects* subheading *Effects on Plant Occurrences* and protection requirements described in Chapter 5 and **Table 5-16**. For each additional new occurrence impacted, new occurrences of as good or better condition than the new occurrences impacted by covered activities must be protected within the Reserve System prior to impacts. Of the 26 known occurrences, 18 have population estimates, most of which are from 2004–2006, with one from 1995 and one from 2002. They range from 20 to 3,000 individuals and total 7,260 (California Natural Diversity Database 2012).

Maximum allowable impacts to modeled primary habitat are 2,117 acres (2%) of permanent impacts and 413 acres (less than 1 %) of temporary impacts. A maximum of 266 acres (1%) of modeled secondary habitat may be permanently impacted, and 60 acres (less than 1%) may be impacted temporarily impacted (**Table 4-4**).

Indirect Effects

New trails and facilities associated with the Reserve System will increase public access to areas that had not previously been accessible. Such an increase in foot traffic and trails could increase the risk of invasion by nonnative species which can result in the permanent loss of habitat for covered species. Increased access also increases the possibility of collection, disturbance, injury or mortality from trampling by humans or domestic animals (e.g., dogs, horses, etc.).

Indirect effects could also occur from increased risk of wildfire in covered species' habitat. However, since most native plants in these habitats are adapted to a burn regime, this impact may not be detrimental to certain covered plant species.

4.7 Effects on Critical Habitat

Critical habitat is defined in Section 3 of the ESA as:

1. The specific areas within the geographical area occupied by a species at the time it is listed in accordance with the Act, on which are found those physical or biological features
   a. essential to the conservation of the species and
   b. that may require special management considerations or protection; and
2. Specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

A summary of effects on critical habitat is provided in **Table 4-9**. A discussion of effects of covered activities on critical habitat in the study area is provided below.

4.7.1 Bay Checkerspot Butterfly

Critical habitat was redesignated for Bay checkerspot butterfly in 2008 [73 FR 50405–50452]. Most of the designated critical habitat is within the study area boundary (**Figure 4-4**). In fact, 10 of the 13 units or 16,601 acres of the designated 18,293 acres (91%) fall within the study area. This critical habitat includes serpentine and California annual grasslands that stretch from southern San José to just south of Morgan Hill. The five primary constituent elements for Bay checkerspot butterfly are:

1. The presence of annual or perennial grasslands with little to no overstory that provide north–south and east–west slopes with a tilt of more than 7 degrees for larval host plant survival during periods of atypical weather (for example, drought).
2. The presence of the primary larval host plant, dwarf plantain (*Plantago erecta*), and at least one of the secondary host plants, purple owl's-clover (*Castilleja densiflora*) or exserted paintbrush (*Castilleja exserta*), are required for reproduction, feeding, and larval development.
3. The presence of adult nectar sources for feeding.
4. Soils derived from serpentinite ultramafic rock (Montara, Climara, Henneke, Hentine, and Obispo soil series) or similar soils (Inks, Candlestick, Los Gatos, Fagan, and Barnabe soil series) that provide areas with fewer aggressive, nonnative plant species for larval host plant and adult nectar plant survival and reproduction.
5. The presence of stable holes and cracks in the soil, and surface rock outcrops that provide shelter for the larval stage of the Bay checkerspot butterfly during summer diapause.

The 16,601 acres of designated critical habitat for the Bay checkerspot butterfly in the study area includes 7,616 acres of modeled habitat for the Bay checkerspot butterfly and 8,985 acres of additional areas outside the Plan's modeled habitat. Critical habitat areas that do not support serpentine soils and vegetation are included in the designation because USFWS concluded that they "likely play an important role in dispersal of adult butterflies from one habitat patch to another" (73 FR 50405-50452). Although Bay checkerspot butterfly tend to show high fidelity to patches of serpentine grassland, a small but important number (estimated to be 10% or less), will leave serpentine bunchgrass areas (see **Appendix D**).

Critical habitat as defined by the primary constituent elements may be affected by covered activities as described below.

Continued urban and rural growth on the east side of Coyote Creek in and near the Silver Creek hills would result in the conversion of critical habitat into developed land cover types. Any conversion of habitat would also result in a complete loss of primary constituent elements. An increase in vehicles on local highways, as well as highways throughout the San Francisco Bay Area, will result in increased nitrogen deposition which would reduce the quality of designated critical habitat. In addition, several of the critical habitat units are near urban areas which may limit the types of management (i.e., fire) used to return these sites to a more natural state. Public access to Plan reserves would further affect critical habitat units by facilitating transfer of invasive plants into areas that were previously inaccessible, or by treading on individuals, larvae, and host plants. However, this Plan targets the acquisition of most of the core habitat areas identified in this Plan. Grazing will be a key management tool used within reserves and it is expected that careful grazing management will successfully rehabilitate degraded serpentine areas and protect existing habitat from the stressors of nitrogen deposition and competing plants. Furthermore, within the Reserve System, trails and recreational use will only be allowed if it is consistent with the biological goals and objectives of the Plan. As such, the potential for impacts associated with recreation will be minimized in reserves. Protection of critical habitat and proper management will result in the preservation of the primary constituent elements of Bay checkerspot butterfly habitat within the Reserve System.

Impacts to modeled primary Bay checkerspot butterfly habitat are capped at 300 acres and impacts to serpentine bunchgrass grassland are capped at 550 acres. No more than 550 acres (less than 3%) of Bay checkerspot butterfly critical habitat in the study area associated will be lost as a result of covered activities in this Plan (**Table 4-9**). This estimate does not include nitrogen deposition impacts.

The impact analysis does not identify impacts by critical habitat unit; however, impacts to Bay checkerspot butterfly habitat is limited to 3% of the unprotected portion (everything except Type 1 open space) of any core or satellite habitat unit targeted for conservation (as defined in **Table 5-7**) with the exception of the Kirby/East Hills core unit which has a 11% allowance to accommodate the Kirby Landfill expansion (80 acres) and the Pound Site core habitat unit which has an

13% allowance to accommodate the Mariposa Lodge/Sheriff's Firing Range project (approximately 27 acres).

There are more core habitat units identified for this Plan than critical habitat units, but core habitat does largely overlap with critical habitat designations. The impact caps for each core habitat unit are intended to ensure that core habitat will continue to function as habitat for the butterfly. Therefore, it is expected that limits on core habitat development will also ensure that units of critical habitat continue to function for Bay checkerspot butterfly.

Table 5-21 describes estimated acreages of Bay checkerspot butterfly critical habitat that will be preserved within the Reserve System by unit. As shown, no conservation for critical habitat units 9b and 12 is anticipated for this Plan. Unit 9b is located in the foothills of the Santa Cruz Mountains at the southern tip of the Coyote Valley Urban Reserve, just outside of the planning limit of urban growth for the City of San José. It also borders a portion of the Coyote Valley Greenbelt. This area is unincorporated and is characterized by the Ranchland/Woodland land use type (**Figure 2-2**) which allows a maximum development density 1 dwelling unit per 20 acres. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). While it is possible that this unit could be affected by rural development permitted by this Plan, due to the location of the site (outside urban areas), development density requirements, and the small size of the unit (only 56 acres), it is not expected that this unit will experience much development.

Unit 12 is located in the foothills of the Santa Cruz Mountains between the planning limits of urban growth for the Cities of Morgan Hill and Gilroy. A portion of this unit borders the western edge of the unincorporated community of San Martin. This unit is in unincorporated lands and is characterized by the Ranchland/Woodland land use type. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). Approximately 52% of unit 12 is currently protected as Type 1 Open Space. While it is possible that this unit could be affected by rural development permitted by this Plan, due to the location of the site (outside urban areas) and development density requirements, it is not expected that this unit will experience much development.

4.7.2 California Tiger Salamander

Critical habitat was designated for the central population of California tiger salamander in 2005 [70 FR 49380–49458]. There are eight critical habitat units within the study area (East Bay Region Units 5–12) (**Figure 4-5**). The study area supports 28,096 acres of critical habitat, including 92 acres of modeled breeding habitat and 27,235 acres of modeled non-breeding habitat (**Table 4-9**).

The three primary constituent elements for California tiger salamander are:

1. Standing bodies of fresh water including natural and manmade (e.g., stock) ponds, vernal pools, and other ephemeral or permanent water bodies which

typically support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall.

2. Upland habitats adjacent and accessible to and from breeding ponds that contain small mammal burrows or other underground habitat that CTS depend upon for food, shelter, and protection from the elements and predation.
3. Accessible upland dispersal habitat between occupied locations that allow for movement between such sites.

Nearly all the critical habitat units are in or on the periphery of urban areas, meaning that urban development, rural residential development, and any associated infrastructure (e.g., roads, water conveyance) could affect this critical habitat. Such impacts are less likely in units 11 and 12 because these areas are in the far east hills of the study area where fewer covered activities are anticipated. Operations and maintenance activities will affect all units in the study area, particularly those associated with aquatic resources that serve as potential breeding habitat. Covered activities that result in a change in land use adjacent to potential breeding habitat, particularly if the change in land use includes control or elimination of burrowing mammals, would result in a loss of important upland habitat for the species, including the primary constituent elements listed above, and reduce the overall habitat quality for year-round occupation. Avoidance and minimization measures described in Chapter 6 will reduce the potential for indirect impacts on critical habitat.

No more than 272 acres (1%) of all California tiger salamander critical habitat in the study area will be affected by covered activities in this Plan (**Table 4-9**). The impact analysis does not identify impacts by critical habitat unit; rather, it identifies impacts grouped by all critical habitat present in the study area. However, 97% of all critical habitat was also mapped as breeding or non-breeding habitat for this Plan. Impacts to breeding and non-breeding habitat are quantified and discussed in Section 4.6.2 *California Tiger Salamander, California Red-legged Frog, Western Pond Turtle*.

Table 5-21 also describes estimated acreages of California tiger salamander critical habitat that will be preserved within the Reserve System by unit. As shown, little to no critical habitat in units EB-9, EB-10A, and EB-11 is anticipated to be included in the Reserve System. Unit EB-9 is located in the Diablo Range east and south of Coyote Reservoir. A large portion of unit EB-9 is located in the Palassou Ridge Open Space Preserve (Type 2 Open Space). The portion south of the reservoir is split across Coyote Lake Harvey Bear Ranch County Park (Type 3 Open Space) and the Ranchland/Woodland land use type. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). Open space areas account for approximately 66% of this unit. While it is possible that some covered activities occur within the open space, it is expected to be minimal. It is also possible that this unit could be affected by rural development permitted by this Plan. However, due to the location of the site (outside urban areas), development density requirements, and portion of this unit that is available for development (approximately 34%), it is not expected that this unit will experience much development.

Unit EB-10A is located in the foothills of the Santa Cruz Mountains between the planning limits of urban growth for the Cities of Morgan Hill and Gilroy. This unit largely overlaps Bay checkerspot critical habitat unit 12. Permanent impacts to Bay checkerspot butterfly modeled primary habitat that overlaps Bay checkerspot butterfly critical habitat is capped at 300 acres to meet regulatory standards (**Table 4-9**). Subsequently, it is likely that permanent impacts in the portion of California tiger salamander critical habitat unit EB-10A that overlaps with Bay checkerspot critical habitat unit 12 will be minimal. A portion of this unit borders the western edge of the unincorporated community of San Martin. This unit is in unincorporated lands and is characterized by the Ranchland/Woodland land use type. No water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). None of this unit is currently protected by any type of open space. While it is possible that this unit could be affected by rural development permitted by this Plan, due to the location of the site (outside urban areas) and development density requirements, it is not expected that this unit will experience much development.

Unit EB-11 is located is located in the Diablo Range east and somewhat south of unit EB-9. Approximately 94% of this site currently located within Henry Coe State Park. Activities occurring within Henry Coe State Park are not covered by this Plan. As such, a maximum of 6% of this site could be affected by the covered activities of this Plan. However, no water or transportation projects are planned for this site (**Figures 2-6 and 2-7**). This site is located in the far east portion of the study area and is unlikely to receive much rural development. As such, it is not expected that this unit will be substantially affected by the covered activities of this Plan.

4.7.3 California Red-Legged Frog

Critical habitat was designated for California red-legged frog in 2010 [75 FR 12816–12959]. The two main critical habitat units in Santa Clara County are STC-1 (52,283 acres) which is entirely within Santa Clara County and STC-2 (204,718 acres in total, 97,214 acres of which are in the study area) which extends west into Stanislaus County and south into San Benito County (**Figure 4-6**). Santa Clara County also contains a small section of ALA-2 (1,465 acres). STC-1 is located in the near and far east hills of the study area, from the northern border of the study area south to Anderson Reservoir. STC-2 is adjacent to STC-1 in the north and continues south to the southern and eastern boundaries of the study area. The study area supports 150,962 acres of critical habitat, including 2,964 acres of primary habitat and 146,452 acres of secondary habitat (**Table 4-9**). These critical habitat units include both breeding and upland habitats and account for 9% of the designated critical habitat for this species throughout the species' range.

The three primary constituent elements for California red-legged frog are:

1. *Aquatic Breeding Habitat*. Standing bodies of fresh water (with salinities less than 4.5 ppt), including natural and manmade (e.g., stock) ponds, slow-moving streams or pools within streams, and other ephemeral or permanent

water bodies that typically become inundated during winter rains and hold water for a minimum of 20 weeks in all but the driest of years.

2. *Aquatic Non-Breeding Habitat*. Freshwater pond and stream habitats, as described above, that may not hold water long enough for the species to complete its aquatic life cycle but which provide for shelter, foraging, predator avoidance, and aquatic dispersal of juvenile and adult California red-legged frogs. Other wetland habitats considered to meet these criteria include, but are not limited to: plunge pools within intermittent creeks, seeps, quiet water refugia within streams during high water flows, and springs of sufficient flow to withstand short-term dry periods.
3. *Upland Habitat*. Upland areas adjacent to or surrounding breeding and non-breeding aquatic and riparian habitat up to a distance of 1 mile (1.6 km) in most cases (i.e., depending on surrounding landscape and dispersal barriers) including various vegetation types such as grassland, woodland, forest, wetland, or riparian areas that provide shelter, forage, and predator avoidance for the California red-legged frog.

Impact of covered activity implementation on critical habitat units may occur as a result of rural development, park maintenance and new construction activities, and Plan implementation. There is some potential for impacts due to ongoing operations and maintenance activities, particularly in streams, to affect these two units, but permanent changes in land use are anticipated to be minimal. Avoidance and minimization measures described in Chapter 6 will reduce the potential for indirect impacts on critical habitat.

No more than 1,035 acres (less than 1%) of all California red-legged frog critical habitat in the study area will be affected by covered activities in this Plan (**Table 4-9**). The impact analysis does not identify impacts by critical habitat unit; rather, it identifies impacts grouped by all critical habitat present in the study area. However, 99% of all California red-legged frog critical habitat was also mapped as primary or secondary habitat for this Plan. Impacts to primary and secondary habitat are quantified and discussed in Section 4.6.2 *California Tiger Salamander, California Red-legged Frog, Western Pond Turtle*. In addition, **Table 5-21** also describes estimated acreages of California red-legged frog critical habitat that will be preserved within the Reserve System by unit.

4.8 Cumulative Effects

As described above, the impacts of covered activities were assessed in the context of existing conditions in the study area. Some activities and projects that are outside the scope of this Plan may nonetheless contribute to cumulative impacts on covered species. An analysis of cumulative effects is not required in an HCP or NCCP. However, we include an analysis here to support the federal Biological Opinion that will conclude the USFWS Section 7 internal consultation process (see Chapter 1 for details). The scope of the cumulative analysis in a Biological Opinion is limited to non-federal actions because federal actions (i.e., any federal project, project with federal funding, or project that requires a federal

permit) will be the subject of future Section 7 consultations in which cumulative impacts can be considered more fully. To support this analysis, the cumulative projects evaluated in this section are limited to non-federal projects that are not covered by the Plan. The EIR/EIS presents a thorough analysis of the cumulative effects of all projects, federal and non-federal, when combined with the effects of the Habitat Plan.

4.8.1 Future Potential Development by the City of Gilroy

The Gilroy General Plan (City of Gilroy 2002) designates a number of areas outside the 20-year planning boundary as future areas for development and open space (W. Faus pers. comm.). Policy 2.11 of the Gilroy General Plan designates two areas outside its 20-year planning boundary (the boundary used as the planning limit of urban growth for the purposes of this Plan) as potential areas for future development. These areas are described below.

- The area north of Day Road, west of Santa Teresa Boulevard, and east of the foothills. This area is suitable for long-term residential expansion and related development.
- The area east of U.S. 101 between Buena Vista and Masten Avenue, bordering on the highway. This area is suitable for long-term expansion of highway-oriented commercial development.

Other City policies place further restrictions on where future development may occur. Gilroy General Plan Policy 1.03 states that uses east of U.S. 101 are restricted to industrial and agricultural use except for (1) commercial developments with the majority of the customer base from outside Gilroy, and (2) public and quasi-public facilities. Residential care facilities that meet criteria of Policy 14.05, *Residential Care Facilities for Seniors*, will also be allowed east of U.S. 101. Future development is also identified for the area north of Day Road and west of Santa Teresa Boulevard, east of the foothills, which is an area suitable for long-term residential expansion and related development.

Policy 20.05 designates protected open space areas in conjunction with agricultural lands to create natural buffers, or “greenbelts,” between Gilroy and surrounding communities; in particular, between Gilroy and San Martin to the north. The policy states that if an adequate greenbelt cannot be established in the area north of Masten and Fitzgerald Roads, then the Gilroy land use designations should be amended to include a greenbelt strip in the northern part of Gilroy’s 20-year Planning Area. Masten and Fitzgerald Roads make up the northern boundary of Gilroy’s 20-year plan (the planning limit of urban growth for this Plan) as well as the southern boundary of the unincorporated community of San Martin. Both the requirements of a greenbelt along Masten and Fitzgerald Roads and the proximity to San Martin would greatly reduce the possibility of Gilroy expanding farther than the 20-year planning boundary to the north except as identified in the first bullet above.

Policy 25.01 restricts development in areas where potential danger to the health, safety, and welfare of residents exists unless it can be mitigated to an "acceptable level of risk." This applies to development in areas subject to flood damage or geological hazard due to location and/or design. Policy 4.06 works together with policy 25.01 to encourage existing agricultural lands in areas subject to natural hazards, such as major flooding or soils with a high water table, to remain in long-term agricultural production where such use exists. Much of the land to the east of Llagas Creek and south of Gilroy falls into this category of potentially hazardous areas. While development is not prohibited in these areas, a great deal of work on existing flood management infrastructure may be required in advance of any further development in these areas.

Permanent and temporary, direct and indirect impacts to Plan covered species could occur as a result of expansion of urban development outside of the planning limits of urban growth for the City of Gilroy. These impacts would be similar to those impacts described above as occurring within the planning limit of urban growth or nearby to Gilroy, but would increase the extent of described impacts beyond that anticipated by this Plan. Species most likely to be affected by the expansion of Gilroy include species that use agricultural and riparian land cover types on the valley floor. This may include California red-legged frog, California tiger salamander, western pond turtle, western burrowing owl, least Bell's vireo, tricolored blackbird, and San Joaquin kit fox (**Table 3-5**). The only plant covered species that may be affected is Loma Prieta hoita (**Table 3-6**).

4.8.2 Ongoing and Routine Agriculture

Ongoing and routine agricultural activities in the study area are not covered by this Plan except for pond maintenance as described in Chapter 2 if project proponents obtain a permit with the local jurisdiction and those activities eligible for and enrolled in the Neighboring Landowner Assurances Program (see Chapter 10, Section 10.2.7 *Assurances for Private Landowners*, for details of this program and what is covered). Under Section 4(d) of the ESA, routine ranching activities located on private or Tribal lands are exempt from the take prohibitions of Section 9 of the ESA (50 CFR 17.43). This exemption applies to both California red-legged frog and California tiger salamander. However, this exemption does not apply to cultivated agriculture. While it is anticipated that the effects of ongoing agricultural activities on covered species will be relatively low, there is the potential for cumulative effects on covered species to accrue. Ongoing ranching operations such as road construction, road maintenance, or intensive livestock grazing may limit or degrade habitat for species such as western pond turtle, California tiger salamander, California red-legged frog, and foothill yellow-legged frog. (However, ranching activities such as pond maintenance and moderate livestock grazing are essential to the long-term survival of some covered species such as California red-legged frog and California tiger salamander.) Rodent control on grazing lands may adversely affect western burrowing owl and California tiger salamander. Pesticide run-off could also reduce water quality. Some ongoing cultivated agricultural activities may limit or degrade foraging habitat for tricolored blackbird and western

burrowing owl. Covered species could be trampled by cattle, and hydrology of an area may also be impacted by a loss of or change to agricultural practices, specifically grazing practices (Pyke and Marty 2005).

4.8.3 Use of Existing Roads

As described above, the construction of rural roads, driveways, and access roads covered by this Plan is expected to increase mortality of covered species such as California red-legged frog and California tiger salamander. Continued use of existing rural roads (i.e., those not covered by the Plan) will contribute to a cumulative impact on these species through continued mortality and injury. The magnitude of this cumulative impact is unknown.

4.8.4 Landfill or Quarries

Landfills and quarries other than those described in this Plan are not covered activities under this Plan. If such projects are implemented, they would result in the loss of land cover at the site of the project. Due to urban development constraints and siting requirements for such projects, it is likely that construction of a landfill or quarry project would occur outside the valley floor where natural land covers are dominant. The substantial loss of natural land covers would likely affect the covered species of this Plan. At this time, no landfills or quarries other than those described in this Plan are anticipated to be developed in the study area. As such, possible cumulative impacts are unknown.

Permanent and temporary, direct and indirect impacts to Plan covered species could occur as a result of development of landfills or quarries within the study area. Due to the lack of information about where these projects could occur, it is difficult to describe the land cover-types or covered species that may be affected. Any additional loss of un-developed land cover would likely result in direct and indirect impacts to covered species in accordance with **Table 3-5** and **Table 3-6**.

Table 4-1. Potential Indirect Adverse Impacts on Covered Species from New Urban and Rural Development and Operation of the Habitat Plan Reserve System

	Lights in New Urban and Rural Areas	Harassment, Disturbance from More People	Harassment or Injury from Additional Pets	More Noise	Increased Vehicle-Related Disturbance and Mortality[1]	Spread of Invasive Exotic Plants or Wildlife	Increased Risk of Wildfire[2]	Increased Runoff of Urban Pollutants/ Change in Hydrology	Increased Recreation in Reserves	Enhancement or Restoration Activities[3]	Habitat Plan Monitoring
Location of Impact											
Outside Habitat Plan Reserves	✓	✓	✓	✓	✓	✓	✓	✓[4]			
Inside Habitat Plan Reserves	✓	✓	✓	✓		✓	✓		✓	✓	✓
Within existing parks/open space		✓	✓	✓	✓	✓	✓		✓	✓	
Covered Species Potentially Affected											
Bay checkerspot butterfly		✓	✓		✓	✓	✓		✓	✓	✓
Tricolored blackbird	✓	✓							✓	✓	✓
Western burrowing owl		✓	✓		✓	✓	✓		✓	✓	✓
Least Bell's vireo	✓	✓	✓	✓				✓		✓	✓
Western pond turtle		✓	✓		✓	✓	✓	✓	✓	✓	✓
California tiger salamander	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
California red-legged frog	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
Foothill yellow-legged frog	✓	✓	✓		✓	✓		✓	✓	✓	✓
San Joaquin kit fox	✓			✓	✓		✓		✓	✓	✓
Tiburon Indian paintbrush		✓	✓		✓	✓	✓		✓[5]	✓	✓
Coyote ceanothus		✓	✓		✓	✓			✓[5]	✓	
Mount Hamilton thistle		✓	✓		✓	✓	✓	✓	✓[5]	✓	
Santa Clara Valley dudleya		✓	✓		✓	✓	✓		✓[5]	✓	
Fragrant fritillary		✓	✓		✓	✓	✓		✓[5]	✓	✓
Loma Prieta hoita		✓	✓		✓	✓	✓		✓[5]	✓	✓
Smooth lessingia		✓	✓		✓	✓	✓		✓[5]	✓	✓
Metcalf Canyon jewelflower		✓	✓		✓	✓	✓		✓[5]	✓	✓
Most beautiful jewelflower		✓	✓		✓	✓	✓		✓[5]	✓	✓

	Lights in New Urban and Rural Areas	Harassment, Disturbance from More People	Harassment or Injury from Additional Pets	More Noise	Increased Vehicle-Related Disturbance and Mortality[1]	Spread of Invasive Exotic Plants or Wildlife	Increased Risk of Wildfire[2]	Increased Runoff of Urban Pollutants/ Change in Hydrology	Increased Recreation in Reserves	Enhancement or Restoration Activities[3]	Habitat Plan Monitoring

Notes:

[1] Excludes indirect effects of vehicle emissions, which causes the spread of invasive exotic plants on serpentine grassland.

[2] Accounts for the increased risk of wildfire from a growing human population and increased access to wildfire-prone areas (i.e., the Reserve System), all of which is expected to increase the frequency of human-caused wildfire ignition. Effects of wildfires and firefighting activities would be direct, including grading, clearing, disking, mowing, irrigation and other fire suppression activities, plus the temporary damage done by the wildfire itself. In some cases, wildfire will be beneficial to many covered species.

[3] Adverse impacts from restoration activities on covered species are expected to be temporary; long-term effects of restoration and enhancement will be beneficial.

[4] Impacts from increased runoff of urban development downstream of urban development would be confined to streams and channels and would not likely affect terrestrial covered species.

[5] Potential impacts if recreational users go off-trail.

Table 4-2. Total Allowable Permanent Impacts on Land Cover Types and Natural Communities (acres)

Land Cover Type	Total in Study Area	Estimated Impacts: Urban Development	In-Stream Capital Projects	Rural Capital Project	Rural Development	Conservation Strategy Implementation	Total Allowable Impact	% of Total in Study Area
Grassland								
California annual grassland	81,795	421	76	672	700	137	2,006	2.5%
Serpentine bunchgrass grassland	10,308	359	32	104	155	23	550[1]	5.3%
Serpentine rock outcrop	260	16	0	1	4	1	22	8.5%
Serpentine seep	34	0	0	0	0	0	0.5	1.5%
Rock outcrop	87	0	0	0	0	0	0.5	0.6%
Subtotal Grassland	92,483	796	108	777	860	161	2,579	2.8%
Chaparral & Northern Coastal Scrub								
Northern mixed chaparral/chamise chaparral	23,763	1	4	15	58	7	86	0.4%
Mixed serpentine chaparral	3,712	57	9	32	29	4	131	3.5%
Northern coastal scrub/Diablan sage scrub	10,306	19	26	53	71	8	178	1.7%
Coyote brush scrub	180	0	6	2	2	0	10	5.5%
Subtotal Chaparral & Northern Coastal Scrub	37,960	78	45	102	160	19	404	1.1%
Oak Woodland								
Valley oak woodland	12,895	46	11	62	70	12	201	1.6%
Mixed oak woodland and forest	84,488	610	71	292	411	57	1,441	1.7%
Blue oak woodland	11,160	41	5	25	51	9	131	1.2%
Coast live oak forest and woodland	31,652	316	45	230	230	18	840	2.7%
Foothill pine-oak woodland	10,960	1	3	13	27	2	46	0.4%
Mixed evergreen forest	5,775	0	6	20	22	2	50	0.9%
Subtotal Oak Woodland	156,930	1,014	142	642	810	100	2,709	1.7%
Riparian Forest and Scrub								
Willow riparian forest and scrub	2,544	32	130	16	1	2	180	7.1%
Central California sycamore alluvial woodland	373	0	2	4	1	1	7	1.9%
Mixed riparian forest and woodland	3,766	5	62	31	6	5	109	2.9%
Subtotal Riparian Forest and Scrub	6,682	37	194	50	8	7	296	4.4%

Table 4-2. Continued

Land Cover Type	Total in Study Area	Estimated Impacts: Urban Development	In-Stream Capital Projects	Rural Capital Project	Rural Development	Conservation Strategy Implementation	Total Allowable Impact	% of Total in Study Area
Conifer Woodland								
Redwood forest	9,693	0	0	80	28	1	109	1.1%
Ponderosa pine woodland	419	0	1	0	0	0	0[1]	0.0%
Knobcone pine woodland	711	0	0	5	3	1	8	1.1%
Subtotal Conifer Woodland	10,823	0	1	84	31	2	117	1.1%
Wetland								
Coastal and valley freshwater marsh	381	18	8	5	3	0	25[1]	6.6%
Seasonal wetland	201	16	0	0	5	0	15[1]	7.4%
Subtotal Wetland	583	34	8	5	7	0	40	6.9%
Aquatic								
Pond	1,110	40	5	0	6	1	52	4.7%
Riverine (miles)	2,391.5	0[2]	7.1	1.9	0.4	0.0	9.4	0.4%
Subtotal Aquatic (acres)	1,110	40	5	0	6	1	52	4.7%
Agricultural								
Orchard	2,697	492	5	59	69	0	625	23.2%
Vineyard	1,393	0	0	2	34	0	37	2.6%
Grain, row-crop, hay and pasture, disked/ short-term fallowed	33,648	6,220	95	261	766	14	7,356	21.9%
Subtotal Agricultural	37,738	6,711	100	322	870	14	8,018	21.2%
Developed								
Rural residential	12,414	1,207	30	103	261	2	1,603	12.9%
Golf courses / Urban parks	8,673	1,989	47	16	43	0	2,095	24.2%
Ornamental woodland	95	25	1	3	1	0	30	31.3%
Barren	211	0	18	5	9	0	32	15.2%
Subtotal Developed	21,392	3,221	95	127	314	2	3,759	17.6%
TOTAL	365,701	11,931	699	2,110	3,067	307	17,975	4.9%

[1] A maximum allowed impact is set for this land cover type that is lower than the total estimated impacts to ensure regulatory standards are met. Estimated impacts do not sum to the total allowable impact.

[2] Stream impacts occuring inside the planning limits of urban growth are included in the In-Stream Capital Projects category.

Table 4-3. Total Allowable Temporary Impacts on Land Cover Types and Natural Communities (acres)[a]

Land Cover Type	Total in Study Area	Estimated Impacts: In-stream Capital Project Construction	In-stream O&M	Rural Capital Project Construction	Rural O&M	Total Allowable Impact	% of Total in Study Area
Grassland							
California annual grassland	81,795	46	0	158	267	574	0.7%
Serpentine bunchgrass grassland	10,308	23	14	6	23	91	0.9%
Serpentine rock outcrop	260	0	0	0	0	2	0.6%
Serpentine seep	34	0	0	0	0	0.4	1.3%
Rock outcrop	87	0	0	0	0	0.2	0.2%
Subtotal Grassland	92,483	68	14	164	291	667	0.7%
Chaparral & Northern Coastal Scrub							
Northern mixed chaparral/chamise chaparral	23,763	5	0	2	16	31	0.1%
Mixed serpentine chaparral	3,712	10	0	3	12	30	0.8%
Northern coastal scrub/Diablan sage scrub	10,306	31	0	7	19	66	0.6%
Coyote brush scrub	180	4	0	5	0	10	5.4%
Subtotal Chaparral & Northern Coastal Scrub	37,960	50	0	17	48	136	0.4%
Oak Woodland							
Valley oak woodland	12,895	8	0	7	16	45	0.3%
Mixed oak woodland and forest	84,488	63	0	39	136	302	0.4%
Blue oak woodland	11,160	5	0	7	16	39	0.3%
Coast live oak forest and woodland	31,652	33	0	36	91	181	0.6%
Foothill pine-oak woodland	10,960	5	0	3	16	26	0.2%
Mixed evergreen forest	5,775	6	0	2	15	25	0.4%
Subtotal Oak Woodland	156,930	120	0	94	290	618	0.4%
Riparian Forest and Scrub							
Willow riparian forest and scrub	2,544	62	26	6	6	103	4.0%
Central California sycamore alluvial woodland	373	0	0	0	4	6	1.6%
Mixed riparian forest and woodland	3,766	39	27	8	22	101	2.7%
Subtotal Riparian Forest and Scrub	6,682	101	54	14	32	209	3.1%

Table 4-3. Continued

Land Cover Type	Total in Study Area	Estimated Impacts: In-stream Capital Project Construction	In-stream O&M	Rural Capital Project Construction	Rural O&M	Total Allowable Impact	% of Total in Study Area
Conifer Woodland							
Redwood forest	9,693	0	0	8	47	56	0.6%
Ponderosa pine woodland	419	1	0	0	0	1	0.3%
Knobcone pine woodland	711	0	0	0	0	2	0.3%
Subtotal Conifer Woodland	10,823	1	0	8	48	59	0.5%
Wetland							
Coastal and valley freshwater marsh	381	6	0	1	0	7	1.9%
Seasonal wetland	201	0	0	0	1	2	0.8%
Subtotal Wetland	583	6	0	1	2	9	1.5%
Aquatic							
Pond	1,110	5	0	0	3	9	0.8%
Riverine (miles)	2,391.5	44.7	1.5	1.5	0.1	48.0	2.0%
Subtotal Aquatic (acres)	1,110	5	0	0	3	9	0.8%
Agricultural							
Orchard	2,697	13	0	10	2	24	0.9%
Vineyard	1,393	0	0	1	1	3	0.2%
Grain, row-crop, hay and pasture, disked/ short-term	33,648	63	0	163	42	284	0.8%
Subtotal Agricultural	37,738	76	0	174	45	311	0.8%
Developed							
Rural residential	12,414	35	0	50	51	139	1.1%
Golf courses / Urban parks	8,673	15	0	4	21	40	0.5%
Ornamental woodland	95	1	0	6	1	8	8.2%
Barren	211	1	0	13	0	15	7.0%
Subtotal Developed	21,392	52	0	73	74	201	0.9%
TOTAL	365,701	481	69	545	832	2,219	0.6%

Notes:
Temporary impacts shown for operation and maintenance activities are annual impacts. Construction impacts are one-time impacts.

Table 4-4. Maximum Allowable Permanent and Temporary Impacts to Covered Species Modeled Habitat

Species and Habitat Type[1]	Total Modeled Habitat[2] in Study Area (acres)	Maximum Allowable Permanent Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)	Maximum Allowable Temporary Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)
Bay Checkerspot Butterfly					
Primary Habitat	8,621	300[3, 4]	3%	54	<1%
California Tiger Salamander					
Breeding Habitat	1,027	77	7%	14	1%
Non-Breeding Habitat	323,721	12,855	4%	1,529	<1%
Total	324,748	12,932	4%	1,543	<1%
California Red-Legged Frog					
Primary Habitat	10,101	299	3%	116	1%
Secondary Habitat	331,672	12,937	4%	1,489	<1%
Total	341,773	13,236	4%	1,605	<1%
Foothill Yellow-Legged Frog (length in miles)					
Primary Habitat	244	1.9	<1%	0.7	<1%
Secondary Habitat	447	4.8	1%	1.3	<1%
Total	690	6.7	1%	2.0	<1%
Western Pond Turtle					
Primary Habitat	82,895	1,824	2%	440	<1%
Secondary Habitat	232,021	7,825	3%	986	<1%
Total	314,916	9,649	3%	1,426	<1%
Western Burrowing Owl[5]					
Occupied Nesting Habitat	1,348	198	15%	20	<1%
Potential Nesting Habitat	63,751	4,000	6%	604	<1%
Overwintering Habitat	132,770	9,671	7%	762	<1%
Total	197,869	13,869	7%	1,385	<1%
Least Bell's Vireo					
Primary Habitat	3,097	72	2%	43	1%
San Joaquin Kit Fox					
Secondary Habitat	38,543	198	<1%	46	<1%
Secondary Habitat (Low Use)	2,349	28	1%	6	<1%
Total	40,892	226	<1%	52	<1%
Tricolored Blackbird					
Primary Habitat	7,933	276	3%	93	1%
Secondary Habitat	132,358	10,317	8%	768	<1%
Total	140,291	10,593	8%	861	<1%

Species and Habitat Type[1]	Total Modeled Habitat[2] in Study Area (acres)	Maximum Allowable Permanent Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)	Maximum Allowable Temporary Impact to Modeled Habitat from Covered Activities (acres)	Proportion (%)
Mt. Hamilton Thistle					
Primary Habitat	487	26	5%	4	<1%
Fragrant Fritllary					
Primary Habitat	8,820	550[3]	6%	59	<1%
Secondary Habitat	156,635	2,729	2%	655	<1%
Total	165,455	3,279	2%	714	<1%
Loma Prieta Hoita					
Primary Habitat	104,126	2,117	2%	413	<1%
Secondary Habitat	17,745	266	1%	60	<1%
Total	121,871	2,383	2%	473	<1%
Smooth Lessingia					
Primary Habitat	10,491	550[3]	5%	68	<1%
Metcalf Canyon Jewelflower					
Primary Habitat	8,105	550[3]	7%	62	<1%
Most Beautiful Jewelflower					
Primary Habitat	14,277	550[3]	4%	92	<1%
Secondary Habitat	85	0	0%	0	<1%
Total	14,362	550	4%	92	<1%

Notes:

[1] Includes species for which habitat distribution models were developed. For other covered species, see the text.

[2] Habitat as shown in Appendix D habitat distribution models.

[3] Allowable impacts to Bay checkerspot butterfly, fragrant fritillary, smooth lessingia, Metcalf Canyon jewelflower, and most beautiful jewelflower are capped below the estimated impacts to account for the caps on serpentine grassland (see Table 4-2) and Bay checkerspot butterfly habitat. These acreages are caps, not estimates.

[4] This cap does not apply to Bay checkerspot butterfly habitat units mapped as “historic/unoccupied” and “occupancy unknown.”

[5] Western burrowing owl modeled habitat includes occupied and potential nesting habitat only in the study area.

Table 4-5a. In-Stream Capital Improvement Project Permanent Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
San José[4]		
New and existing bridge (re)construction	• Determine total acres of expanded area on existing bridges • Determine total acres of new proposed bridges • Combine acres of expanded bridge with acres of new bridge • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate stream impacts by identifying the total new width (bridge dimension parallel to stream bed) of expanded and new bridges in feet	• Impacts are based on list of bridges provided by City of San José that will be built or reconstructed within the permit term. This list included bridge width and length for each existing, expanded, and new proposed bridge • The list of bridges for City of San José includes the bridges that are likely to receive funding for replacement and/or rehabilitation within the 50-year permit term (J. Hart pers. comm. b) • New permanent impact to land cover and streams is assumed only for new or expanded areas, not total footprint of all bridges as permanent impacts are assumed to have already taken place for existing infrastructure • This method likely over estimates riparian impacts as it assumes that all new bridge area will remove riparian vegetation. It is likely that some new bridge locations will not have existing riparian vegetation • Stream impacts assume that new bridge width is directly related to linear stream ft and that stream length covered by new or expanded bridge is permanently impacted
New trails	• Identify all proposed new trails in GIS layer • In GIS, overlay trails on the land cover layer and apply a 16-foot buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of new stream crossings made by new trails • Multiply number of new stream crossings by 16-foot width to determine total linear ft of stream impacted	• Impacts are based on a GIS trails layer provided by City of San José • Assume a width of 16 feet (12 feet for the trail and two 2-foot compact gravel shoulders) (J. Hart pers. comm. a) • Assume 100% of impacts resulting from overlay are permanent • Existing trails are not assumed to be widened if reconstructed during the permit term • Stream crossings of trails assumed to be 16 feet wide
Cherry Flat dam seismic safety retrofit, including borrow site(s)	• Develop footprint of project based on existing dam footprint from aerial photos • Overlay footprint on land cover layer in GIS • Assess impacts to land cover types, including streams	• That borrow site(s) will be approximately scaled to the size of the reservoir and dam when compared to County Parks dams, reservoirs, and borrow site size
Morgan Hill[4]		
Bridge expansion	No impacts assessed	• No expansion of existing bridges is assumed and therefore no new permanent land cover or stream impacts are assumed

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
New bridge construction	No impacts assessed	• No new vehicular bridge construction is assumed for Morgan Hill; pedestrian and trail bridge impacts are assumed under the New Trails covered activity
New trails	• Identify trail bridges using GIS • Apply a 15-foot buffer to each trail where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers and linear ft of stream	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.); AutoCAD files were imported into GIS • It is assumed that all trails in the AutoCAD data are new trails • Impacts are assumed to occur in the area encompassed by a 15-foot buffer (30-foot width) along all linear infrastructure identified in the AutoCAD files provided by Morgan Hill (City of Morgan Hill recommended a buffer of 10–20 feet and the middle value of 15 feet was used) (S. Golden pers. comm.)
Storm drains	No impacts assessed	• No impacts to streams from implementation of storm drain infrastructure are assumed; All crossings will be jack and bore (beneath the streambed) (J. Behzad pers. comm.)
Gilroy[4]		
Bridge expansion	• Utilize data provided by the City of Gilroy to calculate the area of each expanded bridge • Distribute acres of expanded bridge to riparian land cover types proportional to occurrence in Gilroy • Add all bridge expansion widths together to calculate linear feet of stream impacts	• Bridge count, including length and width for planned bridge widening, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.)
New bridge construction	• Utilize data provided by the City of Gilroy to calculate the area of each new bridge • Distribute acres of new bridge to riparian land cover types proportional to occurrence in Gilroy • Add all new bridge widths together to calculate linear feet of stream impacts	• Bridge count, including length and width for planned new bridges, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.)
New trails	• Identify location of new trails using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers and linear ft of stream	• Impacts are based on AutoCAD files provided by Gilroy of current master plans for infrastructure development; AutoCAD files were imported into GIS • Impacts are assumed to occur in the area encompassed by a 15-foot buffer (30-foot width) along all linear infrastructure identified in the AutoCAD files; this assumption is consistent with the assumptions used for Morgan Hill

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Sewer improvements	• Identify location of sewer improvements using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers	• Impact consideration is based on AutoCAD files provided by Gilroy of current master plans for infrastructure development; AutoCAD files were imported into GIS • Sewer improvement projects are assumed to avoid streams and not result in permanent stream impacts; a small amount of riparian vegetation may be affected; this is consistent with the guidance provided in the Water Collaborative Guidelines and Standards
New recycled water pipes	• Identify location of new recycled water pipes using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers	• Impact consideration is based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Recycled water pipe projects are assumed to avoid streams and not result in permanent stream impacts; a small amount of riparian vegetation may be affected; this is consistent with the guidance provided in the Water Collaborative Guidelines and Standards
Water improvements	• Identify location of water improvements using GIS • Apply a 15-foot buffer the mapped facility boundary where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers	• Impact consideration is based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Water improvement projects are assumed to avoid streams and not result in permanent stream impacts; a small amount of riparian vegetation may be affected; this is consistent with the guidance provided in the Water Collaborative Guidelines and Standards
SCVWD		
Dam Maintenance Program	• In GIS, overlay the Area of Routine Maintenance footprint on the land cover layer and assess acres of land cover impacted • In GIS, overlay the Area of Routine Maintenance and the Area of Potential Effect on the land cover layer • Assess acres of land cover within the Area of Potential Effect but outside of the Area of Routine Maintenance • Take 15% of the acres identified in the above bullet, proportional to the occurrence of each land cover type identified • Add the land cover identified in the first bullet to the land cover identified in the fourth bullet together to identify total impacts	• GIS footprint of Dam Maintenance Program project extent was provided by SCVWD • SCVWD Dam Maintenance Program GIS data identifies the zone in which 85% of all impacts are expected to occur (also called the *Area of Routine Maintenance*); this area is assumed to experience permanent impact • The remaining 15% of impacts would occur within the Area of Potential Effect; the Area of Potential Effect includes the Area of Routine Maintenance but is somewhat larger than the Area of Routine Maintenance • Although this is a maintenance program, implementation of the Dam Maintenance Program results in a permanent clearing of all vegetation from the dam face and surrounding areas; therefore, this is considered a permanent impact to land covers (excluding riverine/streams) and is assessed under In-stream CIP • Streams are not assumed to be permanently impacted due to implementation of the Dam Maintenance Program

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Dam safety retrofit footprint	• Overlay GIS footprints of "Area A" on land cover layer AND on Dam Maintenance Program footprints • Assess acres of land cover impacted Area A excluding any areas that overlap with the Dam Maintenance Program footprints • Integrate stream impact lengths provided by SCVWD	• Because permanent impacts to land cover were fully assumed for the Dam Maintenance Program, additional impacts to land cover in this zone are not assessed under safety retrofit • SCVWD provided safety retrofit footprints for all dams; this data identifies the footprint of the new dam (Area A), and the area affected by construction impacts (Area B); these footprints assume worst case dam reconstruction of downstream embankment strengthening • All land cover types, including streams, falling within the footprint are assumed to be lost • SCVWD provided stream impact numbers • Safety retrofit of Coyote, Chesbro, and Uvas Dams is not a covered activity under this Plan
Safety retrofit borrow sites	• Use the total acres of borrow site impacts as calculated in the draft Three Creeks HCP (April 2009) for Anderson, Almaden, Calero, and Guadalupe dam borrow sites • Identify the acres of each land cover type present within a 5-mile radius of each of the four dams • For each dam, distribute the total acres of borrow site impact proportionally across the land cover types within a 5-mile radius of the dam	• Acres required for safety retrofits covered by the draft Three Creeks HCP (April 2009) were used as the basis of this analysis • That borrow will be acquired within a 5 mile radius of the dam • This analysis does not account for avoidance of certain land cover types based on the siting criteria in Chapter 2; impacts to certain land cover types may be overestimated while others are underestimated
Temporary supplemental water supply systems during reservoir drawdown	No impacts assessed	• That impacts associated with this activity will be entirely contained within the footprints of the Dam Maintenance Program, the water utility / water supply operations and maintenance impacts, or within existing roads and other disturbed areas
Water utility / water supply operation and maintenance	• Determine permanent impacts as defined in the draft Three Creeks HCP (April 2009) impact analysis for the Coyote and Guadalupe watersheds (Stevens Creek numbers were excluded) • Divide this number by the number of dams in the study area in north County (six dams) • Multiply this number by the number of dams in south County (2 dams) • Distribute 0.4 acre of permanent impact to land cover types proportional to impact for other impacts in this activity	• The draft Three Creeks HCP (April 2009) identifies permanent impacts for operations and maintenance activities in the north County; these impacts were used for this Plan directly for north County impacts and indirectly to derive estimates for impacts associated with activities in south County • In addition to these estimates, some new access roads and facility pads may be required; assume up to 1,600 sq ft per new facility and up to 10 new facilities (0.4 acre); distribute impacts to land cover types proportional to other impacts in this category • That impacts in south County are proportional to impacts in north County based on the number of dams

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Lower Llagas vegetation management	• Using an aerial map for guidance, draw a polygon in GIS around the full extent of the project area including the outer edge of the channel levee as appropriate • Overlay GIS polygon on land cover layer • Assess total acres of land cover and streams impacted • Reduce impacts by 50% for each land cover type • Reduce impacts by 95% for permanent stream impacts	• 50% of existing vegetation will be removed and this reach permanently maintained in this state for flood protection purposes, resulting in a 50% permanent impact • The stream may experience some degradation to habitat due to removal of large woody debris and other in-channel vegetation due to flood protection management needs; this amount of degradation is estimated as a permanent impact to 5% of the total stream length
Canal reconstruction or realignment	• Using an aerial map for guidance, draw a polygon around the extent of each canal including access roads adjacent to the canal • Overlay GIS polygons on land cover layer • Assess total acres of land cover impacted	• Canals will be dry when they are reconstructed and no stream impacts are anticipated • Decommissioning of canals would result in reduced permanent impacts compared to reconstruction or realignment; this analysis assumes the highest level of impacts as associated with reconstruction or realignment
Flood protection projects (collective)	• Using an aerial map for guidance, draw a polygon in GIS around the full extent of the project area including the outer edge of the channel levee as appropriate • Overlay GIS polygon on land cover layer • Assess total acres of land cover and streams impacted • Reduce impacts by 80% for each land cover type • Reduce impacts by 95% for permanent stream impacts • Reduce final impacts by approximately one-third to account for cap on total flood protection projects covered by the Plan	• That 20% of existing vegetation, on average, will be removed and permanently due to construction of flood control projects; this assumption is based on engineer drawings from past and current projects, and SCVWD professional experience in implementing flood control projects; this assumption is also based on implementation of the Clean, Safe, Creeks Program by which SCVWD protects and maintains as much natural structure of a stream system as possible • Project footprint impacts were based on a polygon footprint from the outer edge of the existing channel or levee • Total length of flood protection projects covered by the Plan is capped at 64 miles, with a maximum of 3.1 miles of permanent stream impacts • The assumption that only 5% of the total stream length will be permanently impacts is based on: o review of past and planned projects; o the understanding that SCVWD is committed to designing flood control projects to incorporate and support natural stream function and riparian habitat; o development and adoption of the Clean, Safe Creeks and Natural Flood Protection Plan program to support the above commitment; o examples of planned flood control projects that seek to remove existing development and replace it with a wider and more natural channel (Upper Penitencia project) and that may result in net benefit for habitat; and o the understanding that conditions identified in the Habitat Plan (Condition 4) will be utilized and incorporated into project design and

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
		construction o Feedback from SCVWD engineers (D. Arnold pers. comm. a)
Levee reconstruction projects (collective)	• Using an aerial map for guidance, draw a polygon in GIS around the full extent of each individual levee (i.e., a channel with a levee on each side would require two separate polygons) including the outer edge of the channel levee as appropriate • Import GIS levee layer and combine with levees mapped from the aerial photo • Overlay GIS polygons on land cover layer • Assess total acres of land cover impacted • Reduce impacts by 95% for permanent stream impacts • Divide all resulting impacts (land cover and stream) by one-half to account for 10 mile impact cap	• Includes all reconstruction activities including improvements and expanded levees (taller or wider levees) • SCVWD provided aerial images marking the extent of levee location (D. Arnold pers. comm. b); SCVWD also provided a GIS layer for SCVWD levees; levees identified in both data sources were utilized for this analysis • Assumes levees will be reconstructed within the same footprint as in aerial photos and in GIS; may be a slight under estimation of impacts if levee encroaches into stream bed area due to design constraints • Assumes that all vegetation within the footprint will be removed; may be an overestimate as levee reconstruction will not result in a loss of shaded riverine habitat • Assumes impacts are capped at 10 miles
Groundwater recharge ponds	• Digitize recharge ponds, new diversion dam at Metcalf Road, pipeline to Ford Road pond, and existing diversion outtake at Church Avenue in GIS • Overlay GIS polygons on land cover layer • Assess total acres of land cover impacted • Delete impacts to “ponds” land cover type	• SCVWD plans to re-operate Ford Road and Church Avenue groundwater recharge ponds; projects includes rehabilitation of diversion at Church Avenue and construction of a new diversion at Metcalf Road • Ford Road project includes installation of a new pipeline from the diversion to the pond • SCVWD provided aerial maps showing where the re-operated ponds are located • Metcalf Road diversion is assumed to be approximately 200 feet (stream length) by 170 feet (stream width); and that approximately half of this area is riparian vegetation (0.4 acre of riparian) • Approximately 80% of the Church Avenue ponds site is currently mapped as ponds land cover type; because ponds will be the land cover type after project implementation, impacts to the ponds land cover type were not included in the impact analysis • As SCVWD’s water rights have not changed, no impact to in-stream flow is anticipated
Alamitos Creek/ Almaden Reservoir Fish Passage	• Digitize in GIS the general area of where the project components may go • Distribute 30 acres of impacts proportional to the percentages of land cover in the generally mapped area • Assess 50 feet of stream impact	• Assume up to 30 acres of impact to land cover types around Almaden Dam and Reservoir • Assume up to 50 feet of permanent stream loss

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Trails	No impacts assessed	• Assumes that trail projects are located on existing maintenance roads or as components of flood protection projects; therefore, impacts are assumed to either already have occurred (existing maintenance roads) or that impacts are captured by the impacts assessed for flood protection projects; no additional impacts to land cover are assessed
County Roads and Airports		
Bridge replacement - expanded footprint	• Determine total acres of expanded area on existing bridges or acres of new bridges • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in the county • Estimate stream impacts by identifying the total new width (bridge dimension parallel to stream bed) of expanded and new bridges in feet	• Impacts based on data provided by County of Santa Clara Road and Airports containing a list of bridges that will be reconstructed within the permit term; This list includes bridge width and length for each existing bridge (D. Cameron pers. comm. a) • County Roads has identified three road connection projects in the study area. One of these projects, Center Avenue extension to Marcella will require a new bridge. Another project, McKean Road connection to Almaden Expressway, may require a new bridge depending on land acquisition constraints (D. Cameron pers. comm. b) • Aside from the exceptions noted in the above bullet, County Roads has no plans to build bridges in new locations in the Study area Any new bridges would be due to land use development and would have to be funded by the developer and impacts are assessed under Rural Development • Bridges are assumed to be double in width during reconstruction to account for new safety and seismic codes • New permanent impact to land cover and streams is assumed only for new or expanded areas, not total footprint of all bridges as permanent impacts are assumed to have already taken place for existing infrastructure • This method likely over estimates riparian impacts as it assumes that all new bridge area will remove riparian vegetation. It is likely that some new bridge locations will not have existing riparian vegetation • Stream impacts assume that new bridge width is directly related to linear stream ft and that stream length covered by new or expanded bridge is permanently impacted

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Parks		
New bridges	• Calculate the stream miles of existing bridges (i.e., total width of all bridges) • Calculate the ratio of existing but unplanned parks to existing but planned and constructed parks • Multiple the miles of existing bridges by the ratio calculated in the previous bullet to determine miles of bridges in existing but unplanned parks • Calculate the ratio of future park lands to existing park lands • Multiple the miles of existing bridges by the ratio calculated in the previous bullet to determine miles of bridges in future parks • Add the results of 3rd and 5th bullets for total new permanent stream impacts	• The number of bridges constructed in the future is proportional to the number of bridges currently in existence • Analysis only accounts for stream impacts as all other impacts are assessed under Rural CIP
Dam safety retrofit, including borrow sites	• Using data provided by County Parks, develop polygons in GIS around dams • Overlay on land cover layer to assess impacts to land cover type from dam retrofits • Apply acres of impact for borrow sites to California annual grassland land cover type	• County Parks provided impact numbers for the dam at Sandywool Lake and the five dams at Grant Lake and for the size of borrow pits required for each dam (D. Rocha pers. comm.) • Borrow sites will be located in grasslands
VTA		
Light-rail bridge reconstruction	• No impacts assessed	• VTA provided a list of eight (8) light rail bridges that are likely to be replaced over the permit term • New permanent impact to land cover and streams is assumed only for new or expanded areas, not total footprint as permanent impacts are assumed to have already taken place for existing infrastructure • No expansion is assumed for reconstruction of VTA bridges
S.R. 237 HOV /HOT lane (full length inside the study area)	• Use GIS to identify number of stream crossings • Using aerial photos, identify length and width of existing stream crossings • Add 24 ft to width of crossing (linear ft of stream) • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José • Assess permanent impacts to streams at 24 feet per crossing	• VTA provided project location • Full length of project is inside the planning limit of urban growth; no new land cover impacts are assumed because this area was assessed under the Urban Development impact category, with the exception of stream crossings • Each stream crossing will require bridge widening of 24 feet • New bridge width will affect in-stream riparian and linear feet of stream

Table 4-5a. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
S.R. 85 HOV/HOT lane (full length inside the study area)	• Use GIS to identify number of stream crossings • Using aerial photos, identify length and width of existing stream crossings • Add 24 feet to width of crossing (linear ft of stream) • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José • Assess permanent impacts to streams at 24 feet per crossing	• VTA provided project location • Full length of project is inside the planning limit of urban growth; no new land cover impacts are assumed because this area was assessed under the Urban Development impact category, with the exception of stream crossings • Each stream crossing will require bridge widening of 24 feet • New bridge width will affect in-stream riparian and linear feet of stream

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] Impacts assessed for cities under the In-Stream impacts category only include impacts to riparian and riverine land cover types as impacts to all other land covers for urban development are assumed under the Urban Development impact analysis assumptions.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5b. In-Stream Capital Improvement Project Construction Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
San José[4]		
New and existing bridge (re)construction	• Determine the total length of all existing and planned bridges • Multiply the total length of all existing and planned bridges by a construction width of 30 ft (15 ft buffer[5] on each side of the bridge) to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of bridges to be constructed or reconstructed	• Impacts are based on list of bridges provided by City of San José that will be built or reconstructed within the permit term. This list included bridge width and length for each existing, expanded, and new proposed bridge • The list of bridges for City of San José includes the bridges that are likely to receive funding for replacement and/or rehabilitation within the 50-year permit term (J. Hart pers. comm. b) • Length of bridges is assumed to be bank to bank, perpendicular to flow, and that construction impacts would occur along the full length of the bridge • Temporary construction impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This method likely over estimates riparian impacts as it assumes impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation
New trails	• In GIS, overlay trails on the land cover layer and apply a 4 ft buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of stream crossings (existing and new) by trails • Multiply number of new stream crossings by 8 ft width to determine total linear ft of stream impacted	• Impacts are based on a GIS trails layer provided by City of San José • Assume temporary construction impacts occur in a buffer of 4 ft along each trail (8 ft total width, one-half of trail footprint)

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Morgan Hill[4]		
Bridge replacement and expansion	• Identify the existing number of bridges using GIS by overlaying the road layer on the stream layer • Verify on aerials that bridge locations were accurate from the overlay of roads and streams • Apply a 15 ft buffer to each bridge footprint where it crosses the in-stream area • Overlay the resulting buffered land cover to determine riparian land covers impacted during bridge replacement	• Neither a list of bridges for replacement nor GIS locations of existing bridges were provided; instead, bridges were assumed to occur at locations where roads cross a mapped creek or stream • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • Temporary impacts are not assumed for the area under the existing bridge as that area is assumed to be already permanently impacted
New bridge construction	No impacts assessed	• No new vehicular bridge construction is assumed for Morgan Hill; pedestrian and trail bridge impacts are assumed under the New Trails covered activity
New trails	• Identify trail bridges using GIS • Apply a 5 ft buffer to each trail where it crosses the in-stream area • Overlay the resulting buffered area on the land cover layer to determine impacts to riparian land covers and linear ft of stream	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.) • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • It was assumed that all trails in the AutoCAD data are new trails
Storm Drainage	No impacts assessed	• No impacts to streams from implementation of storm drain infrastructure are assumed; All crossings will be jack and bore (beneath the streambed) (J. Behzad pers. comm.)
Gilroy[4]		
Bridge replacement and expansion	• Identify number of bridge expansion projects based on data provided by the city of Gilroy • Identify average length of each bridge widening project • Multiply number of bridges by average length by 30 ft (15 ft buffer on either side of expanded bridge) to calculate acres of temporary impact • Distribute acres of impact to riparian land cover types proportional to occurrence in Gilroy • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of bridges to be replaced or expanded	• Impacts are based on bridge count, including length and width for planned bridge widening, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.) • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • Temporary impacts are not assumed for the area under the existing bridge as that area is assumed to be already permanently impacted

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
New bridge construction	• Identify number of new bridges based on data provided by the city of Gilroy • Identify average length of each new bridge project • Multiply number of bridges by average length by 30 ft (15 ft buffer on either side of new bridge) to calculate acres of temporary impact • Distribute acres of impact to riparian land cover types proportional to occurrence in Gilroy • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of bridges to be replaced or expanded	• Impacts are based on bridge count, including length and width for planned new bridges, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.) • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream
New trails	• Multiply permanent impacts identified in permanent in-stream impacts for new trails by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts
Sewer improvements	• Multiply permanent impacts identified in permanent in-stream impacts for sewer improvements by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts
New recycled water pipes	• Multiply permanent impacts identified in permanent in-stream impacts for recycled water pipes by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts
Water improvements	• Multiply impacts identified in permanent in-stream impacts for water improvements by one-third	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Assume a 5 ft buffer (10 ft width); This is equivalent to 1/3 the area of CIP footprint • Assume that the land covers impacted by construction are the same types and the same proportion as the permanent impacts

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
SCVWD		
Dam Maintenance Program	No impacts assessed	• Because full permanent impacts to land cover were assumed under the In-Stream CIP category, and because this is not a construction projects, no temporary impacts are assessed
Dam safety retrofit footprint	• SCVWD provided GIS footprints of estimated extent of safety retrofit for all SCVWD dams • Overlay GIS footprints of "Area B" on land cover layer AND on Dam Maintenance Program footprints • Assess acres of land cover impacted in Area B excluding any areas that overlap with the Dam Maintenance Program footprints • Assess temporary impacts to miles of streams for all length of stream occurring in Area B	• SCVWD provided safety retrofit footprints for all covered dams; this data identifies the existing dam face, the footprint of the new dam (Area A), and the area affected by construction impacts (Area B)
Safety retrofit borrow sites	• April 2009 draft Three Creeks HCP identified acres of temporary impacts for Anderson, Almaden, Calero, and Guadalupe dam borrow sites • Identify the acres of each land cover type present within a 5-mile radius of each of the four dams • For each dam, distribute the total acres of temporary impact proportionally across the land cover types within a 5-mile radius of the dam	• The April 2009 draft Three Creeks HCP identified acres of temporary impacts • Borrow will be acquired within a 5 mile radius of the dam • This analysis does not account for avoidance of certain land cover types based on the siting criteria in Chapter 2; impacts to certain land cover types may be overestimated while others are underestimated
Lower Llagas vegetation management	• Using GIS, identify stream miles of entire project footprint • Assess temporary impacts on 5% of the identified stream miles	• Temporary losses of vegetation are assumed to be incorporated in the 50% permanent loss of vegetation assessed under In-Stream CIP; therefore, no temporary impacts are assessed • Temporary impacts to streams can largely be avoided by applying the requirements identified in Chapter 6; however, vegetation management activities that require removal of trees, or root wads from the active channel (channel with water) may result in temporary water quality impacts associated with ground disturbance. These impacts are assumed to be very small and are estimated to be 5% of the project length
Canal reconstruction or realignment	• Using the GIS footprint developed for In-stream CIP impacts, apply a 10 ft buffer around the project site • Assess impacts to land cover in the buffer area only	• Temporary impacts are assumed for an average of 10 ft buffer around the project site which is the full extent of the canal • Canals are assumed to be dry at the time of construction and therefore no stream impacts are assessed

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Flood protection projects (collective)	• Using the polygons developed for In-Stream CIP project footprints, overlay the GIS polygon on the land cover layer • Assess total acres of land cover and streams impacted • Reduce impacts by 80% for each land cover type • Reduce impacts by 50% for temporary stream impacts • Reduce final impacts by approximately one-third to account for cap on total flood protection projects covered by the Plan	• Temporary impacts to land cover are assumed to be on average 20% of all existing land cover; this represents vegetation that will be impacted during project construction but replaced upon completion of construction • Construction impacts were assumed to occur within the same footprint as the project; as such, no buffer was used • Total length of flood protection projects covered by the Plan is capped at 64 miles • Temporary impacts to streams are assumed to be on average 50% of the total stream miles in the project area; this account for dewatering in portions of the channel and other temporary construction impacts
Levee reconstruction projects (collective)	• Using the GIS polygons developed for In-Stream CIP levee project footprints, apply a 20 ft buffer • Overlay with the polygon buffer with the land cover layer in GIS • Assess total acres of impacts by land cover • Using GIS, identify the full length of stream miles associated with each channel that will require levee reconstruction • Assess temporary stream impacts along the identified stream miles	• Temporary impacts are assumed for an average of 20 ft buffer around the project site which includes the inner (i.e., in-channel) and outer edges of the levee • Because this project calls for full levee reconstruction, it is assumed there will be temporary impacts to the entire length of stream in the channel being reconstructed
Groundwater recharge ponds	• Digitize temporary impact area in GIS • Overlay GIS polygons on land cover layer • Assess total acres of land cover temporarily impacted	• A perimeter of 10 ft around the outer edge of the Ford Road ponds site and around the Church Avenue diversion site is assumed to be temporarily affected during construction
Alamitos Creek / Almaden Reservoir Fish Passage	• Distribute 5acres of impact proportional to the acres of land cover affected by permanent project impacts • Assess 30 ft of temporary stream impact	• Assume up to 5 acres of temporary construction impacts to non-stream land cover types may occur and up to 30 ft of temporary stream impacts • Construction impacts are distributed proportional to land cover types affected by permanent project impacts

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Roads and Airports		
Bridge replacement - expanded footprint	• Determine the total length of all existing bridges • Multiply the total length of all existing and planned bridges by a construction width of 32 ft (16 ft buffer on each side of the bridge) to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in Santa Clara unincorporated county • Estimate temporary stream impacts by multiplying a 32 ft width of temporary impacts per bridge by the number of bridges to be reconstructed	• Impacts based on data provided by County of Santa Clara Road and Airports containing a list of bridges that will be reconstructed within the permit term; This list includes bridge width and length for each existing bridge • County Roads plans one new bridge in the study area • Temporary impacts are assumed to occur within 16 ft upstream and downstream of the bridge crossing, for a total construction width of 32 ft along the linear stream (D. Cameron pers. comm.) • This method likely over estimates riparian impacts as it assumes that all bridge construction will remove riparian vegetation. It is likely that some bridge construction will not have existing riparian vegetation
County Parks		
Existing and New Bridge Construction	• Apply ratios of new bridges to existing bridges determined for In-stream CIP permanent impacts to the number of existing bridges to identify numbers and types of future bridges by bridge type • Add results of first bullet to the number of existing bridges to identify total number of existing bridges to be rebuilt and new bridges to be constructed for each type of bridge • Multiple construction buffers by 2 (to get total length of stream temporarily affected during construction) and then multiply by the total number of bridges for each bridge type • Add results of three bridge types together to get total stream miles of temporary construction impacts	• County Parks provided data on total number of existing bridges by bridge type (non-bridge water crossings, large bridges, and small bridges and puncheons), dimensions of each bridge type, and count of existing bridges by type • Assume temporary construction buffers of 2 ft for non-bridge water crossings, 15 ft for large bridges, and 5 ft for small bridges and puncheons • Analysis only accounts for temporary construction stream impacts as all other construction impacts are assessed under Rural CIP

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
VTA		
Light-rail bridges	• Determine the total length of all existing bridges • Multiply the total length of all existing bridges by a construction width of 30 ft (15 ft buffer on each side of the bridge) to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying a 30 ft width of temporary impacts per bridge by the number of existing bridges	• Impacts based on data provided by VTA regarding location of bridges assumed to be reconstructed over the permit term • The average width of each bridge is assumed to be 100 ft and average length 143 ft; these numbers correspond to the average width and length of San José bridges; all VTA bridges are located in San José • Temporary impacts are assumed to occur within 15 ft upstream and downstream of the bridge crossing, for a total construction width of 30 ft along the linear stream • All eight bridges are located inside of the San José planning limit of urban growth; therefore, only riparian impacts are assessed as all other impacts are assessed under the Urban Development category • This method likely over estimates riparian impacts as it assumes impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation
S.R. 237 HOV/HOT lane (full length inside the study area)	• 20 ft of linear stream temporary impact per stream crossing • Multiply 20 ft by the length of each crossing as identified under the permanent impact calculations and convert to acres • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted, with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing
S.R. 85 HOV /HOT lane (full length inside the study area)	• 20 ft of linear stream temporary impact per stream crossing • Multiply 20 ft by the length of each crossing as identified under the permanent impact calculations and convert to acres • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the planning limit of urban growth for the City of San José	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted, with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] Impacts assessed for cities under the In-Stream impacts category only include impacts to riparian and riverine land cover types as impacts to all other land covers for urban development are assumed under the Urban Development impact analysis assumptions.

[5] Buffers described for temporary impacts identify the area immediately surrounding the footprint of the associated project where temporary impacts are assumed to occur. Temporary impact buffers are in addition to buffers assumed to represent the project footprint as described in Table 4-5a.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5c. In-Stream Operations and Maintenance Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
San José		
New and existing bridge maintenance	• Determine the total length of all existing and planned bridges • Multiply the total length of all existing and planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• Impacts are based on list of bridges provided by City of San José that will be built or reconstructed within the permit term. This list included bridge width and length for each existing, expanded, and new proposed bridge; average length is 143 ft and average width is 100 ft • The list of bridges for City of San José includes the bridges that are likely to receive funding for replacement and/or rehabilitation within the 50-year permit term (J. Hart pers. comm. b) • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This method likely over estimates riparian impacts as it assumes all impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation
New and existing trail maintenance	• In GIS, overlay trail layer provided by San José on the land cover layer • Apply a 4 ft buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of trail stream crossings (existing and new) • Multiply number of stream crossings by 8 ft width to determine total linear feet of stream impacted	• Impacts are based on a GIS trails layer provided by City of San José • Temporary land cover and stream impacts in urban areas are assumed to occur within 4 ft upstream and downstream of the bridge crossing, for a total maintenance width of 8 ft along the linear stream • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Urban Development impact category

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Morgan Hill		
Bridge maintenance	• Identify the existing number of bridges using GIS by overlaying the road layer on the stream layer • Verify on aerials that bridge locations were accurate from the overlay of roads and streams • Apply a 12ft buffer to each bridge footprint where it crosses the in-stream area • Overlay the resulting buffered land cover to determine riparian land covers impacted	• Bridges were assumed to occur at locations where roads cross a mapped creek or stream; 6 bridges were identified in Morgan Hill. • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge (60 ft by 100 ft) as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Rural Operations and Maintenance impacts category
Trail maintenance	• In GIS, overlay trail layer provided by Morgan Hill on the land cover layer • Apply a 4 ft buffer • Exclude all land covers from the results except the riparian land covers as impacts to all other land cover are already assumed in the urban development impact analysis • Estimate stream impacts using GIS to calculate the number of trail stream crossings (existing and new) • Multiply number of stream crossings by 8 ft width to determine total linear feet of stream impacted	• 10 trail stream crossings are assumed • Temporary land cover and stream impacts in urban areas are assumed to occur within 4 ft upstream and downstream of the bridge crossing, for a total maintenance width of 8 ft along the linear stream • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Urban Development impact category
Gilroy		
Bridge maintenance	• Determine the average length of all planned new and widened bridges • Multiply the average length of all planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land–cover types in proportion to those land covers occurrence in Gilroy city limits • Estimate temporary stream impacts by multiplying the maintenance buffer (24 ft) by the number of bridges to be maintained	• Bridge count, including length and width for new and widened bridges, was provided by the City of Gilroy for planned and existing bridges (K. Abrams pers. comm.) • Gilroy is assumed to have 32 planned and existing bridges • Existing bridges are assumed to have the same average width and length as new and widened bridges • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Trail maintenance	• In GIS, calculate total ft of trails that occur in the in-stream area • Apply a 4 ft buffer on each side of the trail and overlay on land cover data • Assess impacts to acres of land cover	• Impacts are based on AutoCAD files provided by Gilroy of current Master Plans for infrastructure development; AutoCAD files were imported into GIS • Temporary impacts for urban trail operations and maintenance are assumed to occur within 4 ft on either side of a trail • This analysis only attempts to capture trail impacts in in-stream areas; impacts in upland areas are identified in the Urban Development impact category
Stream maintenance	• Distribute 12 acres of temporary impact across the three riparian land-cover types in proportion to occurrence in Gilroy planning limits of urban growth	• City of Gilroy provided impact estimates of 3 acres 4 times per year (R. Smelser pers. comm.)
SCVWD		
Canal Maintenance in Serpentine	No impacts assessed	• No impacts are assumed for canal maintenance because full permanent impacts to canals are assumed under In-Stream CIP for canal reconstruction
Ground-Disturbing, Winter work in Almaden-Calero	No impacts assessed	• No impacts are assumed for winter work in Almaden-Calero canal because full permanent impacts to this canal are assumed under In-Stream CIP for canal reconstruction
County Roads and Airports		
Bridge Maintenance	• Determine the total length of all existing bridges • Multiply the total length of all existing and planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in the County • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• County Roads is assumed to have 91 bridges that will be maintained • Temporary land cover impacts from operations and maintenance are assumed to occur within a 12 ft buffer up and downstream of the bridge (24 ft width total) • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Parks		
Bridge Maintenance	• Determine the total length of all existing and planned bridges • Multiply the total length of all existing and planned bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in the County • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• Impacts based on data provided by County of Santa Clara Parks Department containing a list of existing bridges; this list includes bridge width and length for each existing bridge • County Roads is assumed to have 69 bridges, inclusive of vehicular and trail stream crossing • Temporary land cover impacts from operations and maintenance are assumed to occur within a 12 ft buffer up and downstream of the bridge (24 ft width total) • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges or by new or expanded bridges
VTA		
Light-rail bridge Maintenance	• Determine the total length of all bridges • Multiply the total length of all bridges by a maintenance width of 24 ft (12 ft buffer on each side of the bridge) and convert to acres to identify acres of temporary impact • Distribute acres across the three riparian land covers in proportion to those land covers occurrence in San José city limits • Estimate temporary stream impacts by multiplying the maintenance buffer zone (24 ft) by the number of bridges to be maintained	• Impacts based on data provided by VTA regarding location of bridges assumed to be reconstructed over the permit term • The average length is assumed to be 143 ft; this number corresponds to the average width and length of San José bridges; all VTA bridges are located in San José • Temporary land cover and stream impacts are assumed to occur within 12 ft upstream and downstream of the bridge crossing, for a total maintenance width of 24 ft along the linear stream; this assumption is based on County Roads maintenance buffers • Temporary impacts are not assumed for the area under the bridge as that area is assumed to be already permanently impacted by existing bridges • All eight bridges are located inside of the San José planning limit of urban growth; therefore, only riparian impacts are assessed as all other impacts are assessed under the Urban Development category • This method likely over estimates riparian impacts as it assumes impacts will temporarily affect riparian vegetation. It is likely that some bridge locations will not have existing riparian vegetation

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
General		
Natural resource protection (small bank stabilization projects, restoration to reduce erosion, fish passage enhancements, and debris)	• For bank stabilization, multiply 10*50 feet*20 feet, convert to acres, and distribute this impact across riparian land-cover types in proportion to relative presence in the study area of the riparian land-cover types • For bank stabilization projects, multiply 10*50 feet, convert to miles of temporary steam impact • For erosion control projects, multiply 5*50 feet*50 feet, convert to acres, and distribute this impact across riparian land-cover types in proportion to relative presence in the study area of the riparian land-cover types • For erosion control projects, multiply 5*50 feet, convert to miles of temporary steam impact • For fish passage projects, multiply 2*50 feet*20 feet, convert to acres, and distribute this impact across riparian land-cover types in proportion to relative presence in the study area of the riparian land-cover types • For fish passage projects, multiply 2*50 feet, convert to miles of temporary steam impact	• Assume that Local Partners will request, on average,10 bank stabilizations per year; each stabilization is 50 feet long and 20 feet wide; that this area will impact riparian vegetation; that one-half of the projects will require dewatering which results in a temporary stream impact • Assume that Local Partners will request, on average, 5 erosion correction projects per year; each project 50 feet long and 50 feet wide; that this area will impact riparian vegetation; that one-half of the projects will require dewatering which results in a temporary stream impact • Assume that Local Partners will request, on average, 2 fish passage enhancement projects per year; each project 50 feet long and 15 feet wide; that this area will impact riparian vegetation; that one-half of the projects will require dewatering which results in a temporary stream impact • Debris removal impacts are assumed to be too small to estimate

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5d. Rural Capital Improvement Project Permanent Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
San José		
Kirby Canyon Landfill expansion	• Digitize in GIS the Kirby Canyon Landfill Fill Areas • Overlay digitized Fill Areas on the land cover layer • Assess impacts to land cover and to streams for Fill Areas 3 and 4	• The City of San José is seeking coverage under the Habitat Plan for development of Fill Areas 3 and 4 • A digital aerial map of Kirby Canyon Landfill Fill Areas was provided that identified Fill Areas (T. Peterson pers. comm.)
Morgan Hill		
Butterfield detention basin	• Identify proposed Butterfield detention basin in GIS • Overlay footprint of detention basin on the land cover layer to determine land cover impacts	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.); AutoCAD files were imported into GIS • No stream impacts are assumed
SCVWD		
Llagas recharge basins #1, #2, and #3, and Coyote Greenbelt recharge basin	• SCVWD provided approximate project locations for the three Llagas groundwater recharge basins, and for the approximate location of the Coyote Greenbelt groundwater recharge basin • Digitize in GIS the boundaries for the location of the Llagas recharge basins and the Coyote Greenbelt basin • These boundaries are larger than the actual project, but represent the general area in which the project will occur • Assess total acres of each project area including acres of project area that is located inside of a planning limit of urban growth • Assess acres of land cover inside of each project area and determine proportion of each land cover within each project area • Calculate total project footprint based on percentage of project area acres inside/outside of a planning limit of urban growth (e.g., project area #3 is 69% located in the County and 31% located in Morgan Hill's planning limit of urban growth; therefore, for a 10 acre project, only 69% of 10 acres would be counted in the impacts because the other 31% was already assessed under Urban Development impacts) • Distribute project impacts proportionally across the land covers identified to be located in each project area • Include an additional 2.2 acres of impacts, distributed to barren and agriculture land covers	• For the Llagas recharge basins, total project footprint for each project is 10 acres (for a total of 30 acres) • Portions of the Llagas recharge basin project area fall within the Morgan Hill planning limit of urban growth; all impacts for areas zoned for development were included in the Urban Development impact assessment; therefore, portions of projects that overlap with Morgan Hill are not assessed in this analysis • For the Coyote Greenbelt basin, total project footprint is 15 acres • Coyote Greenbelt project will occur in the Coyote Greenbelt in close proximity to the Cross Valley Pipeline • 1.5 miles of new access road are assumed to be gravel roads, 12 ft wide and located in disturbed barren or agriculture lands • No stream impacts are assumed as the projects are not located in a stream or in a riparian area

Table 4-5d. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
County Roads and Airports		
South County Airport Master Plan	• Digitize in GIS the extent of the airport, excluding existing developed areas, avigation easements, and proposed fee simple acquisition areas • Calculate the acres of each land cover type within this area • Distribute project impacts identified by the County proportionally across the land covers identified GIS	• The South County Airport Master Plan was used to identify areas of impact; lands identified as proposed avigation easements and proposed fee simple acquisition were not included in the impact analysis as they are not assumed to be developed further than already exists (e.g., developed residences may be removed and replaced with agricultural uses) • The County provided acres of estimated impacts to be 11.5 acres associated with runway extension and 26 acres associated with new facilities (D. Cameron pers. comm. a) • No stream impacts are assumed
South County Circulation Study intersection improvement projects	• Based on data provided, identify intersection projects in GIS • Apply project footprint width and length in GIS • Overlay project footprint on land cover layer • Assess impacts to land cover	• County of Santa Clara provided a spreadsheet of road intersection projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm. b) • Data provided included width of expansion by intersection; most projects include an expansion of 12 ft (6 ft buffer) along 300 ft of road in each direction from the center of the intersection; these widths were used to identify new permanent impacts for each project • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • No new stream impacts are assumed as all intersection improvements are made to existing intersections and replacement of existing bridges is assessed under the In-Stream CIP category

Table 4-5d. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
South County Circulation Study road improvement projects	• Based on data provided, identify project road segment in GIS • Apply project width to road line in GIS • Overlay resulting project footprint on land cover layer • Remove areas of overlap with South County Circulation Study Intersection Improvement Projects • Assess impacts to land cover • Identify number of stream crossings for each new road alignment by counting number of times the new road alignment crosses a stream • Multiply the number of crossings by 60 ft	• County of Santa Clara provided a spreadsheet of road projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm. b) • Data provided included start and end points for each projects, and width of expansion or new road project; widths ranged from an additional 8 ft to 92 ft; these widths were used to identify new permanent impacts for each project • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth, including projects that immediately border a planning limit of urban growth, AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • Assume stream impacts only for new roads (impacts for replacement of existing roads is assessed under In-Stream CIP Construction category); Stream impacts were calculated based on number of crossings and the assumptions that each stream crossing was, on average, 60 ft
County Roads safety projects and turn lanes	• Multiply miles of safety and intersection projects by the appropriate width and convert to acres • Distribute 25 miles of safety projects and 0.5 mile of turning lane project impacts to land cover types proportional to those land cover type occurrences in the near and far east hill zones developed for the Rural Development analysis • Distribute 8 miles of safety projects and 1 mile of turning lane project impacts to land cover types proportional to those land cover type occurrences in the valley floor zone developed for the Rural Development analysis	• The County provided data for miles and width of safety and intersection projects, as well as general location of projects; 33 miles of safety projects, requiring 8 ft of new road, with 25 miles in the near east and west hills and the remainder on the valley floor; 1.5 miles of turn lanes requiring 12 ft of new road, with 0.5 miles in the near east and west hills and the remainder on the valley floor • No additional bridge expansions beyond those addressed in the road projects

Table 4-5d. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
County Parks		
New trails, fire roads, and development	• Import County Parks covered activity impacts into the Plan's impact analysis • Reduce impacts by 25%	• County Parks conducted its own impact analysis and provided these impacts for inclusion in this Plan; this analysis evaluated all uses and impacts (recreational and natural resource management) anticipated to occur during the permit term and impacts associated with implementing the Plan's conservation strategy within County Parks lands • County Parks developed impact numbers and distributed impacts to land cover types based on existing land use in existing parks, components of master plans not yet implemented, and anticipated avoidance of certain land cover types • Assumptions for development outside of the planning limit of urban growth: 20 miles of fire road (12 ft wide); 25 miles of unpaved, single-track trail (5 ft wide); 3 miles of paved service roads (12 ft wide); 7 miles of paved multi-use trail (16 ft wide); and 10 miles of paved roads (20 ft wide); This does not include roads and trails that are part of a larger site development (e.g., nature center, large picnic areas, pavilions, golf course, etc.) • Assumptions for development outside of the planning limit of urban growth: larger-scale site development projects (e.g., nature center, large picnic areas, pavilions, golf course, etc.) requiring 1,700 acres • Assumptions for impacts to in-stream resources: 300 non-bridge water crossings (e.g., single-track trail crossings; 40 sq ft), 20 large bridges (i.e., one-or two-way automotive use; 924 sq ft), and 30 small bridges and puncheons (i.e., footbridges; 54 sq ft) • Assumption that County Parks will only implement approximately 75% of described projects

Table 4-5d. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
VTA[4]		
U.S. 101 Improvement Project (Monterey Road to SR 129)	• Acres of permanent impact by land cover type, including streams, provided by VTA were used to assess impacts	• This project includes extending Santa Teresa Boulevard from Castro Valley Road to US 101 • This road extension requires a new bridge to be constructed across Gavilan Creek • VTA provided impact estimates for this project that were recently developed for the environmental compliance process for this project (A. Calnan pers. comm.); impacts included both permanent and temporary impacts • These impact estimates were used for both land cover and stream impacts
U.S. 101 widening between Cochrane Rd. and Monterey Hwy	• Identify project road segments in GIS • Apply a 50 ft buffer to the existing road line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the length of the project by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft to determine stream impacts	• Assume a buffer of 50 ft (100 ft width) on either side of the existing road line • Assume a stream impact width of 100 ft per stream crossing • A portions of this project fall within the Morgan Hill and Gilroy planning limits of urban growth • Areas inside the planning limit of urban growth AND outside of the in-stream areas were excluded from the analysis as impacts for these areas are assessed under urban development • Assume a stream impact width of 100 ft per stream crossing
Buena Vista Interchange	No impacts assessed	• The Buena Vista Interchange is located inside of the Gilroy planning limit of urban growth and does not overlap with any in-stream areas or stream channels; no additional impacts (beyond those assumed for areas inside planning limits of urban growth under urban development) are assumed for this project
Caltrain Double Tracking	• Identify project track segments in GIS • Apply a 50 ft buffer to the existing track line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the length of the project by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft	• Assume a buffer of 50 ft (100 ft width) on either side of the existing track line • Assume a stream impact width of 100 ft per stream crossing

Table 4-5d. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
Coyote Valley Parkway Interchange	• Identify project road segments in GIS • Apply a 50 ft buffer to the existing road line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the intersection by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft	• Assume a buffer of 50 ft (100 ft width) on either side of the existing road line • Assume a stream impact width of 100 ft per stream crossing
East Middle Interchange	• Identify project road segments in GIS • Apply a 50 ft buffer to the existing road line in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify number of stream crossings along the intersection by counting number of times the project crosses a stream • Multiply the number of crossings by 100 ft	• Assume a buffer of 50 ft (100 ft width) on either side of the existing road line • Assume a stream impact width of 100 ft per stream crossing
SR 152/SR 156 Interchange	• Overlay project footprint on the land cover layer in GIS • Calculate the acres of impact for each land cover type	• VTA provided a GIS footprint of the project that included both permanent and temporary impact zones (A. Calnan pers. comm.) • The project footprint does not overlap with any streams
U.S. 101 HOV/HOT lane (western study area boundary to Cochrane Road)	• Use GIS to map length of project • For calculating land cover impacts other than in-stream, exclude areas inside the planning limit of urban growth • For areas outside the planning limit of urban growth, multiply length of project by 32 ft (2 lanes plus 2 shoulders) and convert to acres of impact • Apply acres of impact to annual grassland land cover type • Using aerial photos, identify length and width of stream crossings • Add 24 ft to width of crossing (linear ft of stream) • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the City of San José or the valley floor rural development zone, depending on the location of the crossing • Assess permanent impacts to streams at 24 ft per crossing	• VTA provided project location • Assume 12 ft for a new HOV/HOT lane in each direction, plus 4 ft in each direction for additional shoulder • All impacts occur in the existing median • Median is categorized as annual grassland land cover type • Impacts inside the planning limit of urban growth are excluded because these area were assessed under the Urban Development impact category, with the exception of stream crossings • Each stream crossing will require bridge widening of 24 ft

Table 4-5d. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
U.S. 101 HOV/HOT lane (Cochrane Road to Masten Avenue; VTA ID H6)	• Use GIS to map length of project • Multiply length of project by 32 ft (2 lanes plus 2 shoulders) and convert to acres of impact • Apply acres of impact to annual grassland land cover type • Using aerial photos, identify length and width of stream crossing • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist on the valley floor • Assess impacts to streams consistent with the required width of the new bridge	• VTA provided project location • Assume 12 ft for a new HOV/HOT lane in each direction, plus 4 ft in each direction for additional shoulder • All impacts occur in the existing median • Median is categorized as annual grassland land cover type • Impacts inside the planning limit of urban growth are excluded because these area were assessed under the Urban Development impact category, with the exception of stream crossings • One stream crossing will require a new bridge
U.S. 101 HOV/HOT lane (Masten Avenue to 10th Street; VTA ID H7)	• Using aerial photos, identify width of stream crossing • Assess impacts to streams consistent with the required width of the new bridge	• VTA provided project location • This project is located entirely within the planning limit of urban growth for Gilroy, the development of which is covered in the Urban Development category; no impacts are assessed aside from the stream crossing • One stream crossing will require a new bridge • No riparian impacts are assumed because aerial photos show this reach of stream is channelized and does not support any riparian vegetation
U.S. 101 HOV/HOT lane (10th Street to SR 25; VTA ID H8)	• Use GIS to map length of project • Multiply length of project by 32 (2 lanes plus 2 shoulders) and convert to acres of impact • Apply acres of impact to annual grassland land cover type • Using aerial photos, identify length and width of stream crossing • Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist in Gilroy • Assess impacts to streams consistent with the required width of the new bridge	• VTA provided project location • Assume 12 ft for a new HOV/HOT lane in each direction, plus 4 ft in each direction for additional shoulder • All impacts occur in the existing median • Median is categorized as annual grassland land cover type • Impacts inside the planning limit of urban growth are excluded because these area were assessed under the Urban Development impact category, with the exception of stream crossings • One stream crossing will require a new bridge

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] All VTA projects are listed in Table 2-6.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5e. Rural Capital Improvement Project Construction Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
San José		
Kirby Canyon Landfill Expansion	No impacts assessed	• Construction impacts are assumed to be included within the permanent impacts for Kirby Canyon landfill
Morgan Hill		
Butterfield detention basin	• Identify proposed Butterfield detention basin in GIS • Apply a 10 ft buffer around the project footprint • Overlay the buffer on the land cover layer in GIS • Assess temporary impacts to land cover	• Impacts based on an AutoCAD file provided by City of Morgan Hill (S. Golden pers. comm.); AutoCAD files were imported into GIS • Temporary construction impacts are assumed to occur within a 10 ft buffer around the project footprint • No stream impacts are assumed
SCVWD		
Llagas Recharge basins #1, #2, and #3, and Coyote Greenbelt Recharge basin	• Based on 10-acre or 15-acre square sites, identify the acres of construction and staging area within a 10 ft buffer of the project site • Scale construction buffer impacts according to how much of the project area is located outside of a planning limit of urban growth • Distribute construction buffer impacts proportionally across the land covers identified to be located in the project area (conducted a part of capital improvement project impact assessment)	• Project areas will be approximately square • Buffer of average distance outside of project area that will be impacted during construction is 10 ft • 1.5 miles of new access road are assumed to temporarily disturb 1 ft on either side of the road and will affect the same land-cover types as the permanent road footprint • No stream impacts are assumed as the projects are not located in a stream or in a riparian area
County Roads and Airports		
South County Airport Master Plan	• Multiply permanent land cover impacts for this project by 10%	• Temporary construction impacts to land cover are assumed to be 10% of the total permanent impacts to land cover • No stream impacts are assumed
South County Circulation Study intersection improvement projects	• Based on data provided, identify intersection projects in GIS • Apply 10 ft buffer to project footprint in GIS • Overlay construction buffer on land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying the permanent stream impacts by one-third	• County of Santa Clara provided a spreadsheet of road intersection projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm.) • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • Assume temporary impacts to land cover occur in a 10 ft buffer[4] around project footprints • Assume temporary stream impacts occur within a 10 ft construction buffer (20 ft width); this is equal to one-third of permanent stream impacts

Table 4-5e. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
South County Circulation Study road improvement projects	• Based on data provided, identify intersection projects in GIS • Apply 10 ft buffer to project footprint in GIS • Overlay construction buffer on land cover layer • Assess impacts to land cover • Identify number of stream crossings for each new road alignment by counting number of times the new road alignment crosses a stream • Multiply the number of crossings by 20 ft	• County of Santa Clara provided a spreadsheet of road projects identified in the South County Circulation Study that may be completed during the permit term (D. Cameron pers. comm.) • Impacts were not assessed for projects, or portions of projects, that overlap with a planning limit of urban growth AND that occur outside of in-stream areas as these impacts are already assessed under the Urban Development assumptions • Assume temporary impacts to land cover occur in a 10 ft buffer around project footprints • Assume stream impacts only for new roads (impacts for replacement of existing roads is assessed under In-stream CIP Construction category); Assume temporary stream impacts occur within a 10 ft construction buffer (20 ft width)
County Roads safety projects and turn lanes	• Multiply miles of safety and intersection projects by the appropriate width assumed for temporary construction impacts and convert to acres • Distribute 25 miles of safety projects and 0.5 mile of turning lane project impacts to land-cover types proportional to those land-cover type occurrences in the near and far east hill zones developed for the Rural Development analysis • Distribute 8 miles of safety projects and 1 mile of turning lane project impacts to land-cover types proportional to those land-cover type occurrences in the valley floor zone developed for the Rural Development analysis	• The County provided data for miles and width of safety and intersection projects, as well as general location of projects; 33 miles of safety projects, with 25 miles in the near east and west hills and the remainder on the valley floor; 1.5 miles of turn lanes with 0.5 miles in the near east and west hills and the remainder on the valley floor • Assume temporary construction impacts is 4 ft for safety projects and 6 ft for turning lane projects (or 50% of the permanent impact) • No additional bridge expansions beyond those addressed in the road projects
County Parks		
New trails, fire roads, and development	• Multiply permanent land cover impacts for these actions by 10%	• Temporary construction impacts to land cover, excluding streams, are assumed to be 10% of the total permanent impacts to land cover • Temporary construction stream impacts for County Parks projects are assumed under In-Stream CIP Construction new trails, fire roads, and development
VTA		
U.S. 101 Improvement Project (Monterey Road to SR 129)	• Acres of temporary impact by land cover type provided by VTA were used to assess impacts	• VTA provided impact estimates for this project that were recently developed for the environmental compliance process for this project (A. Calnan pers. comm.); impacts included both permanent and temporary impacts • These impact estimates were used for both land cover and stream impacts

Table 4-5e. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
U.S. 101 widening between Cochrane Rd. and Monterey Hwy	• Identify project road segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
Buena Vista Interchange	No impacts assessed	• The Buena Vista Interchange is located inside of the San José planning limit of urban growth and does not overlap with any in-stream areas or stream channels; no additional impacts (beyond those assumed for areas inside planning limits of urban growth) are assumed for this project
Caltrain Double Tracking	• Identify project track segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
Coyote Valley Parkway Interchange	• Identify project road segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
East Middle Interchange	• Identify project road segment in GIS • Apply a 20 ft construction buffer to the project footprint in GIS • Overlay on the land cover layer • Assess impacts to land cover • Identify temporary stream impacts by multiplying permanent stream impacts for this project by 20%	• Assume a construction buffer of 20 ft (40 ft width) around the project footprint • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing; this equals 20% of the value calculated for permanent impacts associated with the stream project
SR 152/SR 156 Interchange	• Overlay project footprint on the land cover layer in GIS • Calculate the acres of impact for each land-cover type	• VTA provided a GIS footprint of the project that included both permanent and temporary impact zones (A. Calnan pers. comm.) • The project footprint does not overlap with any streams

Table 4-5e. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1,2, 3]
U.S. 101 HOV/HOT lane (western study area boundary to Cochrane Road)	• Convert to acres and apply impacts to the riparian land cover types proportional to how those land cover types exist within the City of San José or the valley floor rural development zone, depending on the location of the crossing	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted, with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing
U.S. 101 HOV/HOT lanes (Cochrane Road to Masten Avenue; VTA ID H6)	• 20 ft of linear stream temporary impact per stream crossing • Multiply 20 ft by the length of each crossing as identified under the permanent impact calculations and convert to acres • Convert to acres and apply impacts to the riparian land cover types	• All construction impacts are assumed to occur on the adjacent freeway or within the median that is being permanently impacted with the exception of in-stream areas • Assume a temporary stream impact buffer of 10 ft (20 ft total width) on either side of the crossing • Assume a temporary riparian impact buffer of 10 ft (20 ft total width) on either side of the crossing

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

[4] Buffers described for temporary impacts identify the area immediately surrounding the footprint of the associated project where temporary impacts are assumed to occur. Temporary impact buffers are in addition to buffers assumed to represent the project footprint as described in Table 4-5d.

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5f. Rural Operations and Maintenance Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
SCVWD		
Pipeline Maintenance Program		• All impacts assessed under the Pipeline Maintenance Program were derived from the Pipeline Maintenance Program EIR (Santa Clara Valley Water District 2006) • The Pipeline Maintenance Program covers SCVWD's activities throughout the County, not only in the Habitat Plan study area; therefore, impacts assessed here are slightly over estimated • The Pipeline Maintenance Program uses the term "aquatic" to describe impacts to acres of stream. This Plan assesses stream, or riverine, impacts linearly. For this analysis, acres of impact assessed for aquatic habitats in the Pipeline Maintenance Program are included in the riparian land cover type impacts. Aquatic impacts were also used to derive liner stream impacts • These analyses did not use GIS to derive total impact numbers • Impacts are calculated on an annual basis
Staging	• Identify acres of impact described in the Pipeline Maintenance Program EIR for upland impacts related to staging • Distribute acres of upland impact proportionally across all upland land covers in the study area	• Upland impacts assume that 5 pipelines are maintained per year; that there are up to 20 staging areas per pipeline in natural areas; and that each staging area is up to 100 ft by 100 ft • Impacts are applied to the proportion of land cover throughout the entire study area, inclusive of land covers excluded from the baseline data; this is based on the fact that SCVWD supply pipelines occur throughout the entire study area • Upland land covers include all land covers except the Riparian Forest and Scrub natural community land covers and the Reservoir land cover
Off-road access	• Identify acres of impact described in the Pipeline Maintenance Program EIR for upland impacts related to off-road access • Distribute acres of upland impact proportionally across all upland land covers in the study area • Identify acres of impact described in the Pipeline Maintenance Program EIR for riparian impacts related to off-road access • Distribute acres of riparian impact proportionally across all riparian land covers in the study area	• Upland impacts assume that 5 pipelines per year are maintained; up to 12 access points per pipeline; access areas are up to 15 ft by 1 mile • Riparian impacts assume that 5 pipelines per year in which they are maintained; up to 3 access points in riparian areas; access area would be up to 15 by 50 ft • Impacts are applied to the proportion of land cover throughout the entire study area, inclusive of land covers excluded from the baseline data; this is based on the fact that SCVWD supply pipelines occur throughout the entire study area • Upland land covers include all land covers except the Riparian Forest and Scrub natural community land covers and the Reservoir land cover • Riparian land covers include all land covers in the Riparian Forest and Scrub natural community

Table 4-5f. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Draining	• Identify acres of impact to riparian and aquatic habitats described in the Pipeline Maintenance Program EIR • Distribute acres of impact proportionally across all riparian land covers in the study area • Identify linear ft of stream impacts described in the Pipeline Maintenance Program EIR • Distribute linear ft of stream impacts to the streams, or riverine, land cover type	• Riparian impacts assume placement of erosion control structures would impact up to 15 by 20 ft; up to 10 structures placed per year • Aquatic impacts assume that no more than 10 temporary flow check dams would be installed per year and that the maximum impact area per dam would be 5 ft by 25 ft • Stream impacts assume that the longest in linear stream feet that a temporary flow dam could be is 25 ft; assume 25 ft for each of the 10 installations per year • Impacts are applied to the proportion of land cover throughout the entire study area, inclusive of land covers excluded from the baseline data; this is based on the fact that SCVWD supply pipelines occur throughout the entire study area • Riparian land covers include all land covers in the Riparian Forest and Scrub natural community
Excavation	• Identify acres of impact described in the Pipeline Maintenance Program EIR for upland impacts related to excavation • Distribute acres of upland impact proportionally across all upland land covers in the study area • Identify acres of impact to riparian and aquatic habitats described in the Pipeline Maintenance Program EIR • Distribute acres of impact proportionally across all riparian land covers in the study area • Identify acres of wetland impacts described in the Pipeline Maintenance Program EIR • Distribute acres of wetland impacts to the seasonal wetland land cover type • Identify linear ft of stream impacts described in the Pipeline Maintenance Program EIR • Distribute linear ft of stream impacts to the streams, or riverine, land cover type	• Upland impacts assume up to 4 pipelines; excavation area per pipeline of 25 ft by 1 mile per pipeline; AND up to 10 point excavations of 25 ft by 25 ft each per pipeline • Riparian impacts assume a maximum of 3 excavations in riparian corridors per year, each excavation with a maximum footprint of 25 ft by 50 ft; also assumes a max of 1 acre per year of disturbance due to road repair • Aquatic impacts assume up to 3 blow-off points across all systems; excavation area of 25 ft by 50 ft • Wetland impacts assume up to 1 acre of wetland impact per year • Stream impacts assume 50 ft of stream impact per blow-off excavation; 3 excavations per year • Upland land covers include all land covers except the Riparian Forest and Scrub natural community land covers and the Reservoir land cover • Riparian land covers include all land covers in the Riparian Forest and Scrub natural community
Excavation—bank stabilization	• Identify acres of impact to aquatic habitats described in the Pipeline Maintenance Program EIR • Distribute acres of impact proportionally across all riparian land covers in the study area • Identify linear ft of stream impacts described in the Pipeline Maintenance Program EIR • Distribute linear ft of stream impacts to the streams, or riverine, land cover type	• Aquatic impacts assume 0.5 stabilizations per year; assumed to occur on each side of the channel; each side is 25 ft by 10 ft • Stream impacts assumes 0.5 bank stabilizations per year; each stabilization is 25 ft long

Table 4-5f. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
County Roads and Airports		
Road maintenance	• In GIS, identify County mountain roads • Apply a 10 ft buffer to County roads • Overlay on the land cover layer to assess acres of impact by land cover type	• Assume a 10 ft maintenance buffer (20 ft width) (D. Cameron pers. comm.) • Assume all roads outside of a planning limit of urban growth will be maintained (impacts of road maintenance inside the planning limit of urban growth is incorporated into the urban development impacts) • Most (65%) of County roads occur in the valley floor area where shoulders are highly disturbed and often lacking vegetation; most impacts associated with road maintenance will occur on the 35% of County roads that are mountain roads that have vegetation on either side; only maintenance of mountain roads is assumed to have impacts to natural land cover (D. Cameron pers. comm.) • Stream impacts for road maintenance are identified under In-Stream O&M for bridges
South County Airport	• In GIS, identify areas in the South County Airport that are not currently developed or proposed for development • Overlay area on land cover map • Exclude any in-stream areas • Subtract acres identified in Rural CIP projects from the total land assessed at the airport (first bullet) • Distribute remaining acres across land cover types in proportion to land cover type occurrence in the airport	• Lands identified in the South County Airport Master Plan as proposed avigation easements and proposed fee simple acquisition were not included in the analysis because these areas are not assumed to be affected by covered activities • Assume that all areas not identified for future permanent impacts will need to be maintained (mowed) • Assume that the County will avoid all impacts to in-stream areas
County Parks		
Trail maintenance	• In GIS, overlay the trail layer provided by the County on the land cover layer • Apply a 4 ft buffer • Assess acres of temporary impacts to land cover	• County Parks provided GIS for existing trails (J. Falkowski pers. comm. a) • Trails maintenance based on 4 ft buffer (8 ft total width) to both unpaved and paved County trails • Stream impacts are assessed under In-Stream O&M activities
Road maintenance	• In GIS, overlay the road layer provided by the County on the land cover layer • Apply a 8 ft buffer • Assess acres of temporary impacts to land cover	• County Parks provided GIS for existing paved and non-paved roads (J. Falkowski pers. comm. a) • Service Roads and Paved Roads maintenance based on an 8 ft buffer (16 ft width) • Stream impacts are assessed under In-Stream O&M activities
Parking lot maintenance	• In GIS, overlay the parking lot layer provided by the County on the land cover layer • Apply a 8 ft buffer around the perimeter of the lots • Assess acres of temporary impacts to land cover	• County Parks provided GIS for existing paved and unpaved parking lots (J. Falkowski pers. comm. b) • Paved and unpaved parking lots based on an 8 ft buffer around lot • No stream impacts are assumed

Table 4-5f. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Other		
Utility line operations and maintenance	• Convert 50 miles to ft • Multiply resulting number of ft by 15 ft width • Convert to acres • Distribute acres of impact	• 50 miles of lines maintained/replaced in the study area • Assume that 5 ft will be disturbed for excavating the utility; and 10 ft will be disturbed for access; total impact of 15 ft width • Assume that utility maintenance will proportionally impact all land cover types in the study area

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5g. Reserve System Permanent Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Implementing Entity and other Landowners that Implement Covered Activities within the Reserve System		
Installation of signage (boundary, landbank, etc.)	• Identify acres in the Reserve System in thousands • Multiply by 25% • Distribute acres of impact to the grassland land cover	• Assume that 0.25 acres per 1,000 acres of Reserve System will be affected by placement of signage • Assume that the signage will be sited on grassland land cover
Installation of new fences	• Approximately 278,000*2 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume that 278,000 ft of new fences will be installed over the permit term; equal to 53 miles • Assume 2 ft wide permanent impact • Assume that fences will proportionally impact all land cover types in the Reserve System
Field facilities	• Identify number of facilities in Reserve System based on assumption • Multiply by 1 acre • Apply acres of impact to the grassland land cover	• Assume 1 facility per 10,000 acres of Reserve System • Assume 1 acre per facility will be affected • Assume that the facility will be sited on grassland land cover
Wells	• Identify number of wells in Reserve System based on assumption • Multiply by 0.1 • Distribute acres of impact	• Assume 1 well per 1,000 acres of Reserve System • Assume 0.1 acre per well will be affected • Assume that the wells will be sited on grassland land cover
Dirt Roads	• Approximately 40*5280*12 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume 40 miles of dirt road will be constructed over the permit term • Assume 12 ft wide • Assume that dirt roads will proportionally impact all land cover types in the Reserve System
Paved Roads	• Approximately 12.5*5280*24 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume 0.25 miles of paved road will be constructed per year; 12.5 miles total • Assume 24 ft wide area will be affected • Assume that paved roads will proportionally impact all land cover types in the Reserve System
New vehicle bridges	• Approximately 5*8*39 sq ft • Convert to acres • Distribute acres of impact proportionally across all riparian land cover types in the Reserve System	• "Bridges" includes all types of vehicle crossings including culverts • Assume 0.5 bridges every 5 years; 5 total • Assume 8 ft wide, and 39 ft long (based on average bridge width and length for County Parks bridges) • Assume that vehicle bridges will proportionally impact all riparian land cover types in the Reserve System • No permanent stream impacts are assumed as any new bridges built will be balanced with removal of an equal or greater amount of bridges

Table 4-5g. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Vehicle bridge replacement	• Approximately 10*2*39 sq ft • Convert to acres • Distribute acres of impact proportionally across all riparian and California annual grassland land cover types in the Reserve System	• Assume 1 replacement every 5 years; 10 total • Assume replacement bridges are 2 ft wider than existing bridges and 39 ft long • Assume that bridges will proportionally impact all riparian and California annual grassland land cover types in the Reserve System • No permanent stream impacts are assumed as any new impacts will be balanced with removal of an equal or greater amount of streams
Trail bridges	• Approximately 25*8*39 sq ft • Convert to acres • Distribute acres of impact proportionally across all riparian land cover types in the Reserve System	• Assume 2.5 bridges every 5 years; 25 total • Assume 8 ft wide and 39 ft long (based on average bridge width and length for County Parks bridges) • Assume that vehicle bridges will proportionally impact all riparian land cover types in the Reserve System • No permanent stream impacts are assumed as any new bridges built will be balanced with removal of an equal or greater amount of bridges
Trails	• Approximately 126*5280*5 sq ft • Convert to acres • Distribute acres of impact proportionally across all land cover types in the Reserve System	• Assume 126 miles total trials will be built in the Reserve System • Assume a 5 ft width will be affected • Assume that trails will proportionally impact all land cover types in the Reserve System
Trailhead facilities	• Identify number of trailhead facilities in Reserve System based on assumption • Multiply by 5 acres • Apply acres of impact to the grassland land cover	• Assume 1 trailhead facility per 5,000 acres of Reserve System • Assume 5 acres per facility will be affected • Assume that trailhead facilities will be sited on grassland land cover

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description or Key Assumptions column).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-5h. Reserve System Construction Temporary Impact Estimation Methods and Key Assumptions

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Implementing Entity and other Landowners that Implement Covered Activities within the Reserve System		
Installation of signage (boundary, landbank, etc.)	No impacts assessed	• Assume that each project site is very small; no construction impacts assumed
Installation of new fences	• Temporary impacts are equal to permanent impacts	• An area equal to permanent impact is assumed for temporary construction impacts • Assume that 278,000 ft of new fences will be installed over the permit term; equal to 53 miles • Assume 2 ft wide permanent impact • Assume that fences will proportionally impact all land cover types in the Reserve System
Field facilities	• Approximately 10*220*4 sq ft per facility • Multiply by number of facilities • Convert to acres • Distribute acres of impact	• Assume 1 facility per 10,000 acres of Reserve System • Assume a 10 ft buffer around a 1 acre footprint will be affected; and acre is approximately 220 ft by 220 ft • Assume that the facility will be sited on grassland land cover
Wells	• Approximately 10*22*4 sq ft per well • Multiply by number of wells • Convert to acres • Distribute acres of impact	• Assume 1 well per 1,000 acres of Reserve System • Assume a 10 ft buffer around a 0.1 acre per well will be affected; 1/10 acre is approximately 22 ft by 22 ft • Assume that the wells will be sited on grassland land cover
Dirt roads	• Temporary impacts are equal to 5/6ths of the permanent impacts	• Assume 40 miles of ranch road will be constructed over the permit term • Assume 5 ft construction buffer (10 ft width) • Assume that dirt roads will proportionally impact all land cover types in the Reserve System
Paved roads	• Temporary impacts are equal to 5/12ths of the permanent impacts	• Assume 0.25 miles of paved road will be constructed per year; 12.5 miles total • Assume 5 ft wide buffer (10 ft width) will be affected • Assume that paved roads will proportionally impact all land cover types in the Reserve System
New vehicle bridges	• Temporary land cover impacts are equal to permanent impacts • Multiply the width of each crossing by the number of crossings to get the total linear ft of temporary stream impact	• "Bridges" includes all types of vehicle crossings including culverts • An area equal to permanent impact is assumed for temporary construction impacts • Assume 0.5 bridges every 5 years; 5 total; • Assume 8 ft wide, and 39 ft long (based on average bridge width and length for County Parks bridges) • Temporary stream impacts are assumed to equal the width of the crossing

Table 4-5h. Continued

Covered Activity	Method of Impact Estimation	Key Assumptions[1, 2, 3]
Vehicle bridge replacement	• Temporary land cover impacts are equal to permanent impacts • Multiply the width of each crossing by the number of crossings to get the total linear ft of temporary stream impact	• "Bridges" includes all types of vehicle crossings including culverts • An area equal to permanent impact is assumed for temporary construction impacts • Assume 1 bridge replacements every 5 years; 10 total • Assume replacement bridges are 2 ft wider than existing culverts and 39 ft long • Temporary stream impacts are assumed to equal the width of the crossing
Trail bridges	• Temporary land cover impacts are equal to permanent impacts • Multiply the width of each crossing by the number of crossings to get the total linear ft of temporary stream impact	• An area equal to permanent impact is assumed for temporary construction impacts • Assume 2.5 bridges every 5 years; 25 total; • Assume 8 ft wide and 39 ft long (based on average bridge width and length for County Parks bridges) • Temporary stream impacts are assumed to equal the width of the crossing
Trails	• Multiply permanent impacts by 10%	• Assume construction impacts are equal to 10% of the project footprint • Assume that trails will proportionally impact all land cover types in the Reserve System
Trailhead facilities	• Approximately 10*475*4 sq ft per facility • Multiply by number of facilities • Convert to acres • Distribute acres of impact	• Assume 1 trailhead facility per 5,000 acres of Reserve System • Assume a 10 ft buffer around a 5 acre footprint will be affected; 5 square acres is approximately 475 ft by 475 ft • Assume that trailhead facilities will be sited on grassland land cover

[1] All impact analyses are based on the baseline land cover as described in Chapter 4. Additional land cover parameters are identified in the Key Assumptions column.

[2] Unless otherwise noted, impacts to Urban-suburban, developed agriculture, landfill, and reservoir were excluded from final impact numbers because these land covers are assumed to either not provide any habitat value or will not be impacted in such a manner as to require conservation or mitigation (for the reservoir land cover).

[3] When using the method of impact distribution proportional to land cover, it is assumed that a project is likely to impact land covers in the same proportion at which land covers exist in a given project area. This approach may skew impacts higher for sensitive land covers that can be avoided through application of conditions on covered activities, design, and project siting, and skew impacts lower for impacts to less sensitive land covers that may be utilized in favor of impacting more sensitive land covers. Nonetheless, this impact analysis was conducted assuming any land cover can be impacted so long as it is not protected or excluded for other reasons (identified in the baseline data description).

Note: This table of impact analysis methods and key assumptions is not intended to be all inclusive of all covered activities. Rather, this table shows how impacts were calculated for covered activities that have impacts significant enough to be estimated. Minor activities described in Chapter 2 are covered under this Plan even though they may not appear in this table.

Table 4-6. Covered Plant Occurrences and Estimated Permanent Impacts from Covered Activities

Species Name	Number of Extant Occurrences in California[1]	Number of Known Occurrences in Study Area[1,2]	Study Area Occurrences in Type 1 Open Space[3]	Study Area Occurrences in Type 1, 2, or 3 Open Space[3]	Permanent Impact Limit if No Additional Occurrences Found[4]	Impact Proportion on Known Study Area Occurrences (%)	Total Permanent Impact Limit if Additional Occurrences are Found and Protected in Study Area[5]
Tiburon Indian paintbrush	9	2	0	2	0[6]	N/A	0
Coyote ceanothus	3	3	0	2	0[7]	N/A	0
Mt. Hamilton thistle	48	40	2	15	6	15%	8
Santa Clara Valley dudleya	209	207	2	72	11	5%	14
Fragrant fritillary	59	8	0	4	1	13%	3
Loma Prieta hoita	26	14	1	10	0	0%	2
Smooth lessingia	39	39	3	18	6	15%	9
Metcalf Canyon jewelflower	11	10	1	3	2	20%	2
Most beautiful jewelflower	86	39	3	22	6	15%	8
Total	**490**	**362**	**12**	**148**	**32**	**9%**	**46**

Notes:

[1] Includes all CNDDB occurrences except those classified as "extirpated." See Chapter 3 and Chapter 5 for a complete list of data sources.

[2] For the purposes of this Plan and the analyses, occurrences are equivalent to populations for all species except for Mt. Hamilton thistle, Santa Clara Valley dudleya, and smooth lessingia. Populations may be redefined during implementation based on field monitoring and other data.

[3] Occurrences that are only partially in open space are not included in totals.

[4] This column provides the limit of impacts by number of occurrences allowable under the Habitat Plan. Impact is defined as a permanent loss of an entire occurrence or a partial loss that results in a reduction of viability (as further described in Chapter 6, Condition 20). See text for methods to determine whether partial impacts to an occurence will be counted against the impact limit. The impact limit assumes that no new occurrences of the species are discovered during the permit term and that occurrences impacted are in worse condition than those protected within reserves (See Section 5.3.1. for a discussion on incorporating covered plant species into the Reserve System). Impact limits were determined based on estimated impacts of covered activities. In some cases, impacts were capped to ensure regulatory standards are met.

[5] Impact limits in this column are the total allowable impacts if additional natural occurrences (i.e., not created populations) are discovered and protected in reserves. Protected occurrences must be of higher conservation value than impacted occurrences. New occurrences must be found and protected before impacts occur. See Chapter 5 and Table 5-16 for protection ratios that must occur in order for impact limits to be increased.

[6] Loss of a population of this species is not allowed or needed due to covered activities. Impact is allowed to a portion of one population due to management actions within the Reserve System (e.g., prescribed burning) or inadvertent trampling due to livestock grazing.

[7] Impacts are allowed to no more than 3,650 individuals or 5% of the individuals in the population adjacent to Anderson Dam, whichever is smaller.

Table 4-7. Assumptions of Land Cover Imperviousness

Land Cover Type	Impervious Assumption[1]
California Annual Grassland	1
Non-serpentine native grassland (not mapped)	n/a
Serpentine Bunchgrass Grassland	1
Serpentine Rock Outcrop / Barrens	100
Serpentine Seep	0
Rock Outcrop	100
Northern Mixed Chaparral / Chamise Chaparral	1
Mixed Serpentine Chaparral	1
Northern Coastal Scrub / Diablan Sage Scrub	1
Coyote Brush Scrub	1
Valley Oak Woodland	1
Mixed Oak Woodland and Forest	1
Blue Oak Woodland	1
Coast Live Oak Forest and Woodland	1
Foothill Pine - Oak Woodland	1
Mixed Evergreen Forest	1
Willow Riparian Forest and Scrub	1
Central California Sycamore Alluvial Woodland	1
Mixed Riparian Forest and Woodland	1
Redwood Forest	1
Ponderosa Pine Woodland	1
Knobcone Pine Forest	1
Coastal and Valley Freshwater Marsh	0
Seasonal Wetland	0
Pond	0
Reservoir	0
Orchard	2
Vineyard	10
Grain, row-crop, hay and pasture, disked/ short-term fallowed	2
Agriculture developed / Covered Ag	70
Urban - Suburban	35
Rural - Residential	10
Golf Courses / Urban Parks	3
Landfill	20
Ornamental Woodland	1
Barren	1
Streams (miles)	0
Total	

[1] In a range of 0 (least impermeable) to 100 (most impermeable). Based on Center for Watershed Protection imperviousness classifications for land cover.

Table 4-8. Results of Impervious Surface Analysis

Watershed and sub-watershed	Acres in Study Area	Est. Current Impervious Surfaces (acres)	Est. Current Impervious Surfaces (%)	Est. Impervious Surfaces at Buildout (acres)	Est. Impervious Surfaces at Buildout (%)	Est. Change (acres)	Est. Change (%)
Study Area	460,205.4	38,381.8	8.3%	44,105.4	9.6%	5,724	14.9%
San Francisco Bay Watershed							
Coyote sub-watershed							
Above Anderson Dam	86,188	1,125	1.3%	1,383	1.6%	258	22.9%
Below Anderson Dam	91,496	12,531	13.7%	14,016	15.3%	1,485	11.8%
Guadalupe sub-watershed							
Above Guadalupe, Almaden, and Calero Dams	6,363	92	1.5%	139	2.2%	47	50.9%
Below Guadalupe, Almaden, and Calero Dams	52,438	13,585	25.9%	14,041	26.8%	456	3.4%
Monterey Bay Watershed							
Llagas sub-watershed							
Above Chesbro Dam	12,234	164	1.3%	227	1.9%	62	38.0%
Below Chesbro Dam	53,131	6,017	11.3%	8,499	16.0%	2,481	41.2%
Pacheco sub-watershed							
Above Pacheco Dam	26,048	274	1.1%	277	1.1%	3	1.1%
Below Pacheco Dam	53,591	674	1.3%	687	1.3%	13	2.0%
Uvas sub-watershed							
Above Uvas Dam	19,441	251	1.3%	276	1.4%	24	9.7%
Below Uvas Dam	36,379	1,224	3.4%	2,027	5.6%	803	65.6%

Note: This analysis assumes that all interim projects (those projects entitled for development in advance of Plan implementation) that are located inside the planning limits of urban growth will be developed to the equivalent of the urban-suburban land cover type and that all interim projects located outside the planning limit of urban growth will be developed to the equivalent of the rural-residential land cover type.

Table 4-9. Estimated Impacts to Critical Habitat

Species and Habitat Type	Total Critical Habitat in Study Area (acres)	Permanent Impact to Critical Habitat from Covered Activities (acres)	Proportion (%)	Temporary Impact to Critical Habitat from Covered Activities (acres)	Proportion (%)
Bay Checkerspot Butterfly					
Estimated Modeled Habitat overlapping Critical Habitat	7,616	<300[1, 2]	4%	49	<1%
Estimated Critical Habitat outside Modeled Habitat[3]	8,985	437[4]	49%	76	<1%
Maximum Allowable Impact to Total Critical Habitat	16,601	<550[2]	3%	86[5]	<1%
California Tiger Salamander					
Estimated Modeled Breeding Habitat overlapping Critical Habitat	92	1	1%	0	<1%
Estimated Modeled Non-Breeding Habitat overlapping Critical Habitat	27,235	263	1%	119	<1%
Estimated Critical Habitat outside Modeled Habitat[3]	769	8	1%	6	<1%
Maximum Allowable Impact to Total Critical Habitat	28,096	272	1%	125	<1%
California Red-Legged Frog					
Estimated Modeled Primary Habitat overlapping Critical Habitat	2,964	21	<1%	11	<1%
Estimated Modeled Secondary Habitat overlapping Critical Habitat	146,452	1,002	<1%	265	<1%
Estimated Critical Habitat outside Modeled Habitat[3]	1,546	12	<1%	5	<1%
Maximum Allowable Impact to Total Critical Habitat	150,962	1,035	<1%	277[5]	<1%

Notes:

[1] Allowable permanent impact to Bay checkerspot butterfly critical habitat is capped below the estimated impact to account for the cap on impacts to Bay checkerspot butterfly modeled habitat in this Plan. This acreage is a cap, not an estimate.

[2] Impacts to modeled primary Bay checkerspot butterfly habitat are capped at 300 acres and impacts to serpentine bunchgrass grassland are capped at 550 acres.

[3] "Critical Habitat outside Modeled Habitat" is critical habitat area that does not overlap with habitat modeled for the Plan. Critical habitat is identified separately from modeled habitat because critical habitat is a relatively broad estimation based on "physical or biological features that are essential to the conservation of the species... if those features may require special management considerations or protection" (73 FR 50417). The modeling conducted for this Plan was done at a finer resolution than the critical habitat designation.

[4] Impacts to Bay checkerspot butterfly critical habitat could occur outside of modeled habitat on land cover types without impact caps. As such, allowable impacts to critical habitat outside of modeled habitat may be higher than allowed on modeled habitat. The cumulative cap on critical habitat is 550 acres.

[5] Allowable temporary impact to Bay checkerspot butterfly critical habitat and California red-legged frog critical habitat is capped below the estimated impact to hold impact levels constant with the Public Draft. Temporay impacts increased slightly due to the re-allocaiton of impacts to other locations in the study area due to the removal of State Parks lands from the impact analysis. This acreage is a cap, not an estimate.

Data sources: U.S. Fish and Wildlife Service 2005 (California tiger salamander), 2008 (Bay checkerspot butterfly), 2010 (California red-legged frog).

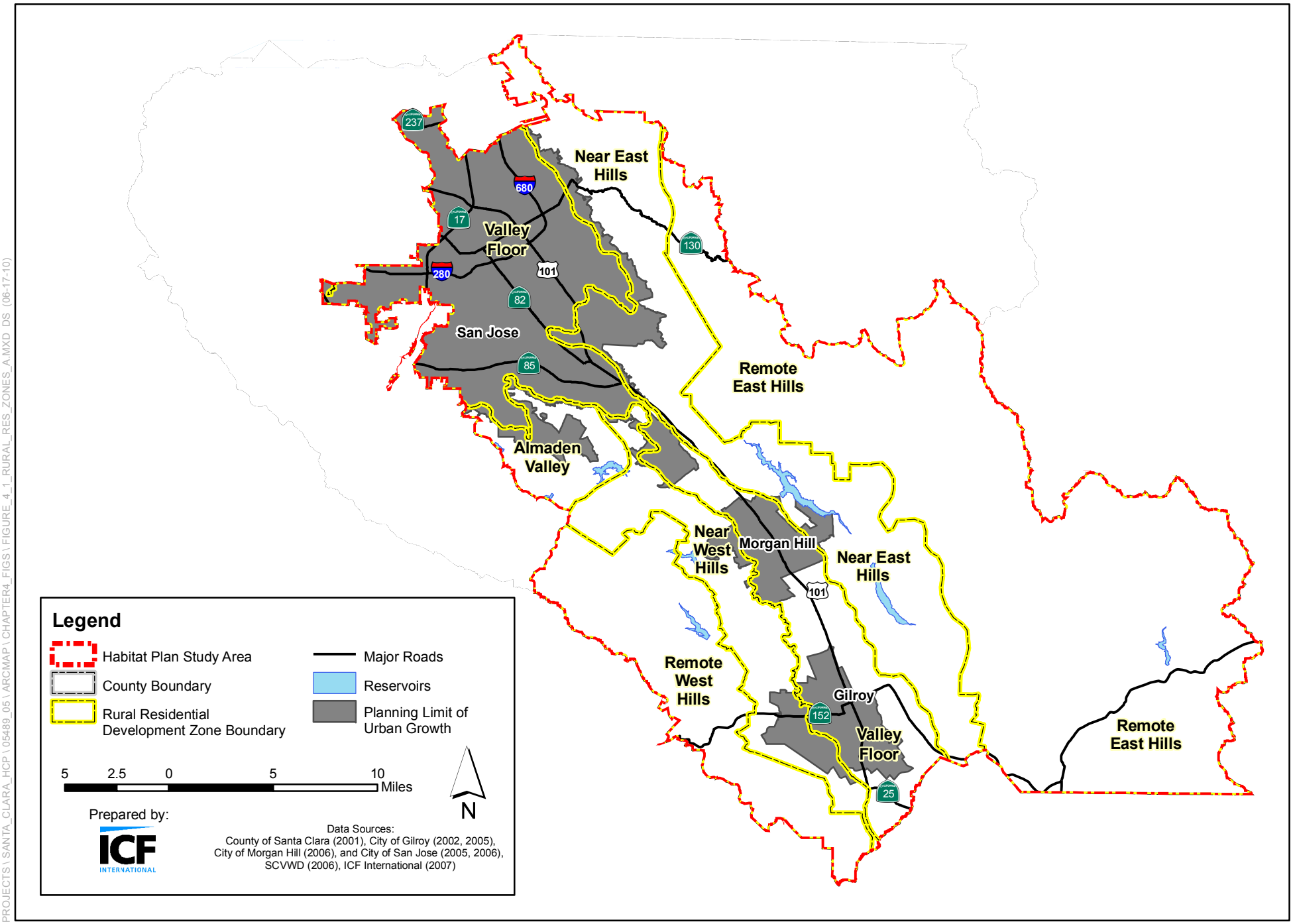

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Figure 4-1
Rural Development Zones Used in the Impact Analysis

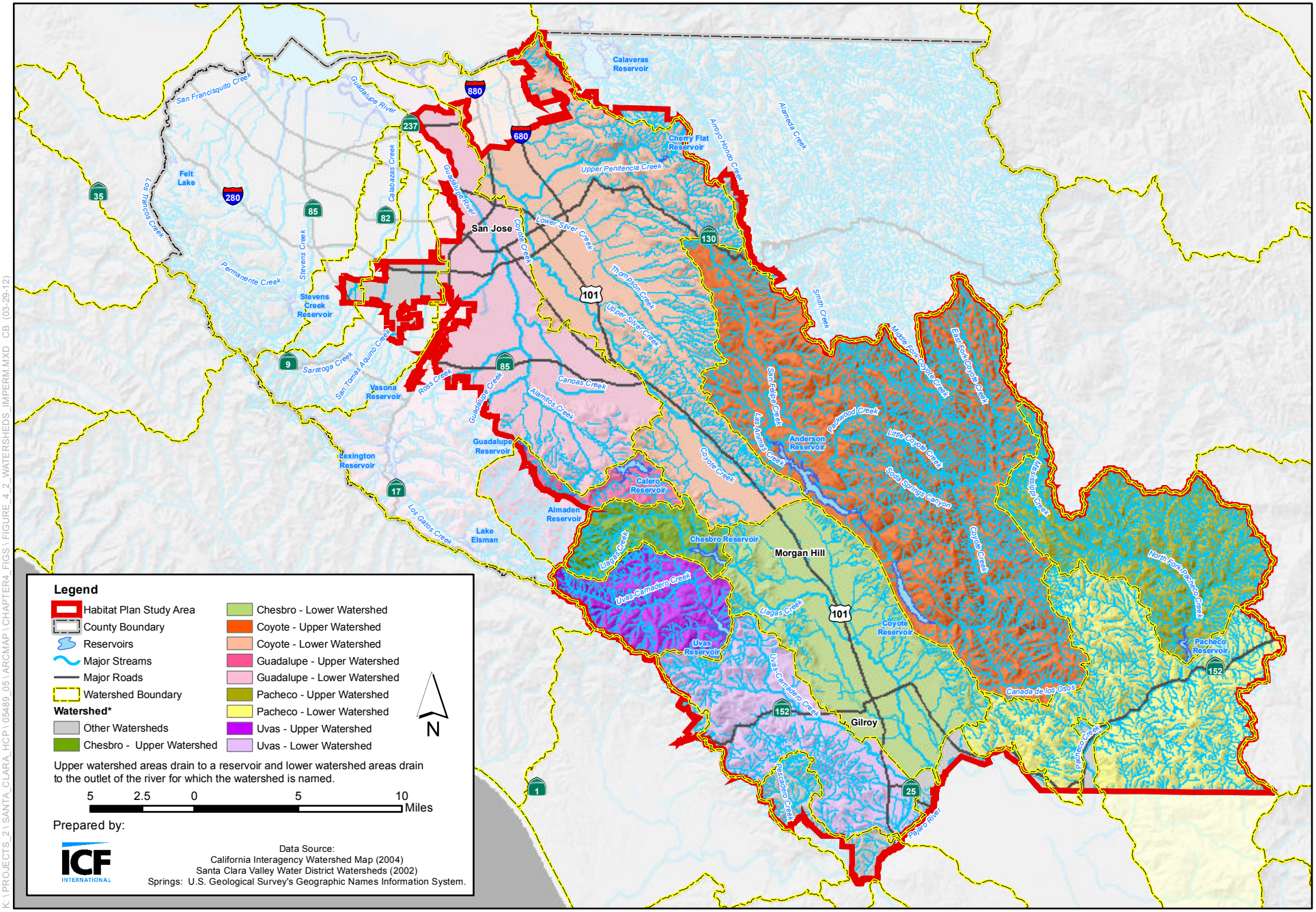

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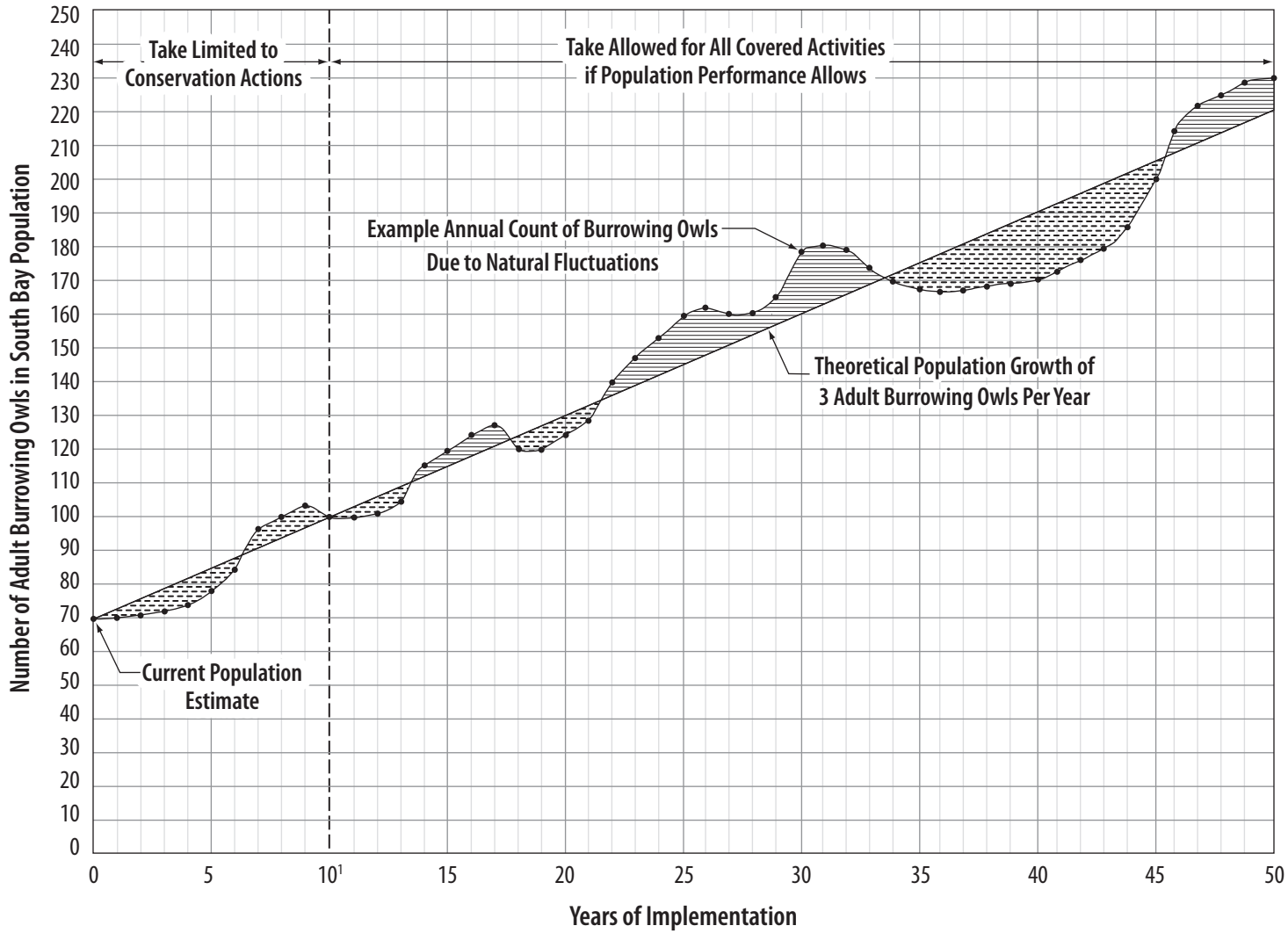
Figure 4-2
Habitat Plan Watersheds Assessed for Impervious Surface Analysis



Take only for conservation actions (capture, harm, harassment).

Take allowed for death, injury, capture, harm, and harassment (including passive relocation/eviction during the non-breeding season) at a level that would not drop the number of owls below the assumed growth rate.

1. No take will occur before year 10 except when related to conservation actions.

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Figure 4-3
Illustration of Burrowing Owl Take Allowance

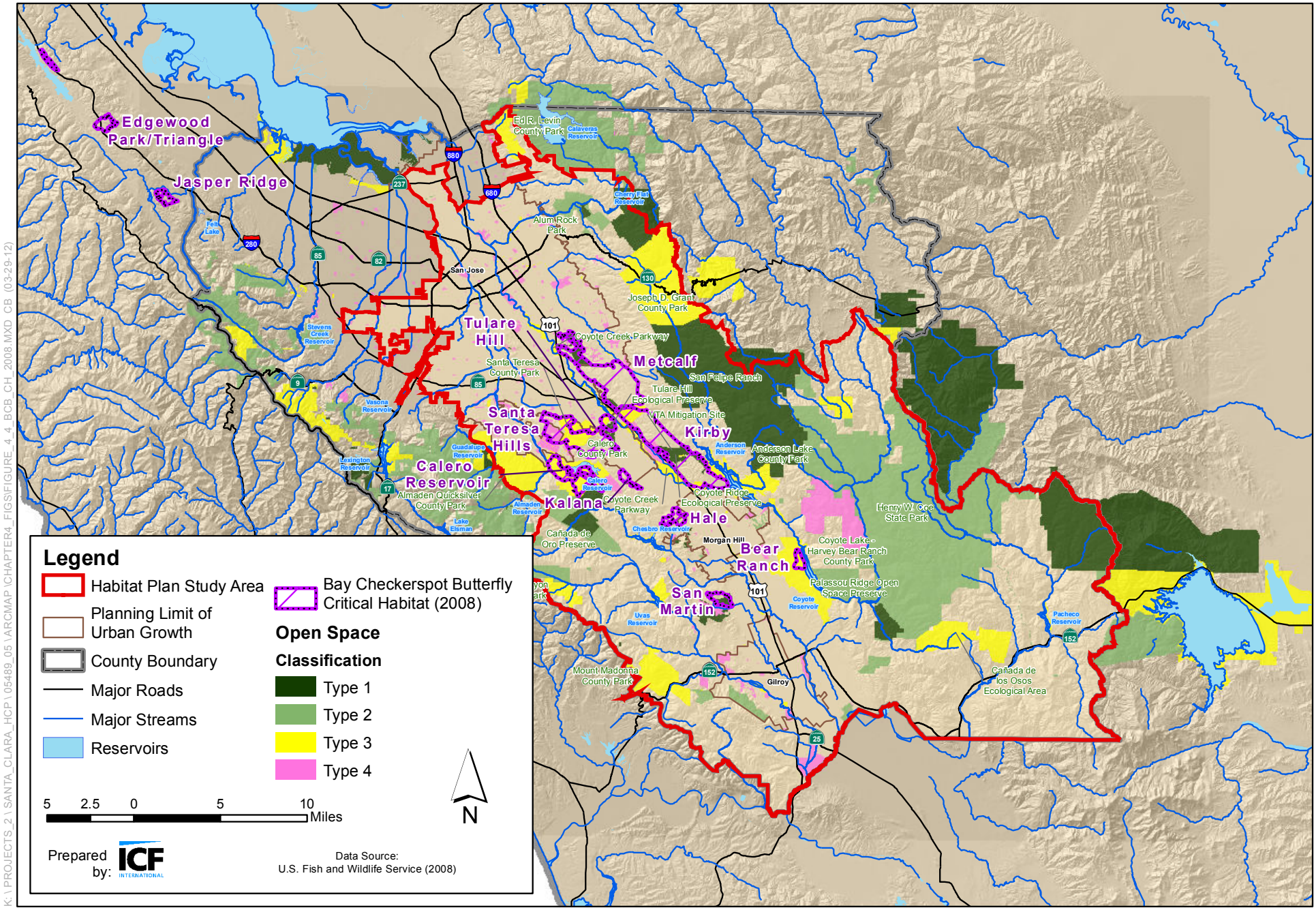

Figure 4-4
Bay Checkerspot Butterfly Critical Habitat within the Study Area

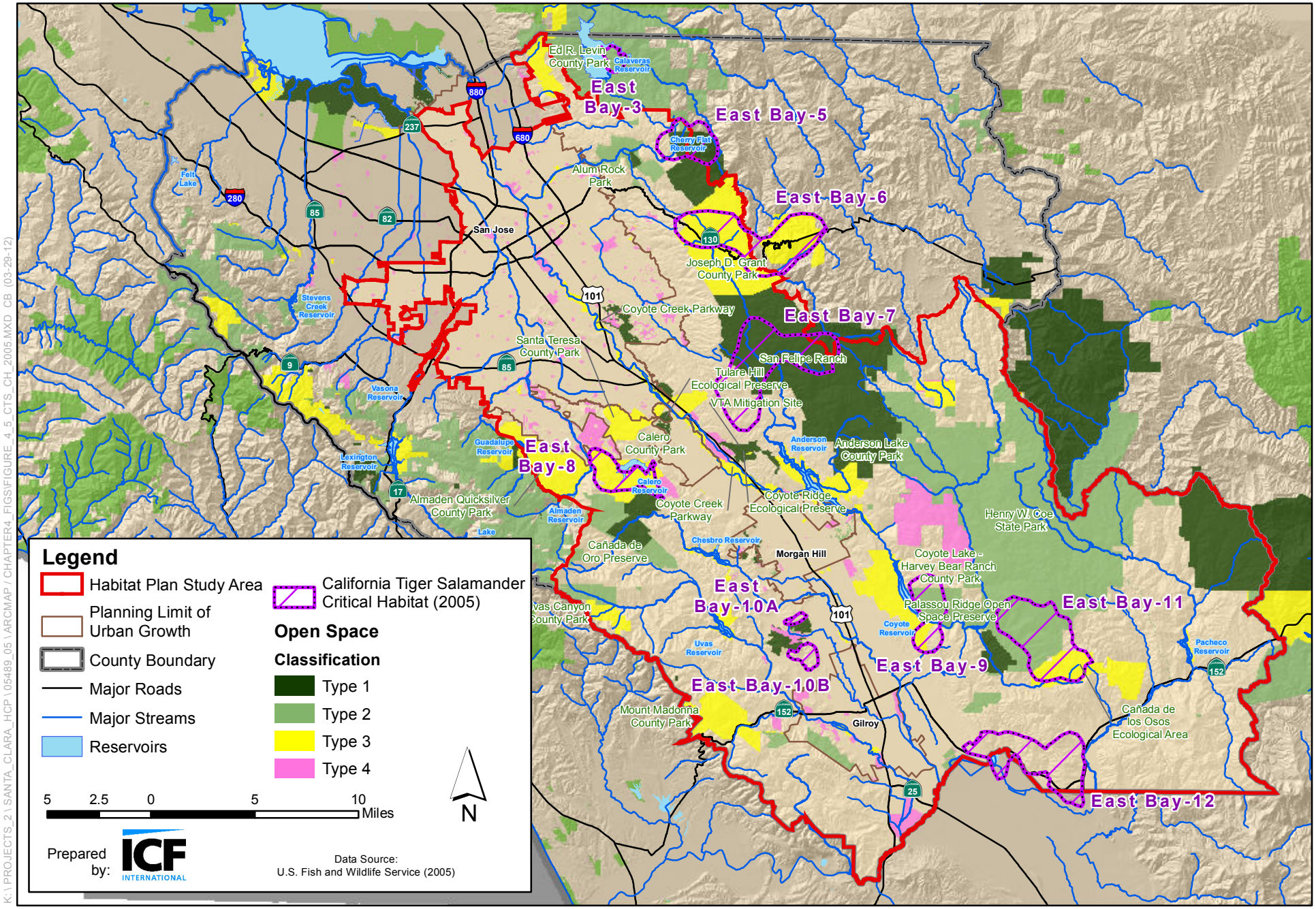

Figure 4-5
California Tiger Salamander Critical Habitat within the Study Area

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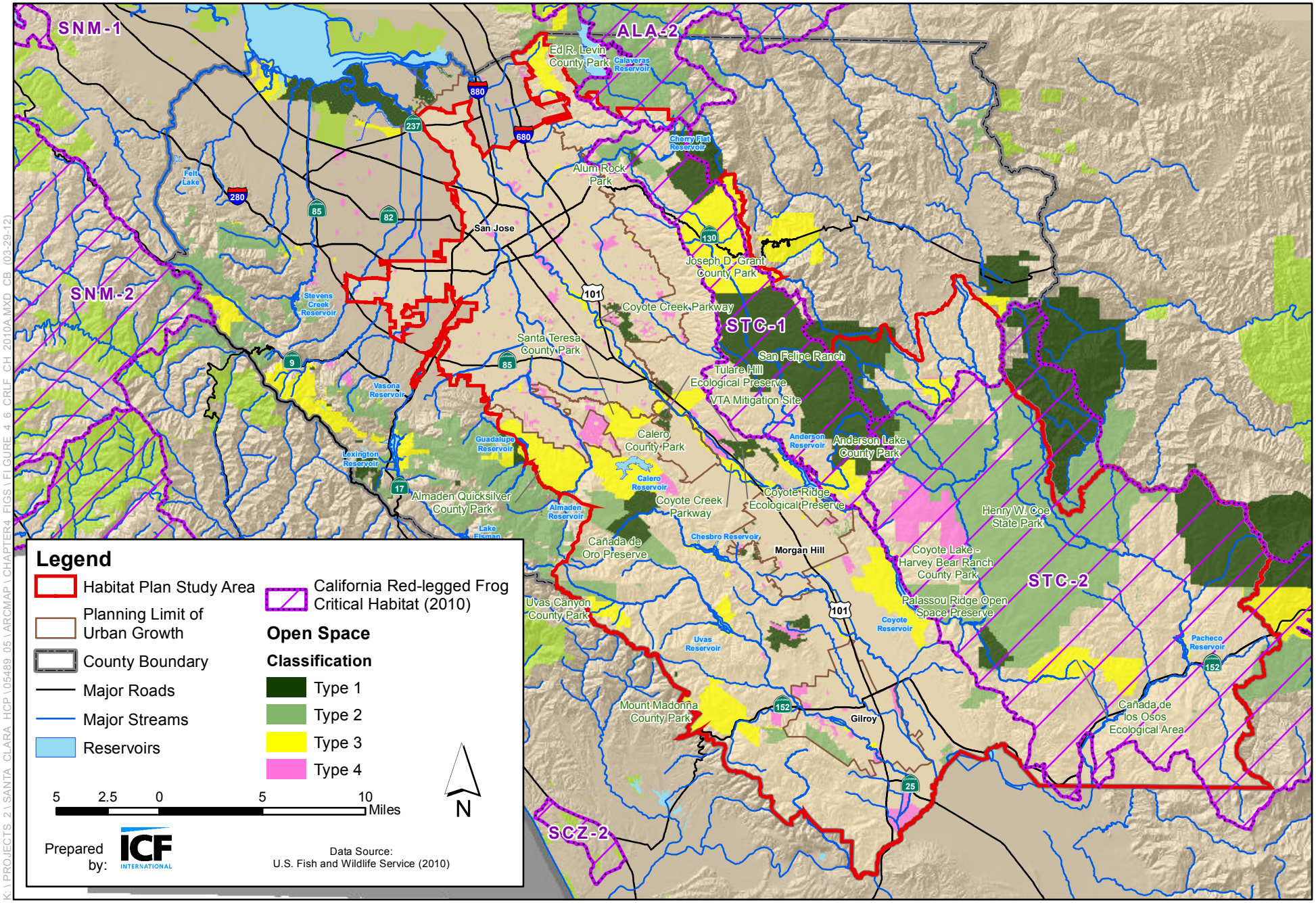

Figure 4-6
California Red-legged Frog Critical Habitat within the Study Area

Chapter 5
Conservation Strategy

5.1 Summary

The conservation strategy was designed to meet the regulatory requirements of ESA and the NCCP Act and to streamline compliance with CEQA, NEPA, and other applicable environmental regulations (see discussion in Chapter 1). The conservation strategy provides mitigation for impacts on covered species on the basis of species and habitat needs. The conservation strategy mitigates all of the impacts described in Chapter 4, including direct, indirect, temporary, and permanent impacts. To meet the NCCP Act permit standards, the conservation strategy also contributes to species recovery to help to delist the listed species and prevent the listing of non-listed species through the protection, restoration, and enhancement of natural communities and species habitat. The conservation strategy also achieves the objectives listed below, pursuant to the NCCP Act (Section 2820).

- Conserves, restores, and provides for the management of representative natural and semi-natural[1] landscapes.
- Establishes reserves that provide conservation of covered species within the study area (i.e., contributes to species recovery) and linkages to adjacent habitat outside the study area.
- Protects and maintains habitat areas that are large enough to support sustainable populations of covered species.
- Incorporates in the reserves a range of environmental gradients and high habitat diversity to provide for shifting species distributions in response to changing circumstances.
- Sustains the effective movement and interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the Reserve System.

Because the conservation strategy achieves the standards of the NCCP Act to contribute to species recovery, the strategy therefore exceeds the mitigation standards of the ESA. The conservation strategy is based on the best scientific data available at the time of its preparation and takes into account the limitations of the baseline data available for the study area (see Chapter 3 and **Appendix D**).

[1] A semi-natural landscape is defined as one that is disturbed by human activity but still provides important habitat for a variety of native species.

The conservation strategy is born out of the biological goals and objectives developed for the Plan and described below. To achieve these goals and objectives, a series of conservation actions have been developed that often meet multiple objectives or goals. The chapter is focused on conservation actions that will accomplish the following.

- Create a Reserve System by Year 45 of the permit term that will preserve a minimum of 33,205 acres and an estimated 33,629 if all impacts occur of newly acquired land for the benefit of covered species, natural communities, biological diversity, and ecosystem function.
- In addition to newly acquired land, incorporate 13,291 acres of existing open space into the Reserve System to enhance their long-term management.[2] The total size of the Reserve System will be at least 46,496 acres and up to an estimated 46,920 acres.
- Protect 100 miles of streams.
- Preserve major local and regional connections between key habitat areas and between existing protected areas.
- Establish a framework for long-term management of the Reserve System and streams throughout the permit area to enhance populations of covered species and maintain biological diversity.
- Restore minimum of 70 acres and up to 428 acres of riparian woodland and wetlands to offset losses of these land cover types and contribute to species recovery. All restoration construction will be completed by Year 40.
- Create a minimum of 20 acres and up to 72 acres of ponds to offset losses and contribute to species recovery. All creation construction will be completed by Year 40.

All of these actions will be accomplished by the Implementing Entity with partnerships with the Permittees, Santa Clara County Open Space Authority, landowners, possibly non-profit land conservation organizations, mitigation banks, and the state and federal government (see Chapter 9 for funding and land acquisition partnerships). This chapter does not describe avoidance and minimization actions; these and all other conditions on covered activities are addressed in Chapter 6.

5.2 Framework

The conservation strategy was designed using a multi-scale approach in accordance with principles of conservation biology. At the largest scale, biological goals and objectives were developed to encompass ecological

[2] This is the maximum acreage of existing open space that would be credited toward the Reserve System size under the Plan. Additional acres of existing open space could be incorporated into the Reserve System; however, they would not receive credit toward the Reserve System size. Alternatively, the Implementing Entity may acquire new lands for the Reserve System in place of adding this acreage from existing open space, as long as the total Reserve System size requirements are met.

processes, environmental gradients, biological diversity, and regional wildlife linkages. Conservation actions were developed to implement these goals and objectives. These conservation actions occur at the *landscape level*, generally at the scale of miles or tens of miles. At the middle level, conservation actions were developed to address natural communities primarily through the enhancement, restoration, and management of vegetation types (i.e., land cover types). This medium scale is called the *natural community level*. The final level addresses the specific needs of covered species for protection and enhancement of individuals, populations, and groups of populations. *Species-level* conservation actions were developed to supplement and focus actions developed at the broader levels and to ensure that all the needs of particular species are addressed.

This framework for the conservation strategy follows the multi-scale structure and approach advocated by Hunter (2005) that combines "coarse filter conservation," "meso-filter conservation," and "fine-filter conservation" (see **Figure 5-1**).

The conservation actions are described in Section 5.3 *Conservation Actions*; they are divided into land acquisition actions and actions at the natural community and species levels. All conservation actions are designed to have enough detail and specificity to allow implementation. Because of the large scale of this Plan and its long timeframe, actions are also designed to be flexible. For example, natural community–level actions provide broad management guidelines and principles such that future land managers can implement specific techniques on the ground that are best suited to site conditions. Preserving this flexibility is an important part of the conservation strategy.

Implementation of many actions will require the preparation of site-specific implementation documents. These plans will be prepared during Plan implementation after land is acquired and specific restoration and management needs are determined. Reserve unit management plans will guide activities within specific reserve units. Reserve units are defined as groups of contiguous or neighboring parcels that have similar natural communities, covered species, and infrastructure and therefore similar management issues. Reserve unit management plans for individual reserve units will be completed within 5 years of the first acquisition (fee title or easement) of the land for that reserve unit and submitted to the Wildlife Agencies for review and approval.

All conservation actions will be implemented using an adaptive management approach that is closely tied to long-term monitoring (see Chapter 7 *Monitoring and Adaptive Management Program*).

5.2.1 Biological Goals and Objectives

The Implementing Entity will achieve landscape, natural community, and species-level goals and objectives. Goals are broad, guiding principles based on the conservation needs of the resources. Biological objectives are expressed as

conservation targets or desired conditions. Objectives are measurable and quantitative when possible; they clearly state a desired result and will collectively achieve the biological goals **Figure 5-2**). Biological goals for covered species are required by USFWS's *5-Point Policy* to be included in HCPs (65 FR 35242, June 1, 2000)[3].

All the biological goals and objectives on which this Plan is based are presented in **Tables 5-1a through 5-1d**. The conservation actions in this chapter contain detailed information on all aspects of reserve acquisition and management. They provide a strategy for how the goals and objectives will be achieved. It is expected that many of the details of the conservation actions will be modified during Plan implementation through the monitoring and adaptive management program, while goals and objectives will remain relatively static.

The 21 biological goals and 94 objectives in **Table 5-1** are organized by level: landscape level (**Table 5-1a**), natural community level (**Table 5-1b**) and species level (**Tables 5-1c and 5-1d**). At the species level, wildlife and plants are separated in order to make the tables more accessible. The 135 conservation actions that were designed to achieve each objective are shown in **Tables 5-2a and 5-2b**. **Table 5-2a** lists sequentially all land acquisition actions; **Table 5-2b** lists all management actions, broadly defined. One conservation action may contribute to multiple objectives or goals.

In some cases, conservation actions include the phrase "biologically appropriate" or "biologically feasible". These phrases were added to conservation actions such as plant occurrence creation (see Section 5.3.1 subheading *Incorporating Covered Plant Species* for the definition of a plant occurrence) that are highly dependent on site conditions and other ecological contexts. These conservation actions will be implemented unless the Implementing Entity, with the concurrence of the Wildlife Agencies, determines based on further evaluation that the action is not biologically appropriate or biologically feasible but the biological goals of the Plan would still be fulfilled by implementing a more effective conservation action.

If the agreed upon conservation actions cannot be implemented and there are no alternatives that provide similar benefit and will achieve the biological goals, as agreed to by the Wildlife Agencies and the Implementing Entity, then coverage of the target species may need to be modified, reduced, or eliminated according to the process described in Chapter 10, Section 10.3 *Modifications to the Plan.*

[3] Due to the scope of this Plan, it was not possible to develop biological goals and objectives that strictly adhered to the Service's and NMFS' 5-Point Policy requirements as described in 65 FR 35251. That is, despite best efforts, the scope of the Plan precluded the Applicants from developing biological objectives that in all instances included species or habitat indicators, locations, actions, quantify/state, and timeframe. This information is presented in this chapter, which will be supplemented by implementation plans that will be reviewed and approved by the Wildlife Agencies (i.e., reserve unit management plans).

Process of Developing Biological Goals and Objectives

The biological goals and objectives were initially developed through a series of six workshops composed of key technical staff from ICF Jones & Stokes, experts from the Wildlife Agencies, biologists and species experts from SCVWD, Local Partner staff, and outside species experts.

The purpose of each workshop was to collaboratively develop working draft biological goals and objectives. Each workshop began with an overview of the relevant natural communities and species, including key threats, ecological needs, and issues for the conservation strategy (e.g., potential conflicts with other species) by technical experts. Participants then worked through a set of preliminary draft goals and objectives developed by ICF and provided to participants prior to the workshop. Follow-up web-based conference calls or meetings were held at least once for every workshop to refine the goals and objectives to a point where all meeting participants were satisfied.

Every effort was made to create biological objectives that were quantitative as well as measurable. Workshop participants acknowledged that quantitative biological objectives may be somewhat subjective, but at least these quantitative objectives are explicit, clear, and transparent, and they serve as a starting point for conservation actions in the study area, including adaptive management and compliance monitoring (Margules and Pressey 2000).

Goals and objectives were frequently refined and updated as new analysis or new information was developed. In some cases, several possible quantitative targets emerged for an objective. These were carried forward as alternative approaches to meeting the same goal, and formed the basis for the alternative conservation strategies that preceded the selected conservation strategy. Biological goals and objectives were developed using the primary sources listed below.

- Ecological data from species accounts (**Appendix D**) and natural community descriptions (Chapter 3).
- Existing conservation targets or management recommendations for covered species in state or federal recovery plans or status reviews (Hays et al. 1999; U.S. Fish and Wildlife Service 1998a, 1998b, 1998c, 2002, 2006a).
- Other sources with conservation targets or conservation recommendations that address the covered species or the study area (Harrison et al. 1988; Weiss 1999; California Partners in Flight 2002; Klute et al. 2003; Ehrlich and Hanski 2004; Haight et al. 2004; Riparian Habitat Joint Venture 2004; Hamilton 2004; Trenham and Shaffer 2005; The Nature Conservancy 2006a).
- Critical habitat maps and data in published critical habitat rules for covered species (U.S. Fish and Wildlife Service, 2005, 2006b, 2008, 2010).
- Habitat distribution models developed for most of the covered species (see Chapter 3 and **Appendix D**).
- Results of the conservation gap analysis (see below).

- Input from resource specialists outside workshops including staff from the Wildlife Agencies.

When developing quantitative objectives, workshop participants recognized that conservation encompasses both mitigation and the need to contribute to species recovery. The level of this contribution to recovery was based, in part, on the proportion of the species' range within the study area. Quantitative biological objectives were established on the basis of relevant species-specific data. When data were not available, general guidelines or conservation "rules of thumb" were used to help establish quantitative biological objectives on the basis of the proportion of the species' current range within the study area (Margules and Pressey 2000) (**Table 5-3**).

Conservation of ecological processes, environmental gradients, regional biological diversity, and regional wildlife linkages were addressed primarily in the landscape-level biological goals and objectives. These goals and objectives were inherently difficult to develop because of the large scale of the processes and the general lack of data regarding their operation in the study area. The land cover mapping described in Chapter 3 was assumed to be an adequate surrogate for regional biological diversity. If adequate and representative stands of all of these land cover types are preserved and enhanced, it is assumed that native biological diversity in general will be preserved and enhanced.

Biological Goals

Most of the biological goals and objectives are designed at least to conserve current populations of covered and other native species in the study area. In some cases, populations of covered species are expected to increase as a result of land preservation, improved water management, habitat enhancement, habitat restoration, and habitat creation.

Goals are listed below by level (see **Tables 5-1a through 5-1d**): landscape level, natural community level, and species level. The biological goals apply only to the Reserve System unless stated otherwise. Though most conservation actions will occur within the Reserve System, similar conservation approaches on private lands outside of the Reserve System will be encouraged during implementation. In cases where species conservation will occur outside the Reserve System (e.g., stream and riparian restoration), biological goals apply to the study area as a whole.

Landscape-Level Goals (Table 5-1a)

- **Goal 1a.** Protect and maintain natural and semi-natural landscapes.
- **Goal 1b.** Protect and maintain ecological (natural) processes.
- **Goal 2.** Maintain or improve opportunities for movement and genetic exchange of native organisms within and between natural communities inside and connecting to areas outside the study area.

- **Goal 3.** Enhance or restore representative natural and semi-natural landscapes to maintain or increase native biological diversity.

Natural Community-Level Goals (Table 5-1b)

- **Goal 4.** Maintain and enhance functional grassland communities that benefit covered species and promote native biodiversity.
- **Goal 5.** Maintain and enhance functional chaparral and northern coastal scrub communities to benefit covered species and promote native biodiversity.
- **Goal 6.** Maintain and enhance functional oak woodland communities to benefit covered species and promote native biodiversity.
- **Goal 7.** Maintain and enhance functional conifer woodland communities to benefit covered species and promote native biodiversity.
- **Goal 8.** Improve the quality of streams and the hydrologic and geomorphic processes that support them to maintain a functional aquatic and riparian community to benefit covered species and promote native biodiversity.
- **Goal 9.** Maintain a functional riparian forest and scrub community at a variety of successional stages and improve these communities to benefit covered species and promote native biodiversity.
- **Goal 10.** Maintain, enhance, and create or restore functional pond, freshwater perennial wetland, and seasonal wetland habitats that benefit covered species and promote native biodiversity.

Species-Level Goals (Tables 5-1c and 5-1d)

- **Goal 11.** Improve the viability of existing Bay checkerspot butterfly populations, increase the number of populations, and expand the geographic distribution to ensure the long-term persistence of the species in the study area.
- **Goal 12.** Not used.
- **Goal 13.** Increase the size and sustainability of the breeding population and increase the distribution of breeding and wintering burrowing owls in the study area.
- **Goal 14.** Increase the ability of San Joaquin kit fox to move into and within the study area and provide habitat to increase the likelihood of breeding.
- **Goal 15.** Provide for the expansion of a breeding population of least Bell's vireos into the study area and increase reproductive success of least Bell's vireo.
- **Goal 16.** Conserve existing populations of the foothill yellow-legged frog population where possible and increase the overall population of foothill yellow-legged frog in biologically appropriate locations in the study area.

- **Goal 17.** Conserve existing populations of California red-legged frog, California tiger salamander, and western pond turtle where possible, and increase the number of individuals and expand the overall distribution of populations of these species in biologically appropriate locations within the study area to maintain viable populations and contribute to the regional recovery of these species.
- **Goal 18.** Increase the population size of tricolored blackbird to enhance the viability of the species in the study area.
- **Goal 19.** Not used.
- **Goal 20.** Maintain viability, protect, and increase the size and number of populations of covered serpentine plant species, including Coyote ceanothus, Santa Clara Valley dudleya, Metcalf Canyon jewelflower, most beautiful jewelflower, smooth lessingia, fragrant fritillary, Mt. Hamilton thistle, Loma Prieta hoita, and Tiburon paintbrush, within the study area.
- **Goal 21.** Protect and increase the size and number of Loma Prieta hoita within the study area.

5.2.2 Avoidance and Minimization Measures

As required by ESA, the Plan includes measures to avoid or minimize the impact of the taking of covered species. The primary focus of these measures is to avoid or minimize take of *individuals* of covered species (i.e., death or injury to species) and of high-quality habitat, such as streams and riparian areas that may be affected by covered activities. Others forms of take (e.g., harm or harassment of covered species) will still occur.

For example, an intent of certain measures is to encourage individuals of covered wildlife species to avoid or escape project construction zones. Occurrences of covered plants will also be avoided when adequate conservation of these species is not available within the Habitat Plan Reserve System. Activities within streams will be carefully designed and implemented to minimize their effects on this important resource and habitat for covered species. Impacts will also be minimized by requiring development projects adjacent to the Reserve System to be designed in ways that reduce their impacts on covered species and natural communities (as described in Chapter 6).

Areas designated for conservation and described in this chapter include substantial amounts of high-quality habitat for covered species and of natural communities, as well as areas important for maintaining regional biological diversity. Covered activities that result in permanent impacts are anticipated to occur primarily in areas with low-quality habitat. This *regional avoidance and minimization approach* to conservation of land cover and species habitat reduces the need to avoid or minimize impacts on habitats at the small or project scale. Avoidance and minimization measures at the landscape level are accordingly built into the Plan. Most habitat preservation and enhancement will be concentrated away from covered activities in the high-quality habitat of the

proposed Reserve System. Avoidance and minimization measures that apply to covered activities are described in detail in Chapter 6.

5.2.3 Reserve System

Land preservation is an important component of this conservation strategy. The term *land preservation* is intended broadly to specify the acquisition of terrestrial and aquatic land cover types. Land will be acquired from willing sellers in fee title or through establishment of conservation easements to create the Habitat Plan Reserve System. Land acquisition mechanics and processes are described in more detail in the Section 5.3.1 *Land Acquisition and Restoration Actions*. In order to become part of the Reserve System, lands must:

1. be consistent with the conservation strategy described in this chapter;
2. be approved by the Implementing Entity and Wildlife Agencies; and
3. be protected with a conservation easement[4] (see Chapter 8 for additional information).

Because management of riparian and stream land cover types takes place both inside and outside the Reserve System, specific acquisition and management priorities related to aquatic habitat are described in Section 5.2.4 *Aquatic Habitat Protection and Enhancement.*

Reserve Design Process

The process for delineating and prioritizing land for acquisition corresponds to the scalar approach of the conservation actions (landscape-level, natural community-level, and species-level). First, consideration was given to large, core reserves that could accommodate large blocks of key land cover types (e.g., serpentine grassland) and covered species with large geographical ranges and specific habitat needs (e.g., areas with high densities of ponds to accommodate covered amphibians and reptiles). This level of design also considered expanding existing open space to create larger core reserves. Linkages were also considered so that habitat connectivity goals and objectives could be met (see discussion below). Next, the conservation of rare land cover types (e.g., serpentine seeps and rock outcrops) was considered. Finally, the conservation of species with small ranges was considered (e.g., covered plants). For resources not protected by the core reserves or the habitat linkages, smaller, “satellite” reserves will be proposed when necessary to protect isolated but important resources such as occurrences of covered plants and rare land cover types. In all cases, the Reserve System was designed to adhere to the reserve design principles discussed below with the least amount of acreage in order to efficiently achieve the conservation targets.

[4] The exception to the conservation easement requirement is existing lands listed in **Table 5-5** and owned by the Open Space Authority. See Chapter 9 for details.

Land use and economic factors in the Reserve System design were also considered in a step-wise manner. The first draft maps of the proposed Reserve System considered biological goals and objectives and maximized conservation benefit with the minimum amount of land. The second iteration of the maps took into account relevant land use and broad financial considerations. For example, areas with larger parcel sizes were selected over areas with very small parcels, all else being equal, due to the higher per-acre cost of small parcels. Areas without extensive rural development were favored over areas with such development, all else being equal, due to the habitat incursions and edge effects around rural development. In cases where the conservation priorities overlapped with covered activities, alternative conservation sites were sought. If an alternative conservation site was not available, then the covered activity was scaled back or dropped to allow for the conservation to occur. For example, urban development has been limited along stream corridors to ensure adequate conservation of stream and riparian systems (see Chapter 6, Condition 11 *Stream and Riparian Setbacks*). This step-wise approach enabled the proposed Reserve System to be developed independently from the covered activities but in a manner that quickly identified and resolved conflicts between them.

The independent Science Advisors and stakeholders provided early feedback on draft reserve design and assembly principles and the preliminary reserve design process. Reserve design alternatives were reviewed by all of the major land management and conservation organizations in the study area: County Parks, Open Space Authority, State Parks, The Nature Conservancy, and the Peninsula Open Space Trust, as well as staff from the Wildlife Agencies. Their valuable input was incorporated into the conservation strategy presented here.

Reserve Design and Assembly Principles

The reserve design process utilized scientifically accepted tenets of conservation biology in concert with the best available biological data (Noss et al. 1995). Information on species (e.g., population biology, genetics, distribution, life history characteristics) and information on habitats (e.g., distribution, composition, ecological functions) informed the reserve design process. Relevant ecological data for covered species are summarized in the species accounts in **Appendix D**.

To be successful, a reserve system must be designed in consideration of multiple ecologically relevant spatial levels. Most small- and medium-level considerations are driven by the needs of covered species and natural communities. For example, at a small level, a reserve system must contain the microhabitats necessary for local populations of the species to survive. At a medium level, habitat patches must be large enough to support populations or important portions of populations of species and the seasonal movement of species (e.g., aquatic habitat for winter breeding of amphibians and upland habitat for non-breeding periods). At a larger level, natural communities must be well represented, and reserves must be linked to allow movement of species for genetic exchange and for recolonization following local extirpation. Biological goals and objectives pertaining to the acquisition and management of the Reserve

System were developed at these three levels as discussed above (Section 5.2.1 *Biological Goals and Objectives*).

In addition to the biological goals and objectives, the principles of conservation biology summarized below (Soule and Wilcox 1980; Soule 1986; Primack 1993; Noss et al. 1997; Margules and Pressey 2000; Groom et al. 2006) were used as design criteria for the Reserve System. The reserve design and assembly principles must also be used to assemble the Reserve System during Plan implementation.

- **Maximize Size Efficiently.** The Reserve System will be as large as possible within funding and management limits. It must be large enough to mitigate impacts of covered activities and contribute to the recovery of covered species in the study area. A large reserve system is important to ensure viable populations or portions of populations of covered species, to maximize protection of species sensitive to disturbances from adjacent land use, and to maximize the protection of biodiversity. Large reserves tend to support more species for longer periods of time than small reserves. Large reserves are also generally easier to manage on a per-acre basis because, for example, a large reserve reduces conflicts that may arise when managing for covered species with very different habitat requirements. Large reserves also better allow for large-scale management treatments such as prescribed burning and livestock grazing and the maintenance of natural disturbance regimes such as flooding. The only way to maximize size within funding and other constraints is to protect areas efficiently.
- **Preserve Irreplaceable and Threatened Resources.** Irreplaceability is a measure of the degree to which conservation goals can be met by preservation of multiple sites. A site with high irreplaceability has unique species or natural communities that cannot be preserved or restored elsewhere. An example of an irreplaceable resource in the study area is serpentine grassland, which cannot be replaced elsewhere once lost. Threatened resources are those most under threat from natural or anthropogenic factors. The Reserve System will first protect biological diversity and natural communities that have a high level of irreplaceability and a high degree of threat.
- **Preserve the Highest-Quality Communities.** The Reserve System will preserve the highest-quality natural communities and habitat for covered species in the study area. *Highest quality* is defined using various parameters and differs according to community type, but highest-quality habitats are frequently characterized by a high abundance and diversity of native species, intact natural processes, and few roads or other evidence of human disturbances. Degraded communities may need to be preserved as well to capture unique habitats or populations of covered species, to link preserve areas together, or to provide opportunities for land cover restoration required by this Plan.
- **Preserve Connectivity.** The Reserve System will link existing protected areas and proposed reserves inside and outside the study area to maximize habitat connectivity. This will maintain and enhance the ability of organisms to move between reserves; facilitate exchange of genetic material, species

migration, dispersal, and colonization; and increase the integrity of the network of reserves (e.g., reducing the extent of reserve edge that is in contact with adjacent land uses). Linking reserves may require acquisition of disturbed habitats that can be restored to facilitate better habitat and wildlife movement value. A single large reserve is generally better than several small, linked reserves of equal area in the context of maintaining viable populations of species. In some cases, however, small or isolated reserves are necessary to protect certain features or populations with high biological importance (e.g., covered plant species populations, unique or especially diverse land cover types such as serpentine grassland or scrub). Preserving connectivity will also tend to minimize habitat fragmentation.

- **Minimize Edge.** The Reserve System will share a minimum amount of edge (i.e., will have the greatest possible area-to-perimeter ratio) with non-preserve land, especially urban development, to minimize the indirect effects of adjacent land uses on the preserve resources and to minimize management costs. For example, preserves will tend toward round or square configurations rather than long and narrow ones. In some cases, however, preserves with low area-to-perimeter ratios may be appropriate to protect linear features with high biological value, such as streams, riparian woodland, valley bottoms, or ridgelines essential to wildlife movement.
- **Buffer Urban Impacts.** When adjacent to existing urban areas or planned urban areas (i.e., areas zoned for urban development), the Reserve System will include buffer lands within its boundaries. The purpose of this buffer land is to reduce indirect effects on covered species and natural communities from urban development and to provide a zone for fuel load management to reduce the risk of wildland fire spreading to adjacent development[5]. The size of the buffer will depend on site-specific conditions such as topography, the intensity of adjacent urban development, the natural community being separated from the development, the condition of the buffer lands, and whether covered species are or will be present near these lands. (See the section on *Buffer Zones within the Reserve System* below and Chapter 6, Section 6.4.6, subheading *Condition 10 Fuel Buffer*.)
- **Fully Represent Environmental Gradients.** The Reserve System will include a range of contiguous environmental gradients (e.g., topography, elevation, soil types, geologic substrates, slopes, and aspects) to allow for shifting species distributions in response to catastrophic events (e.g., fire, prolonged drought) or anthropogenic change (e.g., global warming).
- **Consider Watersheds.** The Reserve System will include a full range of catchment types, including watersheds, subwatersheds, and headwater streams that are not already in protected status; this approach can help to maintain ecosystem function and aquatic habitat diversity.
- **Consider Full Ecological Diversity within Communities.** The Reserve System will reflect the full ecological diversity within natural communities (e.g., species composition, dominant species, physical and climatic factors) in order to maintain sufficient habitat diversity and species and population interactions. This principle is also called *representativeness* and

[5] Consistent with California Public Resources Code 4291.

comprehensiveness. Some of the diversity within each of the Habitat Plan land cover types is described in Chapter 3.

- **Consider Management Needs.** Reserves will be manageable. That is, desired management treatments such as livestock grazing, prescribed burning, or invasive species control must be feasible on the reserve units and within the Reserve System. In general, larger reserves are easier to manage on a per-acre basis, but other factors such as adjacent land uses, topography, and parcel configuration must also be considered. Management needs may be driven by factors on or off site (e.g., adjacent land uses, watershed processes such as upstream erosion or ongoing contamination).

Requirements of Covered Species

The Reserve System is intended to preserve and in many cases enhance populations of covered species. The ecological information used to determine the needs of covered species is summarized in the species accounts (**Appendix D**) and in this chapter.

All Covered Species

The principles listed below, which apply to all covered species, were used to design the Reserve System and will be used to assemble the Reserve System during implementation.

- **Protect Multiple Populations of Covered Species.** In order to maintain viable populations of covered species, multiple populations of covered species will need to be protected and linked through existing or new protected lands to reduce the risk of local extirpation and ensure the genetic connectivity of populations. This is especially important for species that may function as metapopulations[6] or for species that naturally occur at low density or small population sizes.
- **Protect Higher-Quality Habitat for Covered Species.** Habitat Plan reserves were designed to protect the highest-quality habitat for covered species and allow most impacts to occur in lower-quality habitat.
- **Protect Suitable but Unoccupied Habitat for Covered Species.** Protecting suitable but unoccupied habitat for covered species creates opportunities to enhance habitat through improved management, attracting species to new areas and expanding their ranges and population sizes. Protecting unoccupied habitat also allows for future shifts in populations in response to natural and anthropogenic environmental change.

Consistent with the reserve design approach described above, the needs of covered species were considered at the landscape and habitat levels, and then

[6] A *metapopulation* is a group of partially isolated populations belonging to the same species that are connected by pathways of immigration and emigration. Exchange of individuals occurs between such populations, enabling recolonization of sites from which the species has recently become extirpated (locally extinct).

independently at the species level to ensure that each species' biological goals and objectives would be met. The conservation strategy in this Plan applies a "multi-species umbrella" approach (Lambeck 1997), where the species selected as covered species are the ones in the study area most under threat (i.e., those already listed or most likely to become listed during the permit term).

Bay Checkerspot Butterfly

Early in the development of this Plan, it was recognized that one covered species, Bay checkerspot butterfly, would greatly influence the design of the Reserve System, particularly for the serpentine grassland land cover type. Because the study area supports all of the known populations and individuals of this subspecies throughout its range, a relatively high conservation target was set to protect it so that this Plan could contribute substantially to its recovery (**Table 5-1c**). Many of the serpentine plant occurrences also coincide with habitat for Bay checkerspot butterfly. In this sense, Bay checkerspot butterfly serves as an umbrella species[7] for many serpentine plants. For these reasons, the reserve design process began by determining the preservation needs of Bay checkerspot butterfly.

The reserve design for this species was a major focus of discussion at the biological goals and objective workshop held for serpentine species. The reserve design for Bay checkerspot butterfly had the benefit of extensive previous research and recommendations for specific reserve design strategies (e.g., Thomas Reid Associates et al. 1985; Harrison et al. 1988; Murphy 1988; Weiss et al. 1988; Murphy et al. 1990; Hanski et al. 2004). In addition, the USFWS Recovery Plan and revised critical habitat designation recommend specific land acquisition actions that could result in delisting of the subspecies (U.S. Fish and Wildlife Service 1998c, 2008). Many of these recommended actions were incorporated into the conservation strategy.

Existing Open Space in the Reserve System

An estimated 117,686 acres, or 26% of the study area, are protected as Type 1, 2, 3, or 4 open space. These areas are already owned by public agencies or private conservation organizations or are subject to private conservation easements (**Figure 2-3**, **Table 2-2**, and **Table 5-4**). Type 1 open space is protected in perpetuity for the specific purpose of managing and protecting ecological integrity. Type 2 lands are also managed for the preservation of ecological integrity, but are not protected in perpetuity. Although ecological protection is not the primary management goal, Type 3 open space lands still provide some level of ecological value and function. Type 4 open space lands are not managed for ecological integrity and they offer little or no long-term or measurable ecological value. (See Chapter 2, Section 2.2.5 *Protection and Resource*

[7] *Umbrella species* are species whose occupancy areas are large enough and whose habitat requirements are broad enough that, once protection is established, it will bring other species under that same protection (e.g., Lambeck 1997; Fleishman et al. 2000; Rubinoff 2001).

Management Status of Open Space Lands for more discussion and examples of open space types.)

The Reserve System was designed to take advantage of the substantial amount of open space land already conserved within the study area. Existing Type 2 or 3 open space in the study area that contributes to the biological goals and objectives of the Plan are proposed for inclusion in the Reserve System as *existing open space***.** Enrolled existing open space must conduct their management and monitoring according to the requirements and guidelines outlined in this conservation strategy and in Chapter 7 *Adaptive Management and Monitoring Program*. In many cases, this new obligation represents a substantial improvement over the type and level of habitat and species management and monitoring practices that are currently in place. In other cases, this requirement will simply standardize management and monitoring to provide a cohesive Reserve System throughout the study area, and ensure consistent management and monitoring in perpetuity. This upgrade and standardization of management and monitoring on existing open space therefore constitutes an important part of this conservation strategy.

To determine which existing open space would be eligible for the Reserve System, the criteria listed below were applied to all existing Type 2 or 3 open space.

- The site contributes to the biological goals and objectives of this Plan and meets many of the reserve design principles described above.
- The site provides clear opportunities for habitat enhancement that would provide substantial benefits to one or more covered species.
- The site is owned by one of the Permittees and the management agency cannot afford to conduct biologically appropriate habitat management, enhancement, or long-term monitoring.
- Land uses on and surrounding the site are compatible with the management and monitoring required by the Plan (e.g., if the site is small, adjacent land uses will not preclude use of necessary management actions).

Existing Type 2 or 3 open space sites proposed for inclusion in the Reserve System are listed in **Table 5-5** and illustrated on **Figure 5-4**. This table also lists how these areas will be enhanced and how they will contribute to the biological goals and objectives of the Plan. **Table 5-5** lists six park units owned by County Parks. Up to 1,000 acres of lands owned by the Open Space Authority may also be included in the Reserve System. State Park lands were also considered for the Reserve System but were not included because that agency declined to participate in this Plan. The Implementing Entity, with review and approval by the Wildlife Agencies, may incorporate existing open space not included in **Table 5-5** or shown in **Figure 5-4** if it is determined that other lands are able to support the biological goals and objectives of the Plan.

For a site to qualify and receive credit as part of the Reserve System, the Implementing Entity will obtain a conservation easement or similar mechanism that is approved by the Wildlife Agencies over these lands. The conservation

easement (or similar mechanism) will ensure that these lands are managed and monitored in perpetuity as part of the Reserve System and in accordance with the terms of the Habitat Plan (see Chapter 8, Section 8.6.3 *Conservation Easements* for details).

Conservation Gap Analysis

A key step in the development of a conservation strategy for a regional HCP or NCCP is to determine the existing level of protection for natural communities and covered species. Species or natural communities with low levels of existing protection may require greater emphasis in the Plan to ensure that their conservation in the study area is assured and the regulatory requirements of the NCCP Act are met. In contrast, species or natural communities that are well protected may need little or no additional protection by the Plan. For these species, the conservation strategy may instead focus on habitat restoration or improved habitat management. For all species it is expected that enhanced management and monitoring on existing and new protected lands will be needed.

The analysis conducted to determine the levels of existing protection of species and natural communities is called a *conservation gap analysis*. The methods used were based on similar approaches applied at the national, state, and local levels (Scott et al. 1993, 2001; Wild 2002).

The gap analysis was used as a preliminary step in the conservation planning process to guide the reserve design process. Conservation biology theory holds that by protecting a wide variety of ecosystems and natural communities or land cover types at a broad level (i.e., a coarse-filter and meso-filter approach; see **Figure 5-3**), the majority of the biological diversity contained within these natural communities will also be protected (Noss 1987; Hunter 2005). This approach is then complemented by focusing on finer-level resources such as species occurrences, species habitat, or unique physical features to conserve biological diversity not protected by the broader-level approaches.

Conservation Gaps in the Study Area

To determine the gaps in protection in the study area, the following GIS data layers were overlaid with the open space Types 1, 2, and 3 layer (**Figure 2-3**).

- Land cover (see Chapter 3 and **Figure 3-10**).
- Species habitat distribution (see Chapter 3 for a general description of these models and **Appendix D** for the model parameters for each species).
- Watersheds (see **Figure 3-6**).

The results of the conservation gap analyses are presented in **Table 5-4** for land cover types and **Table 5-6** for covered species. Data are presented by open space Types 1, 2, 3, and 4 (see Chapter 2 for a definition of open space types). Because of the importance of protecting substantial portions of occupied and suitable

habitat for Bay checkerspot butterfly, **Table 5-7** presents the gap analysis for the individual populations recognized in the species account (**Appendix D**). Together, these results constituted a key input to the conservation strategy and the design of the Reserve System.

Gaps in Land Cover and Watershed Protection

Many natural land cover types have greater than 30% of their extent in open space Types 1, 2 or 3 (**Table 5-4**). Natural land cover types that are generally well represented in the study area in open space (>40%) are mixed oak woodland and forest, ponderosa pine woodland, coastal and valley freshwater marsh, willow riparian forest and scrub, blue oak woodland, seasonal wetland, reservoir, and central California sycamore alluvial woodland. Natural land cover types with the lowest proportion in open space overall and where the conservation gaps are most likely to occur are knobcone pine woodland, coast live oak forest and woodland, rock outcrop, serpentine rock outcrop, northern mixed chaparral/chamise chaparral, mixed riparian forest and woodland, and California annual grassland. Agricultural land cover types are poorly represented in open space in the study area.

Of the five major watersheds in the study area (Coyote, Pacheco, Llagas, Guadalupe, and Uvas), Type 1, 2, 3, or 4 open space is greatest in quantity and proportion in the Pacheco and Uvas watersheds (34 and 20%, respectively). The Alameda and Guadalupe watersheds have the least representation in open space Types 1, 2, 3, or 4 (1% each), followed by the Uvas and Llagas watersheds (15% each). In all five watersheds, the majority of land in open space is upstream of reservoirs. There is no Type 1, 2, 3, or 4 open space in the portion of the Santa Cruz Mountains watershed—which includes the headwaters of Pescadero Creek—within the study area (7,209 acres).

Of the 2,392 miles of mapped USGS blue line streams within the study area, approximately 34% are within Type 1, 2, or 3 open space. The Plan will also provide additional protection for ephemeral streams that are not mapped. The level of protection for these streams is generally high with approximately 16% in irrevocable protection and 34% of streams in Types 1, 2, or 3 open space.

Gaps in Species Protection

As shown in **Table 5-6**, most covered species with models have moderate levels of representation in open space Types 1, 2, and 3, between 25% and 50%. Exceptions to this are San Joaquin kit fox secondary habitat and secondary habitat (low use); western burrowing owl overwintering, occupied nesting, and potential nesting habitat; tricolored blackbird secondary habitat; least Bell's vireo primary habitat; Loma Prieta hoita secondary habitat, and most beautiful jewelflower secondary habitat. Potential breeding habitat for least Bell's vireo is particularly underrepresented in Type 1, 2, or 3 open space (11%). No species' habitat occurs in open space Types 1, 2, and 3 above 50%.

Table 5-7 presents more detail on the status of protection for all Bay checkerspot butterfly populations in the study area, because this species is one of the key species used to design the conservation strategy. As described in the biological goals and objectives for this species (**Table 5-1c**), some populations are targeted

for conservation. Of these targeted populations, more than two-thirds are in need of long-term protection, and the level of occurrence in open space by population varies from zero to 100%.

Regional and State Gaps

Gap analyses conducted at scales larger than the study area were also considered to determine whether land cover types in the study area are underrepresented in Type 1, 2, or 3 open space compared to other regions or to regional conservation targets. For example, the conservation strategy in this Plan will contribute to regional conservation goals for land cover types found throughout the region.

Analysis at the regional scale entailed consulting a gap analysis conducted in the nine-county San Francisco Bay Area (Wild 2002). Although that study was conducted using an older and much coarser dataset[8], it provided a wider regional context and helped to inform conservation priorities for the Habitat Plan. This study utilized a system of open space classification (based on Davis et al. 1998) similar to the one used in this Plan. **Table 5-8** lists the vegetative communities that are found in the study area (equivalent to Habitat Plan land cover types) that were identified as being underrepresented in protected status in the San Francisco Bay Area. Data are also presented in **Table 5-8** on the level of protection of these vegetation communities at the state level (Davis et al. 1998).

Landscape Linkages

Landscape linkages were also used to design the Reserve System. For the purposes of this Plan, landscape linkages are defined as areas that allow for the movement of species from one area of suitable habitat to another. A linkage can vary from a narrow strip of habitat that only functions as a conduit for movement (i.e., a corridor) or a large area of intact habitat that is used for movement, dispersal, and other life functions such as foraging and breeding.

The NCCP Act explicitly requires NCCPs to address landscape or habitat linkages, as shown below.

> Establishing one or more reserves or other measures that provide equivalent conservation of covered species within the plan area and linkages between them and adjacent habitat areas outside of the plan area. (Section 2820[a][4][B].)
>
> Sustaining the effective movement and interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the habitat areas within the plan area. (Section 2820[a][4][E].)

[8] This analysis utilized land cover data from the California Gap Analysis Project (Davis et al. 1998), which used aerial photography from 1990 and minimum mapping units of 247 acres (100 hectares) for upland communities and 98.8 acres (40 hectares) for wetland communities. In addition, the open space data are from 2002.

Some species require linkages for periodic migrations among different habitat types used for breeding, feeding, or roosting. Wildlife movement from one important habitat area to another may vary from daily to seasonal migration depending on the species. Linkages may also be needed for the permanent immigration or emigration of individuals among habitat patches, allowing for gene flow and recolonization after local extinction (Beier and Noss 2000; Hilty et al. 2006; Groom et al. 2006).

Linkage requirements differ greatly from species to species. Specific characteristics of linkages, such as dimensions, location, and quality of habitat, can influence species use. Wider linkages tend to be more effective than narrower linkages (Merenlender and Crawford 1998; Hilty et al. 2006).

To incorporate landscape linkages in the reserve design process, all known or potential linkages within the study area and in the surrounding areas were compiled from the following sources, in no particular order.

- Statewide assessment of wildlife linkages needs developed by expert opinions of wildlife biologists (California Wilderness Coalition 2002).
- Ecoregional planning process conducted for the central coast region (The Nature Conservancy 2006b).
- A study of movement needs of mountain lions estimated by least-cost path analysis of regional land cover data (Thorne et al. 2002).
- A local workshop on wildlife linkages in the Sierra Azul region[9] held on October 11, 2006 (Coastal Training Program, Elkhorn Slough National Estuarine Research Reserve 2006).
- Wildlife movement data from the study area for American badgers (Diamond 2006; T. Diamond pers. comm.), Tule elk (Coletto 2006; H. Coletto pers. comm.), bobcat, and other species (T. Diamond pers. comm.).
- Locations of existing culverts, bridges, and other overpasses suitable for wildlife along U.S. 101 between Metcalf Road in San José and the Coyote Creek bridge crossing near Morgan Hill (California Department of Fish and Game 2006).
- Locations of median barriers and existing culverts, bridges, and other overpasses suitable for wildlife along SR 152 between the SR 156 interchange and the Santa Clara/Merced County line (data collected by Jones & Stokes in February 2007).
- *Coyote Valley Specific Plan Draft Environmental Impact Report* (City of San José 2007).

Potential dispersal routes for plants and wildlife covered by the Plan were also inferred from the land cover data, compiled occurrence data, and habitat distribution models developed for this Plan (see Chapter 3 and **Appendix D**).

[9] The Sierra Azul region was defined to encompass the southern portion of the Santa Cruz Mountains south of Highway 17, the Diablo Range, and the Gabilan Range. The workshop focused on issues of connectivity between the Santa Cruz Mountains and the Diablo and Santa Lucia mountain ranges to the east and south.

The results of the compilation of these sources are described in **Table 5-9** as 20 distinct and potential landscape linkages found either entirely within the study area or within the study area that lead to outside the study area. **Figure 5-6** illustrates these 20 potential linkages, which are discussed below for their relative importance to the Habitat Plan. These linkages are drawn at a regional level as broad swaths of natural land cover types rather than specific alignments or corridors. Often there are multiple ways to protect land to achieve the linkage design in **Figure 5-6** and the goals in **Table 5-9**.

Regional Connectivity

Maintaining linkages with areas outside the study area (i.e., regional habitat connectivity) is essential to retaining a high level of native biological diversity within the study area. For example, the southeast part of the study area may be an important linkage within the Diablo Range to the north and south (Linkage 15). The San Luis Reservoir in Merced County forms a significant barrier to terrestrial wildlife moving through the eastern Diablo Range, and the study area includes most of the Diablo Range west of the reservoir. Habitat continuity in this area likely benefits species such as San Joaquin kit fox. If kit foxes move from the Salinas Valley to the San Luis Reservoir area in Merced and Stanislaus Counties, they may use the southeastern part of the study area as a secondary route around the San Luis Reservoir.

The Santa Cruz Mountains on the western edge of the study area provide a connection for wide-ranging species between the Santa Cruz Mountains in Santa Cruz and San Mateo Counties and the Gabilan Range to the south. This connection is most apparent at the southern tip of the study area (Linkages 19 and 20) where there is a narrow linkage through the “Chittenden Gap” in Santa Cruz County to the Gabilan Range and the Santa Lucia Range to the south. If linkages like this are severed, populations of wide-ranging species (e.g., mountain lion) could be extirpated from the Santa Cruz Mountains because that range is likely insufficient in size to sustain a viable mountain lion population on its own (Thorne et al. 2002; Coastal Training Program 2006).

Connectivity within the Study Area

Within the study area, many landscape linkages are important to maintain connections among populations. For example, the major stream corridors of Coyote Creek, Guadalupe River, Pacheco Creek, Uvas Creek, Llagas Creek, Pajaro River (Linkages 1, 2, 11, 12, 17, 18), and Pescadero Creek all support native fish species. These corridors also provide critical connections for other aquatic and terrestrial species moving through urban or cultivated agricultural areas.

There is considerable existing open space in the Santa Cruz Mountains both inside and outside the study area (**Figure 2-3**). Additional linkages could be made between existing open space within the study area (Linkages 9 and 13).

Such connectivity would benefit covered species such as California tiger salamander, California red-legged frog, and foothill yellow-legged frog, and other native species such as Coast Range newt, bobcat, and mountain lion.

Protected areas adjacent to Henry W. Coe State Park form a large nucleus of open space within the study area. These protected areas already provide landscape linkages for species such as California red-legged frog, California tiger salamander, Tule elk, American badger, bobcat, mountain lion, and mule deer. Additional landscape linkages would connect this large core open space with smaller protected areas and with key features outside the study area (e.g., Linkages 5, 6, 7, 14, 15, and 16).

Linking the Santa Cruz Mountains and the Diablo Range

Historically, the Santa Cruz Mountains and the Diablo Range were linked across the Santa Clara Valley through a network of creeks, wetland complexes, and large stands of valley oak woodland (San Francisco Estuary Institute 2006). Over time this linkage has diminished with urban development, road barriers, and cultivated agriculture. Because some of the valley floor has remained in agricultural production and the creek corridors are largely intact, some connectivity remains (Linkages 8 and 10). There has been considerable debate recently about the best means to maintain this important connectivity between the Santa Cruz Mountains and the Diablo Range within the study area (Coastal Training Program 2006; City of San José 2007).

The connectivity between the Santa Cruz Mountains and the Diablo Range is expected to degrade further as covered activities are implemented. For example, development within Morgan Hill and Gilroy will make it more difficult for some wildlife species to cross the valley floor. While the Habitat Plan does not authorize incidental take associated with urban development in the Coyote Valley Urban Reserve at the southern end of San José, continued rural growth is expected to contribute to some long-term degradation (see Chapter 4). An important conservation objective of this Plan is to preserve and enhance the linkage between the two ranges (see Goal 2 in **Table 5-1a**). See landscape-level conservation actions in Section 5.3.2 *Landscape Conservation and Management* for more details.

The Use of Maps to Define the Reserve System

Regional conservation plans take a variety of approaches in the use of maps to display land acquisition requirements. At one end of the spectrum, a conservation plan may use maps to delineate exactly where reserves are to be created. In this type of plan, often called a *map-based plan*, map designations define the application of regulations, fees, land acquisition, restoration, or other elements of the plan. Because all landowners must agree to the designation placed on their lands, purely map-based plans (otherwise known as *hard boundary* or *hard line* plans) are difficult to develop on a large scale and are rare.

At the other end of the spectrum, a conservation plan may display no maps or only very general maps and instead include a *process-based* land acquisition strategy. A purely process-based plan (also known as a *policy-based* or *criteria-based* plan) has no maps of where reserves will be established or other mitigation accomplished. Instead, the conservation plan outlines a detailed process by which reserves are assembled according to a set of clear criteria. The amount of flexibility in a process-based plan depends on the flexibility of the reserve assembly criteria.

The Local Partners considered the full range of available approaches and chose to employ a combination of these strategies. This Plan uses a hybrid approach in which maps display conservation priorities on a regional scale. Land acquisition will be undertaken in accordance with a detailed set of requirements, while maintaining flexibility in how the Reserve System is ultimately assembled. Although the final boundaries of the system cannot be known, the general location, size, configuration, and protected resources of the reserves are described in the conservation actions below. The Local Partners considered this element of the Plan to be essential to its success.

Geographic Units of Conservation

The study area was subdivided into 34 discrete units called *conservation analysis zones* (**Figure 5-5**) to identify locations for conservation actions consistent with the hybrid approach to the use of maps described above. These zones define the areas in which conservation actions could occur outside existing protected areas. The primary purpose of these zones is to describe the specific areas in which conservation actions such as land acquisition will occur without identifying individual parcels. This focuses the conservation actions in a spatially explicit manner while maintaining the flexibility to conduct these actions on different parcels to meet the same conservation objectives (i.e., to respond to willing sellers where they arise). The arrangement of the zones also provides a mechanism to apply conservation actions at several spatial scales using consistent units (e.g., within a watershed, within a combination of zones, or within a single zone).

The conservation analysis zones were developed using subwatershed boundaries from the California Department of Water Resources (Calwater 221) that were aligned with the watershed boundaries used by the Habitat Plan. Existing open space (Types 1–3) was excluded from the zones. Subwatersheds smaller than 3,000 acres were merged with their adjacent larger subwatershed within the same watershed. Other adjustments were made to the zone boundaries to facilitate the conservation strategy; for example, the large Santa Clara Valley subwatershed that includes lower Llagas Creek was split into two subwatersheds for planning purposes[10]. Subwatersheds with mostly urbanized areas were also merged for convenience.

[10] In addition, the subwatershed surrounding Anderson Reservoir was merged with the adjacent three subwatersheds to create a less fragmented conservation planning unit.

Conservation analysis zones were defined within the six primary watersheds of the study area: Guadalupe, Coyote, Llagas, Uvas, Pacheco, and Pescadero (**Figure 5-5**). The portions of the study area within the Calabazas and San Tomas watersheds were combined into a single conservation analysis zone. Conservation analysis zones were numbered sequentially within each watershed generally from headwaters to their exit from the study area. The size and land cover types found in each conservation analysis watershed is shown in **Table 5-10**.

Reserve Assembly Process

The Implementing Entity will establish the Reserve System through acquisition of land in fee title, conservation easement, or purchase of credits at an approved mitigation bank. Lands will only be acquired from willing sellers or donors and lands must meet one or more of the biological goals and objectives and the land acquisition requirements described below. The Implementing Entity will assemble the Reserve System in any of the following ways.

- Inclusion of land owned by a Permittee by conservation easement.
- Purchase of land in fee title from willing sellers.
- Purchase of conservation easements from willing sellers.
- Purchase of land or conservation easements in partnership with other organization(s) (not to be used as mitigation for another project that is not a covered activity).
- Acceptance of land or easement dedication in lieu of some development fees if the easement contributes to the goals and objectives of the Habitat Plan and is approved by the Implementing Entity and the Wildlife Agencies.
- Acceptance of credits sold in private mitigation banks approved by USFWS and CDFG if they meet the terms of the Plan (see Chapter 8, Section 8.6.2 *Land Acquired by Other Organizations or through Partnerships*, subheading, *Private Mitigation Banks*).
- Acceptance of land or easement dedication as a gift or charitable donation.

Acquisition of land in fee title or use of conservation easements will likely be the primary mechanisms used in most conservation analysis zones. Conservation easements will be used when the property owner wishes to enter that type of arrangement rather than sell land in fee title. The terms of each conservation easement may be tailored to each landowner and parcel, but will be consistent with goals of the conservation strategy, the general principles for easements outlined in this Plan (see Chapter 8), and the guidelines in the Implementing Agreement. The land and conservation easement acquisition process and the conditions under which the other four reserve assembly techniques may be used are discussed in detail in Chapter 8.

To achieve the Plan's biological goals and objectives, including contribution to the recovery of covered species, it is important to focus land acquisition where it

will have the greatest conservation benefit. By concentrating land acquisition in certain areas, larger effective reserves can be assembled by augmenting and connecting existing protected lands. However, the Implementing Entity must have flexibility in deciding where to acquire land because the Plan depends on the availability of willing sellers. The Plan balances these needs by focusing acquisition of certain land cover types within certain conservation analysis zones, as described below.

Despite this flexibility, the Implementing Entity will prioritize land acquisition in order to buy parcels of greatest conservation value (e.g., see *Reserve Design and Assembly Principles*, above) under the greatest threat of development and whose cost is expected to rise fastest. These criteria are met in conservation areas that span the floor of the Santa Clara Valley (Coyote-7, Llagas-3, Llagas-4) and the foothills immediately adjacent to the valley floor (Guadalupe 1, 3; Coyote-7, 8; Llagas-2, 3, 4; Uvas-1, 2, 5, 6; Pescadero-1).

When possible, land will first be acquired adjacent to existing protected areas to ensure that, in the unlikely event that funding does not become available for full acquisition of the Reserve System (see Chapter 9 for details), the Reserve System is composed of contiguous units rather than isolated parcels.

Field Verification Prior to Acquisition

Land cover data, species occurrence data, and species habitat distribution models were developed for this Plan at a regional scale. The data and models were used to develop a sound conservation strategy for the study area at this regional scale. These data and models are not intended for site-specific planning because of the limitations described in Chapter 3.

To account for some of the uncertainty inherent in this conservation strategy, biological resources in potential conservation areas will, whenever possible, be verified in the field prior to land acquisition. The Implementing Entity will conduct *pre-acquisition assessments* on potential reserve lands to evaluate whether these lands are likely to meet Plan requirements. If a pre-acquisition assessment is not feasible, the Implementing Entity will conduct an assessment of the site based on air photo analysis and the best available regional data sets (e.g., Habitat Plan data, CNDDB).

The biological suitability of the site for the Reserve System will be determined on the basis of the information listed below.

- The results of past biological surveys, updated land cover mapping, assessments of habitat suitability for covered species, air photo interpretation, and the biological resources present or expected on site.
- An evaluation of the site’s enhancement and restoration potential.
- An evaluation of how well the site achieves the reserve design principles listed above.

- An evaluation of the site's existing and potential biological value in the context of the remaining unmet biological goals and objectives and land acquisition requirements.

Types of information collected during these assessments will include an evaluation of location, quantity, quality, and type of covered species populations; covered species habitat; and natural communities present, as well as other site conditions or infrastructure that would benefit or conflict with the Plan's biological goals and objectives. The site's restoration and enhancement potential will also be evaluated. This information will help the Implementing Entity prioritize acquisition of reserve lands based on their relative contribution toward meeting the biological goals and objectives. More details on pre-acquisition assessments are found in Chapter 8.

5.2.4 Aquatic Habitat Protection and Enhancement

Protection and enhancement of aquatic habitat for covered species and other native species is an important goal of this Plan. Protection of off-stream aquatic habitats will be accomplished through the land acquisition process described below and through the stream and riparian setback requirement described in Chapter 6 (see Section 6.5, subheading *Condition 11 Stream and Riparian Setbacks*). In addition, the Plan requires restoration of aquatic land cover types to ensure no net loss in their extent and function within the study area.

The approach to stream and riparian woodland land cover protection and enhancement combines elements of land acquisition, restoration, and water management. The land acquisition strategy focuses on stream protection primarily in areas where large stands of riparian woodland are present, such as along Pacheco Creek, San Felipe Creek, and upper Uvas Creek. This focus has the dual benefit of protecting streams and riparian woodland habitats. Stream protection through land acquisition will also occur in areas most suitable for riparian woodland restoration to support covered birds, amphibians, reptiles, and native fish species.

Stream and riparian protection will also occur through the development review process when projects are proposed adjacent to streams. Through the stream and riparian setbacks condition (Condition 11 described in Chapter 6), applicants will be required to set aside stream frontage to protect stream and riparian functions. In some cases, high-value stream setback areas will be incorporated into the Reserve System to increase opportunities for riparian and stream restoration, and provide greater consistency in management and monitoring of these areas.

To enhance habitat for native fish species and covered amphibian and riparian bird species, broader strategies are needed than riparian woodland restoration in specific locations. To contribute to the recovery of covered amphibians and reptiles, the Plan will acquire and enhance upper watershed streams and associated upland riparian habitat throughout the study area. To enhance habitat

for least Bell's vireo and other native songbirds, the Plan will provide riparian restoration opportunities along Llagas Creek, Pacheco Creek, Uvas Creek, and the Pajaro River.

5.2.5 Land Management

The primary means of mitigating impacts on and conserving covered species and natural communities is preservation of high-quality habitat in accordance with the reserve design criteria outlined above. In order to meet regulatory requirements and to contribute to the recovery of covered species, habitat enhancement, restoration, and creation are also important components of the conservation strategy. Some land cover types that are lost to covered activities will be replaced with the same or similar communities or land cover types within the Habitat Plan reserves. Habitat enhancement, restoration, and creation ensure that there will be no net loss of certain resources (e.g., wetlands, breeding habitat for specific covered species). In other cases, restoration and enhancement are used to supplement preservation to adequately conserve land cover types or covered species habitat.

Some habitat-restoration requirements exceed those typically required for individual mitigation in order to contribute to the recovery or prevent listing of covered species that these habitats support. (These greater restoration requirements are also proportional to the stronger regulatory assurances provided by CDFG to the Permittees and private developers within the participating jurisdictions.) Depending on the resource, creation, restoration, or enhancement is required as part of the conservation strategy. Habitat enhancement, restoration, and creation will occur in addition to, not as a substitute for, land preservation. Success criteria for habitat enhancement, restoration, and creation will be based in part on reference stands in the region. Reference stands will be selected based on their condition as representative of high-quality communities in the study area. Such use of reference stands will allow habitat enhancement, restoration, and creation plans to incorporate any unique regional characteristics of these habitats. Each of these terms is defined below.

Definitions

Appendix A *Glossary* has a complete list of definitions used in this Plan. The following are selected key definitions critical to the conservation strategy.

Habitat Enhancement

Habitat enhancement is the manipulation of the physical, chemical, or biological characteristics of a land cover type to heighten, intensify, or improve one or more specific existing ecological function(s). Enhancement results in the gain of selected existing ecological function(s), but may also lead to a decline in other ecological function(s). Habitat enhancement implemented in the Reserve System will result in an increase or improvement in specific ecological function without

a change in the amount of land cover types. Examples of ecological functions include native species richness, species diversity, native vegetative cover, and wildlife habitat.

Examples of habitat enhancement include:

- Planting valley oak seedlings in an existing stand of valley oaks to increase oak cover and density and improve the age-class structure of the valley oak population.
- Manipulating the growth stage composition of vegetation on a site.
- The reduction or removal of one or more threats to covered species or natural communities, including:
- The treatment and removal of invasive species including bullfrog removal, weed abatement, and prescribed burning (see **Appendix D** for a discussion of threats to each covered species).
- Permanently protecting Reserve System lands to remove threats of development, overcollecting, overgrazing, lack of grazing, and others.
- Fencing installation and repair to support improved livestock grazing and prevent unauthorized access.
- Reducing hazards to animal movement by adding or resizing culverts or reducing traffic on private roads within the Reserve System.

Enhancement actions will differ according to each natural community and site. For example, some communities in the study area have inherently low productivity, low species richness, or low vegetation cover. Enhancement of these communities may be measured by an increase in relative cover of native plants or a decrease in inappropriate disturbance.

The appropriate type of habitat enhancement will be considered on a site-by-site basis by the Implementing Entity within the context of the entire Reserve System and Plan goals and objectives. Habitat enhancement will occur on all lands preserved in the Reserve System. The level of habitat enhancement will vary greatly within the Reserve System. For example, degraded communities will need a higher degree of enhancement than lands with little or no degradation. Some natural communities will need little to no management unless changed circumstances occur; in these cases, permanent protection of the land and the removal of key threats may be the only enhancement occurring on those sites.

Habitat enhancement will be informed by pre-acquisition assessments, targeted studies and by the monitoring and adaptive management program, to conserve the populations of all covered species and maintain or improve ecological processes.

Habitat Restoration

Habitat restoration is the manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural or historic functions to a site that historically supported such functions, but no longer does because of the loss of one or more required ecological factors or as a result of past disturbance.

Restoration typically involves altering the soil or other substrate to improve a site's ability to support the historic land cover types, although it may also include physical manipulation to restore specific ecological function in a site where that function has been lost (e.g., removal of hardscape in a stream channel and re-vegetation with riparian plantings). In contrast to enhancement, restoration results in the re-establishment of ecological function, value, *and* acreage of a natural community or land cover types.

For example, riparian woodland could be restored to stream reaches that historically supported them. In this Plan, habitat restoration is only allowed in those land cover types for which techniques are generally successful, and where restoration would substantially enhance habitat for covered species and native biological diversity. Restoration actions must also incorporate the best available science.

Habitat restoration may not restore all functions of natural communities. For example, recent studies of wetland restoration projects indicate that many of them fail to meet success criteria or lack important functions of natural reference sites (National Research Council 2001). The conservation strategy takes this uncertainty into account by relying primarily on habitat preservation and by requiring habitat restoration in amounts exceeding typical mitigation ratios. Also, uncertainty is taken into account by the adaptive management strategy (see Chapter 7 *Monitoring and Adaptive Management Program*).

Habitat restoration will be focused in the Reserve System, including existing open space that may become part of the Reserve System. Riparian and stream restoration that is counted towards the total conservation benefit of the Plan (**Table 5-13**) is allowed on private or public lands outside the Reserve System (i.e., without a conservation easement) as long as the following conditions are met.

- Restoration is conducted by a Permittee, including the Implementing Entity, or a third party under contract with a Permittee.
- Restoration is done consistent with the *Reserve Design and Assembly Principles* described in Section 5.2.3[11].
- The site is restored to pre-project or ecologically improved conditions within 5 years of the end of the covered activity.
- A Wildlife Agency-approved site restoration plan is developed consistent with the requirements in Section 5.3.6 *Riverine and Riparian Forest and*

[11] Restoration efforts need to remain in compliance with the Plan's Stay-Ahead provision, described in Section 8.6.1.

Scrub Conservation and Management, subheading *Riparian Restoration*, subheading *Site Restoration Plan*.

- There are no suitable and feasible restoration sites within the Reserve System.
- The restoration project meets the riverine and riparian and requirements described below in Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*.
- The site is maintained in perpetuity according to the terms of the Plan by the Implementing Entity or a Permittee. If the site is maintained by a third party, the third party must enter into a contract with the Implementing Entity to ensure management according to the terms of the Plan.
- The Implementing Entity, or its designated third party, monitors the restoration site in accordance with Chapter 7.
- The Implementing Entity and Wildlife Agencies approve the project.

One exception to the requirement that the site be maintained in perpetuity is that restoration projects occurring on streams managed for flood control and human safety purposes may be adversely modified (i.e., modified such that the restoration no longer serves the functions for which it was designed) by future covered activities. In such cases, any adverse modification of a restoration site will be off-set by new restoration in an alternative location(s). New restoration actions must be initiated in advance of the new covered activity that would adversely modify the restoration site. All such arrangements will be discussed and approved by the Wildlife Agencies as soon as the Permittees or Implementing Entity become aware of such a need.

All restoration conducted outside of the Reserve System will be tracked by the Implementing Entity to ensure that the site is monitored and managed consistent with the requirements of the Plan for the Reserve System. These projects will also be identified in the annual report.

Stream and riparian restoration outside of the Reserve System (i.e., on lands not under a conservation easement) is likely to constitute a small proportion of the Plan's commitment to riparian and stream restoration (**Table 5-13**) because the Implementing Entity will prioritize all feasible sites within the Reserve System. In addition, restoration must comply with the Plan's reserve design and assembly principles which include, but are not limited to, preservation of the highest-quality communities, preservation of connectivity, and consideration of management needs. Furthermore, the Wildlife Agencies will also need to approve restoration outside of the Reserve System.

Habitat Creation

Habitat creation is the manipulation of the physical, chemical, or biological characteristics present to develop a land cover type in an area that did not previously support it. Similar to restoration, creation results in establishment of

new ecological function, value, *and* acreage of a natural community or land cover types.

The only habitat creation proposed under this Plan is for ponds. Ponds will be created as breeding habitat for California red-legged frog or California tiger salamander in areas along streams that did not previously support ponds. This type of habitat creation must be balanced by the need to maintain and enhance stream functions. No on-stream ponds will be constructed in drainages that support, or could support, covered species under this Plan. Habitat creation will occur in damaged or disturbed areas to minimize the loss of existing habitats by the creation of new ones. Ponds may also be created in other appropriate areas as long as there is normally enough water, or a water source may be established (e.g., installation of a spring box or a well) to adequately maintain the necessary inundation schedule for the target species.

In-kind/like-function habitat creation is the establishment of the same land cover type as the land cover type lost to the covered activity, and that would establish the same type of ecological functions over time. For example, creating an artificial pond with species similar to those found in a natural pond would be in-kind/like-function creation.

Out-of-kind/like-function creation of habitat is the establishment of a different land cover type with some of the same ecological functions as the affected land cover type. Out-of-kind/like-function creation or restoration is not allowed under the Habitat Plan except in situations where historic physical conditions can be restored to recreate a community that has been lost historically. For example, sycamore alluvial woodland and alkali wetland may have been more common in the study area before human alterations of the landscape (San Francisco Estuary Institute 2006, 2008). If conditions supporting these communities could be restored, then the historic communities could be recreated out-of-kind.

Land Management on Reserves

Reserve management is designed to maintain and enhance natural communities, habitat for covered and other native species, native biological diversity, and ecosystem function. The location of reserves and condition of resources within these reserves will not be known until suitable sites are identified, surveyed, and acquired. Therefore, site-specific management objectives and techniques cannot be developed until reserve sites are known. The Implementing Entity will prepare a *reserve unit management plan.*

Reserve unit management plans will be developed for each reserve unit to identify, on the basis of site-specific conditions and reserve objectives, the management and maintenance actions necessary to ensure that desired ecosystem characteristics and functions are maintained and enhanced. Reserve units are defined as groups of contiguous or neighboring parcels that have similar natural communities, covered species, and infrastructure. Reserve unit management plans must address and minimize the conflicts that may arise when managing for multiple species and habitats. Reserve unit management plans will also describe

reserve-specific actions to address invasive species, fire management, infrastructure maintenance, recreation, monitoring, agricultural activities, and mosquito abatement as applicable.

Separate reserve unit management plans will be prepared for a minimum of five reserve units. These reserve units are expected to support similar land cover types, covered species, and habitats, and will therefore face similar management issues. A list of likely reserve units is presented below based on the expected geographic distribution of the Reserve System.

- Upper Penitencia Creek,
- Coyote Ridge,
- Pacheco Watershed,
- Southern Santa Cruz Mountains, and
- Santa Teresa Hills.

The Implementing Entity may decide to prepare additional reserve unit management plans to address more specific geographic areas of the Reserve System.

All reserve unit management plans must be prepared in collaboration with the Wildlife Agencies and approved by the Implementing Entity and the Wildlife Agencies. In cases where reserve unit management plans include land that remain in private ownership (i.e., conservation easements but not fee title), plans will also be prepared in collaboration with applicable landowners. The Wildlife Agencies will review each draft reserve unit management plan and provide comments to the Implementing Entity within 60 days after receiving the draft plan. The Implementing Entity will revise the draft plan based on the Wildlife Agencies' comments, if any, and will provide a revised draft to the Wildlife Agencies, which will have an additional 60-day review period. If an initial draft reserve unit management plan or any subsequent revised draft reserve unit management plan adequately addresses a Wildlife Agency's comments, the Wildlife Agency will so notify the Implementing Entity within 60 days, and the reserve unit management plan will be deemed to be approved by that Wildlife Agency for purposes of this Plan, the Implementing Agreement, and the permits. In addition, if a Wildlife Agency does not provide comments within 60 days after receiving the revised draft reserve unit management plan, the Wildlife Agency will thereafter be deemed to have approved the revised draft plan for purposes of this Plan, the Implementing Agreement, and the permits. The Implementing Entity will incorporate comments submitted by the Wildlife Agency after the 60-day period in the revised draft reserve unit management plan to the extent that the Implementing Entity determines the comments can be incorporated.

Comments from the Wildlife Agencies will focus on implementation of the management techniques described in this chapter or introduction of new techniques associated with the adaptive management program and in response to monitoring results (see Chapter 7). The deadlines described above are established to ensure the timely review and comment on the reserve unit

management plans by Wildlife Agency staff and to enable the Implementing Entity to implement conservation actions as soon as possible.

Reserve unit management plans will also be updated and revised as part of the adaptive management program (Chapter 7). Land management on new reserves must not wait until adoption of the first reserve unit management plan; until the first reserve unit management plan is approved, land management will occur according to the guidelines in this chapter and best scientific practices. The conservation actions below describe the objectives, principles, and general requirements of these reserve unit management plans.

Reserve Unit Management Plans

Reserve unit management plans will be prepared by the Implementing Entity for each reserve unit for natural land cover types (i.e., on land not cultivated or irrigated for crops or pasture; see the next section for management of other lands). Reserve unit management plans will describe reserve-specific management strategies for maintaining, and when necessary, improving existing habitat conditions for covered species. These plans will also facilitate the management of enhanced/created/restored habitats, to maintain or improve their functions over time through the adaptive management process. The Implementing Entity should consider developing decision trees or flow charts for certain types of management such as prescribed burning or invasive species management (e.g., Starfield and Bleloch 1991).

Reserve unit management plans will be prepared as soon as reasonably possible but not longer than 5 years following acquisition of the first parcel in a reserve unit or of placing a conservation easement on the parcel. This time period will provide an opportunity to conduct thorough inventories of the site's resources over several seasons. It will also provide the time necessary to seek review and approval from the Wildlife Agencies. Reserve unit management plans will be developed in partnership with adjacent land management agencies, resource agencies, and current grazing lessees, if any. In cases where reserve unit management plans include land that remain in private ownership (i.e., conservation easements but not fee title), plans will also be prepared in collaboration with applicable landowners. Input from interested citizens will be included in reserve unit management plan development through public outreach and education (see *Public Education and Outreach* below). When possible, new or updates to existing reserve unit management plans will be coordinated with concurrent open space planning processes of the agency that owns the site (e.g., County Parks Master Plan).

Until the first reserve unit management plan is developed and formally approved by the Wildlife Agencies, reserve lands will be managed in the interim to maintain and improve covered species habitats in accordance with the guidance in the Plan, best available information, and management methods currently being used in the study area. Subsequent reserve units will be managed in the interim based on reserve unit management plans for other units of the Reserve System.

Until a reserve unit management plan is prepared, management regimes that existed prior to acquisition will continue until it can be shown through management on other Habitat Plan reserves or elsewhere in the study area, pilot studies, experimentation, or other relevant studies that changing management will benefit natural communities or covered species. If the pre-existing management was damaging the resource or resources contained in that reserve, interim actions, based on best available information, will be implemented immediately and continued until the specific reserve unit management plan is completed. For example, if a parcel was previously overgrazed, the stocking rate could be reduced to the point where it can reasonably be assumed that the modified level of grazing will sustain natural resources. The reserve unit management plan will then define the appropriate standards to provide for reserve enhancement in perpetuity.

As described in Chapter 9, development fees are the primary source of funding for management actions and other operational activities in the Reserve System. Due to the slow pace of development in the study area as a result of the recent recession, it is unclear whether development fees will be adequate to fully fund management of the Reserve System in the early years of Plan implementation. In the event that development fees cannot fully fund management in reserve units according to the requirements and guidelines in this conservation strategy, the Implementing Entity may conduct only essential management tasks and defer non-essential management tasks for up to 5 years from the first acquisition for each reserve unit, or when development fees become available, whichever comes first. Essential management tasks are defined as those tasks necessary to ensure that the reserve unit does not degrade below the existing condition at the time it was incorporated into the Reserve System in terms of natural land cover and covered species habitat. Existing conditions will be documented by the Implementing Entity through the pre-acquisition assessment and the site inventory, described in Chapters 7 and 8. Management in response to changed circumstances (i.e., remedial actions described in Chapter 10) cannot be deferred.

Reserve unit management plans will be working documents; accordingly, they will not preclude the modification of management measures prior to Plan updates in cases where adaptive management or new research identifies more effective techniques. The Implementing Entity will review and, where biologically appropriate, systematically revise reserve unit management plans at least every 5 years. This review will be based on an evaluation of the success of management methods (i.e., knowledge gained through the monitoring and adaptive management program) in achieving objectives of the reserve, as well as on results of other outside research. As applicable to each reserve unit, reserve unit management plans will include the following types of information.

Objectives of the Conservation Area

Each reserve unit management plan will clearly identify the biological objectives for the reserve unit. Biological objectives for each reserve unit will be a subset of the biological goals and objectives of the Habitat Plan (**Table 5-1**). Each reserve unit management plan will also identify the conservation actions applicable to the reserve (**Table 5-2**).

Vegetation Management

Each reserve unit management plan will describe reserve-specific objectives for the following goals.

- Reducing the abundance and distribution of invasive plants.
- Increasing or maintaining the abundance and distribution of covered plants, and of compatible native plants in general.
- As indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program, reducing the fuel load of the reserve so that the risk to biological resources of catastrophic wildfire is at an acceptable level and the risk to adjacent urban areas is minimized (meeting all state and local requirements). The methods and intensity of fuel management will vary depending on the location of the reserve relative to human populations and structures; emergency vehicle access; and the sensitivity of resources in the reserve to fuel load reduction techniques (e.g., fuel breaks, prescribed fire, mowing). Because fuel load reduction in chaparral habitats may be problematic (i.e., high-quality chaparral habitat is frequently characterized by periodic wildfire), it may be necessary to establish buffers in which to implement fuel load reduction.
- Minimizing the impacts of vegetation management techniques on native biological diversity and covered species (some impacts on covered species from vegetation management are expected and are included in the take allowances provided in this Plan).

Each reserve unit management plan will identify the types of management actions and the implementation schedule required to achieve the vegetation management objectives. Anticipated methods for managing vegetation include, but are not limited to, the following.

- Livestock grazing.
- Prescribed burning.
- Mechanical mowing (e.g., mowing fire breaks near the end of the growing season around the margins of reserves or as an alternative to grazing in areas where livestock cannot be used; large-scale use of heavy machinery to remove vegetation will not be allowed).
- Hand removal of vegetation (e.g., to remove infestations of invasive plants and to increase abundance of early successional vegetation along dense riparian corridors downstream of reservoirs).
- Biological control agents, where biologically appropriate and when shown to have minimal risk to non-target native species.
- Application of herbicides (e.g., spot spraying to remove infestations of invasive plants). There may be a need to apply herbicides on a large scale (e.g., to control yellow star-thistle). Note that use of herbicides is not proposed for coverage in the Section 10(a)(1)(B) permits. Herbicide use should consider the County of Santa Clara Integrated Pest Management Program and Pesticide Use Ordinance Section B28-10.

Reserve unit management plans will also describe the ongoing vegetation management actions that must be undertaken to implement community-level actions required on each of the reserves. This chapter includes detailed recommendations for management techniques and principles grouped by natural community that must be incorporated appropriately into each reserve unit management plan. These measures describe management requirements and guidelines that will be applied to natural communities to benefit covered and other native species.

- Section 5.3.2 *Landscape Conservation and Management*.
- Section 5.3.3 *Grassland Conservation and Management*.
- Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*.
- Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*.
- Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*.
- Section 5.3.7 *Wetland and Pond Conservation and Management*.

Management of Invasive Species

Each reserve unit management plan will include a section on management of invasive species. This section will incorporate management tools for controlling and if possible eradicating invasive plants and animals. Actions to control invasive animals (bullfrogs, nonnative predatory fish and feral pigs) that are described in Section 5.3.2 will also be incorporated as relevant into individual reserve unit management plans. In addition, California tiger salamander hybrid management, discussed in **Appendix K**, will be addressed in relevant reserve unit management plans.

Fire Management

Each reserve unit management plan will include a section on fire management. The fire management section of each reserve unit management plan will include a description of minimum impact suppression techniques, which are described in more detail below. The plans will also include the following elements specific to each reserve:

- A map of fire access roads and gates.
- Identification of fuel-load management methods and criteria for their application.
- Criteria and procedures for use of prescribed fire for management purposes (burn plan).
- A description of fire-suppression criteria, procedures, resources, and responsibilities, including criteria for selecting fire-fighting water sources.
- A discussion of restoration/rehabilitation of vegetation following a fire.

Fire is an important natural component of local ecosystems. Therefore, some wildfires will be allowed to burn naturally to provide periodic disturbances that

will benefit natural communities and covered species, within the larger land-use context. The fire management component of each reserve unit management plan must include a clear decision system to determine when a wildfire will be left to burn and when it must be partially or wholly contained to prevent damage to structures, prevent injuries, prevent impacts to neighboring properties (including loss of forage and livestock), or cause excessive disturbance to natural communities.

The fire management component of each reserve unit management plan must be consistent with achieving the biological objectives of the reserve, as well as associated regulatory requirements. Reserve fire management components will be coordinated with the California Department of Forestry and Fire Protection (Cal-Fire) and any other firefighting agency that has responsibility for Reserve System lands. Copies of all fire plans, including maps of access roads, gates, and biologically sensitive areas, will be provided to all firefighting units. Additionally, the plans may include prescribed burn guidelines for management of fire-dependent natural systems. This would include coordination with other land management entities to assure adequate availability of burn permits from the Bay Area Air Quality Management District.

The development of the fire management component of each reserve unit management plan will include, based on the location of existing access roads and gates, an assessment of the need to develop additional fire access roads sited to minimize impacts on sensitive species and communities and to minimize the need for new access roads (which could affect sensitive species and communities) to be constructed under emergency conditions (i.e., during fires). In addition, all access gates will include common locks, inventoried and regularly checked by the Implementing Entity, which will allow for ready access by firefighting agencies.

Maintenance of Infrastructure

Each reserve unit management plan will include a map showing the location of infrastructure, such as livestock grazing infrastructure, roads, firebreaks, fences, gates, pumps, wells, water control structures, ditches, canals, drains, powerlines, and buildings. The reserve unit management plan will include a schedule for inspecting infrastructure to determine the need for maintenance. Work needed to maintain infrastructure that is necessary for maintaining reserves (e.g., firebreaks, fences) will be conducted as soon as practicable after the need for maintenance has been identified. The reserve unit management plan will also identify periods during which maintenance activities will be conducted to avoid or minimize adverse effects on natural communities and covered species. Applicable avoidance and minimization measures described in Chapter 6 will also be applied. The Implementing Entity will include as a section in the reserve unit management plan a hazardous materials management/spill prevention plan to identify procedures that must be followed if hazardous materials are encountered or a spill occurs on the reserve.

Monitoring Requirements and Adaptive Management

Each reserve unit management plan will include monitoring and adaptive management for the species, threats, and management actions within the reserve.

All management actions described in the reserve unit management plan will take into account the adaptive management program described in Chapter 7. Reserve unit management plans will include a description of how the results of the effectiveness monitoring will be used to adjust management of the reserve unit within the decision-making structure of the adaptive management process.

Recreational Use

The participation of County Parks and the Open Space Authority in the conservation strategy requires that public access be permitted within the Reserve System. For Reserve System lands that permit public access, each reserve unit management plan will address recreational use that is compatible with the preservation and enhancement of natural communities, covered species, and biological diversity on the reserve. The recreation component of the reserve unit management plan will apply the allowances and restrictions described in Condition 9 to the management unit.

Agricultural Lands

The Habitat Plan does not require acquisition of cultivated agricultural lands (i.e., grain, row-crop, hay, disk/short-term fallowed land cover type or irrigated pastures). However, acquisition of a larger site could include some cultivated agricultural land. For reserves that include cultivated agriculture, each reserve unit management plan will describe the agricultural practices that will be undertaken to ensure the land's compatibility with the Habitat Plan. The reserve unit management plan will also include limitations on permitted practices to reduce adverse effects of some practices on covered and other native species. Ongoing agricultural practices will be allowed if they are compatible with the goals and objectives of this Plan. If these ongoing agricultural practices are not compatible with the goals and objectives of this Plan, the parcel will either not be incorporated into the Reserve System or portions of an individual parcel with incompatible uses will be excluded from the Reserve System. Agricultural lands receive credit and enrollment into the Reserve System only if the site supports the biological goals and objectives of the Plan.

The key elements of the agricultural component (e.g., conservation goals and standards) will be negotiated with the landowner and included in the conservation easement when this form of ownership interest is acquired. The agricultural component will include details on the techniques and tools that will be used to achieve these goals. See Chapter 8 for the required elements of these easements, including the prohibitions on uses that would degrade the conservation value of the easement land. Preparation of reserve unit management plans will include opportunities for public review and comments.

Mosquito Abatement

Any mosquito control activities to be performed on Reserve System land will be addressed in the reserve unit management plan in consultation with the Santa Clara County Vector Control District. The Implementing Entity will work with the Santa Clara County Vector Control District to create a unified mosquito control strategy that will apply to the entire Reserve System. All reporting requirements will be consistent with those required by the Santa Clara County Vector Control District and the U.S. Department of Agriculture. The reserve unit

management plan will include specific detail related to that unit. It will also explain specific measures implemented to avoid and minimize impacts to covered species consistent with the Habitat Plan.

5.2.6 Alternative Conservation Strategies

To facilitate the decision-making process, three alternative conservation strategies were developed that served as the basis for the preferred conservation strategy described in this chapter. Before the alternatives were developed, the Permittees established the following criteria, all of which had to be met for an alternative conservation strategy to be considered.

- Meet all applicable regulatory standards of ESA and the NCCP Act.
- Be technically feasible.
- Provide real choices in action and cost.
- Reflect the range of preferences of local agencies and stakeholders.
- Be easily distinguishable (i.e., vary as few parameters as possible).
- Support the CEQA/NEPA process, if possible.

Affordability was considered as a criterion and the Permittees felt that, while the preferred alternative must be affordable, it may be useful to have an alternative that is potentially unaffordable. Such an alternative helps to establish the "maximum practicable" conservation strategy, as required by ESA.

The alternative strategies developed differed primarily in the amount and location of land acquisition required. The details of the three alternative conservation strategies were released in June 2007 in the preliminary working draft of Chapter 5. Land acquisition ranged from 30,000 acres in Alternative 1 to 40,000 acres in Alternative 2 to 58,000 acres in Alternative 3. The alternatives also differed in the amount of existing open space incorporated into the Reserve System. Alternative 1 relied heavily on existing open space while Alternative 3 did not rely on any existing open space; Alternative 2 relied on a moderate amount of existing open space for the Reserve System. The three alternative conservation strategies were considered by the Wildlife Agencies and the Stakeholder Group in a series of meetings between July 2007 and June 2008 and through written comments. The public was also given the opportunity to review the alternative conservation strategy at a public meeting on September 26, 2007.

To develop the preferred conservation strategy, elements were taken from each alternative to best meet the biological goals and objectives of the Plan with the least cost. Although Alternative 3 would result in the greatest benefit to the covered species and natural communities, it was determined that this alternative was unaffordable and would result in infeasible development fees. The preferred land acquisition strategy, as described below in Section 5.3.1 *Land Acquisition and Restoration Actions*, combines elements from all three alternatives but mostly falls between Alternatives 2 and 3 in scale and scope.

5.2.7 Data Sources

The primary sources of data for the conservation strategy were the ecological accounts of covered species (**Appendix D**), the species distribution models (**Appendix D**), and the inventory of existing conditions summarized in Chapter 3. Other sources consulted to develop the conservation strategy are cited throughout the chapters. Additional general sources are listed below.

- Species recovery plans, if available (California Red-Legged Frog [U.S. Fish and Wildlife Service 2002], Least Bell's Vireo [U.S. Fish and Wildlife Service 1998b], Serpentine Soil Species of the San Francisco Bay Area [U.S. Fish and Wildlife Service 1998c], Upland Species of the San Joaquin Valley [U.S. Fish and Wildlife Service 1998a]).
- Species and natural community experts, including the independent Science Advisors for the Plan.
- Approved or in-process HCPs for adjacent or nearby areas with similar natural communities and covered species (e.g., San Francisco Public Utilities Commission Alameda Watershed HCP (ICF International 2010a) [in process], Pacific Gas and Electric Company Bay Area Operations and Maintenance HCP (ICF International 2010b) [in process], East Contra Costa County HCP/NCCP (Jones & Stokes 2006) [approved]).
- Local land acquisition priorities of open space agencies and organizations, where they overlap with the biological goals and objectives of the Plan: County Parks (County of Santa Clara 1987), Open Space Authority, The Nature Conservancy (The Nature Conservancy 2004, 2006b), National Audubon Society (National Audubon Society 2008), and Peninsula Open Space Trust.
- Management or mitigation plans for large-scale projects in the study area that address biological goals and objectives similar to those of the Plan (e.g., Kirby Canyon landfill, SR 152/156 Interchange).

5.3 Conservation Actions

The conservation strategy is composed of a series of *conservation actions*. Conservation actions are tools, strategies, comprehensive programs, and actions to conserve natural communities, habitats, and landscape-level processes and to conserve and help recover covered species in the study area. Tiering off of the biological goals and objectives (Section 5.2.1 *Biological Goals and Objectives*), conservation actions also occur at the landscape-level, natural community-level, and species-level. Conservation actions are grouped into two major categories—land acquisition actions and management actions—and are given unique labels and numeric codes according to their topic area. All conservation actions are listed sequentially in **Tables 5-2a and 5-2b**. The relationship of these conservation actions with the biological goals and objectives is presented in at the landscape-level (**Table 5-1a**), the natural community-level (**Table 5-1b**) and species-level (**Tables 5-1c and 5-1d**). Included as management actions are

studies that will address key management questions related to the covered species and natural communities (**Table 5-2b**). The results of these studies will be incorporated into the adaptive management process described in Chapter 7. Therefore, management actions will be adjusted in response to the results of these studies.

The following subsections describe in detail the landscape-level and natural community-level conservation actions. Section 5.4 *Benefits of and Additional Conservation Actions for Covered Species* relates the landscape-level and natural community level conservation actions to each covered species, while also discussing in detail the species-level conservation actions.

5.3.1 Land Acquisition and Restoration Actions

An important part of the conservation strategy is the creation of a Reserve System. Many parts of the Reserve System will link existing protected areas with newly protected lands. When completed, this Reserve System will protect substantial areas of high-quality habitat for covered species and will provide extensive new opportunities for habitat enhancement, restoration, and creation. The term "land acquisition" includes acquisition of all aquatic land cover types including wetlands, ponds, and streams.

All lands in the Reserve System will be enhanced, as indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program, to improve habitat for covered species and natural communities. The details of habitat enhancement activities are described starting in Section 5.3.2 *Landscape Conservation and Management*. Habitat restoration and creation will occur in targeted sites for wetlands, streams, and ponds as described in Sections 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management* and 5.3.7 *Wetland and Pond Conservation and Management*.

The land acquisition process is described in Chapter 8, Section 8.6 *Land Acquisition*. All land acquisition will be proposed to CDFG and USFWS for review and approval to ensure consistency with the biological goals and objectives.

Acquisition Requirements by Land Cover Type

Acquisition Requirements for Terrestrial Land Cover Types

The minimum land acquisition required under the Habitat Plan for terrestrial land cover types is 32,850 acres, as shown in **Table 5-11**. Additional minimum land acquisition requirements apply to some conservation analysis zones and for aquatic land cover types, as described below. Actual acquisition of some land cover types will likely be greater than the combined minimum requirements

because parcel boundaries typically do not follow ecological boundaries, and the boundaries of acquired parcels will include land cover types that are not specified by acquisition requirements[12]. In addition, qualitative requirements for habitat connectivity or for preservation of plant occurrences could require additional acreage.

All terrestrial land acquisition must be accomplished by Year 45 of the permit term. This requirement is in place to ensure that all lands incorporated into the Reserve System have at least 5 years to be managed, enhanced, and monitored according to the terms of the Plan before the permits expire. This time period will enable the Wildlife Agencies to closely monitor the final land acquisitions to ensure the Implementing Entity will complete the land acquisition strategy and achieve the final biological goals and objectives. Management of these lands however, will occur in perpetuity.

To estimate the actual extent of the Reserve System, the amount of land that would need to be acquired to meet all the requirements of this Plan was estimated. The actual size of the Reserve System will be different than the estimated amount because of the uncertainty in which parcels are acquired. Regardless of the final Reserve System size, all land acquisition requirements described in this chapter must be met by Year 45 of the permit term.

Acquisition and Restoration Requirements for Aquatic Land Cover Types

As described above, the primary approach to conservation of terrestrial land cover types is through preservation and enhancement of lands based on regional estimates of impacts and the conservation needs of the covered species and natural communities. The approach to mitigating and conserving aquatic land cover types (wetlands, ponds, streams, and riparian woodland and scrub) differs from the approach to other land cover types. As described in Chapter 4, there is greater uncertainty in the degree of impact on aquatic features than on other land cover types. This is due, in part, to the uncertainty in some of the land cover mapping (particularly regarding wetlands; see **Table 3-4**). It is also due to the coarse scale of development designations within the local jurisdictions relative to the scale of these aquatic features. For example, even though an area may be designated for residential development, it is anticipated that residential projects will, for the most part, avoid riparian woodland and streams within their boundaries. Because it is difficult to predict the level of onsite avoidance, the Habitat Plan utilizes conservation ratios that are tied to actual impacts during Plan implementation to determine the necessary level of conservation.

All wetlands, ponds, and streams to be affected or preserved will be delineated in the field prior to impacts or acquisition as described in Section 6.8.4. Delineations may not always be feasible prior to acquisition for the Reserve System. Since land will be acquired on a willing seller basis, the Implementing

[12] For example, a 1,000-acre parcel may have required land cover types on 950 acres. Therefore, the remaining 50 acres of the parcel would not count towards Plan requirements.

Entity will need to respond quickly and may not always have the opportunity to conduct a pre-acquisition delineation. If infeasible, a delineation would occur within one year of acquisition. To offset impacts on these aquatic land cover types, the Implementing Entity will acquire these land cover types in-kind within reserves according to the ratios in **Table 5-12**. As with terrestrial land cover types, all aquatic land cover types must be acquired by Year 45. This requirement is in place to ensure that all lands incorporated into the Reserve System have at least 5 years to be managed, enhanced, and monitored according to the terms of the Plan before the permits expire. This time period will enable the Wildlife Agencies to closely monitor the final land acquisitions to ensure they will complete the land acquisition strategy and achieve the final biological goals and objectives.

To ensure a minimum level of protection of wetlands and other aquatic land cover types and ensure contribution to recovery for the covered species, regardless of the level of impact, the Implementing Entity must acquire at least 250 acres of riparian forest and scrub, 40 acres of central California sycamore alluvial woodland, 10 acres of coast and valley freshwater marsh (perennial wetland), 5 acres of seasonal wetland, 50 acres of ponds, and 100 miles of streams as shown in **Table 5-13**. Because there is a finite amount of these relatively rare land cover types in the study area not already protected in open space, the minimum protection levels can be met through preservation needed for mitigation. In addition, the preservation ratios for aquatic land cover types include a recovery component. For example, if all 25 acres of impacts occur to coastal and valley freshwater marsh, then 50 acres of this land cover type must be preserved in the Reserve System. Because of the limited availability of this land cover type, the minimum preservation of 10 acres will be fulfilled by the preservation of 50 acres (i.e., it may be infeasible to make the mitigation and minimums additive). In another example, if only 2 acres of impacts occur to coastal and valley freshwater march, then the minimum of 10 acres of preservation must occur (applying the mitigation ratio of 2:1 only reaches 4 acres of preservation).

Aquatic land cover types will also be restored or created according to the ratios in **Table 5-13**. Guidelines for restoration and creation for each natural community are described in the sections below on each natural community. All restoration and creation construction must be completed by Year 40 of the permit term. This requirement is in place to ensure that there is at least 10 years before the end of the term in which to monitor success criteria and take remedial actions in the event that success criteria are not being met.

To ensure a minimum level of restoration or creation that will contribute to species recovery, the Implementing Entity will restore or create 50 acres of riparian woodland, 20 acres of freshwater marsh, 20 acres of ponds, and 1 mile of streams (**Table 5-21**). These restoration and creation requirements are in addition to those required to offset impacts to these land cover types. To ensure that the Implementing Entity makes steady progress towards the final minimum creation and restoration goals, interim deadlines are established for each of the five applicable land cover types (**Table 5-14**). Interim deadlines are established for Years 15, 30, and 40.

Wetlands and streams exhibit a high degree of biological, physical, and hydrologic diversity in the study area. Consequently, it is important to preserve, enhance, restore, or create the full diversity of these land cover types as they occur in the area. Wetland delineations conducted prior to wetland impacts will be used, in part, to classify wetland types lost to ensure that the same types are being acquired and restored or created within Habitat Plan reserves. In addition, vegetation in wetlands and streams will be classified at the association or alliance level (rather than as a single land cover type) in order to help ensure that a diversity of communities is preserved.

Limits on impacts on aquatic land cover types are described in **Table 4-2** and preservation will occur in accordance with the preservation ratios in **Table 5-13**. Preservation ratios were determined on the basis of the following factors.

- The rarity and irreplaceability[13] of the land cover type within the inventory area (rarer and more irreplaceable land cover types have higher ratios).
- The biological value of the land cover type (e.g., overall biological diversity, function as habitat for covered species, ecosystem function).
- Mitigation ratios previously accepted by state and federal regulatory agencies (these ratios were used as starting points for this Plan).

Avoidance and minimization of impacts on aquatic land cover types (see Chapter 6) at project sites may reduce the amount of preservation area required if preserved aquatic land cover types meet minimum distance requirements from dense urban development (see *Buffer Zones within the Reserve System* below). Note that project proponents who receive take authorization under this Plan and who wish to fill jurisdictional wetlands and waters must obtain separate permits and certification from USACE and the Regional Board, respectively, to comply with CWA Sections 404 and 401, and may also need permits from the Regional Board under the Porter-Cologne Water Quality Control Act and a streambed alteration agreement with CDFG under California Fish and Game Code Sections 1600 et seq.

Buffer Zones within the Reserve System

Fuel Buffers

When the Implementing Entity acquires land adjacent to existing or planned urban development[14] that has no buffer zone, or an inadequate buffer zone, one may be created on the reserve according to the terms described in Chapter 6, Section 6.4.6, subheading *Condition 10 Fuel Buffer*. The buffer zone will experience a reduction in habitat function due to the indirect effects of urban development (see Chapter 4). To account for this loss of habitat function, any area adjacent to development that is disked, mowed, and/or sprayed with herbicides for fuel management will not be credited toward land acquisition

[13] A habitat or land cover type is irreplaceable if it cannot be restored or created elsewhere due to unique soil requirements, topography, or other conditions.
[14] Defined as the planning limit of urban growth (see Chapter 2) or the Urban Service Area, whichever is greater.

requirements (see Chapter 6 for required fuel buffers). The remainder of any buffer zone may be credited toward terrestrial land cover because it will provide habitat for some species and serve an important function. However, aquatic land cover types and aquatic covered species breeding habitat without sufficient buffer zones will not be credited toward meeting preservation requirements because their proximity to intensive urban development can greatly reduce their habitat value. See **Table 5-15** for minimum setback distances required for aquatic land cover types to be counted toward Plan requirements for preservation and restoration or creation (**Table 5-12**).

Plant Occurrence Buffers

In order for a plant occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses. Adverse land uses include permanent land uses that could endanger the long-term viability of the plant occurrence; including urban development, landfill, and other intensive land uses. A 500-foot buffer was recommended in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c), and this same buffer has been extended to the only covered plant not restricted to serpentine soils, the Loma Prieta hoita.

This buffer may be reduced under specific circumstances where, based on documented site conditions, plant occurrences are protected from adverse land uses by another means. For example, a reduced buffer may protect the viability of a plant occurrence if a major physical barrier separates the occurrence from adjacent land use. Conversely, the buffer may need to be increased in specific circumstances where, based on documented site conditions, plant occurrences are not afforded adequate protection from adjacent land uses. For example, to minimize hydrologic effects of adjacent land use on an occurrence located down-gradient, a buffer exceeding 500 feet may be necessary. Adequacy of the 500-foot buffer will be determined by the Implementing Entity, in coordination with the Wildlife Agencies. Buffers surrounding protected plants will also expand as plant occurrences expand, assuming space is available after covered activities are completed. In other words, occurrence expansion will not result in a reduced buffer.

Incorporating Covered Plant Species

The locations of all covered plants within the study area are not known due to survey and mapping limitations. Habitat distribution models were developed for 6 of the 9 covered plant species (see Chapter 3 and **Appendix D**), but the conservation value of these models is limited because of the paucity of known occurrences of most species in the study area. The habitat requirements of the remaining species are not well known enough to develop a credible model at this time. Many covered plants likely have unique microhabitat requirements such as soil types or plant associations that cannot be mapped at the regional scale used in this Plan.

Despite model limitations, for compliance purposes, impacts on all covered plants will be limited by known *occurrences* (**Table 4-6**) and modeled habitat for

the 6 covered plants for which habitat models were developed (**Table 4-4**) if additional occurrences are not discovered during the permit term. Similarly, mitigation and conservation will be based on known occurrences (**Tables 5-16**) and modeled habitat (**Table 5-17**). Additional known occurrences and new occurrences not yet discovered at the time of permit issuance can be impacted up to the limits described in **Table 5-16** and in accordance with the criteria described below. For all but one covered species, a plant occurrence is defined as a group of individuals that are separated by at least 0.25 mile from other groups of individuals of the same species or subspecies. This definition was used to be consistent with how plants are tracked by the CNDDB, and to facilitate compliance monitoring by the Plan (see Chapter 7). For Santa Clara Valley dudleya, a distinct occurrence is ecologically a group of individuals on a rock outcrop. These rock outcrops often occur less than 0.25 mile from each other. A different definition of an occurrence was used for this species because of its unique clumped distribution on rock outcrops.

In some cases, an occurrence may be equivalent to a population; in other cases, multiple occurrences may form a single population. A biological population is defined differently for each of the covered plants and is often unknown due to a lack of population data. Therefore, an occurrence provides a single standard by which to measure impacts and conservation for all covered plants. During implementation, the Implementing Entity may conduct monitoring or management actions based on populations, which is a more biologically meaningful unit.

The Implementing Entity must ensure that adequate numbers of occurrences of covered plants are protected in the Reserve System. The conservation strategy for each plant species includes the acquisition (preservation) and/or creation of covered plant occurrences. Both acquired and created occurrences will be permanently protected in the Reserve System. Land containing occurrences of covered plants will be acquired from willing sellers in fee title or through establishment of conservation easements.

Almost all known occurrences of covered plants in the study area are found outside the planning limit of urban growth and away from the footprint of covered activities. Therefore, many occurrences are expected to be included in the Reserve System as it is established. However in order to ensure that covered plant occurrences are protected, the land acquisition actions listed below include specific requirements for covered plants.

Preservation of covered plant occurrences must occur ahead of the impacts to each plant species, as described in the Stay-Ahead provision in Section 8.6.1 *Stay-Ahead Provision*. Impacts to all plants, with the exception of the Coyote ceanothus (see Section 5.4.11) will be offset by the acquisition of occurrences of the same species that is at least equivalent in size[15] and of the same or better "condition" than the impacted occurrence. The number of occurrences that must

[15] Measured as either plant cover or number of individuals, whichever is most appropriate for the species and site. The occurrence size that must be matched or exceeded is the occurrence size at the time of impact, which may be different from the known occurrence size during the development of this document.

be acquired prior to impacts will be in accordance with the Plan's species-specific mitigation ratios (**Table 5-16**). For example, although the Plan proposes to preserve 55 occurrences of Santa Clara dudleya if additional occurrences were not discovered during the permit term, four occurrences of equal or greater size and same or better condition must be acquired prior to each impact. In other words, all 55 occurrences of Santa Clara dudleya do not need to be acquired prior to the first impact. Acquisition ratios were not developed for the Tiburon Indian paintbrush, Coyote ceanothus, and Metcalf Canyon jewelflower, the three plant species for which additional impacts are not covered by the Plan even if additional occurrences are discovered during the permit term. For more details, refer to species-specific acquisition timing requirements in Section 5.4 *Benefits of and Additional Conservation Actions for Covered Species*.

If the Implementing Entity cannot protect the necessary plant occurrences, then proponents of projects that will have impacts on covered plants will be required to protect the covered plant occurrences in order to receive take authorization under this Plan for any covered species.

To ensure that the Plan adequately protects covered plants, site-specific surveys in impact areas (described in Chapter 6), and site inventories conducted in new reserves, will document the presence, absence, and condition (as defined below) of occurrences of covered plants. When known, this information will also inform the land acquisition process. Field assessments will consist of one season of surveys for all species, except when there is evidence that a single season may not provide adequate information to make a reliable assessment of condition as defined below. Reasons for a second season of surveys could include:

- Extreme weather (e.g., unusually low or high rainfall), fire, or other natural condition or disaster during the survey year that creates unusual negative or positive growing conditions.
- Disease appears to be affecting greater than 50% of an occurrence, especially of woody species.

For the purposes of this Plan, "good condition" of a covered plant occurrence is defined as a high potential to increase in size with improved management. The condition of a plant occurrence will be assessed in the field by a qualified botanist on the basis of the characteristics listed below.

- **Physical health.** Individuals in good or excellent physical health (e.g., little or no signs of disease, viruses, severe herbivory, nutrient deficiencies) are more likely to survive, achieve an average or above-average lifespan, and reproduce successfully than individuals in poor physical condition. Plants in good physical health generally also indicate a highly suitable site.
- **Age structure.** Occurrences of perennial species with an age distribution that includes many seedlings or juvenile plants relative to adults suggests a stable or positive rate of occurrence growth. Additionally, for annual and perennial species, seeds or bulbs in the soil (i.e., the seed bank) are also part of a plant occurrence's age structure, but this component is generally very difficult to assess.

- **Reproductive success.** Occurrences with evidence of average or above-average reproductive success for the species (e.g., production of flowers per plant, seed production per flower or per plant, proportion of seeds that appear to be viable based on visual observations) are more likely to be increasing than occurrences with below-average reproductive success, because this is often a key component of occurrence growth rate. If reproductive success cannot be measured, plant size or other physical features may be an appropriate surrogate in some covered species.
- **Availability of suitable habitat.** In order for a plant occurrence to remain stable or grow, enough suitable habitat must be present. Occurrences near unoccupied suitable habitat or without evidence of shrinking suitable habitat areas (e.g., nonnative plant populations that may be expanding, native shrubs that may be advancing) will be considered in better condition than occurrences without these indicators.
- **Diversity of suitable habitat.** Occurrences that occupy a wide range of microhabitats for the species may exhibit relatively high genetic diversity and therefore occurrence condition. Occurrences that occupy unusual microhabitats for the species may indicate unusual genetic composition or adaptations that should be protected.
- **Threats.** Threats to occurrences within the Reserve System will be assessed to ensure that protection and improved management will not be undermined by external factors such as disease, severe herbivory, recreational uses, or adjacent land uses. Occurrences in danger from threats that can be addressed should be considered in better condition than those that cannot be addressed.

The location of affected plant occurrences and the location of the preserved or created plant occurrences will also be taken into consideration by a qualified botanist. In some cases, it may be beneficial to preserve occurrences that would expand the current range of a species. In other cases, preservation of genetic integrity in a specific locality may have more conservation value. The Implementing Entity will consult the Wildlife Agencies on the location of preserved and created occurrences to ensure that the biological goals and objectives of each species are met.

Sites selected for preservation of plant occurrences in good condition will be incorporated into the Reserve System to ensure long-term viability of these occurrences. Reserves will contain sufficient suitable habitat for the covered plant to support occurrence expansion and fluctuation and to apply beneficial management techniques such as appropriate disturbance regimes.

When practicable, all lands protecting covered plant occurrences will be connected to existing protected areas or Habitat Plan reserves. When not practicable, the minimum reserve size to protect covered plant occurrences will be determined on the basis of site-specific conditions but will not be less than 40 acres unless acquiring a smaller site is the only way to meet a land-acquisition requirement in this Conservation Action (i.e., all other options have been exhausted). The minimum reserve size required for the long-term viability of covered plant occurrences will vary depending on species, site conditions,

occurrence status, and surrounding land uses but will generally be unknown. A 40-acre minimum has been established because it is a common parcel size in the study area (1/16 of a section) and because this is the estimated minimum size needed to properly manage a site in the study area. Because land acquired for the Reserve System must be linked to other Habitat Plan reserves or existing public lands whenever possible, few, if any, isolated, 40-acre reserves will be established. Additionally, reserves must be configured to minimize the extent of edge (e.g., rectangles, squares, or circles instead of strips or fragments).

Created occurrences will not count toward the Stay-Ahead provision for plants and will not be used to mitigate adverse effects, with the exception of the Coyote ceanothus. Created plant occurrences will therefore only contribute to species recovery due to the highly experimental nature of this technique.

Land Acquisition Requirements by Conservation Analysis Zone

To ensure that acquisition occurs in locations that will maximize the benefits to natural communities and covered species, acquisition requirements are also defined by conservation analysis zone (**Figure 5-5**) or by a combination of zones. In addition to numeric land acquisition requirements by land cover and zone, qualitative land acquisition requirements are provided for some zones. For instance, linkage of existing public lands or preservation of covered plant occurrences could be required. The requirements for land acquisition within the zones or groups of zones are described below, generally from north to south in the study area. The relevant acquisition actions from **Table 5-2a** are also referenced.

The proposed land conservation strategy is shown in **Figure 5-7**. **Table 5-18** describes land acquisition and enhancement requirements for select conservation analysis zones where geographic specificity was required to ensure that Plan goals and objectives were met. This figure illustrates the relative level of land acquisition effort that would occur in each of the conservation analysis zone (high, moderate, or low) based on the specific land acquisition requirements described below. The landscape linkages protected or partially protected by the land conservation strategy are shown in **Figure 5-8** (linkages correspond to those in **Table 5-9** and **Figure 5-6**).

Alameda-1 and Coyote-7

The Alameda-1 conservation analysis zone lies at the northern edge of the study area in the Alameda watershed. This zone is combined with the adjacent Coyote-7 zone for the purposes of the land acquisition strategy because together they create an important linkage outside the study area. In addition, land cover types and species habitat in the two zones are similar. The primary purposes of the land acquisition strategy in these conservation analysis zones are listed below.

- Enhance connectivity and linkage between large blocks of existing open space in the northeast corner of the study area and the large network of existing open space adjacent to the study area to the north (Linkage 4 in **Table 5-9** and **Figure 5-8**) (LAND-L7).
- Protect large stands of valley oak woodland (LAND-OC3).
- Protect stands of northern coastal scrub/Diablan sage scrub (LAND-C3).
- Protect upper watershed tributaries of Upper Penitencia Creek (important breeding habitat for foothill yellow-legged frog) and Cherry Flat Reservoir (LAND-L1, LAND-R5).
- Protect an area with a high density of ponds and likely breeding habitat for California red-legged frog, California tiger salamander, and western pond turtle (LAND-G2, LAND-OC1, LAND-OC2, LAND-OC3, LAND-OC4, LAND-OC5, LAND-WP3a, LAND-WP3b, LAND-WP6a, LAND-WP6b).
- Protect designated critical habitat for California red-legged frog and California tiger salamander (LAND-WP4).
- Protect elevation gradients in the north of the study area under threat from rural residential development (LAND-L2a, LAND-L2b, LAND-L-2c, LAND-L2d).

Land acquisition in these conservation analysis zones will expand the existing open space in the northeast corner of the study area and provide an important linkage to more than 75,000 acres of contiguous protected areas to the north in Santa Clara and Alameda Counties. Acquisition in this area also provides a unique opportunity to protect extensive stands of valley oak woodland, critical habitat for three covered species, and elevation gradients, all with moderate amounts of acquisition. Acquired lands are expected to have excellent potential for freshwater marsh restoration and pond creation.

The specific land acquisition requirements for these conservation analysis zones are shown below.

- Acquire natural land cover types in the two conservation analysis zones as shown in **Table 5-18**.
- Land must be acquired to connect existing open space adjacent to the conservation analysis zones to the north and south.
- The landscape linkage between the study area and SFPUC lands to the northwest must be widened to at least 1.0 mile.

Guadalupe-1 and -3

Guadalupe-3 is one of the largest conservation analysis zones in the study area. However, this zone is largely composed of urban development in San José. The southern edge of Guadalupe-3 supports small but important patches of serpentine grassland, including the north side of Tulare Hill. Guadalupe-1 is combined with Guadalupe-3 for the purposes of the land acquisition strategy because of the

similar land cover types found along their borders. The primary purposes of the land acquisition strategy in these conservation analysis zones are listed below.

- Link large block of protected lands south of Calero Reservoir with Almaden Quicksilver County Park and extensive protected lands outside the study area to the west in the Santa Cruz Mountains (Linkage 9 in **Table 5-9** and **Figure 5-8**) (LAND-L8).
- Complete the linkage between the Diablo Range and the Santa Cruz Mountains across Tulare Hill (Linkage 8 in **Table 5-9** and **Figure 5-8**) (LAND-L4, LAND-WP7).
- Protect and enhance important stands of serpentine grassland and serpentine chaparral (LAND-C2).
- Protect and enhance watershed functions in the Guadalupe Watershed (LAND-L3).
- Protect stands of northern coastal scrub/Diablan sage scrub (LAND-C3).
- Protect freshwater perennial marsh and seasonal wetlands (LAND-WP1a, LAND-WP1b, LAND-WP2a, LAND-WP2b).
- Protect important occurrences and suitable habitat of covered plants, including Mt. Hamilton thistle, Metcalf Canyon jewelflower, most beautiful jewelflower, smooth lessingia, and Santa Clara Valley dudleya (LAND-P2, LAND-P3, LAND-P4, LAND-P5, LAND-P6, LAND-P7, LAND-P10).
- Protect important habitat and designated critical habitat for Bay checkerspot butterfly (LAND-G3).
- Partner with various public agencies in north San José (e.g., San José Water Pollution Control Plant, VTA) to protect and maintain the second largest population of western burrowing owls in the study area (LAND-G6).
- Protect the watershed of Alamitos Creek and its tributaries (LAND-R5).

Land acquisition in these conservation analysis zones achieve multiple goals and objectives with relatively low levels of land acquisition. First, many occurrences of covered plants can be protected and possibly enhanced with strategic acquisitions. Second, important potential habitat for Bay checkerspot butterfly would be acquired so that improved management can attract butterflies and expand their range locally.

Finally, key acquisitions can also provide important linkages among the existing network of open space in and adjacent to the study area. These acquisitions can also serve as important buffers between existing and future urban areas and extensive open space in the Santa Teresa Hills and Santa Cruz Mountains.

The land acquisition requirements for these conservation analysis zones are listed below.

- Acquire serpentine grassland within the conservation analysis zones as shown in **Table 5-19**.

- Protect and enhance occupied and potential nesting habitat for western burrowing owl consistent with the burrowing owl conservation strategy described in Section 5.4.6 *Western Burrowing Owl*.
- Acquire at least 1,600 acres in the Guadalupe Watershed as a whole.
- Link Santa Teresa and Calero County Parks.

Coyote-4

Conservation analysis zone Coyote-4 comprises much of the upper watershed of Coyote Creek above Anderson Reservoir (**Figure 5-5**), including some of San Felipe Creek and its tributaries, as well as a portion of Coyote Ridge. The primary purposes of the land acquisition strategy in this conservation analysis zone are listed below.

- Provide landscape linkage between Coyote Ridge and mid- to high-elevation natural communities in the Diablo Range (Linkage 7 in **Table 5-9** and **Figure 5-8**).
- Protect linkage between J. Grant Park and Henry Coe (Linkage 5 in **Table 5-9** and **Figure 5-8**)
- Protect and enhance important stands of valley oak and blue oak woodland (LAND-OC3), mixed oak woodland and forest (LAND-OC1), and annual grassland (LAND-G2).
- Protect and enhance watershed functions in the Coyote Watershed (LAND-L3).
- Protect stands of northern coastal scrub/Diablan sage scrub (LAND-C3).
- Protect and enhance riparian forest along lower San Felipe Creek and its tributaries (LAND-R2, LAND-R5).
- Protect and enhance potential nesting and overwintering habitat for western burrowing owl, and potential breeding and foraging habitat for tricolored blackbird.
- Protect and enhance potential breeding habitat and extensive upland habitat for covered amphibians and western pond turtle (LAND-G2, LAND-OC1, LAND-OC2, LAND-OC3, LAND-OC4, LAND-OC5, LAND-WP3a, LAND-WP3b, LAND-WP5, LAND-WP6a, LAND-WP6b).
- Protect and enhance annual grasslands that support or could support California ground squirrels to provide food and shelter for covered and native species (LAND-G8).
- Protect freshwater perennial marsh and seasonal wetlands (LAND-WP1a, LAND-WP1b, LAND-WP2a, LAND-WP2b).
- Protect designated critical habitat for California tiger salamander.

This conservation analysis zone is noteworthy because of its relatively high concentration of desirable land cover types: blue oak woodland, valley oak

woodland, riparian woodland (including high quality sycamore alluvial woodland) and forest, and ponds. Moreover, these areas are largely unsurveyed and may contain important undocumented occurrences of covered plants. Covered wildlife species known or with potential to occur in this area are California red-legged frog, California tiger salamander, western pond turtle, and foothill yellow-legged frog; extensive habitat for these species occurs in this conservation analysis zone. Acquisition in this zone would also support a large proportion of the annual grassland in the Reserve System. These lands may also support secluded rock outcrops or large trees overlooking open grassland that would protect suitable nesting sites for golden eagle and other raptors.

The land acquisition requirements for this conservation analysis zone are listed below.

- Acquire natural land cover types in conservation analysis zone as shown in **Table 5-18**.
- Acquire serpentine grassland within the conservation analysis zones as shown in **Table 5-19**.
- Provide landscape linkage along Coyote Ridge between Anderson Lake County Park and the Silver Creek Hills (Linkage 6 in **Table 5-9** and **Figure 5-8**).
- Connect Coyote Ridge with the San Felipe Ranch Conservation Easement.

In 2008, creation of the San Felipe Ranch Conservation Easement protected all of the remaining unprotected ponderosa pine woodland in the study area. Therefore, no ponderosa pine woodland is available to protect in the Reserve System. There is also no impact expected to this land cover type.

Coyote-5 and 6

Conservation analysis zone Coyote-5 encompasses the southern end of the Coyote watershed and the southern half of Coyote Ridge (**Figure 5-5**). Because this subwatershed spans Coyote Valley, it also includes the eastern extent of the Santa Teresa Hills and the lower foothills of the Santa Cruz Mountains west of Coyote Valley. Coyote-6 encompasses the northern half of Coyote Ridge and the immediate watershed of Silver Creek. The main stem of Coyote Creek below Anderson Dam is excluded from the conservation analysis zone because it occurs within several County parks. These conservation analysis zones were combined for the purposes of the land acquisition strategy because together they include all of Coyote Ridge and support most of the unprotected serpentine grassland in the study area. The primary purposes of the land acquisition strategy in these conservation analysis zones are listed below.

- Provide landscape linkage across Coyote Ridge (Linkage 6 in **Table 5-9** and **Figure 5-8**).
- Enhance the landscape linkage from Coyote Ridge to Coyote Creek, facilitating connections across the Santa Clara Valley (Linkages 8 and 10 in **Table 5-9** and **Figure 5-8**).

- Protect and enhance watershed functions in the Coyote Watershed (LAND-L3).
- Provide a connection from Santa Teresa County Park to Calero County Park.
- Protect and enhance extensive serpentine grassland and serpentine chaparral along Coyote Ridge (LAND-L5, LAND-C2).
- Protect and enhance extensive occupied habitat for Bay checkerspot butterfly and designated critical habitat (LAND-G3).
- Protect freshwater perennial marsh and seasonal wetlands (LAND-WP1a, LAND-WP1b, LAND-WP2a, LAND-WP2b).
- Protect and enhance occurrences of and suitable habitat for covered plants including Mt. Hamilton thistle, Metcalf Canyon jewelflower, most beautiful jewelflower, smooth lessingia, fragrant fritillary, Loma Prieta hoita, Coyote ceanothus, and Santa Clara Valley dudleya (LAND-P1, LAND-P2, LAND-P3, LAND-P5, LAND-P6, LAND-P7, LAND-P8, LAND-P11).
- Protect and enhance annual grasslands that support or could support California ground squirrels to provide food and shelter for covered and native species (LAND-G8), including overwintering habitat for western burrowing owl.
- Protect and enhance upland habitat near and adjacent to Laguna Seca, a future wetland restoration site, for covered species that breed in coastal and valley freshwater marsh (e.g., tricolored blackbird, California tiger salamander, California red-legged frog, and western pond turtle).
- Protect upland habitat connections to Coyote Creek below Anderson Dam, an important regional wildlife linkage (Linkage 10 in **Table 5-9** and **Figure 5-8**).

Land acquisition in these two conservation analysis zones will protect and provide the opportunity to enhance 73% of the remaining suitable and occupied habitat for Bay checkerspot butterfly in Coyote-5 and Coyote-6. Land acquisition in these zones is essential to meeting the conservation objectives for this species. Serpentine grassland and chaparral in these zones also support at least eight covered plant species, sometimes in multiple occurrences; accordingly, conservation in these zones is essential to meeting the plant conservation requirements. To meet the plant conservation targets, serpentine grassland will be acquired on both sides of the Santa Clara Valley, protecting occurrences that may be disjunct from one another. Much of the serpentine chaparral in the Reserve System would be acquired in these zones.

Land acquisition in these conservation analysis zones would also protect and provide opportunities to enhance upland habitat near Laguna Seca. Historically, this large wetland complex was unique in the Santa Clara Valley, supporting a large freshwater marsh and large willow groves (San Francisco Estuary Institute 2006). This wetland complex will be restored by SCVWD to some of its historic condition in conjunction with the approved Coyote Valley Research Park development.

The valley floor between Tulare Hill and Anderson Reservoir is one of the narrowest points in the Santa Clara Valley between the Santa Cruz Mountains and the Diablo Range (Linkages 8, and 10 in **Table 5-9** and **Figure 5-8**). The land acquisition strategy in Coyote-5 focuses on protecting lands east and west of Coyote Creek to allow terrestrial and aquatic wildlife to continue to access and use that creek as a movement corridor (portions of both sides of the creek are already protected by County Parks). Additional land acquisition in the Coyote Valley could occur, but it is not required. As development intensifies on the valley floor in this zone west of the creek, Coyote Creek will increasingly become the primary corridor for terrestrial wildlife moving through the valley.

At least 24 undercrossings or culverts have been documented along this stretch of U.S. 101, most of which are small culverts associated with drainages from Coyote Ridge (though at least one is approximately 6 feet in diameter) (California Department of Fish and Game 2006). There are also two large underpasses that allow wildlife passage under U.S. 101. Many species of wildlife have been documented using these culverts recently, and most of the culverts are utilized by multiple species (T. Diamond pers. comm.). Of the 24 culverts along this stretch of U.S. 101, 19 have Type 1, 2, or 3 open space on both sides of the highway; the remaining five culverts have Type 1, 2, or 3 open space only on the west side of the highway (Coyote Creek Parkway, a County park). The land acquisition strategy in Coyote-5 targets protection of land that provides access to most of the remaining culverts. Management actions within the Reserve System could then focus on enhancing these corridors, as indicated by pre-acquisition assessments and targeted studies. The conservation strategy also includes actions to assess and improve wildlife connectivity in these conservation analysis zones; see Section 5.3.2 *Landscape Conservation and Management* subheading *Connectivity and Permeability*.

The land acquisition requirements for these conservation analysis zones are listed below.

- Acquire serpentine grassland within the conservation analysis zones as shown in **Table 5-19**. Serpentine grassland acquisition must occur on both sides of the Santa Clara Valley.
- Provide linkage between Santa Teresa County Park and Calero County Park.
- Protect at least 50 acres of serpentine grassland east of Santa Teresa County Park.
- Acquire the unprotected portions of the three unprotected occurrences of Coyote ceanothus within Coyote-5.
- Acquire either Kalana 1 or Kalana 2, 3, and 4 populations of Bay checkerspot butterfly (see **Table 5-7** and the species account in **Appendix D**) to protect and enhance habitat for Bay checkerspot butterfly.
- Acquire at least 75% of the currently unprotected portions of mapped habitat for Bay checkerspot butterfly at the Hale and Falcon Crest sites within Coyote-5 and Llagas-3 (see habitat map in species account in **Appendix D**).

Llagas-3

Conservation analysis zone Llagas-3 comprises the northern half of the Llagas Basin subwatershed downstream of Chesbro Reservoir, mostly on the floor of the Santa Clara Valley. This zone includes the city of Morgan Hill and extensive agricultural areas of the valley. It also includes small but important patches of serpentine grassland and riparian woodland. The primary purposes of the land acquisition strategy in this conservation analysis zone are listed below.

- Protect and enhance habitat for Bay checkerspot butterfly on the west side of the Santa Clara Valley (LAND-G3).
- Protect and enhance potential breeding and overwintering habitat for western burrowing owl.
- Protect and enhance the largest population of Coyote ceanothus on the west side of the Santa Clara Valley (LAND-P1).
- Protect designated critical habitat for California tiger salamander (LAND-WP6b, LAND-WP1a, LAND-WP1b, LAND-WP2a, LAND-WP2b).
- Protect occurrences of and suitable habitat for covered plants, including most beautiful jewelflower, Santa Clara Valley dudleya, and smooth lessingia (LAND-P2, LAND-P5, LAND-P7, LAND-P10).
- Provide riparian restoration opportunities along Llagas Creek for least Bell's vireo and other native songbirds (LAND-R2).

Land acquisition on the west side of the Santa Clara Valley within Llagas-3 is essential to meeting the biological objectives for protection of known populations of Bay checkerspot butterfly and Coyote ceanothus. Land acquisition in this area is also important to meeting several plant acquisition targets. Llagas-3 shares conservation targets with Llagas-4 and Uvas-2 for acquisition of critical habitat for California tiger salamander northwest of Gilroy. This area also supports extensive seasonal wetlands and has been proposed as a conservation and wetland mitigation bank (WRA Environmental Consultants 2008).

Land acquisition and riparian/stream restoration along middle Llagas Creek and Little Llagas Creek within Llagas-3 and 4 were considered but rejected. Much of the narrow Llagas Creek is already owned by SCVWD, but the restoration potential is limited by several factors. First, the creek is highly channelized and would therefore require extensive physical modification that may not be feasible in consideration of surrounding lands uses and small parcels. Second, as urban development in Gilroy expands to the east, the habitat value of Llagas and Little Llagas Creeks will diminish. Finally, one of the covered activities in this Plan is a flood protection project along Llagas Creek. While that project will be built to minimize adverse effects on wildlife and habitat, its increasing use as a flood conveyance facility limits its dual use as habitat for covered species. For these reasons, land acquisition and stream and riparian restoration was instead directed to stream reaches with greater potential for enhancement of stream and riparian functions such as Uvas Creek, Carnadero Creek, Lower Llagas Creek, the Pajaro River, and Pacheco Creek.

The land acquisition requirements for this conservation analysis zone are listed below.

- Acquire land in Llagas-3 to fully protect the occurrence of Coyote ceanothus found in this zone.
- Acquire serpentine grassland within the conservation analysis zones as shown in **Table 5-19**.
- Acquire at least 75% of the currently unprotected portions of mapped habitat for Bay checkerspot butterfly at the Hale and Falcon Crest sites within Llagas-3 and Coyote-7 (see habitat map in species account in **Appendix D**).

Llagas-4

Conservation analysis zone Llagas-4 encompasses the southern half of the Llagas Basin, mostly on the floor of the Santa Clara Valley. For convenience, this zone also includes the northern edge of the adjacent watershed that extends into San Benito County (**Figure 5-5**). The primary purpose of the land acquisition strategy in this conservation analysis zone is to protect designated critical habitat for California tiger salamander (LAND-WP6b, LAND-WP1a, LAND-WP1b, LAND-WP2a, LAND-WP2b).

Llagas-4 shares conservation targets with Llagas-3 and Uvas-2 for acquisition of critical habitat for California tiger salamander northwest of Gilroy. This area also supports extensive seasonal wetlands and has been proposed as a conservation and wetland mitigation bank (WRA Environmental Consultants 2008). See Llagas-3 for a discussion of why land acquisition along Llagas and Little Llagas Creek was not a priority within Llagas-3 and 4. There are no specific land acquisition requirements in Llagas-4.

Pescadero-1

Conservation analysis zone Pescadero-1 is located at the southwest corner of the study area and encompasses all of the Pescadero watershed within the study area. This conservation analysis zone includes most of the headwaters of Pescadero Creek. The primary purposes of the land acquisition strategy in this conservation analysis zone are listed below.

- Protect the headwaters and streams of the Pescadero Creek watershed (LAND-L1, LAND-L3, LAND-R5).
- Protect and maintain high-quality redwood forest (LAND-OC6).
- Protect large stands of northern coastal scrub/Diablan sage scrub (LAND-C3) and annual grassland (LAND-G2).
- Protect and maintain high-quality riparian woodland in Pescadero Creek (LAND-R2).

- Facilitate the landscape linkage from the study area to the Lomerias Muertas Range (Linkage 19 in **Table 5-9** and **Figure 5-8**) and to the Gabilan Range (Linkage 20) (LAND-L19).
- Protect a portion of the linkage along the ridgeline of the Santa Cruz Mountains (Linkage 13).
- Protect and enhance habitat for California red-legged frog and western pond turtle in the Santa Cruz Mountains (LAND-WP5, LAND-WP6a, LAND-WP6b).
- Protect strong environmental gradients within the Santa Cruz Mountains (LAND-L2a, LAND-L2b, LAND-L2c, LAND-L2d).

In most years stream flow in Pescadero Creek is low, and some reaches are likely to be intermittent or dry. In wet years, most reaches along Pescadero Creek are flowing and are bordered by dense riparian forest that provides ample shade and in-stream woody debris that create pools for rearing and sheltering native fish, including juvenile steelhead. In-stream ponds and off-stream seasonal wetlands and ponds in this watershed likely provide habitat for California red-legged frog, California tiger salamander, and western pond turtle (H.T. Harvey & Associates 2006). The Pescadero watershed also supports stands of redwood forest, some of which may be unlogged.

Land acquisition in this watershed will protect large stands of riparian woodland and potential breeding habitat for least Bell's vireo, along with diverse land cover types in the southern Santa Cruz Mountains that range from California annual grassland to redwood forest to valley oak woodland. These lands may also support secluded rock outcrops or large trees overlooking extensive stands of annual grassland that would provide suitable nesting sites for raptors.

Uvas-1, 2, 5, and 6

All the conservation analysis zones in the Uvas watershed are combined for the purposes of the land acquisition strategy. The primary purposes of the land acquisition strategy in these conservation analysis zones are listed below.

- Protect headwaters of tributaries of Uvas Creek (LAND-L1, LAND-R5).
- Protect stands of northern coastal scrub/Diablan sage scrub (LAND-C3).
- Protect freshwater perennial marsh (LAND-WP3, LAND-WP1a, LAND-WP1b).
- Protect and enhance breeding habitat for California red-legged frog and western pond turtle in the Santa Cruz Mountains (LAND-WP5, LAND-WP6a, LAND-WP6b).
- Facilitate the landscape linkage from the study area to the Lomerias Muertas Range (Linkage 19 in **Table 5-9** and **Figure 5-8**) and to the Gabilan Range (Linkage 20) (LAND-L9).

- Protect a portion of the linkage along the ridgeline of the Santa Cruz Mountains (Linkage 13 in **Table 5-9** and **Figure 5-8**).
- Protect strong environmental gradients within the Santa Cruz Mountains (LAND-L2a, LAND-L2b, LAND-L2c, LAND-L2d).
- Protect and enhance watershed functions in the Uvas Watershed (LAND-L3).
- Protect stands of northern mixed chaparral (LAND-C1) and annual grassland (LAND-G2).
- Protect riparian woodland and opportunities for riparian woodland restoration along Uvas/Carnadero Creek and the linkage along the creek (Linkage 12) (LAND-R2, LAND-R5).

Land acquisition is planned above Uvas Reservoir to protect high-quality habitat for foothill yellow-legged frog, riparian woodland, and a relatively high diversity of natural communities with a relatively low intensity of rural development in the watershed. Land cover types above Uvas Reservoir include serpentine chaparral, blue oak woodland, foothill pine-oak woodland, and valley oak woodland. Land acquisition above Uvas Reservoir has the potential to create an unbroken landscape linkage from Uvas Reservoir to Santa Teresa County Park. Land acquisition in the Uvas watershed conservation analysis zones will also support populations of California red-legged frog and California tiger salamander in the Santa Cruz Mountains to ensure that populations on either side of the Santa Clara Valley are protected and managed.

The land acquisition requirements for these conservation analysis zones are listed below.

- Protect natural land cover types within the conservation analysis zones as shown in **Table 5-18**.
- Extend the Uvas Creek Park Preserve 1.6 miles upstream to Hecker Pass Highway (LAND-R1) and setback expected development adjacent to this stream segment consistent with the stream setback condition (see Chapter 6) to protect the Uvas Creek Corridor[16].
- Protect at least 1.0 mile of Uvas Creek above Uvas Reservoir to protect and enhance habitat for foothill yellow-legged frog and California red-legged frog.

Llagas-2

Conservation analysis zone Llagas-2 occurs around and upstream of Chesbro Reservoir and borders the eastern edge of the Cañada del Oro Open Space Preserve. The primary purposes of the land acquisition strategy in this conservation analysis zone are listed below.

- Protect riparian woodland in upper Llagas Creek (LAND-R5).

[16] This conservation action is consistent with Goals 5-5, 5-7, and 5-8 of the approved City of Gilroy Hecker Pass Specific Plan (City of Gilroy 2005).

- Protect occupied habitat for foothill yellow-legged frog in upper Llagas Creek.
- Protect and enhance serpentine grassland and serpentine chaparral (LAND-G1, LAND-C2).
- Protect stands of northern coastal scrub/Diablan sage scrub (LAND-C3).
- Protect and enhance breeding habitat for California red-legged frog and California tiger salamander in the Santa Cruz Mountains (LAND-WP1a, LAND-WP1b, LAND-WP2a, LAND-WP2b).
- Protect riparian habitat along upper Llagas Creek for least Bell's vireo and other native songbirds and provide riparian restoration opportunities (LAND-R2).
- Protect potential habitat for Bay checkerspot butterfly (LAND-G3).

Land acquisition in this conservation analysis zone serves multiple purposes. Some of the only known occupied habitat for foothill yellow-legged frog in the Santa Cruz Mountains in the study area is present upstream of Chesbro Reservoir (H.T. Harvey & Associates 1999). The conservation strategy includes stream protection along upper Llagas Creek to protect this habitat and provide opportunities for habitat enhancement, as indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program. Furthermore, potential habitat for Bay checkerspot butterfly (Cañada Garcia site) and serpentine covered plants are also found in this conservation analysis zone. Because surveys have not been conducted in this area, the occurrence of serpentine covered species is largely unknown. This conservation analysis zone also supports small patches of serpentine chaparral.

The land acquisition requirements for this conservation analysis zone are listed below.

- Acquire serpentine grassland within the conservation analysis zones as shown in **Table 5-19**.
- Acquired land that will connect with either protected lands around Chesbro Reservoir or the Open Space Authority lands within the analysis zone.
- Acquire at least 1.0 mile of Llagas Creek above Chesbro Dam to protect and enhance habitat for foothill yellow-legged frog, California red-legged frog, and least Bell's vireo.

Pacheco-1, 2, 3, 4, 5, and 6

Conservation analysis zones Pacheco 1–6 encompass the upper and middle reaches of Pacheco Creek and its tributaries (e.g., south and north forks of Pacheco Creek). These conservation analysis zones are characterized by large, remote ranches with grassland, oak woodland, and chaparral at a variety of elevations and terrain. Extensive tracts of riparian woodlands are found in several zones along Pacheco Creek and its major tributaries. These zones are combined for the purposes of the land acquisition strategy because of their

similar land cover types and species habitat, and the overlapping land ownership patterns among the zones. The primary purposes of the land acquisition strategy in these conservation analysis zones are listed below.

- Protect and enhance riparian woodland, including large stands of sycamore alluvial woodland, along the main stem and tributaries of Pacheco Creek, and provide restoration opportunities in this area (LAND-R2).
- Protect potential breeding habitat for least Bell's vireo (LAND-R5).
- Protect portions of landscape linkage along Pacheco Creek (Linkage 17 in **Table 5-9** and **Figure 5-8**) (LAND-L1).
- Maintain landscape linkages across SR 152 at key undercrossings or gaps in the highway median barrier (Linkage 15 in **Table 5-9** and **Figure 5-8**) for San Joaquin kit fox and other native species.
- Protect and enhance watershed functions in the Coyote and Pacheco Watersheds (LAND-L3).
- Protect movement and potential breeding habitat for San Joaquin kit fox (LAND-G9).
- Protect and enhance extensive stands of annual and potential native grasslands (LAND-G2, LAND-G3) that support or could support California ground squirrels to provide food and shelter for covered and other native species (LAND-G5, LAND-G8).
- Protect strong environmental and elevation gradients (LAND-L2a, LAND-L2b, LAND-L2c, LAND-L2d).
- Protect large stands of northern mixed chaparral (LAND-C1), mixed oak woodland and forest (LAND-OC1), and valley oak woodland (LAND-OC3).
- Protect and enhance breeding and upland habitat for covered amphibians and reptiles (LAND-G2, LAND-OC1, LAND-OC2, LAND-OC3, LAND-OC4, LAND-OC5, LAND-WP5, LAND-WP6a, LAND-WP6b).

Land acquisition in these conservation analysis zones will protect important stands of riparian woodland and scrub, valley oak woodland, and northern mixed chaparral. Riparian woodland along Pacheco Creek may provide suitable breeding habitat for least Bell's vireo. These lands may also support secluded rock outcrops or large trees overlooking open grassland that would provide suitable nesting sites for golden eagle and other raptors. In addition, the low-elevation annual grassland and some oak woodland types are suitable for movement of San Joaquin kit fox through the study area to known breeding sites at the fringes of the inner Coast Ranges to the east and south of the county. Acquisition of low-slope grassland in this area may also provide suitable breeding habitat for San Joaquin kit fox, although such events are expected to be rare.

Land acquisition in these conservation analysis zones will also protect a landscape linkage within the Diablo Range (Linkage 15) that will benefit several covered and other native species such San Joaquin kit fox, Tule elk, and mountain lion. Because the threat of development in these zones is low, land

acquisition in these zones is targeted, in part, at key points along SR 152 where kit fox and other native wildlife are most likely to cross the busy road. SR 152 between Gilroy and the Santa Clara/Merced county line poses a major hazard and a partial barrier to wildlife movement. In addition to the large and increasing volume of traffic, a 6-mile-long median barrier stretches from Bell Station to the Santa Clara/Merced County line. There are only three breaks in this barrier, each about 50 feet wide. Because these breaks are so narrow and few, and because of the high volume of traffic on the road, undercrossings are very important to maintain a landscape linkage across the road.

There are six bridges that span creeks along SR 152 and offer connectivity along the stretch with the median barrier (**Figure 5-8**). The riparian corridors are well vegetated, and the bridge spans offer adequate clearance for all species to move underneath. There are no data of wildlife use of these undercrossings, but the habitat model for San Joaquin kit fox (**Appendix D**) suggests this area as a potential regional linkage. The land acquisition strategy in these zones will preserve key undercrossings along SR 152. The conservation strategy also includes actions to assess and improve wildlife connectivity in these conservation analysis zones; see Section 5.3.2 *Landscape Conservation and Management* subheading *Connectivity and Permeability*.

The land acquisition requirements for these conservation analysis zones are listed below.

- Land acquisitions in these conservation analysis zones will occur as shown in **Table 5-18**.
- Land will be acquired on either side of SR 152 at two key crossing points to protect and provide opportunities to enhance wildlife movement across the road.
- Protect at least 1.0 mile of the main stem of Pacheco Creek, North Fork of Pacheco Creek below Pacheco Dam, or South Fork Pacheco Creek.
- Protect land in the Pacheco Creek Watershed giving higher priority to lands with gentler slopes that provide suitable habitat for San Joaquin kit fox.

Pacheco-7 and -8, Coyote-2

Although they are in different watersheds, Pacheco-7, Pacheco-8, and Coyote-2 serve a similar function because they represent the closest connection between Henry W. Coe State Park and the extensive wetland complex across the county line in San Benito County (San Felipe and Soap Lakes). These conservation analysis zones are also combined for the purposes of the land acquisition strategy because of their similar patterns of land ownership and parcel configuration. The primary purposes of the land acquisition strategy in these conservation analysis zones are listed below.

- Link Henry W. Coe State Park with the San Felipe Lake (Soap Lake) region in San Benito County (Linkage 14 in **Table 5-9** and **Figure 5-8**) (LAND-L6).

- Protect immediate watershed of San Felipe Lake.
- Protect riparian woodland and streams in upper Coyote Creek and Pacheco Creek (LAND-L1, LAND-R2), including large stands of sycamore alluvial woodland.
- Protect freshwater perennial marsh (LAND-WP1a, LAND-WP1b).
- Protect and enhance high density of ponds to support covered amphibians and reptiles and other native species, and possibly tricolored blackbird (LAND-G2, LAND-OC1, LAND-OC2, LAND-OC3, LAND-OC4, LAND-OC5, LAND-WP5, WP3a, LAND-WP3b, LAND-WP5, LAND-WP6a, LAND-WP6b).
- Protect designated critical habitat for California tiger salamander.
- Protect movement and potential breeding habitat for San Joaquin kit fox (LAND-G9).
- Protect and enhance annual grasslands (LAND-G2) that support or could support California ground squirrels to provide food and shelter for covered and other native species (LAND-G5, LAND-G8).
- Protect foraging habitat for birds using the large wetland complex surrounding San Felipe Lake, including tricolored blackbird.
- Protect strong environmental gradients in the study area (LAND-L2a, LAND-L2b, LAND-L2c, LAND-L2d).
- Protect and enhance valley oak woodland (LAND-OC3).

The land acquisition strategy in these conservation analysis zones focuses on protection of environmental gradients, habitat for covered amphibians, and an important landscape linkage. This area has an unusually high density of ponds compared to the rest of the study area; accordingly, it provides excellent potential breeding sites for California red-legged frog, California tiger salamander, western pond turtle, and possibly tricolored blackbird. With enhancement, this dense network of ponds could support a large population of these covered species. These conservation analysis zones, particularly Pacheco-8, also provide an important connection over a wide range of environmental gradients between Henry W. Coe State Park and the large wetland complex in Soap Lake, including San Felipe Lake. Land within Pacheco-8 provides the most direct connection between this wetland complex and the vast area of annual grassland and oak woodland in the Diablo Range foothills; consequently, Pacheco-8 may be important for terrestrial wildlife moving from the Santa Clara Valley to the Diablo Range. In addition, aquatic species breeding at San Felipe Lake (e.g., tricolored blackbird) likely forage in upland habitats nearby; land within these conservation analysis zones provides the closest upland foraging habitat to San Felipe Lake. This area also provides the “gateway” from the Diablo Range to Linkage 18 along the Pajaro River. Large stands of valley oak woodland and riparian sycamore alluvial woodland are also found within these conservation analysis zones.

The land acquisition requirements for these conservation analysis zones are listed below.

- Land acquisitions in these conservation analysis zones will occur as shown in **Table 5-18**.
- Protect land that connects Henry W. Coe State Park to SR 152 (and San Felipe Lake in adjacent San Benito County).
- Protect at least 1.0 mile of the main stem of Pacheco Creek.

Conservation Analysis Zones without Requirements

There are no specific land acquisition requirements in the following conservation analysis zones.

- San Tomas-1. This zone is highly urbanized at the western edge of the study area, entirely within San José. There is almost no natural vegetation left in this zone, and the creeks running through it do not provide habitat for any of the covered species.
- Guadalupe-2. This zone is also highly urbanized (84%) and provides only small, fragmented habitat for the covered species. Much of what remains is already in open space designations.
- Coyote-1 and 3. These remote and rugged conservation analysis zones are adjacent to the north and west side of Henry W. Coe State Park. There are limited acquisition opportunities in the zone due to the low number of large parcels. Development potential in this zone is very low due to steep topography, little or no access, and a lack of surface water. The few parcels occurring in these zones are expected to be acquired by State Parks as part of the expansion of Henry W. Coe State Park. Because State Parks is not a permittee in this Plan, land acquisition targets were not established in these zones.
- Coyote-8, 9, and 10. These conservation analysis zones have a relatively high degree of parcelization and urban and rural development, making conservation in these zones challenging. Coyote-10 is almost entirely within the urban service area for San José and is highly urbanized. Coyote-8 and 9 have limited conservation opportunities because of the high degree of rural development. Land acquisition or long-term management agreements within Coyote-10 (and possibly Coyote-8 and 9) will occur to protect and enhance breeding habitat for western burrowing owl consistent with the burrowing owl conservation strategy described in Section 5.4.6 *Western Burrowing Owl*.
- Llagas-1 and 5. These zones are small (Llagas-1 = 3,092 acres; Llagas-5 = 4,129 acres), support only small amounts of high-priority land cover types, and have a high proportion of small parcel sizes, making land acquisition in these zones inefficient.

- Uvas-3 and 4. Similar to Llagas-1 and 5, these zones are small (Uvas-3 = 5,061 acres; Uvas-4 = 4,422 acres). They support only small amounts of high-priority land cover types.

Despite the lack of specific land acquisition requirements in these zones, there are still portions of some of these zones that can contribute to the goals of the Plan. Any land acquired within zones Coyote-3, Coyote-8, or Coyote-9 will count towards the overall land cover requirements for the study area (**Table 5-11**). Acquisition of streams in Coyote-10 may also count towards overall stream acquisition requirements and acquisition of habitat for western burrowing owl in this zone will contribute to goals for this species.

Acquisition of Habitat for Covered Wildlife Species

The land acquisition requirements for land cover types, by geographic locations (e.g., by Conservation Analysis Zones), and for landscape linkages, combined with the reserve assembly principles will allow the Implementing Entity to create a Reserve System that will conserve the covered species. This will occur through preservation, management, and enhancement, and in some cases, restoration, of suitable habitat for the covered species. Although the Plan is not based on field verification of suitable habitat, we have inferred the location of suitable habitat through a combination of the species models (**Appendix D**), locations of designated critical habitat (for some species), extensive data on species observations, and the expert opinion of field biologists familiar with the covered species and the study area. As a result, we are confident that the Reserve System as designed will adequately conserve the covered species.

Requirements to permanently protect plant occurrences will ensure that the covered plants will be conserved by the Plan. The Wildlife Agencies require additional assurances to guarantee that the Implementing Entity will protect habitat for the covered wildlife species and not just land cover types that are assumed to support their habitat. Furthermore, assurances are needed that the Reserve System will support habitat that is occupied by the covered wildlife species. The following requirements are included in the Plan to address these regulatory needs. All of the additional requirements below are additive to the other land acquisition requirements in the Plan.

Acquisition of Modeled Habitat for Covered Species

To address the need to acquire habitat for the covered species and not just land cover types, the Implementing Entity will acquire land with modeled habitat for each covered species for which models were developed in the minimum amounts specified in **Table 5-17**. Commitments are provided both for new land acquired for the Reserve System and land incorporated into the Reserve System from existing open space. The commitments are to acquire minimum amounts of *modeled habitat* based on the species models in **Appendix D**.

Species models will be updated during implementation based on new information. Modeled habitat requirements will be tracked based on the most recent model update. The Implementing Entity will be conducting field inventories of new reserve lands to locate, quantify, and assess the quality of suitable habitat for all covered species. The results of this inventory are important for habitat and land acquisition requirement tracking and long-term management and monitoring (see Chapter 7).

Acquisition of Occupied Habitat for Select Wildlife Species

The Wildlife Agencies require additional assurances that land will be acquired for the Reserve System that will support occupied habitat for five covered wildlife species:

- Bay checkerspot butterfly,
- California red-legged frog,
- California tiger salamander,
- Western pond turtle, and
- Foothill yellow-legged frog.

These species were selected because they are known to consistently breed in multiple locations in the study area or because they are so rare that it is necessary to be assured that occupied lands are protected. It is critical that the Reserve System protect some of this occupied habitat to ensure the conservation of the species in the study area.

Occupancy requirements for the purposes of this Plan do not need to be met at the time of land acquisition. This flexibility provides the opportunity to acquire unoccupied habitat that is later occupied as a result of improved management, habitat restoration (e.g., streams), or habitat creation (e.g., ponds) (see Chapter 5, Section 5.2.3 *Reserve System* and Chapter 8, Section 8.2.5 *Wildlife Agencies*). The metapopulation dynamics of the Bay checkerspot butterfly warranted a specific temporal component of the occupancy requirements, which are described in detail below.

It is important to note that these occupancy requirements are designed to aid the Wildlife Agencies in making their regulatory findings. The Implementing Entity will provide habitat management, habitat enhancement, habitat restoration, and/or habitat creation, in addition to these basic occupancy requirements, because these requirements are not the minimum species targets for the Reserve System. To meet the biological goals and objectives for these species (and all covered species), the Plan includes additional restoration/creation, and monitoring beyond those noted in the following basic occupancy requirements. The abundance and condition of the covered species in the Reserve System will be monitored to determine the effectiveness of the conservation actions.

Bay Checkerspot Butterfly

For the Bay checkerspot butterfly, occupancy will be demonstrated in both core and satellite habitat units (see **Table 5-7** and the species account in **Appendix D** for definitions of core and satellite habitat units). The occupancy requirement will be met by demonstrating the presence of larvae and adults (not just adults, in case individuals fly through a site but are not reproducing).

The Implementing Entity will acquire and manage enough habitat for Bay checkerspot butterfly to ensure occupancy of each of the four core habitat units identified in Figure 5-A of the 1998 Serpentine Recovery Plan (Kirby, Metcalf, San Felipe, and Silver Creek Hills). Occupancy in these four core habitat units must be demonstrated at least four out of every 10 consecutive years of the permit term. This occurrence frequency is based on population data reported for the Kirby, Metcalf, and Silver Creek core habitat units, which are fairly robust (e.g., Kirby population data dates back to 1991).

The Implementing Entity will also acquire and manage land to ensure occupancy of at least three of the six (50%) satellite habitat units identified in the 1998 Serpentine Recovery Plan (W. Hills of Santa Clara Valley, Tulare Hill, Santa Teresa Hills, Calero, Communication Hill[17], or North of Llagas Avenue) (**Table 5-7**) by Year 45. Occupancy is less certain in satellite habitat units because of their smaller size than and greater distance from core habitat units. Because of their isolation, they are colonized only periodically by long-distance dispersal events. Because of their small size, populations that become established go extinct quickly due to small population sizes (Harrison et al. 1988). For these reasons, occupancy of a total of 50% of satellite habitat units must only be demonstrated once by Year 45. For example, occupancy of Tulare Hill in Year 5, North of Llagas Avenue in Year 10, and Calero in Year 15 would fulfill the satellite component of the occupancy criteria. The satellite units with the greatest chance of occupancy due to size, proximity to core units, and expected improvements in habitat management are:

- Santa Teresa Hills
- Tulare Hill
- Calero

There is a potential that less than 50% of the satellite populations will be occupied by Year 45. If this occurs, the Implementing Entity will remain in compliance with the satellite occupancy criteria if it demonstrates to the Wildlife Agencies that it has managed satellites incorporated in the Reserve System in accordance with the Plan and Bay checkerspot butterfly has not colonized these sites for reasons beyond its control (e.g., climate change).

[17] Communication Hill is considered a historic/unoccupied site. Therefore, the three occupied satellite units could occur in any of the five remaining satellite units that are described by this Plan as occupied, potential, or occupancy unknown.

California Red-legged Frog, California Tiger Salamander, and Western Pond Turtle

California red-legged frog, California tiger salamander, and western pond turtle have been grouped for the purposes of the species occupancy requirement because of their co-reliance and frequent co-occurrence in ponds and perennial wetlands in the study area. To simplify this requirement, the species occupancy requirement for these three species is defined as a minimum percent occupancy of the number of freshwater wetlands and ponds in the Reserve System (not wetland or pond acreage).

- California red-legged frog = 40% of ponds and wetlands in each of the federal Recovery Units 4 and 6 in the Reserve System (which correspond to the two major watersheds in the study area).
- California tiger salamander = 30% of ponds and wetlands in the entire Reserve System.
- Western pond turtle = 25% of ponds and wetlands in the entire Reserve System.

The occupancy requirements for these species must be demonstrated when the Reserve System is fully acquired, which will be at or before Year 45. Occupancy is demonstrated the first time that a pond or wetland is occupied by the species, as defined above. Once occupied, a pond or wetland is counted as occupied for this requirement for the rest of the permit term, even if it becomes unoccupied later[18]. As is the case for all covered species habitat, habitat for these species contained within the Reserve System will be protected, enhanced, restored, and monitored. As such, once presence is documented, there is a high probability that these species will persist within the Reserve System.

To ensure that the Implementing Entity is making progress towards these requirements during the permit term, these occupancy requirements must also be met for the Reserve System at Year 30, minus 5% for each one (i.e., 35% for California red-legged frog, 25% for California tiger salamander, and 20% for western pond turtle). The measurement will be made based on the total Reserve System at Year 30.

For the frog and salamander, an entire wetland or pond is considered occupied if the species is reproducing successfully, which is defined as evidence of metamorphosis. This metric ensures that ponds have the correct hydroperiod to support the full life-cycle of California red-legged frog and California tiger salamanders. A site is considered occupied by western pond turtle if basking is observed by adults and juveniles at the same site. Observations of juveniles and adults provide evidence of successful reproduction, and therefore is an indication of population viability. The presence of multiple age-classes is important given that adult turtle populations can persist in highly modified environments

[18] If a pond or wetland becomes unoccupied later, the Implementing Entity will consider altering management at that site to encourage recolonization through the adaptive management process, but that outcome will not affect the occupancy requirement for that site. See Chapter 7 for more details on the monitoring and adaptive management program.

providing the illusion that the population is stable when in fact reproduction is unable to take place, likely due to degraded upland nesting habitat (**Appendix D**).

Ponds created or wetlands restored in the Reserve System that meet the occupancy criteria will count towards the occupancy requirement. Although unoccupied created ponds or restored wetlands would not contribute to the occupancy requirements of this Plan, they would be credited toward the aquatic land cover requirements described in **Table 5-12**. In other words, these created and restored sites do not count as part of the total ponds and wetlands assessed in the Reserve System for this requirement, if these sites are unoccupied. This approach creates an incentive to create ponds and restore wetlands that are occupied by one or more of the covered species.

The occupancy requirements were derived from three data sources, East Bay Regional Park District (Bobzien and DiDonato 2007), and the Central Valley of California (Germano and Bury 2001). Henry W. Coe State Park has the largest data set in the study area on ponds and wetlands and their occupancy by these three species. Surveys of 136 ponds and wetlands were conducted from 2001–2007 in the park (Belli 2007), most of which were in the study area (the remaining sites were just outside the study area in Santa Clara and Stanislaus Counties). The land cover types in Henry W. Coe State Park are similar to those in the rest of the study area. However, there is less grassland in the park than in the rest of the study area because of its higher elevation.

East Bay Regional Park District conducted surveys of 271 ponds 1996, 2000, and 2004. All ponds were surveyed at least once and many ponds were surveyed more than once (Bobzien and DiDonato 2007). Although not in the study area, the habitats, landscapes, and topography of the park lands within the East Bay Regional Park system are similar to that of the study area. The survey in the Central Valley of California was conducted in 1999 at 55 aquatic sites in the Sacramento and San Joaquin Valleys; 27 of these sites were ponds or lakes (Germano and Bury 2001). Only the data from ponds and lakes was considered for this analysis.

Surveys in Henry W. Coe State Park found California red-legged frog in 41 ponds (30.1%), California tiger salamander in 9 ponds (6.7%), and western pond turtle in 18 ponds (13.2%). The ponds and wetlands in Henry W. Coe State Park are representative of the ponds and wetlands expected to be found in the Reserve System, with two exceptions. First, Henry Coe is at higher elevations than the expected Reserve System. This means that California tiger salamander will likely be more common in the Reserve System than in Henry Coe, all else being equal. Second, there is no active predator removal program in Henry W. Coe State Park to remove bullfrogs, bass, and other nonnative predators. Therefore, California red-legged frog and California tiger salamander are expected to be more abundant in the Reserve System than in Henry W. Coe State Park due to the aggressive predator control planned for the Reserve System.

Surveys of ponds in the East Bay Regional Park District system found California red-legged frog in 75 of 271 ponds (27.7%) and California tiger salamander in 75

of 170 ponds within the range of that species (44.1%) (Bobzien and DiDonato 2007). Western pond turtle occurrences were not reported. The East Bay Regional Park District has an active predator-control program in ponds and other wetlands. Therefore, the abundance of the two amphibians within their ponds is likely more representative of what the Reserve System should expect, with one exception. California tiger salamander distribution within the East Bay Regional Park District may be higher than what will be seen in the Reserve System because the Reserve System will include ponds and wetlands in the Santa Cruz Mountains (not just the Diablo Range, where the East Bay Regional Park District is found). California tiger salamander is likely less abundant in the Santa Cruz Mountains than in the Diablo Range.

The aquatic surveys of the Central Valley ponds and lakes found western pond turtle at 10 of the 27 ponds and lakes surveyed (37%). Amphibians were not surveyed. In this study, sites were selected based on known historic or suspected occurrences of western pond turtle (Germano and Bury 2001). Therefore, the sample was likely biased towards occupied sites and may overestimate the occurrence of this species in all ponds and lakes in the Central Valley.

The species occupancy target for California red-legged frog (40%) was set for the study area as a rounded number greater than the results of these two applicable studies, considering the factors outlined above. The minimum occupancy targets for California tiger salamander and western pond turtle (30% and 25% respectively) were set at or above the midpoint between the two applicable study results. In all three cases, targets take into account the assumed success in attracting these species to created ponds. Nonnative barred tiger salamander alleles will be assumed present in wetlands and ponds containing paedamorphic tiger salamanders[19]; therefore, such ponds and wetlands will not count towards the California tiger salamander species occupancy requirement (see **Appendix K** for details).

Species occupancy for California red-legged frog must be met equally in both of the major watersheds in the study area, which match the two federal recovery units identified in Figure 5-B of the Species Recovery Plan (Units 4 and 6; U.S. Fish and Wildlife Service 2002). In other words, 40% of the ponds and/or wetlands in the Coyote Creek/Guadalupe River portion of the Reserve System will be occupied and 40% of the ponds and/or wetlands in the Pajaro River watershed portion of the Reserve System will be occupied.

Both California red-legged frog and western pond turtle also occur in streams throughout the study area. However, accounting for occupancy in streams, which do not have discrete boundaries as do ponds and wetlands, will complicate compliance monitoring. Furthermore, both species are known to travel significant distances from breeding sites, which would make it more difficult to identify the extent of “occupied” stream length. For these reasons, and because the majority of the conservation benefits afforded to these two species will be

[19] Paedamorphic tiger salamanders are sexually mature adult tiger salamander that retain juvenile characteristics (e.g., maintain larval form). Paedamorphisis is a characteristic of non-native barred tiger salamanders, whereas, California tiger salamanders always metamorphize prior to sexually maturity.

through the preservation and enhancement, restoration, and/or creation of ponds and wetlands (**Table 5-12**), occupancy requirements will be measured by pond and wetland habitat within the Reserve System, not streams.

The species occupancy target for western pond turtle is based on the best available data and the need to meet the regulatory standard to contribute to recovery. If future monitoring data or other information suggests that this target is biologically unattainable, the Implementing Entity will confer with the Wildlife Agencies to revise the target (including how it is measured) to better meet the regulatory standards and the biological goals and objectives of this Plan. Additional conservation actions (e.g., translocation) may be necessary to achieve conservation for this species. All translocation activities will be reviewed and approved by the Wildlife Agencies in advance of translocation activities occurring.

Foothill Yellow-legged Frog

Foothill yellow-legged frog is known or suspected to occur in at least five major rivers and creeks in the study area based on occurrence records and the presence of suitable habitat:

- Upper Penitencia Creek, below Cherry Flat Reservoir
- San Felipe Creek
- Upper Coyote Creek and its tributaries, above Coyote Reservoir
- Llagas Creek above Chesbro Reservoir
- Upper tributaries to Uvas Creek, including Little Arthur and Bodfish Creeks

Additional populations may be present in the many unsurveyed streams of the study area. The population in Upper Coyote Creek is located in Henry W. Coe State Park and the Palassou Ridge Open Space Preserve. The populations in Upper Penitencia Creek and San Felipe Creek are partially contained in Alum Rock Park and the San Felipe Ranch Conservation Easement, respectively. Known populations occur in three of the major watersheds in the study area shown in **Figure 3-6** (Coyote, Llagas, and Uvas). Additional populations may occur in two more watersheds (Pacheco and Pescadero).

For the purposes of demonstrating occupancy of foothill yellow-legged frog in this Plan, occupied habitat within the Reserve System is defined as perennial streams with an observation of egg masses by Year 45. Although there are some reports of foothill yellow-legged frogs breeding in perennial tributaries in the study area, the species typically breeds in perennial portions of main-stem channels (E. Gonsolin pers. comm.; Kupferberg et al. 2009). This is likely because main stem channels provide habitat that is more conducive to successful breeding in the study area (i.e., areas of shallow, low velocity flows during the spring months) as opposed to perennial portions of tributaries that often have turbulent conditions (E. Gonsolin pers. comm.). The presence of egg masses will adequately demonstrate occupancy because spring breeding and summer tadpole rearing represent critical life stages for this species (Kupferberg et al. 2009).

Foothill yellow-legged frogs are known to travel significant distances and are highly stream dependent (**Appendix D**). For these reasons, correlating occupied stream segments (i.e., miles of stream) to observed egg masses will be difficult. Therefore, the foothill yellow-legged frog occupancy requirement for this Plan will be met when the Implementing Entity protects occupied habitat in the Reserve System in at least four of the watersheds in **Figure 3-6**. This target was set based on the probability of occupancy in the Reserve System in each of the watersheds in **Figure 3-6**: very high in the Reserve System within the Llagas watershed, high in the Coyote watershed, moderate-high in the Uvas watershed, and moderate in the Pacheco and Pescadero watersheds. These rough probabilities were based on the location of known occurrences, highly suitable habitat, and Reserve System acquisitions.

Occupied habitat in the Reserve System must be in both the Diablo Range and in the Santa Cruz Mountains. Historic populations of this species have likely been lost from the Santa Clara Valley floor (H.T. Harvey & Associates 1999), so it is important to protect occupied habitat in both mountain ranges in case there is no connectivity between the two ranges.

Furthermore, occupancy will be demonstrated upstream of dams that present permanent barriers to the species or on streams unaffected by dam operations. Although foothill yellow-legged frogs could occur downstream of dams within the study area, remnant populations are likely to be adversely affected by continued dam operations. Foothill yellow-legged frog populations in regulated rivers are likely at greater risk of extinction by virtue of their low abundance, even before the effects of hydrologic stressors are considered (Kupferberg et al. 2009). For these reasons, the best opportunities for maintaining and increasing foothill yellow legged frog populations exists upstream of dams, or in streams unaffected by dam operations, and will be the focus of the conservation strategy for this species (e.g., see Goal 16 for this Plan).

Stay-Ahead Provision and Rough Proportionality

The timing and sequence of reserve assembly relative to impacts of covered activities is critical to the success of the Habitat Plan. Progress toward assembling the Reserve System must *stay ahead* of progress toward total impacts allowed under the permit. This sequence ensures that reserve assembly is keeping pace with development and that the Implementing Entity is making steady progress toward the complete Reserve System.

Such progress toward assembly of the Reserve System is a requirement under the NCCP Act. The NCCP Act requires that implementation of mitigation and conservation actions be “roughly proportional in time and extent to the impact on habitat or covered species authorized under the plan” (California Fish and Game Code Section 2820[b][9]). To meet the requirements of this section, CDFG requires that NCCPs make progress towards the final conservation goals (i.e., the ultimate size and configuration of the Reserve System) in proportion to the impacts of covered activities. The Stay-Ahead provision applies to both preservation/enhancement and restoration commitments in this Plan and is

further described in Chapter 8 (Section 8.6.1 *Stay-Ahead Provision*) addresses this requirement.

If impacts occur more slowly than expected, strict adherence to the Stay-Ahead provision would result in relatively slow growth of the Reserve System initially, followed by a rapid expansion of the Reserve System in order to meet the final acquisition targets. To ensure that the Implementing Entity makes steady progress towards the final land acquisition targets, in Year 20 of implementation, the Implementing Entity will work with the Wildlife Agencies to conduct a formal and complete review of progress toward building the Reserve System. To ensure that the Implementing Entity makes steady progress towards final restoration/creation goals, interim deadlines are established in **Table 5-14** for each watershed in the study area. Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management* also includes deadlines for riverine acquisition and restoration. The Stay-Ahead provision described above must always be followed.

Land Acquisition Outside the Permit Area

In order to meet the requirements of this conservation strategy, all land acquisition must occur within the Habitat Plan permit area, including the *Expanded Study Area for Burrowing Owl Conservation*[20] (**Figure 1-2**). Parcels extending beyond the County and/or Habitat Plan permit area could be counted toward land acquisition commitments of this Plan if more than half of the parcel is located within the permit area. For example, land acquisition along the ridgeline of the Santa Cruz Mountains may include some land in Santa Cruz County. If parcels are acquired that include land outside the permit area, land cover types on that parcel will be credited toward applicable Plan requirements as long as less than half the parcel is outside the permit area and the total land area credited outside the permit area is less than 250 acres.

As described in the land acquisition strategy, regional linkages are important to some covered and other native species (**Table 5-9** and **Figure 5-6**). The Implementing Entity is encouraged to partner with other organizations to secure these regional linkages inside and outside the study area. For example, the linkage from the Santa Cruz Mountains to the Gabilan Range will not function unless suitable habitat is present in four counties: Santa Clara, Santa Cruz, Monterey, and San Benito. Securing this linkage will require strong partnerships.

Conservation in the Study Area beyond Habitat Plan Requirements

The land acquisition requirements above are not designed to provide the blueprint for all conservation in the study area. Open space acquisition will

[20] Land acquisition in the *Expanded Permit Area for Burrowing Owl Conservation* will only be done to satisfy requirements for the burrowing owl conservation strategy, not other species covered under this Plan.

continue separate from the Habitat Plan during and after the permit term, and projects not covered by the Plan will need to implement their own mitigation. However, conservation that occurs separate from this Plan will benefit the Plan and the biological resources of the study area if these acquisitions occur in coordination with the Plan. The following general priorities were developed to help guide conservation that occurs separate from the Habitat Plan. These priorities can also guide conservation actions under the Habitat Plan in the event that separate conservation or other actions prevent land from being acquired under the Habitat Plan in the areas listed above. These priorities build on the Habitat Plan Reserve System to create a larger system of conservation and open space in the study area.

- **Conservation Analysis Zones with High Acquisition Priority.** More land acquired in the conservation analysis zones already designated at a high priority for conservation will strengthen the Reserve System by creating larger, more contiguous conservation areas that are better able to preserve covered species habitat and landscape linkages.
- **Uvas-4, 5, Pescadero-1.** Additional land acquisition in these zones will increase protection in the Uvas and Pescadero watersheds to benefit native fish, California red-legged frog, California tiger salamander, and western pond turtle, among others. Land acquisition in this area could complete Landscape Linkage 13 between Mount Madonna County Park and the Reserve System in the southwestern corner of the study area.
- **Uvas-2 and 3.** Additional land acquisition in these zones will increase watershed protection in the Uvas watershed, protecting water quality and habitat for California red-legged frog, California tiger salamander, and western pond turtle along Uvas Creek, above and below Uvas Reservoir. Land acquisition will also support Landscape Linkage 13 and help to connect Mount Madonna County Park with open space surrounding Uvas Reservoir and the Reserve System to the north.
- **Coyote-9.** Land acquisition in this zone will increase protection of annual grassland and blue oak woodland near Alum Rock Park and the Reserve System in Coyote-7 and Alameda-1. Additional protection in this area will preserve more habitat for California red-legged frog, California tiger salamander, and western pond turtle and create a stronger linkage to outside the study area to the north (Landscape Linkage 4).
- **Coyote Ridge.** While most of Coyote Ridge is targeted for land acquisition (see Coyote-4, 5, and 6), parcels with no or lower-quality habitat for Bay checkerspot butterfly and serpentine covered plants would not be included in the Reserve System. Additional land acquisition in Coyote Ridge, particularly in the northwest, would provide additional covered species habitat and important buffers between the Reserve System and existing urban development.
- **Pacheco Watershed.** Additional land acquisition in the Pacheco watershed would strengthen and expand the Reserve System and could provide better linkages to Henry W. Coe State Park and Pacheco State Park. Although development threats in this watershed are low, increased open space could

provide much greater opportunities for habitat enhancement and long-term monitoring.

- **Uvas-1.** Additional land acquisition in the upper Uvas Creek watershed could expand the existing open space and the Reserve System that protects some of the only stands of knobcone pine woodland in the study area. Additional land acquisition could protect the remaining stands of this land cover type and enhance watershed and water quality protection.

5.3.2 Landscape Conservation and Management

This section discusses conservation and management in the permit area at the landscape level. The following sections describe conservation and management guidelines and principles for each natural community. Conservation and management guidelines specific to individual covered species are presented in the discussion of the relevant natural community. Additional conservation and management discussions are also included in the species-specific sections (see Section 5.4 *Benefits of and Additional Conservation Actions for Covered Species)*.

Each section is organized as shown below.

- **Biological Goals and Objectives:** A summary of the biological goals and objectives for that community presented in **Table 5-1b**.
- **Acquisition, Restoration, and Enhancement:** A summary of the acquisition, restoration, and enhancement requirements as they apply to that landscape or natural community, referencing the biologically appropriate conservation action from **Table 5-2a or 5-2b**.
- **Management Techniques and Tools:** Guidelines and specific techniques and tools that are recommended to achieve the biological goals and objectives. This section provides details on the conservation actions in **Table 5-2b**.
- **Threats and Uncertainties:** Describes the uncertainties associated with the conservation actions and external threats that may make their successful application more difficult.

Biological Goals and Objectives

A primary goal of this Plan is to protect and maintain natural and semi-natural landscapes within the study area that are large enough to accommodate natural processes beneficial to populations of covered and other native species. The Plan will accomplish this by establishing a Reserve System within the permit area that will preserve a minimum of 33,205 acres (**Table 5-13**). Up to an additional 13,291 acres of existing open space will be incorporated into the Reserve System to enhance their long-term management. The total size of the Reserve System will therefore be a minimum of 46,496 acres.

This Reserve System will support a range of environmental gradients (such as slope, elevation, aspect, rainfall) and a representative diversity of natural communities. In addition to protecting riverine systems and hydrologic function through fee title and conservation easement, the Plan will benefit stream and riparian habitats through the stream setback (described in Chapter 6, Section 6.5, subheading *Condition 11 Stream and Riparian Setbacks*) and by implementing stream and riparian restoration projects.

The Reserve System will be assembled to reduce habitat fragmentation and to sustain and enhance the effective movement and genetic exchange of native organisms within and between natural communities. Habitat connectivity and important movement and dispersal routes will be protected and, when necessary, enhanced inside the study area. Further, the Implementing Entity will increase the permeability for species movement in targeted areas.

The Plan will also enhance or restore representative natural and semi-natural landscapes to maintain or increase the diversity and distribution of native species. Enhancement and restoration activities within the Reserve System will increase the total area of high-quality habitat for covered and other native species and promote those natural processes that define each natural community (e.g., succession, competition). The Reserve System will be large enough to accommodate management for conflicting life history requirements between species. The Reserve System will also be large enough to allow natural disturbance regimes such as fire and flooding to occur. When these natural disturbances cannot be allowed, other management actions will be implemented that mimic those disturbances and yield similar results. Finally, the Plan will eradicate, where possible, or at least reduce the cover, biomass, and distribution of target nonnative invasive plants and reduce the number and distribution of nonnative invasive animals within the Reserve System.

Acquisition, Restoration, Enhancement, Creation

Acquisition

During the course of Plan implementation, a minimum of 33,205 acres of natural land cover types will be acquired through fee title or conservation easement to create the Reserve System (**Table 5-13**).

This Plan does not require protection of agriculture land cover types, although the Implementing Entity may acquire and manage agricultural lands if it determines such acquisition would support the goals and objectives of the Plan. All else being equal, the Implementing Entity will acquire parcels with natural land cover types over cultivate agriculture to fulfill the goals and objectives of this Plan.

Enhancement and Restoration of Natural Communities

All land and aquatic habitats in the Reserve System, including streams, will be enhanced to benefit covered and other native species as indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program (LM-6, LM-7a, LM-7b). Existing open space included in the Reserve System would add up to 13,291 acres of natural land cover that would also be enhanced (**Table 5-5**). In total, the Reserve System would encompass 46,496 acres to 46,920 acres.

A required compensation ratio for specific land cover types, plus a minimum compensation requirement regardless of the level of impact, will result in restoration or creation of an estimated 339 acres of riparian forest and scrub, 75 acres of wetland, 72 acres of pond and 10,4 miles of streams in the Reserve System if all anticipated impacts occur (LM-6, LM-7a, LM-7b; see sections below on each land cover type for further information) (**Table 5-13**). The minimum compensation requirement will allow the Plan to contribute to the recovery of these resources within the study area during the permit term.

Restoration and enhancement of natural communities involves the recovery of ecosystem function that has been lost or degraded, respectively. Implementation of restoration or enhancement activities will initiate or accelerate ecosystem recovery with respect to functional processes, species composition, and community structure. Typically, the aim of restoration and enhancement is to return an ecosystem to a historic state or within the bound of its historic trajectory. In other words, the goal would be to recreate an ecological state that existed prior to the degradation of the system (Clewell et al. 2005). However, the level of restoration and the final result of these activities will be constrained by current conditions and feasibility. For the purposes of this Plan, restoration and enhancement activities will be guided by the biological goals and objectives of the Plan, with the overarching goal of enhancing ecological values in protected landscapes.

There are generally four broad steps to determine a restoration or enhancement program (Hobbs and Norton 1996).

- Identify the processes that have led to or are leading to degradation.
- Develop methods to slow or reverse the decline.
- Determine realistic goals and clear measures of success.
- Develop techniques for implementing these goals.

In this Plan, the techniques for enhancement and restoration are articulated as conservation actions and are summarized in each natural community section below. Guidelines are also presented in each section, where applicable, for selecting restoration sites. However, the following broad recommendations apply to all restoration activities.

- **Manage at multiple levels.** Biological processes occur at a wide variety of scales across the landscape. Restoration and enhancement activities will

therefore be planned and executed with these multiple levels in mind. For example, the enhancement of covered plant occurrences will likely occur at a relatively small species level due to the small size of many occurrences. Microhabitats for covered plants such as soil texture, soil depth, rockiness, and nearest neighbor plants will be considered. However, other processes operating at larger levels—such as the spread of invasive species, hillside erosion or deposition, and the patterns of wildfires—will also affect plant habitat enhancement. To be successful, management actions will consider and anticipate processes operating at multiple levels.

- **Balance conflicting species needs.** The effects of an enhancement or restoration action must be evaluated for all covered species before management decisions are finalized. For instance, grazing generally benefits Bay checkerspot butterfly and many of the covered plant species. In contrast, Mt. Hamilton thistle may require grazing exclusions to prevent livestock from trampling its habitat. Similarly, some pond-dependent covered species can require conflicting habitat conditions. Dense emergent vegetation around pond margins can provide good habitat for tricolored blackbird and California red-legged frog but may not provide adequate habitat for California tiger salamander or western pond turtle. The large size of the Reserve System will allow disparate actions to occur in different places and benefit all of the covered species.
- **Account for inherent variability.** It is important to acknowledge that chance events can often exert strong effects on species and natural systems. The most common of these chance events are weather-related factors such as rainfall, temperature, timing of seasons, drought, and the unknown ramifications of global climate change. Other chance events are associated with species populations themselves; these may include reproductive success and dispersal. Such inherently uncontrollable variables and their effects on covered species are best offset by maintaining within the Reserve System a variety of microsites, environmental gradients, and management treatments. This ensures that covered species can take advantage of suitable habitat during good seasons and find refugia in bad seasons.
- **Mimic natural processes.** This is a management technique that recognizes that natural processes (e.g., hydrologic regimes, wildfire) are the fundamental forces that shape natural systems and create and maintain habitat for covered species. Therefore, management actions will focus on defining, maintaining or restoring and, as indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program, enhancing these natural processes. If not feasible, then the effects of those processes can be duplicated by alternative management actions.
- **Use adaptive management principles.** Flexibility and adaptation will be embraced in making management decisions and improving restoration and enhancement activities within natural communities. Adaptive management principles (described in Chapter 7) will apply across the range of general principles as well as to the specific management techniques and tools described below.

Management Techniques and Tools

Most management techniques and tools are discussed under each natural community. Some techniques, however, apply to several natural communities or to the Reserve System as a whole. These landscape-level management actions are described below.

Connectivity and Permeability

One important measure of the Reserve System's success will be the degree to which it allows native wildlife species to move freely within and between the reserve units and to other habitat outside the Reserve System. In addition to wildlife, it is also important that plant occurrences be able to disperse with minimal limitations in order to facilitate occurrence expansion and ensure long-time viability within the context of global climate change. To achieve this, the permeability and connectivity of the study area will be increased by the actions listed below. In landscape ecology, connectivity refers to corridors between core habitat patches that allow for species movement. Protecting species habitat between two existing large protected areas of species habitat to link the two areas is an example of increasing landscape connectivity. Permeability, on the other hand, refers to the relative potential for a species to move across a landscape (Singleton et al. 2002). For example, removal of a fence or other barriers to species movement would increase landscape permeability. While these measures are targeted toward wildlife movement, it is assumed that they will also enhance opportunities for plant dispersal and occurrence expansion.

- Retrofitting or removing fences that serve as barriers or hazards to wildlife movement.
- Improving culverts and other crossing points under roads to make them more attractive and safer for wildlife.
- Perforating or modifying median barriers within the constraints of public safety to make road crossings more available in locations safe for wildlife.
- Collecting consistent data on wildlife movement throughout the study area to better inform the location and type of structures to facilitate movement.

Most fences in the Reserve System will remain and will be utilized for grazing management. Those that are unnecessary will be removed to increase the continuity of the Reserve System (LM-1). Additional fences may be installed to increase flexibility in grazing management or to exclude feral pigs from sensitive natural communities. Most existing private roads within the Reserve System will be utilized for management or monitoring purposes, but those that are unnecessary will be removed and decommissioned (i.e., returned to a natural condition) or stabilized and abandoned both to reduce hazards to wildlife and to reduce the erosion potential associated with dirt and gravel roads. Additional roads may be added to access parts of the Reserve System for management or monitoring purposes. These access routes will conform to the natural contours of

the surrounding landscape and will only be maintained to the extent necessary for access and to reduce the spread of nonnative plant species.

In general, roadways can be made safer for wildlife and for motorists by increasing the number and quality of opportunities for animals to cross them. Median barriers pose a serious hazard to wildlife; when animals try to cross such roads, they often become trapped at the barrier. Median barriers on several major roadways in the study area (e.g., SR 152, Monterey Road) prevent wildlife from crossing except at limited undercrossings. Strategically perforating these medians will both increase the safety of the roadways and increase the connectivity of the study area (LM-5) (see Chapter 6, Condition 6 *Design and Construction Requirements for Covered Transportation Projects*).

Culverts that create a one-way barrier[21] along waterways will be removed or retrofitted to allow movement of fish and aquatic amphibians both upstream and downstream (LM-2). In most cases, retrofitting involves replacing small obstructive culverts with larger, straight culverts to allow species to move through more readily. In some instances culverts may be replaced with clear-span bridges to increase the habitat quality of the waterway where it flows under the roadway (LM-3). This approach enhances the habitat (both aquatic and terrestrial) under the roadway for animal movement. In addition, existing culverts or bridges may be enhanced to increase wildlife movement through or under these permanent barriers. Fencing could be installed along the roadway to guide wildlife species away from the roadway and through undercrossings (LM-4) (see Chapter 6, Section 6.4.4, subheading *Condition 6 Design and Construction Requirements for Covered Transportation Projects*).

Areas of Focus

Three primary areas of focus are suggested to improve landscape linkages in the study area using the techniques described above: Tulare Hill to Anderson Reservoir, Pacheco Creek (SR 152), and Pajaro River.

Tulare Hill to Anderson Reservoir

The section of valley floor between Tulare Hill and Anderson Reservoir is one of the narrowest points in the Santa Clara Valley. For wildlife moving between the Santa Cruz foothills and the Diablo foothills, this topographic pinch point is the closest connection, limiting the distance traveled across the valley floor (Linkages 6, 8, and 10 in **Table 5-9** and **Figure 5-8**) (see *Coyote-7 and -8* in Section 5.3.1 *Land Acquisition and Restoration Actions*).

U.S. 101 is a major barrier influencing wildlife movement across the valley between Tulare Hill and Anderson Reservoir. At least 24 undercrossings or culverts have been documented by CDFG along this stretch of U.S. 101 (**Figure 5-9a**). Most of the culverts would allow safe passage to many species of wildlife, although some are navigable only by the most agile species (e.g., bobcats). Many species of wildlife (e.g., bobcats, skunks, raccoons) have been

[21] One-way barriers occur when species can move in one direction, but not the other; for example, fish moving downstream but not upstream.

documented using these culverts, and most of the culverts are utilized by multiple species (T. Diamond pers. comm.).

All the culverts that adjoin open space Types 1, 2, and 3 on the west side of the highway provide a connection to the Coyote Creek Parkway. These culverts could be improved to better facilitate wildlife movement into and through the culverts. In addition, measures could be implemented to improve wildlife access to the few bridge underpasses along Coyote Creek. Increasing wildlife access to Coyote Creek will help to maintain this important landscape linkage between the Diablo Range and the Santa Cruz Mountains.

Pacheco Creek (SR 152)

Retaining a habitat linkage within the Diablo Range will benefit several covered and other native species (e.g., San Joaquin kit fox, Tule elk, mountain lion) within the study area. Along the 6 miles of SR 152 there are only three breaks in the highway median barrier, each about 50 feet wide (**Figure 5-9b**). These three breaks provide some opportunities for wildlife to cross the highway, but given the high volume of traffic, the likelihood of wildlife successfully using these breaks is low. Increasing the number and quality of crossing opportunities along this stretch will create connections for wildlife across SR 152.

Conservation options that would increase the permeability of SR 152 are limited. There is the possibility of increasing the function of existing linkages by enhancing the few undercrossings on both sides of the highway (bridges and culverts) to make them more biologically appropriate for wildlife use (see *Pacheco 1–6* in Section 5.3.1 *Land Acquisition and Restoration Actions*).

In order to maximize connectivity in this area, enhancements will be prioritized by focusing on the features shown below in descending order.

- Bridges with naturally vegetated riparian corridors on both sides of the highway.
- Bridges with degraded or otherwise limited riparian corridors on one or both sides of the highway.
- Culverts or other small passageways.

Pajaro River

In addition to providing local and regional habitat linkages to native species such as bobcat, and mountain lion, the Pajaro River riparian corridor supports many covered species within the study area. It also provides connectivity to areas outside the study area—specifically the Gabilan Range and Monterey Bay (Pacific Ocean). The river itself provides movement habitat for native fish and linkages to breeding and rearing habitat in the upper reaches of its tributaries (Linkages 11, 12, and 17 in **Table 5-9 and Figure 5-6**). The riparian corridor associated with the river supports California red-legged frog and likely supports least Bell's vireo, though this species has not been documented along the Pajaro in recent years.

Monitoring Wildlife Movement

The Implementing Entity will institute a data collection program to better understand how wildlife moves within and through the study area. While the areas listed above will likely be the focus of monitoring efforts, at least initially, this program will help determine linkage and connectivity throughout the study area. It will also help to define the role of the study area in the overall connectivity of the region. The data collected through this effort will be available for design and implementation of covered road projects. This program will remove the burden of data collection from each participating agency and ensure that all the data collected during the permit term is collected and collated consistently, is maintained in a central location, and is accessible. The program is described in Chapter 7, Section 7.3 *Monitoring and Management Actions*.

Feasibility Study

A feasibility study will be initiated by the Implementing Entity when adequate monitoring data exist on wildlife movement in the three focal areas described above or by year 10 of implementation, whichever comes first (STUDIES-1). The Implementing Entity will commit $500,000 to fund this study, which will evaluate the following questions for each of the three focal areas.

- Based on existing monitoring data, what feasible engineering options are available, small and large, to improve connectivity for the covered species and for native wildlife in general?
- What is the relative feasibility of these options based on factors such as regulatory permitting, cost, environmental impacts, and land use and safety compatibility?

Fire Management

In addition to protection by city fire departments, the study area is served by the Santa Clara County Fire Department and Cal Fire. Cal Fire is often the primary responder to wildfires in natural areas[22] (California Department of Forestry and Fire Protection 2005) and will likely be the primary firefighting agency within Reserve System.

Local wildfire responses may not always benefit covered natural communities and species in the Reserve System. Aggressive response to wildfires can damage topsoil or cause excessive erosion, particularly if heavy machinery or chemical treatments are used to create firebreaks or suppress flames. Most of the natural communities in the study area are adapted to fire and respond positively after a burn. Some communities (e.g., chaparral, foothill pine-oak woodland) and species (e.g., Coyote ceanothus) require fire for regeneration and may require some level of burning to continue to persist. However, fire also often threatens human lives and property. These differing perspectives on fire need to be balanced during Plan implementation.

[22] Three battalions in the Santa Clara Unit of Cal Fire serve the study area: Battalion 1 (Morgan Hill), Battalion 2 (San José), and Battalion 7 (South Santa Clara County) (California Department of Forestry and Fire Protection 2005).

Fire management will be a component of each reserve unit management plan developed as the reserve units are acquired and incorporated into the Reserve System. The fire management component will include discussions with Cal Fire and other local fire-fighting agencies on the use of biologically appropriate management response measures for fire events and fire-dependent ecosystems (LM-8). This general fire management component for the Reserve System should be based, in part and as applicable, on agreement between USFWS, CDFG, and the U.S. Forest Service on fire-fighting techniques. Fire management will be incorporated into the reserve unit management plans prepared for each reserve unit within 5 years of the first acquisition of the land for the reserve unit. The reserve unit management plans will include a range of fire response, from full suppression when wildfires compromise public safety and personal property, to less than full suppression in predetermined areas of the reserve unit where public safety and personal property is not compromised, and fire-dependent natural communities are present. The plans may include controlled burn and let-burn components. The goal of such components would be to reduce fuel loads and decrease fire intensity while promoting fire-dependent natural community regeneration and a natural successional process where feasible. This approach would protect public safety, personal property, and sensitive natural communities while allowing for persistence of natural processes in fire-dependent natural communities. The reserve unit management plan will also include coordination with other land management agencies regarding allocation of prescribed burn permits from the Bay Area Air Quality Management District (BAAQMD).

The reserve unit management plans will describe minimum impact suppression tactics (also known as MIST[23]). Many plans utilizing these techniques and plans with low-impact rehabilitation (restoration) techniques have been developed in recent years. The goal of minimum impact suppression tactics is to safely suppress wildfire using environmentally sensitive suppression methods. Examples of minimum impact suppression tactics guidelines and actions that will be implemented include the following.

- Give preference to using methods and equipment that have the least adverse environmental effects.
- Give serious consideration to the use of water as a firelining tactic.
- Establish mobilization and demobilization areas to minimize spread of noxious weeds or diseases.
- Consider use of helibucket with water or foam before calling for airtankers and retardant.

In order to assure that the reserve unit management plans are followed during fires, the Implementing Entity will develop a wildfire local operating agreement for the Reserve System with Cal Fire and with any other firefighting agency that has responsibility for Reserve System lands. The operating agreement will ensure that the fire management components are implemented, that minimum

[23] For example, see <http://www.wildfirelessons.net/documents/GB_MIST_Guidelines.pdf> or the National Wildfire Coordinating Group at www.nwcg.gov.

impact suppression tactics are utilized, and that post-fire restoration is carried out. An example of a local operating agreement that has been developed and utilized successfully is the Henry W. Coe State Park agreement with Cal Fire (California State Parks 2007). The wildfire local operating agreement will be in place within four years of permit issuance. This will allow time for the fire management component of reserve unit management plans to be developed and for the Implementing Entity to work closely with Cal Fire to develop the operating agreement.

Specifically, the wildfire local operating agreement for the Reserve System will, at a minimum:

- inform the firefighting agencies of Reserve System fire policies and sensitive resources[24],
- inform the Implementing Entity of functions within the Incident Command System (Cal Fire) with respect to wildland fire,
- be the local working agreement between the Implementing Entity and firefighting agencies for all activities related to wildland fires in the Reserve System,
- designate responsibilities and guidelines for all activities related to wildland fires,
- allow the Implementing Entity to be a Resource Advisor in the Incident Command System in the event of a wildfire,
- identify minimum impact suppression tactics during and after wildland fires to ensure the minimum possible environmental impacts, and
- identify biologically appropriate and complete post-fire restoration and rehabilitation responsibilities.

Following a fire, the Implementing Entity shall initiate remedial measures as described in Chapter 10, Section 10.2.1 *Changed and Unforeseen Circumstances* subheading *Fire*.

To ensure the success of prescribed burns and minimum impact fire suppression techniques described in this Plan, the Implementing Entity will hire staff with expertise in controlled burns and fire fighting using these techniques. Staff with this expertise will also help to ensure clear and frequent communication with Cal Fire, which is essential to proper implementation of these techniques during a wildfire (D. Rocha pers. comm.). Staff with this expertise will also help to ensure immediate assessment and possible responses following detection of wildfires in the Reserve System.

[24] The Implementing Entity will update the appropriate local firefighting agencies of sensitive resources in the Reserve System as the Reserve System grows.

Control Invasive Plants

Exotic plants (i.e., nonnative plants) pose a serious threat to ecosystem function, native biological diversity, and many covered plant species. However, many exotic plants cannot be effectively controlled due to their great abundance, high reproduction rate, and proficient dispersal ability; the high cost of control measures; or unacceptable environmental impacts of control measures. Therefore, the focus of control efforts in the Reserve System will be on the most invasive nonnative plants.

The spread of invasive plants may be exacerbated by covered activities. For example, increased human and pet populations can serve as dispersal vectors at the urban-wildland interface or through increased recreation in the Reserve System. Covered roads or other linear facilities can serve as dispersal corridors for these species. Accordingly, an aggressive control program is needed to minimize the adverse impacts of invasive plants and to enhance natural communities. Moreover, improved management within the reserves is expected to increase the resilience of natural communities to invasion by new invasive plants.

The Implementing Entity will address the control of invasive plants as a component of each reserve unit management plan. The appropriate management technique will be selected based on the invasive species present (**Table 5-20**). Control of invasive plants on reserve lands should begin immediately after acquisition if infestations are serious (e.g., yellow star-thistle), even if the reserve unit management plan is not finalized. Efforts to control invasive plans will be evaluated and revised as needed. Formal evaluations and revisions will take place at least every 5 years[25].

The goals of the each reserve unit management plan will be to control the spread of noxious weeds (as defined by the California Department of Food and Agriculture) and invasive exotic plants listed by the California Invasive Plant Council (California Invasive Plant Council 2007 or latest list) into new areas and to control infestations of noxious and serious weeds. Another important goal will be to distinguish those species for which eradication or control will be the objective and those species that will be addressed through landscape-level management. The major elements listed below will be included in each reserve unit management plan.

- An assessment of the exotic plants likely to be invasive within the reserve unit that includes the following components.
  - Maps and descriptions of their distribution and abundance.
  - Their known or potential effects on ecosystem function, native biological diversity, sensitive natural communities, and covered species.
  - The means and risk of their spread to other areas within and outside the reserves.

[25] This is the approximate interval at which the list of invasive plants in California is updated by the California Invasive Plant Council.

  - The cost, feasibility, and effectiveness of available control measures for each species.

- An assessment of invasive plants not currently found in the reserves but that are found nearby or in similar habitats and that might invade the reserves in the future. The assessment will include a description of known or potential effects on ecosystem function, native biological diversity, sensitive natural communities, and covered species.
- Development and application of criteria for establishing invasive plant control priorities.
- Integration and coordination of exotic plant control efforts in the Reserve System with efforts of other ongoing invasive plant control efforts such as those listed below.
  - Efforts to reduce the spread of barbed goat grass on Coyote Ridge (conducted by Dr. Stuart Weiss)
  - Efforts by SCVWD and County Parks to eradicate giant reed from Coyote Creek below Anderson Dam (County of Santa Clara Parks and Recreation Department 2007).
  - The integrated pest management program for yellow star-thistle in Santa Clara County that has been experimenting with biological control agents (coordinated by the County of Santa Clara Agriculture Commissioner).
  - Plans by County Parks to control invasive plants in various sites to be added to the Reserve System (conducted by County Parks and various consultants).
- A description of methods to control and prevent the establishment of invasive plants and criteria for evaluating the suitability of application of these methods based on site-specific conditions.
- A description of a process by which future invasive plants can be evaluated quickly to determine the best course of action for their effective removal or control.

Development of the invasive plant component of the reserve unit management plans will be coordinated with the Santa Clara County Division of Agriculture, the Santa Clara County Weed Management Area, and other major resource management agencies in the study area including SCVWD, the Open Space Authority, State Parks, and County Parks. Neighboring land management agencies such as Midpeninsula Regional Open Space District and Peninsula Open Space Trust will also be consulted. Because control of many invasive plants in the study area is a regional issue, coordination with these agencies is essential. Coordination could include sharing costs, staff, and equipment and conducting joint management programs to address the regional problem of invasive plants. Management to control invasive plants will be prioritized such that the invasive plants with the greatest impacts on covered species are addressed first.

Herbicide Application

The selective use of herbicides is a conservation action proposed to control or eradicate invasive plants that may be used judiciously and occasionally within the Reserve System in specific locations (LM-14). Herbicide application may be necessary in particularly heavy infestations of exotic plants (e.g., Transline herbicide is effective in controlling yellow star-thistle). Certified personnel will conduct any herbicide application. Herbicides will be used with great caution, especially near seeps, creeks, wetlands, and other water resources. Herbicide use will be reserved for instances where no other eradication techniques are found to be effective. SCVWD is currently using this technique, among others, in the implementation of the Stream Maintenance Program within riparian zones (Santa Clara Valley Water District 2010). Herbicide restrictions within the Pajaro River watershed would also be applied, consistent with the guidelines of the Stream Maintenance Program (Santa Clara Valley Water District 2010).

Control Nonnative Animals

Bullfrogs and Nonnative Predatory Fish

The Implementing Entity will work to eradicate or reduce nonnative predators (e.g., bullfrogs, nonnative predatory fish) through habitat manipulation (e.g., periodic draining of ponds), trapping, hand capturing, electroshocking, or other control methods. Removal of bullfrogs and nonnative predatory fish will be a high priority in existing ponds or wetlands within the Reserve System (LM-13). The creation of new ponds or restoration of wetlands will only be conducted in areas where there are no known bullfrogs or where bullfrog control programs are underway or can be established.

Newly created ponds will be designed to periodically dry up naturally. In addition, where feasible, all new ponds will have drains installed to allow for occasional draining of the pond to control bullfrogs and nonnative predatory fish in case natural drying does not occur (POND-5). Some existing ponds might be retrofitted with drains if the nonnative species populations cannot be controlled by other means. Existing ponds without drains and that do not drain naturally may need to be drained periodically using pumps. During any maintenance or heightening of stock pond dams to increase capacity, the Implementing Entity-maintained rebuilt structures will be fitted with drains.

Draining ponds, sterilizing or removing subsoil, and removing bullfrogs can be effective at reducing predation by bullfrogs and other invasive species on covered amphibians and reptiles (Doubledee et al. 2003). Drainage of stock ponds and other wetlands will be carried out during the summer or fall dry season. Population models predict that draining ponds every 2 years will increase the likelihood that California red-legged frogs will persist in ponds with bullfrogs (Doubledee et al. 2003). SCVWD will evaluate water inputs from outside the study area to control nonnative fish and other exotic species from entering and establishing populations in waters inside the study area.

The SCVWD routinely distributes local and imported water supplies. Water distribution and release to stream channels may introduce and spread exotic, predatory, competitive, and habitat-altering species. To contain exotic species within off-channel recharge basins, current and future outflow systems will be screened.

Feral Pigs

Feral pig impacts on natural communities are well documented within the study area. In Henry W. Coe State Park, adverse affects were documented on grassland, oak woodland, and aquatic natural communities (Sweitzer and Loggins 2001). Rooting disturbance by feral pigs allows nonnative invasive plants to establish in grassland and aquatic communities, and fall acorn foraging likely has a detrimental effect on oak regeneration (Sweitzer and Van Vuren 2002). An aggressive feral pig control program will be implemented on the Reserve System using trapping, hunting, or other effective control methods (LM-12).

The impact of rooting activities in pond and wetland natural communities may be reduced by fencing, although fencing to exclude feral pigs will need to be built for that purpose and maintained frequently in order to be effective. If fencing is used, it must be constructed so as not to restrict wildlife movement routes or corridors. In cases where livestock access to ponds and surrounding uplands is desired but feral pigs are degrading habitat, a feral pig control program could be initiated to improve pond habitats (POND-6). Feral pig control has been effective on San Francisco Public Utility Commission land in the adjacent Alameda Creek watershed (T. Koopman pers. comm.) and in Henry W. Coe State Park within the study area (Sweitzer and Loggins 2001; program is on-going). Feral pig control will be focused on parts of the permit area where the concentrations of feral pigs are high and impacts on native communities have been observed. It would be difficult to census the exact number of feral pigs within the Reserve System without an extensive effort. However, rooting disturbance can be monitored. Pig populations will be controlled during the permit term as long as their disturbance (i.e., rooting disturbance) adversely affects the Implementing Entity's ability to successfully implement the conservation strategy for this Plan.

Public Education and Outreach

Public education and outreach will be an integral component of reserve management. The Implementing Entity will conduct outreach to local private and public landowners and residents that will include education on the Plan's management goals and objectives as well as implementation techniques. The focus of public education and outreach activities will be to raise landowner and public awareness of reserve management goals, actions and methods, and how the public can support and help implement them. For example, through the public outreach program, the Implementing Entity will obtain input from interested citizens on the preparation and implementation of reserve unit management plans. Activities may include education about

- not planting invasive plant species or releasing invasive animals such as bullfrogs,
- land uses to allow wildlife passage through streams and upland areas, or
- best management practices in agricultural and urban areas to minimize impacts to streams and other sensitive habitats.

The public education and outreach staff of the Implementing Entity will serve as a conduit for technical information and expertise available to landowners and the public. The Implementing Entity will develop and publish guidelines for local landowners and provide education programs to assist in the implementation of such guidelines. Public education and outreach will be coordinated with other local agencies providing similar services in the study area (e.g., County Parks, SCVWD, Open Space Authority).

To support the stream conservation actions (e.g., STREAM-1, STREAM-2, STREAM-3) and the stream and riparian setback condition (Chapter 6, Section 6.5, subheading *Condition 11 Stream and Riparian Setbacks*), the Implementing Entity will develop Stream Management (Riparian Land Use). Guidelines for private landowners, including an educational program to assist in the implementation of the guidelines, within five years of permit issuance. The guidelines and educational program will be based on SCVWD's *Guidelines & Standards for Land Use Near Streams* (Santa Clara Valley Water Resources Protection Collaborative 2006) developed for local permitting agencies, homeowners, and developers. The focus of the program and guidelines will be to raise landowner awareness of riparian conservation actions and methods that can be employed to protect riparian habitats and streams.

Threats and Uncertainties

Threats to covered species and natural communities at the landscape level include those threats that this Habitat Plan seeks to minimize and offset, such as habitat loss, habitat fragmentation, and other forms of habitat degradation (see Chapter 4). The expected increase in vehicle traffic in the study area during the permit term will increase the threat to species that move across roads. Increases in population and transportation corridors will also increase the risk of the spread of invasive plants subject to the invasive plant component of the reserve unit management plan. Consequently, more invasive plants and exotic wildlife are expected to warrant eradication or control in the future.

While it is important to provide habitat linkages for native fish, wildlife, and plants, it is also important that those linkages do not facilitate an increase in nonnative species within the study area. The implication of management actions on the distribution of nonnative species will be weighed before these actions are implemented. In some cases, increasing habitat connectivity within the study area may introduce nonnative predators to areas that had been insulated from such introduction. For example, installing or improving culverts may increase access by covered amphibians to sites that expose them to new hazards. By creating the Reserve System and applying substantial long-term management and

monitoring through the Plan, some of these threats will be reduced and offset. However, many of these threats will remain outside the Reserve System.

Fire in the Reserve System is both an opportunity and a threat. Wildfires at moderate frequencies can maintain a healthy mosaic of natural communities without the buildup of too much fuel. If fires occur too infrequently, there is the threat that fires will burn too hot, damaging native ecosystems while promoting nonnative vegetation establishment. Fires that are too frequent could have similar effects. A combination of a let-burn policy, prescribed burns where and as needed, and restrictions on human access or uses in areas of the Reserve System with high fire risk should address this threat.

Climate change is one of the largest threats and uncertainties that the Plan confronts in the management of natural landscapes. Creating climate predictions for an area as small as the study area is not possible with current modeling technology and unlikely for an extended time. At the micro-scale, change in temperature, along with precipitation patterns (either wetter or dryer) could adversely affect covered species and natural communities in the Plan area. Accordingly, several ecological responses are possible during the permit term.

- **Phenological changes resulting in phenological mismatches**. Timing of seasonal events, such as migration, flowering, and egg laying, may shift earlier or later (Walther et al. 2002; Forister and Shapiro 2003; Root et al. 2003; Root et al. 2005). Such shifts may affect the timing and synchrony of events that must occur together, such as butterfly emergence and nectar availability.
- **Reduction in species and natural community range and distribution**. Narrowly distributed species and natural communities that already have restricted ranges due to urban growth, altitudinal gradients, or within narrow environmental gradients are particularly vulnerable (e.g., Bay checkerspot butterfly, Mount Hamilton thistle) because they likely have nowhere to move if their habitat becomes less suitable (Parmesan et al. 1999; Pimm 2001; Walther et al. 2002; Easterling et al. 2000; Shainsky and Radosevich 1986; Murphy and Weiss 1992; J. Hillman pers. comm. 2007).
- **Shifts in natural community distribution and composition**. Increases in disturbance events, such as fire or flooding, could increase the distribution of disturbance-dependent land cover type and plant species, such as redwood forest annual grassland, within the study area (Brown and Hebda 1998; Lenihan et al. 2003; Fried et al. 2004; California Climate Change Center 2006; Rogers and Westfall 2007).
- **Changes in species abundance**. The number or density of individuals found in a particular location may change triggered by changes in resource availability associated with an increase or decrease in precipitation (Walther et al. 2002; Lenihan et al. 2003; Millar et al. 2006; Pounds et al. 2006). Changes such as these may benefit one species at the expense of another.

The conservation strategy, reserve design, and monitoring and adaptive management program address the threat of climate change using a multi-level approach: landscape level, natural community level, and species level. This

approach focuses on protecting and enhancing a range of natural communities, habitat types, and environmental gradients (e.g., altitude, aspect, slope), as well as other features that are important, as availability of resources and habitat types in the study area changes with climate change. More details on the effects of climate change to the study area and covered species, and the Plan's anticipation of these effects, are found in **Appendix F**.

5.3.3 Grassland Conservation and Management

Biological Goals and Objectives

The overarching biological goal for grasslands is to maintain and enhance functional grassland communities that benefit covered species and promote native biodiversity. Specific objectives within the Reserve System entail protection of serpentine grassland, other native grasslands, and other endemic features of the community such as serpentine seeps and serpentine rock outcrops. An additional objective is to ensure that a diversity of soil types and other environmental gradients are acquired in areas suitable for enhancing native species. Grasslands will be enhanced by reducing cover and biomass of nonnative invasive species and by increasing the diversity of native plants. A final objective that will enhance the grassland natural community is to increase distribution of California ground squirrels to increase the prey base and burrow availability for covered species.

Grassland conservation and management is anticipated to benefit 18 covered species. Covered species use of the grassland natural community is varied. Wildlife use includes movement, foraging, breeding, and year-round habitat. The grassland natural community is known to provide primary and secondary habitat for plants. Bay checkerspot butterfly uses serpentine bunchgrass grassland as year-round habitat and may use other grassland types for movement habitat to move between serpentine grassland habitat patches (see Section 5.4.1 *Bay Checkerspot Butterfly*). California tiger salamander and California red-legged frog use grassland for upland and movement habitat (see Section 5.4.2 *California Tiger Salamander* and Section 5.4.3 *California Red-legged Frog*). Western pond turtle uses grassland as movement (see Section 5.4.5 *Western Pond Turtle*). Western burrowing owl uses grassland for foraging and breeding (see Section 5.4.6 *Western Burrowing Owl*). Tricolored blackbird uses grassland as year-round habitat (see Section 5.4.8 *Tricolored Blackbird*). San Joaquin kit fox uses grassland for movement and foraging (see Section 5.4.9 *San Joaquin Kit Fox*).

Serpentine bunchgrass grasslands and serpentine rock outcrop provides primary habitat for Tiburon Indian paintbrush, Santa Clara Valley dudleya, smooth lessingia, and Metcalf Canyon jewelflower (see Section 5.4.10 *Tiburon Indian Paintbrush*, Section 5.4.13 *Santa Clara Valley Dudleya*, Section 5.4.16 *Smooth Lessingia*, and Section 5.4.17 *Metcalf Canyon Jewelflower*). Serpentine bunchgrass grassland provides primary habitat for Coyote ceanothus and fragrant fritillary (see Section 5.4.11 *Coyote Ceanothus* and Section 5.4.14 *Fragrant*

Fritillary). Serpentine bunchgrass grassland and serpentine seeps provide primary habitat for Mount Hamilton thistle (see Section 5.4.12 *Mt. Hamilton Thistle*). Finally, serpentine bunchgrass grasslands and serpentine rock outcrops provides primary habitat and non-serpentine rock outcrops provides secondary habitat for most beautiful jewelflower (see Section 5.4. 18 *Most Beautiful Jewelflower*). The grassland acquisition and enhancement conservation actions identified in the following sections are intended to benefit these species as well as the natural community.

Acquisition and Enhancement

The Plan requires that the Implementing Entity acquire at least 17,300 acres of grassland through fee title or conservation easement (**Tables 5-11 and 5-18**).

Grassland Acquisition

The Implementing Entity will protect, through fee title purchase or easement, at least 4,000 acres of serpentine bunchgrass grassland, 120 acres of serpentine rock outcrops/barrens, 10 acres of serpentine seeps (LAND-G1, **Tables 5-11 and 5-18**), 10 acres of rock outcrops, and 13,300 acres of annual grassland (LAND-G2, **Table 5-11**). Specific acquisition targets are not established for native grasslands because native stands intergrade with nonnative grasses and are generally not well documented or mapped in the study area. Land acquisition will prioritize those parcels with stands of native grasses. Perennial bunchgrass grassland will be prioritized for acquisition where it occurs (LAND-G2). The Implementing Entity will manage these lands as part of the Reserve System. These areas will be representative of the diversity of vegetation alliances, soil types, topography, elevation, and other environmental gradients in the study area.

The Implementing Entity will acquire all land by Year 45 according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. This provision requires that grassland preservation requirements be met prior to impacts occurring to each grassland land cover type, with a 10% allowable deviation.

Acquisition of serpentine grassland will occur primarily on Coyote Ridge from Silver Creek south to Anderson Reservoir. Large stands of serpentine grassland will also be acquired in the Santa Teresa Hills, near Chesbro Reservoir (Llagas-2), and north of Morgan Hill (Coyote-5 and Llagas-3). Land acquisition targets for serpentine grassland that are geographically specific (see **Table 5-19**) will ensure that the most valuable stands are acquired to support the covered species. Portions of several County parks expected to be incorporated into the Reserve System support large and important stands of serpentine grassland that will be managed more effectively: Santa Teresa, Calero, and Coyote Lake-Harvey Bear Ranch (**Table 5-5**).

Annual grassland will be acquired for the Reserve System on and near Coyote Ridge, near San Felipe Creek, in Upper Penitencia Creek watershed, in the Pacheco Creek watershed, north of Gilroy, and in the southwest corner of the study area (Uvas-5, Uvas-6, Pescadero-1). County parks with significant stands of annual grassland that will be incorporated into the Reserve System include Joseph Grant and Coyote Lake-Harvey Bear Ranch (**Table 5-5**).

Grassland Enhancement

All grasslands in the Reserve System will be enhanced. Grassland enhancement will begin immediately after reserve unit management plans are completed or updated for each reserve unit. Native grasslands will be enhanced in the reserves using techniques tailored to the grassland type (i.e., the vegetation alliance) and the site. Each grassland stand will be classified to the alliance level according to the CNDDB vegetation classification scheme (California Department of Fish and Game 2003).

Enhancement techniques and frequencies and intensities of application will be informed by pre-acquisition assessments, baseline surveys, and targeted studies (see Chapter 7). Grassland communities in the study area are mosaics of many vegetation alliances, as described in Chapter 3, and will occur throughout the Reserve System. The proper management regime necessary to maintain this mosaic of grassland types and enhance each grassland vegetation alliance will be determined through a combination of proven techniques such as moderate livestock grazing and small-scale experimental treatments, or pilot studies. Pilot studies will be initiated on small species levels to determine the feasibility of enhancement activities that, if successful, can be applied on a larger level. The pilot studies will test approaches to promote native grassland species and will be conducted as part of the monitoring and adaptive management program.

If monitoring demonstrates that the treatments are effective at increasing the relative cover of native grasses and forbs, the reserve manager will evaluate whether these treatments can be applied to the entire stand of the grassland vegetation alliance to achieve enhancement objectives of grassland on a larger scale. In some cases, management regimes could be shifted in time, location, or intensity to achieve these objectives. This evaluation must be conducted on a case-by-case basis in which the expected benefits to grassland are weighed against the environmental impact, hazard risk, and increased cost of applying the technique on a larger scale.

Management Techniques and Tools

General Principles for Grassland Management

Enhancing grasslands within Habitat Plan reserves will likely require applying many of the management techniques described below concurrently at different sites and on different scales to create a mosaic of grassland conditions. Applying

different management techniques across different spatial and temporal scales will maximize habitat heterogeneity across the landscape and will tend to increase native biological and structural diversity (Fuhlendorf and Engle 2001). For example, the buildup of dead plant material, or thatch, has been implicated in the suppression of native annual forbs in unmanaged wet grasslands in California (Hayes and Holl 2003). Techniques to reduce thatch (e.g., livestock grazing, prescribed burning, raking) will be applied only where the treatment is expected to benefit native grassland species. Techniques to reduce thatch should be discontinued if they are demonstrated to promote expansion of invasive species or encroachment of nonnative grassland into native grassland areas. These management techniques can also be effective at reducing the overall biomass of nonnative, invasive species and brush and increasing the annual success of native grassland species (LM-11).

Managers must consider the impacts of management treatments on other covered species. For example, if burns occur within grassland habitat, treatments may affect covered plants in both positive and negative ways (Gillespie and Allen 2004); accordingly, it is important to monitor several life stages to determine the net effect of management actions.

Site conditions (both physical and biological) and land use history are important in developing biologically appropriate management techniques to attempt to enhance native grassland alliances (Stromberg and Griffin 1996; Hamilton et al. 2002; Harrison et al. 2003). For example, some species of native grasses may occur primarily on steep north- or east-facing slopes where soil moisture tends to be higher (Jones & Stokes Associates 1989). Management strategies at these sites will differ from sites on more level topography and drier, south-facing slopes.

Livestock Grazing

The flora of the study area evolved under the influence of prehistoric herbivores, including large herds of deer, elk, antelope, and other grazing animals, and without the competition from nonnative annuals which dominate much of the study area today. At present, appropriate livestock grazing utilizing cattle, sheep, and goats can be useful for range management, as a vegetation management tool to promote native plants and animals, and to reduce fuel loads for wildfires. In the study area, grazing has been shown to benefit most covered plant species and Bay checkerspot butterfly by reducing cover of invasive plants and increasing habitat for dwarf plantain, the butterfly's host plant (Weiss and Wright 2005, 2006; Santa Clara Valley Transportation Authority 2006; also see **Appendix D**). In addition, grazing and rangeland management practice have been demonstrated to benefit California tiger salamander and California red-legged frog. For these species, the USFWS issued a special Section 4(d) rule exempting ranch practices from a possible take because the benefit of these practices was deemed far greater than any potential individual loss.

Grazing may also benefit some ground-nesting or ground-foraging songbird species by providing variations in vegetative cover (Santa Clara Valley

Transportation Authority 2006). However, effects on all covered species are not quantified or fully understood, and it is possible that in some cases the effects of grazing on some covered plants may be detrimental (J. Hillman pers. comm.). Initially, vegetation management that is implemented will reduce the height of all vegetation to less than 12 inches (through grazing and mowing) (GRASS-8).

Grazing by livestock and native herbivores is a conservation action proposed for implementation in the Reserve System to enhance grasslands by creating structural diversity and increasing the abundance of native grassland species (GRASS-1). Several factors, including timing, stocking rate, rotation type, and grazing species, may affect the success of a grazing program (Sotoyome Resource Conservation District 2007). Tule elk may not be ideal native grazers on a large scale. Large herds of Tule elk may damage fences and disrupt livestock grazing programs (J. Fields pers. comm.). Fencing required to manage herds of Tule elk or other large herbivores may create barriers to wildlife movement.

Varying the timing (i.e., seasonal timing, annual timing) of grazing generally produces different effects across the landscape (Weiss 1999; Santa Clara Valley Transportation Authority 2006). A grazing treatment should be defined by the kinds and classes of livestock, their spatial distribution, their temporal distribution, and their density, and determines the effects of grazing on plants in the grazing area (Huntsinger, Bartolome, and D'Antonio 2007). For instance, researchers have observed that in serpentine grasslands, winter/spring grazing reduces annual grass cover more effectively than other grazing regimes (S. Weiss pers. comm.). While winter/spring grazing increases opportunities for dwarf plantain and other serpentine-adapted forbs, it can crush butterfly larvae, eggs, and pupae (Weiss 1999; Santa Clara Valley Transportation Authority 2006). Alternatively, summer/fall grazing may avoid butterfly larvae, eggs, and pupae; however the habitat created is not as high quality as that produced by the winter/spring regime (Santa Clara Valley Transportation Authority 2006; S. Weiss pers. comm.) Short-term winter grazing following burning may help to control exotic grasses as they germinate after winter rains, while mid-summer grazing may promote native perennial grasses because they are dormant at that time and not substantially damaged by grazing. These tradeoffs will need to be considered as reserve unit management plans are developed. For serpentine grassland, typical stocking rates and seasonality include 1 cow-calf per 10–15 acres for winter-spring (rainy season) or summer-fall (dry season), with small modifications according to short-term seasonal variations.

The stocking rate is the number of cattle grazing a given site for a given period of time. The stocking rate will be consistent with known or experimentally derived rates that promote native plants without adversely affecting covered species or causing long-term rangeland degradation. For example, excessive numbers of cattle in an area may trample Mt. Hamilton thistle, which occurs in serpentine soils in wet habitats such as serpentine seeps and springs, (J. Hillman pers. comm.) and Santa Clara dudleya, which occurs on serpentine rock outcrops (S. Weiss pers. comm.; J. Hillman pers. comm.).

Rotation of cattle on different pastures within and between years can influence the success of a grazing program. Grazing patterns and their effects on serpentine plants and insects are being tested on several sites in the study area, including Coyote Ridge and Tulare Hill. Current BMPs (Santa Clara Valley Transportation Authority 2006; S. Weiss pers. comm.; J. Fields pers. comm.) and research in various systems (Zervas 1998; Cousins et al. 2003) suggest that timing regimes should be consistent over long periods because frequent variation may increase nonnative cover and reduce habitat for native species. In view of this finding, consideration of historical patterns of currently grazed lands will direct decisions about grazing in the Reserve System. Current rotations will be monitored and only shifted if monitoring results indicate that the lands or covered species are adversely affected under the existing timing.

Different herbivorous species have different preferences and abilities to be selective grazers and therefore have different impacts on vegetation. Reserve unit management plans will take these differences into consideration.

Grazers will be excluded from some sensitive riparian areas (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*). In addition, targeted studies examining grazing exclusion from specific terrestrial areas may be considered for sensitive plant species. However small-scale exclusion fences in potentially remote areas are expensive and labor intensive to install and maintain. Therefore, exclusionary fencing will only be considered in areas where monitoring indicates that conservation targets are not being met or detrimental effects of grazing may actually hinder the survival of the species.

Reintroduction of livestock grazing into areas where it has been excluded is an important conservation action of the Plan, particularly on serpentine grasslands. For example, livestock grazing will be reintroduced onto serpentine grassland sites in Santa Teresa County Park (**Table 5-5**) to reduce the biomass and diversity of nonnative grasses and herbs. Reintroduction of grazing is expected to substantially enhance habitat for Bay checkerspot butterfly and several covered plants. Recovery with the reintroduction of grazing may take many years, however, as evidenced in the Silver Creek Hills (Wetlands Research Associates 2008). On Tulare Hill, Weiss and colleagues have noted that seedbanks from the final large cohort of native forbs in 2004 (3 years after the cessation of grazing) provided for dense native forb cover following a June 2004 fire on Tulare Hill (Metcalf Energy Center 2006). Once the native seedbank is depleted, restoration of high-quality serpentine grassland requires recolonization from forb-rich patches of thin soils, which is a much slower process.

In view of the uncertainty of relevant research results, it would be prudent to use grazing management at sites with high potential to improve existing stands of native grasses and other targeted species, and to focus on reduction of the non-native species competition in a heterogeneous pattern—some patches grazed more and some less. Such grazing would favor a diversity of conditions, including those more favorable to expansion and persistence of the natives (Fuhlendorf and Engle 2001). Extensive grazing of large pastures with the livestock dispersed for the entire grazing period will be more effective at producing such heterogeneity than would higher intensity rotational grazing of

smaller pastures. Recent research by Bartolome (2011) shows that undisturbed annual grassland patches with abundant native grasses are low in phosphorous, and the opposite is found at adjacent sites where no native grasses occur. Determining the potential of grassland sites for improvement in native grass abundance may be accomplished by correlating site conditions where native grasses are abundant, soil patches have low productivity, and soils have not been disturbed. Such determinations may be confirmed by analyses of phytolith evidence of prehistoric grasslands and perennial grasses (Bartolome and Evett 2010). Management treatments to improve native grass abundance should be focused only at grassland sites that have the indicators of potential, but do not already support abundant native grasses.

Prescribed Burning

Prescribed burning as a strategy to manage grasslands has been studied extensively in California and elsewhere (Harrison et al. 2003; Rice 2005). A review of existing literature in 2004 found that burning has mixed results depending on the starting condition of the ecosystem and on the timing and frequency of the burns (Rice 2005). Research indicates that in order for fire to successfully reduce nonnative and increase native plant cover, burns must be targeted toward the specific system and species conditions.

Prescribed burning is a conservation action to enhance natural communities, to control or eradicate invasive plants, and prevent natural community type conversion (GRASS-2). If burns are implemented in the Reserve System as a management tool, considerations will include the blooming and seeding times of the targeted nonnative species, the history of site use, and the likely condition of the native soil seed bank. Fires will be conducted at a time when the seeds of the targeted invasive plants will be destroyed. Single burns are generally unsuccessful at restoring native diversity and cover to grasslands; multiple burns are usually required. Burning can be used in conjunction with grazing or mowing to control infestations of invasive species and brush. If native vegetation on a site has been particularly denuded, supplementary seeding of native species may be required.

In particular, prescribed burning within the Reserve System may be an effective tool to eradicate exotic invasive species that are selectively avoided by grazing livestock. An example of this is barbed goatgrass (*Aegilops triuncialis*), a species that recently invaded Coyote Ridge and seriously threatens serpentine grasslands in the study area (S. Weiss pers. comm.). Barbed goatgrass is avoided by livestock but can be controlled with prescribed burns that are appropriately timed (just after plants senesce but while seeds are still maturing) and repeated (probably at least 2 or 3 years in succession) (DiTomaso et al. 2001). A pilot project to eradicate barbed goatgrass through burning that was initiated in 2006 on Coyote Ridge has shown mixed results (S. Weiss pers. comm.). Additional burns occurred in 2007.

Prescribed burns have been conducted by State Parks in Henry W. Coe State Park and by the Open Space Authority on several parcels. Prescribed burns have been

conducted by County Parks at Joseph Grant, Motorcycle, Mount Madonna and Santa Teresa County Parks (D. Rocha pers. comm.). County Parks plans to conduct prescribed burns in Coyote Lake–Harvey Bear Ranch County Park in the future (Rana Creek Habitat Restoration 2004). Prescribed burns in the Reserve System will be planned and conducted using the techniques and lessons learned from these agencies on actual burns.

In areas that are deemed *No-Burn* areas, the Implementing Entity will utilize management strategies that mimic the affects of burning on grassland species (e.g., mowing, hand pulling, targeted herbicide application) (LM-9).

Mowing

In some instances, mowing is a reasonable alternative to prescribed burns; mowing is a conservation action for selected areas when grazing is infeasible (LM-11, GRASS-3). Mowing can often be safer and easier to implement on small scales than fire. Like prescribed burning, mowing needs to be timed to target the blooming/seeding cycle of nonnative species. Mowing may be particularly useful and effective as a small-scale treatment in areas that cattle cannot or should not access or for other site-specific logistical reasons (for example, when removal of vegetation is required at a time other than when livestock are available). Discing as a management tool in grasslands is not recommended because it often destroys burrows for covered and other native species (e.g., western burrowing owl, San Joaquin kit fox), increases soil erosion, and creates invasion sites for noxious weeds.

Seeding Native Forbs and Grasses

In order to protect genetic integrity of the local landscape and ecosystems it is recommended that natural revegetation of local ecotypes should be encouraged first by controlling weeds and non-native species and seeding of native species should only occur in areas where natural revegetation is unlikely to occur (California Native Plant Society 2001). Highly degraded grasslands; however, may need additional input of native seed to restore their functionality. Seeding of native forbs and grasses is a conservation action in support of grassland enhancement (GRASS-4). Seeding may include covered plant species. Where possible, seed sources of covered plants will come from the project site itself and, if unavailable from the project site, from adjacent or nearby sites within the same watershed (California Native Plant Society 2001). If no seed source is available from the same watershed, then the seed source will be from as close as possible. Decisions regarding where to introduce seed and from how far away to collect it will be made in light of all available information about the targeted species, the source population, and issues related to maintaining the genetic integrity of existing populations (California Native Plant Society 2001).

To maximize the success of seed addition, pretreatment (e.g., burning 1 year prior to seeding to reduce weed seeds on the surface and in litter) may be

required. Recent research conducted on serpentine grasslands in Santa Barbara suggests that seedlings of California native forbs can be excellent competitors when enough seeds are present to overcome the dominance in the seed pool of the exotic grasses and forbs (Seabloom et al. 2002). In a 5-year experiment, burning or mowing had no effect on the abundance or the proportion of native forbs without seeding. Targeted studies could test this approach by seeding grasslands with native and locally collected seeds within the reserves.

Ground-Dwelling Mammals

California ground squirrels play a key role in the grassland natural community. They provide a prey base for raptors and other covered species such as San Joaquin kit fox. In addition, their burrows provide nest sites for burrowing owls, (although their name implies otherwise, burrowing owls do not typically excavate their own burrows) and refugia for covered amphibians.

Historically, hunting and rodenticides have been used to control rodents and reduce conflicts with livestock. These practices may have decreased the populations of rodents, reducing prey availability for their predators. For example, in 1975 California ground squirrel, one of the main prey items for San Joaquin kit fox, was severely reduced in Contra Costa County after extensive rodent eradication efforts (Bell et al. 1994). The history of rodent control in Santa Clara County is unknown.

Under the Plan, a conservation action proposes to minimize existing rodent control measures (e.g., poisoning, hunting, and trapping) in reserves (GRASS-5). Minimizing existing ground squirrel control measures may be sufficient to increase squirrel populations in some areas. However, some rodent control measures will likely remain necessary in certain areas where dense rodent populations may compromise important infrastructure (e.g., pond berms, road embankments, railroad beds, levees, dam faces). The use of rodenticides or other rodent control measures will be prohibited in reserves except as necessary to address adverse impacts on essential structures within or immediately adjacent to reserves, including recreational facilities incorporated into the Reserve System. In addition, the Implementing Entity will introduce livestock grazing where it is not currently used, and where conflicts with covered activities will be minimized, to reduce vegetative cover and biomass that currently excludes ground squirrels to encourage ground squirrel colonization of new areas within the Reserve System (GRASS-6).

Threats and Uncertainties

While focusing on management of nonnative invasive species, the Implementing Entity must also have management practices in place to recognize and account for invasions of nonnative species that have not been previously documented in the study area. When a new invasion is documented, an analysis of the threat it poses to native species and the current extent of the invasion will be conducted in

accordance with the invasive plant component of the reserve unit management plan for the Reserve System. In addition, coordination with local, regional, and state-level weed management programs will ensure that new invasions are caught early and their impact on native species minimized. With foreseeable changes in climate, the threat of invasive plants and animals is expected to increase.

Another threat to grasslands, serpentine grasslands in particular, is the ongoing and increasing nitrogen deposition from air pollution (Weiss 1999; California Energy Commission 2006; see **Appendix E**). Nitrogen deposition is predicted to increase during and beyond the term of the Plan due to population growth in the region and from covered activities (although it could possibly decrease if future automobile technologies address this issue; see Chapter 4 and **Appendix E** for details). Serpentine soils are inherently nutrient poor and are particularly limited in available nitrogen. Most serpentine-endemic plant species have evolved to tolerate this condition, while competitive invasive species cannot do so. This nutrient deficiency is believed to be the primary mechanism by which serpentine soils retain a high degree of native diversity (Harrison 1999). Nitrogen deposition has been shown to greatly increase available nitrogen in the soils of the study area and in turn to potentially increase the success of plant invasions into serpentine areas (Weiss 1999). The same study also found that serpentine areas that are grazed do not suffer the same plant invasions, most likely due to the fact that cattle selectively graze the invasive grasses and leave the native species and also because the cattle effectively remove nitrogen from the site (Weiss 1999). Continued active management using livestock grazing, prescribed or natural burning, and other methods will therefore be essential to offsetting the potentially increasing threat of nitrogen deposition in this community. The long-term effects of N-deposition are unknown, but the working hypothesis is that existing grazing regimes will be able to maintain native biological diversity.

5.3.4 Chaparral and Northern Coastal Scrub Conservation and Management

Biological Goals and Objectives

The biological goals and objectives for chaparral and northern coastal scrub communities include enhancement to benefit covered and other native species. The Implementing Entity will accomplish this by protecting land that supports chaparral and northern coastal scrub land cover types through fee title purchase or conservation easement and managing that land as part of the Reserve System. Areas that are protected will contain the full range of chaparral and northern coastal scrub community vegetation associations. An additional objective is to promote regeneration and succession. These natural processes will in turn benefit native species that occur in these land cover types. Acquisition, enhancement, and management actions to achieve these goals are discussed below.

Chaparral and northern coastal scrub conservation and management are anticipated to benefit 15 covered species. Covered species use of the chaparral and northern coastal scrub natural community is varied. Wildlife species use includes upland, movement, and foraging habitat. Chaparral and northern coastal scrub also provide primary and secondary habitat for some covered plant species. Additional details on species specific conservation actions can be found in each of the species sections identified below; however, the following is a summary of covered species use of the chaparral and northern coastal scrub natural community.

Bay checkerspot butterfly uses chaparral and coastal scrub as movement habitat to move between serpentine grassland habitat patches (see Section 5.4.1 *Bay Checkerspot Butterfly*). California tiger salamander uses chaparral and coastal scrub as upland and movement habitat (see Section 5.4.2 *California Tiger Salamander*). California red-legged frog and western pond turtle use chaparral and coastal scrub as movement habitat (Section 5.4.3 *California Red-legged Frog* and Section 5.4.5 *Western Pond Turtle*). Mixed serpentine chaparral serves as primary habitat for Coyote ceanothus (see Section 5.4.11 *Coyote Ceanothus*). Northern sage scrub/ Diablan sage scrub provides secondary habitat for fragrant fritillary (see Section 5.4.14 *Fragrant Fritillary*). Chaparral provides secondary habitat for Loma Prieta hoita (see Section 5.4.15 *Loma Prieta Hoita*). Mixed serpentine chaparral as primary habitat and northern coastal scrub/ Diablan sage scrub provides secondary habitat for Most beautiful jewelflower (see Section 5.4.18 *Most Beautiful Jewelflower*). The acquisition and enhancement conservation actions identified in the following sections are intended benefit the species identified above and contribute to species recovery, as well as benefit the natural community.

Acquisition and Enhancement

During Plan implementation, the Implementing Entity will protect, through fee title purchase or conservation easements, at least 2,500 acres of chaparral and northern coastal scrub (**Table 5-11**).

Chaparral and Northern Scrub Acquisition

The Implementing Entity will acquire at least 400 acres of northern mixed chaparral/chamise chaparral (LAND-C1), at least 700 acres of mixed serpentine chaparral (LAND-C2), and at least 1,400 acres of northern coastal scrub/Diablan sage scrub (LAND-C3) (**Table 5-11**).

The Implementing Entity will acquire all land by Year 45 according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. This provision requires that chaparral and scrub preservation requirements be met prior to impacts occurring to each land cover type, with a 10% allowable deviation.

Acquisition of northern mixed chaparral/chamise chaparral will occur primarily in the Diablo Range in the Pacheco watershed. In the Santa Cruz Mountains, this land cover type is restricted to upper watersheds, so acquisition would occur primarily in Llagas-1, Uvas-1, and Pescadero-1. Acquisition of mixed serpentine chaparral will occur throughout the study area, but primarily on Coyote Ridge. Large stands of serpentine chaparral targeted for preservation are also present in the Santa Teresa Hills (Guadalupe-1), near Chesbro Reservoir (Llagas-2 and Uvas-1), and in the Pacheco watershed. Acquisition of northern coastal scrub/Diablan sage scrub will occur in the Diablo Range near San Felipe Creek and south of Henry W. Coe State Park. In the Santa Cruz Mountains, acquisition of northern coastal scrub/Diablan sage scrub will occur primarily near Pescadero Creek.

Chaparral and Northern Scrub Enhancement

All chaparral acquired for and incorporated into the Reserve System (for the latter, see **Table 5-5**) will be enhanced. Chaparral and northern coastal scrub enhancement will begin immediately after reserve unit management plans are completed or updated for each reserve unit.

Enhancement techniques and frequencies and intensities of application will be informed by pre-acquisition assessments, baseline surveys, and targeted studies (see Chapter 7). Enhancement of chaparral and northern coastal scrub will occur by maintaining or reestablishing natural disturbances such as fire. This will create a mosaic of chaparral and northern coastal scrub stands with varying ages since the last fire, promoting native biological diversity and long-term persistence of this community. However, reestablishing fire through prescribed burning or wildfires will only be possible away from urban or rural areas to minimize risk to human health and structures.

As described in Chapter 3, chaparral and northern coastal scrub are dependent on periodic fires to maintain natural processes such as succession and regeneration. These processes ensure native species diversity and help reduce invasion by nonnative species. Some chaparral species require fire stimulation of the seedbank in order to regenerate. The natural fire frequency and intensity in chaparral and northern coastal scrub habitat is not well understood in the study area, and the effects of prescribed burns on species typically associated with these habitats is unknown. Enhancement of chaparral will involve an investigation of the use of fire to create structural diversity and/or other techniques that mimic the effects of fire.

The Implementing Entity will seek to address uncertainties regarding the enhancement of chaparral and northern coastal scrub through an adaptive management approach and through the monitoring program described in Chapter 7. Targeted research will be conducted to determine factors relevant to the health and regeneration of native chaparral/scrub species (STUDIES-2).

Management Techniques and Tools

Biologically appropriate management techniques will be determined on a site-specific basis and may include those listed below.

- Minimum impact fire suppression techniques (described above in Section 5.3.2 *Landscape Conservation and Management* subheading *Fire Management*).
- Prescribed burning.
- Mechanical or hand clearing.

Prescribed Burning

Where feasible, the Implementing Entity will conduct prescribed burns in chaparral and northern coastal scrub to maintain canopy gaps and promote regeneration (CHAP-1). Prescribed burns may also be needed on portions of the Reserve System closest to urban and suburban areas to reduce the risk of catastrophic wildfires. This management technique is based on four key assumptions: (1) the current fire-return interval in chaparral is longer than historic levels due to modern fire suppression, (2) new growth is lacking and dead material has increased, (3) vegetation density has increased as a result of fire suppression, and (4) this increase in vegetation density has increased the risk of high-intensity fire.

Prescribed burning in chaparral may reduce wildfire risk at some sites, but this benefit will be balanced with the consequences of fires that are too frequent. Fires that occur too frequently in chaparral may reduce chaparral biological diversity by eliminating species not adapted to frequent burning (Zedler et al. 1983). Chaparral that experiences frequent fires is exposed to high rates of erosion, which may damage watershed functions.

Prescribed fires in chaparral should be conducted in late fall or winter when weather conditions maximize the ability of fire crews to control the fire. Burns conducted at that time will exert less effect on the seed banks and reproductive capability of exotic plants. Fall and winter burns will be conducted carefully in order to minimize excessive mortality of native seed banks than can result from lengthy smoldering fires in wet soil conditions (Le Fer and Parker 2005).

Mechanical/Hand Thinning

In areas where burning is not possible, other types of management will be implemented to increase structural diversity (e.g., canopy gaps, variety of stand ages). Mechanical or hand thinning may be used to promote structural diversity in these land cover types (CHAP-2). In addition, these management activities may be used prior to prescribed burns to reduce the chance that the fire will burn too hot and damage the seed bank, or that the fire will escape control due to heavy fuel loads.

Threats and Uncertainties

Many land management plans recommend rotational burning of chaparral and other shrublands to maintain a mosaic of stand ages, providing the maximum benefit to these communities and minimizing the chances of catastrophic wildfire. However, recent research suggests that the assumptions on which these policies are based are erroneous for chaparral communities in southern California (Keeley 2002) and may be erroneous for chaparral communities in central and northern California as well (Keeley 2005). The frequency of fire in southern California shrublands has been as frequent or more frequent in the twentieth century than it was in the nineteenth century (prior to fire-suppression activities), partly because fire-suppression activities have been ineffective at reducing fire frequency in shrublands (Keeley et al. 1999; Keeley and Fotheringham 2001). This pattern appears to hold true in Santa Clara County. Between 1950 and 1985, fire frequency in the county increased significantly, then leveled off and held steady through 2005, despite dramatic population growth in the region (Keeley 2005). Thus, fire suppression has not prevented fires but has been successful at maintaining their frequency and size, despite the increase in ignition sources (i.e., people).

Fire hazard in chaparral habitat appears to be either independent of, or only weakly dependent on, stand age for the first 20 years after fire (Schoenberg et al. 2003). The frequency of severe weather conditions (e.g., low humidity, high winds, and drought) and the number of people with access to stands (providing an ignition source) appear to play much more important roles than do vegetation conditions in determining fire risk. This appears to be true in Santa Clara County, where more than 95% of fires (for the period 1945–2002) were ignited by humans rather than lighting (Keeley 2005). In fact, 60% of the years during that period experienced no lightning-caused fires at all.

Due to the level of uncertainty in managing chaparral and northern coastal scrub communities, some of the management will be undertaken experimentally (STUDIES-2), and changes to the type and frequency of management in all areas will be made through adaptive management.

In some areas, the dynamics of how chaparral or northern coastal scrub interacts with adjacent land cover types is unknown or not well understood. An example is the encroachment of Douglas-fir into chaparral communities on Mt. Tamalpais in Marin County, California. This encroachment is facilitated by the below-ground associations of fungi and plant roots (Horton et al 1999). The Implementing Entity will determine how other communities, such as grassland, oak woodland, and Douglas-fir forests, are affecting chaparral and northern coastal scrub and, as indicated by targeted studies and informed by the monitoring and adaptive management program, work to reduce that impact (CHAP-3).

5.3.5 Oak and Conifer Woodland Conservation and Management

Biological Goals and Objectives

During Plan implementation, the Implementing Entity's goal will be to maintain and enhance oak and conifer woodlands to benefit covered and other native species. The Implementing Entity will accomplish this by protecting land that supports valley oak woodland, mixed oak woodland and forest, coast live oak forest and woodland, blue oak woodland, foothill pine-oak woodland, mixed evergreen forest, redwood forest, and knobcone pine woodland through fee title purchase or conservation easement and enhancing and managing that land as part of the Reserve System.

Areas that are protected will support the full range of oak or conifer woodland community associations found in the study area. Once protected, an additional objective is to enhance oak woodlands using specific management actions to promote regeneration that will in turn sustain beneficial processes and native species diversity. Objectives for conifer woodlands include creating and maintaining the appropriate structure, density, and species composition needed to sustain the natural processes and native species diversity that is typical of these communities. Those management actions are discussed below.

Oak and conifer woodland conservation and management are anticipated to benefit 16 covered species. Wildlife species use includes upland, movement, year-round, breeding and foraging habitat. Oak and conifer woodlands are known to provide primary and secondary habitat for covered plant species. Additional details on species specific conservation actions can be found in each of the species sections identified below; however, the following in a summary of covered species use of the oak and conifer woodland natural community.

Bay checkerspot butterfly uses oak woodlands as movement habitat to move between serpentine grassland habitat patches (see Section 5.4.1 *Bay Checkerspot Butterfly*). California tiger salamander uses oak and conifer woodlands as upland and movement habitat (see Section 5.4.2 *California Tiger Salamander*). California red-legged frog and western pond turtle use oak and conifer woodlands as movement habitat (Section 5.4.3 *California Red-legged Frog* and Section 5.4.5 *Western Pond Turtle*). Western pond turtle uses redwood forest as year-round habitat. Western burrowing owl uses valley oak woodlands for foraging and movement (see Section 5.4.6 *Western Burrowing Owl*). Tricolored blackbird uses valley oak woodlands as year-round foraging habitat (see Section 5.4.8 *Tricolored Blackbird*). San Joaquin kit fox uses oak woodlands with low densities of trees, at lower elevations and with gentle slopes for movement and foraging (see Section 5.4.9 *San Joaquin Kit Fox*). Several oak woodland types provide primary habitat for Santa Clara Valley dudleya (see Section 5.4.13 *Santa Clara Valley Dudleya*). Oak woodlands provide secondary habitat for fragrant fritillary (see Section 5.4.14 *Fragrant Fritillary*). Oak and conifer woodland types are known to provide primary habitat, while others may

provide suitable habitat for Loma Prieta hoita (see Section 5.4.15 *Loma Prieta Hoita*). The acquisition and enhancement conservation actions identified in the following sections are intended be beneficial for the natural community and the covered species identified above and contribute to species recovery.

Acquisition and Enhancement

During Plan implementation, the Implementing Entity will protect, through fee title purchase or conservation easement, at least 17,100 acres of oak woodland (**Table 5-11**). In addition, the Implementing Entity will protect at least 500 acres of conifer woodland.

Oak and Conifer Woodland Acquisition

Of the total acquisition of 12,900 acres, valley oak woodland will account for 1,700 acres (LAND-OC3), mixed oak woodland and forest will account for 7,100 acres (LAND-OC1), coast live oak woodland and forest will account for 2,900acres (LAND-OC2), blue oak woodland will account for 1,100 acres (LAND-OC3), foothill pine-oak woodland will account for 80 acres (LAND-OC4), and mixed evergreen forest will account for 20 acres (LAND-OC5) (**Table 5-11**).

The Implementing Entity will acquire all land by Year 45 according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. This provision requires that oak and conifer woodland preservation requirements be met prior to impacts occurring to each land cover type, with a 10% allowable deviation.

Acquisition of oak woodland land cover types will occur throughout the Santa Cruz Mountains and the Diablo Range. Acquisition of mixed evergreen forest, which is restricted to the Santa Cruz Mountains, will occur in the upper Llagas and Uvas watersheds (Llagas-1 and Uvas-1). Valley oak woodland is largely restricted in the study area to the Diablo Range; acquisition of this land cover type will occur where some of the largest stands are found in the Pacheco watershed (Pacheco-4, Pacheco-7, Pacheco-8), near San Felipe Creek (Coyote-4) and in the Alameda Creek and Upper Penintencia Creek watersheds (Alameda-1 and Coyote-7). Portions of County parks to be incorporated into the Reserve System that will permanently protect and allow improved management of large stands of oak woodland include Almaden Quicksilver, Anderson Lake, Calero, Coyote Lake-Harvey Bear Ranch, Joseph Grant, and Santa Teresa (see **Table 5-5** and below for which land cover types benefit).

Acquisition of conifer woodland land cover types is limited to 10 acres of redwood forest (LAND-OC6). Land acquisition requirements for conifer woodland are modest because there are limited opportunities to protect these land cover types within the study area.

Oak and Conifer Woodland Enhancement

All oak and conifer woodland land cover types acquired would be enhanced as indicated by pre-acquisition assessments, baseline surveys, and targeted studies and informed by the monitoring and adaptive management program. Oak and conifer woodland enhancement will occur immediately after reserve unit management plans are completed or updated for each reserve unit. Enhancement will occur in both the Santa Cruz Mountains and the Diablo Range in all oak and conifer woodlands acquired and protected in the Reserve System. Enhancement of oak and conifer woodland may be appropriate at several specific locations, such as those listed below (**Tables 5-5 and 5-22**).

- Almaden Quicksilver County Park (mixed oak woodland, blue oak woodland, and mixed evergreen forest).
- Calero County Park (mixed oak woodland).
- Joseph D. Grant County Park (valley oak woodland, blue oak woodland, mixed oak woodland).

Enhancement in oak woodland or conifer woodland would be determined on the basis of site conditions and needs, and may include the measures listed below.

- Reducing the cover and density of invasive plants.
- Reducing or eliminating exotic wildlife such as wild pigs.
- Restoring natural processes such as fire or moderate levels of grazing.
- In some instances, restoring historic densities of trees through planting acorns or seedlings where they have been removed, where they are not regenerating naturally, or where densities are low relative to vigorous reference stands due to past land uses.

Management Techniques and Tools

Oak Woodland

Many factors may influence the population dynamics of oak woodlands within the study area (Pavlik et al. 1991). A site-specific assessment is required to determine the factors most limiting to stands in reserves, and management will be prescribed accordingly. The factor that may be most limiting to oak woodlands in the study area is a lack of oak regeneration due to a high density of nonnative invasive plants in the understory. A recent study of the effects of wild pigs in Joseph D. Grant County Park showed that pigs can disturb up to 35–65% of the ground annually where they occur in high densities, and that they significantly reduce acorn survival (Sweitzer and Van Vuren 2002).

Some studies have found that browsing by deer or livestock can negatively affect recruitment (Borchert et al. 1989; Bartolome et al. 2002), while others have found that grazing by small mammals (Tyler et al. 2002) is detrimental. The Implementing Entity will experimentally manage oak woodlands to reduce

seedling mortality; increase seedling and sapling survival; and determine factors relevant to regeneration, including browsing by mammals, birds, and insects (STUDIES-3). In some cases, fencing may be necessary around seed trees or stands of juvenile oaks to exclude native herbivores such as California ground squirrels, rabbits, or black-tailed deer until juvenile trees grow above the browse line.

One possible approach might be to manage oak stands in reserves using the decision-making process adopted by Cal-Fire (Jones & Stokes Associates 1988) and used for management of oak stands in the Los Vaqueros Watershed in eastern Contra Costa County (Brady and Associates 1997; Jones & Stokes Associates 1991; Contra Costa Water District 2001). If canopy coverage is declining, stands will be surveyed to determine if recruitment is adequate to replace lost trees and meet canopy coverage goals. The age structure of the tree population will also be considered to determine if stands may be increasing or in decline. If surveys indicate that recruitment is insufficient, management actions will be implemented to improve recruitment. Decision-making would be reassessed every five years.

To aid in oak regeneration, the Implementing Entity will eradicate feral pigs where feasible, and will reduce the overall number of pigs in the Reserve System through fencing, trapping, or other control methods (LM-12). Henry W. Coe State Park has been operating a successful pig-trapping program for several years (Sweitzer and Loggins 2001) and could be used as a model for the Reserve System.

The Implementing Entity will continue to employ livestock grazing in areas where nonnative vegetation is preventing successful oak regeneration and recruitment (GRASS-1). Modifying livestock stocking rates, timing of grazing, grazer species, or livestock access to certain areas may improve results in oak or conifer woodland. Where grazing is not feasible or not successful, the Implementing Entity will mow, hand clear, or selectively apply herbicides to reduce the nonnative vegetation in the understory of oak woodlands (GRASS-3, LM-14, LM-11). Prescribed burning may also be used in low-density oak woodlands to reduce nonnative invasive grass cover beneath oaks and encourage growth of a native understory and oak seedlings (OAK-1). Oak woodlands will also benefit from a let-burn policy within the study area. Both prescribed burns and the let-burn policy are described above in Section 5.3.2 *Landscape Conservation and Management*.

Conifer Woodland

Conifer woodlands within the study area may have grown denser over time with the suppression of fire and lack of management. There are three types of conifer communities in the study area: redwood forest, knobcone pine woodland, and ponderosa pine woodland; however, the Plan only requires the protection of redwood forest. All but 5 acres of ponderosa pine woodland occur within Henry W. Coe State Park, which is outside of the permit area, and within San Felipe Ranch, which is protected by conservation easement. Although five acres of

ponderosa pine woodland are located within the permit area, just north of Henry Coe State Park, impacts to ponderosa pine woodland are not covered under this Plan because there are no opportunities to mitigate and conserve the natural community within the permit area (**Table 5-11**). Knobcone pine woodlands do not provide important habitat for the covered species; as such they are not targeted for acquisition.

Redwood forest require tailored management techniques based on forest condition, levels of regeneration, and on management goals. Management of redwood forest within the Reserve System will focus on retaining stands of more natural densities that will promote a more natural succession of native species in the understory and mid-canopy. At times this goal may entail some targeted thinning. As indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program, that thinning will involve conducting the appropriate type of prescribed burns in redwood forest (OAK-2). When burning is not possible, other forms of mechanical thinning (e.g., cutting) will be selectively used to reduce the densities of trees in target areas to promote a healthy understory and mid-canopy (OAK-3). Whenever thinning takes place it will be carried out experimentally to determine the factors relevant to regeneration and maintenance; adaptive management will inform changes in this practice as experimental programs generate a body of knowledge (STUDIES-4).

In redwood forests, redwood trees regenerate by sprouting from the base and therefore do not require frequent burning to expose bare soil for regeneration. Management issues in this forest type instead often focus on the reintroduction of fire for fuel reduction, and on trying to create a late successional stage forest, mimicking the old growth forests (G. Gray pers. comm.). Big Basin State Park has one of the largest redwood burn programs in the world. They conduct prescribed broadcast burns in second growth forest to help thin it. They do not conduct mechanical thinning due to cost and the potential for damage to trees by equipment. In the North Coast Redwoods State Parks District, management techniques vary by stand conditions and age of the trees. They may remove redwoods if they are too close together. In old-growth forests, 30 trees/acre is common. In second-growth forests, there can be 200–1,000+ trees/acre. In these densely packed stands, a fire would kill most of the trees, so they often only do mechanical thinning to reduce the available fuel while retaining many of the trees (J. Harris pers. comm.). All of the redwood forest in the study area is second growth forest. Therefore, the Implementing Entity will conduct mechanical thinning or develop a prescribed burning program based on stand conditions. Further research will be conducted on how to best recreate late successional forests (STUDIES-4).

Threats and Uncertainties

Substantially reducing the feral pig population in the Reserve System is an important long-term goal that will benefit all oak and conifer woodland natural communities. However, to be successful, such an effort must also be promoted on private and public land adjacent to, but outside of the Reserve System. This

will reduce the number of pigs immigrating into the Reserve System. An extensive trapping effort has proven successful in Henry W. Coe State Park in recent years, substantially reducing the feral pig population and the habitat destruction that the pigs cause (B. Patrie pers. comm.). It is evident that the feral pig population can be controlled but not eliminated in the Reserve System and that some level of damage to natural communities is likely to continue even with aggressive control measures.

5.3.6 Riverine and Riparian Forest and Scrub Conservation and Management

Biological Goals and Objectives

The overarching biological goals for riverine and riparian habitats are to improve the quality of streams and the hydrologic and geomorphic processes that support them to maintain a functional aquatic and riparian community that benefits covered species and promotes native biodiversity. An additional goal is to maintain a functional riparian forest and scrub community at a variety of successional stages and to improve these communities to benefit covered species and promote native biodiversity. This includes specific objectives to protect and restore streams, riparian forest and scrub, and intermittent/ephemeral upper watershed tributaries within and outside the Reserve System. Land acquisition will target protection of key high-quality stream reaches and riparian woodland land cover types that provide habitat for covered species. Stream segments that could benefit from restoration will also be targeted for acquisition to allow the Implementing Entity to conduct physical and biological improvements to selected streams (actions that are often not possible on private land). Degraded streams and riparian woodland/scrub within the Reserve System will be improved to the maximum extent possible to increase overall ecological functions and values (i.e., species richness and diversity, vegetative cover, wildlife habitat function) and to enhance the ability of these habitats to support existing and new populations of covered species. Additional objectives focus on promoting community functions and habitat heterogeneity and connectivity, including specific targets for maintaining hydrologic and geomorphic stream processes.

Riverine (i.e., streams) and riparian forest and scrub mitigation includes a minimum preservation and restoration requirements to contribute to recovery and impact based mitigation ratios (see Section 5.3.1 *Land Acquisition and Restoration Actions*, subheading *Acquisition and Restoration Requirements for Aquatic Land Cover Types* for rationale). The Plan requires a minimum amount of preservation and restoration to occur regardless of the level of impact to riverine and riparian land cover types (**Table 5-13**). These minimum requirements ensure that the conservation goals of the Plan will be met even if all of the anticipated impacts do not occur. Minimum preservation requirements can be met through the acres preserved according to the preservation mitigation ratios (minimum acres preserved are not in addition to acres preserved according to the

preservation mitigation ratios). The rationale for this is that the preservation ratios include a recovery component as explained Section 5.3.1 *Land Acquisition and Restoration Actions*, subheading *Acquisition and Restoration Requirements for Aquatic Land Cover Types* where factors used to determine the preservation ratios are identified.

The preservation and restoration mitigation ratios for streams and riparian forest and scrub are additive (**Table 5-12**). For example, for every 1 mile of streams impacted, 3 miles must be preserved and enhanced (3:1) and 1 mile must be restored (1:1). This results in a mitigation ratio of 4:1 for all stream impacts. For every 1 acre of willow riparian forest and scrub or mixed riparian forest and woodland impacted, 2 acres must be preserved and enhanced (2:1) and 1 acre must be restored (1:1). This results in a mitigation ratio of 3:1 for all impacts to willow riparian forest and scrub or mixed riparian forest and woodland. For every 1 acre of Central California sycamore alluvial woodland impacted, 2 acres must be preserved and enhanced (2:1) and 2 acres must be restored (2:1). This results in a mitigation ratio of 4:1 for all Central California sycamore alluvial woodland impacts.

Regardless of the level of impacts, a minimum of 250 acres of riparian forest and scrub, 40 acres of Central California sycamore alluvial woodland, and 100 miles of streams must be preserved and enhanced to contribute to recovery (**Table 5-13**).

As explained above, the preservation mitigation counts towards the minimum preservation requirement. For example, the impacts to streams are capped at 9.4 miles. If all impacts occur, 28.2 miles of streams must be preserved and enhanced (3:1 preservation ratio). Since the minimum preservation and enhancement requirement is 100 stream miles, the Implementing Entity will be required to preserve and enhance an additional 71.8 stream miles (28.2 + 71.8 = 100) to meet the minimum requirement, if all impacts occur. The minimum target of 100 miles of streams was determined to meet multiple needs: requirements for stream mitigation, preservation of habitat for foothill yellow-legged frog that would contribute to species recovery, preservation of habitat for California red-legged frog and western pond turtle that would contribute to species recovery (along with preservation of ponds and freshwater wetlands), and mitigation for temporary impacts (48.0 miles of impacts over the permit term). The Reserve System is expected to preserve substantially more than 100 miles of streams.

The same rationale applies to Central California sycamore alluvial woodland. If all impacts occur, 14 acres of Central California sycamore alluvial woodland must be preserved and enhanced (2:1 preservation ratio). Since the minimum preservation and enhancement requirement is 40 acres, the Implementing Entity will be required to preserve and enhance an additional 26 acres of Central California sycamore alluvial woodland (14 + 26 = 40) to meet the minimum requirement, if all impacts occur. For willow riparian forest and scrub or mixed riparian forest, impacts are capped at 289 acres. If all impacts occur, 578 acres of willow riparian forest and scrub or mixed riparian forest must be preserved and enhanced. In this case, if all impacts occur, the minimum preservation and

enhancement requirement of 250 acres will be met by the mitigation ratio. If less than 125 acres of impacts occur, the Implementing Entity will still be required to preserve and enhance 250 acres to meet the minimum preservation requirement.

Riverine and riparian forest and scrub conservation and management are anticipated to benefit 12 covered species. Wildlife use includes movement, foraging, breeding, and year-round habitat. The riparian forest and scrub natural community is known to provide primary for one covered plant, Loma Prieta hoita (see Section 5.4.15 *Loma Prieta Hoita*). Bay checkerspot butterfly uses riverine and riparian forest and scrub natural communities as movement habitat to move between serpentine grassland patches (see Section 5.4.1 *Bay Checkerspot Butterfly*). California tiger salamander uses the riverine natural community for foraging and movement habitat and riparian forest and scrub as movement habitat (see Section 5.4.2 *California Tiger Salamander*). California red-legged and western pond turtle use riverine and riparian forest and scrub natural communities as year-round habitat (see Section 5.4.3 *California Red-Legged Frog* and Section 5.4.5 *Western Pond Turtle*). Foothill yellow-legged frogs use the riverine natural community as year-round habitat and the riparian forest and scrub natural community as foraging and movement habitat. Least Bell's vireo uses riparian forest and scrub as foraging and breeding habitat (see Section 5.4.7 *Least Bell's Vireo*). Tricolored blackbird uses the riparian forest and scrub natural community as breeding and year-round habitat (see Section 5.4.8 *Tricolored Blackbird*). San Joaquin kit fox may use low-density riparian forest and scrub as movement habitat (see Section 5.4.9 *San Joaquin Kit Fox*). The riparian forest and scrub acquisition and enhancement conservation actions identified in the following sections are intended to benefit these species and the natural community as a whole.

Acquisition, Enhancement, and Restoration

Conservation of riverine habitats and riparian woodland and scrub combine land acquisition, habitat restoration, and habitat enhancement. All Reserve System lands will be enhanced. Each of these components is described below separately for riverine and riparian communities. Separate discussions are provided for organizational purposes only. Riverine and riparian woodland and scrub communities are closely tied to one another ecologically and both communities are often present in the same location. Land acquisition and restoration will be planned and implemented for both communities simultaneously for the same sites.

Riverine Acquisition

Streams (riverine habitat) will be preserved in the permit area at a ratio of 3 stream miles to every mile affected (**Table 5-12**). An estimated 9.4 miles of stream is the most that would be permanently affected by covered activities. If this maximum level is reached, then at least 28.2 miles of stream would need to

be preserved. The minimum requirement of stream preservation, regardless of the level of impact, is 100 miles (**Table 5-13**).

During Plan implementation, the Implementing Entity will therefore protect at least 100 miles of stream (LAND-L3) (**Table 5-11**) according to the land acquisition priorities described in Section 5.3.1 *Land Acquisition and Restoration Actions* and below. All Reserve System lands will be enhanced.

All riverine protection will occur by Year 45 according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. This provision requires that stream preservation requirements be met prior to stream impacts occurring, with a 10% allowable deviation. Because streams are distributed widely throughout the study area, they will be part of nearly every land acquisition. The Implementing Entity will protect stream segments on key stream reaches through land acquisition (fee title or purchased conservation easement) or through landowner dedications through the Stream and Riparian Setback Condition when covered activities are proposed (see Chapter 6, Section 6.5, subheading *Condition 11 Stream and Riparian Setbacks* and **Figure 6-2**). Protection will provide opportunities to enhance habitat for native fish, covered amphibian and reptile species, and restore streams and riparian woodland and scrub. At a minimum, riverine acquisitions will include the following:

- Extending the Uvas Creek Park Preserve 1.6 miles upstream to Hecker Pass Highway and set back expected development adjacent to this stream segment to protect the Uvas Creek Corridor consistent with Goals 5-5, 5-7, and 5-8 of the approved City of Gilroy Hecker Pass Specific Plan (LAND-R1). The City of Gilroy Hecker Pass Specific Plan Goals 5-5, 5-7, and 5-8 are as follows:
  - *Goal 5-5: Extend the Uvas Creek Park Preserve and trail to the western boundary of the Hecker Pass Specific study area at the intersection of Uvas Creek and Hecker Pass Highway*
  - *Goal 5-7: Ensure the protection of Uvas Creek Corridor by establishing policies and protective measures for adjacent land uses.*
  - *Goal 5-8: Preserve and enhance the Uvas Creek corridor and the associated riparian habitat wherever possible.*
- At least 1.0 mile of Uvas Creek above Uvas Reservoir.
- At least 1.0 mile of Llagas Creek above Chesbro Reservoir. Pacheco Creek mainstem (2.0 miles) between Pacheco Reservoir and San Felipe Lake (LAND-R1).

Protected streams will include those in upper tributaries that have high sediment loads or other functional shortfalls that limit native fish productivity. Such streams have not been identified in the study area but likely include Bodfish Creek and Little Arthur Creek. Additional study will be needed in implementation to verify these assumptions and determine the locations of other functionally-limited streams.

Riparian Acquisition

Willow riparian forest and scrub or mixed riparian forest and woodland would be acquired for the Reserve System, depending on the level of impact of covered activities (LAND-R2). Two acres of these land cover types would be acquired for every acre impacted by covered activities (2:1) (**Tables 5-13 and 5-21**). The Implementing Entity will protect, through fee title or conservation easement, a minimum of 250 acres of willow riparian forest and scrub or mixed riparian forest and woodland. If all impacts on these land cover types occur as predicted, then up to 578 acres would be acquired. Riparian woodland protection would occur primarily in north County on Upper Penitencia Creek, Upper Coyote Creek, and San Felipe Creek. In south County, riparian woodland protection would occur primarily on Uvas Creek, Bodfish Creek, Little Arthur Creek, Tar Creek, Pescadero Creek, Pajaro River, and Pacheco Creek and its tributaries (LAND-R2, LAND-R3). All Reserve System lands will be enhanced.

In addition to the riparian acquisition described above, a minimum of 40 acres of Central California sycamore alluvial woodland would be acquired for the Reserve System even though only 7 acres of impact are predicted (LAND-R2). This requirement is designed to ensure that this very rare and threatened land cover type (Keeler-Wolf et al. 1997) is adequately preserved in the study area.

All riparian woodland and scrub protection will occur by Year 45 according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. This provision requires that stream woodland and scrub protection requirements be met prior to impacts occurring to these land cover types, with a 10% allowable deviation.

Riverine and Riparian Enhancement

All the riparian woodland/scrub and streams acquired and incorporated into the Reserve System would be enhanced, as indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program. Up to approximately 592 acres of riparian woodland and scrub (including California sycamore alluvial woodland) and a minimum of 100 miles of stream will be enhanced in the Reserve System (**Tables 5-12 and 5-13**). Enhancement techniques are described below.

Habitat enhancement is the improvement of an existing terrestrial vegetation community or aquatic habitat. The overall goal of enhancement actions is to promote natural community functions and habitat heterogeneity and connectivity. Enhancement on streams and riparian woodland/scrub will occur throughout the Reserve System as indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program.

Enhancement of riparian woodland and scrub will include enhancing the cover, density, structural diversity, and species diversity of riparian vegetation in the understory or small stream segments (STREAM-2).

Riverine and riparian enhancement will occur immediately after reserve unit management plans are completed or updated for each reserve unit.

Riverine Restoration

Stream restoration would be accomplished according to the level of impacts on streams. One mile of stream would be restored for every mile of stream permanently affected by covered activities (**Tables 5-13 and 5-21**). A minimum of 1.0 mile of stream would be restored to contribute to species recovery (i.e., regardless of the level of stream impact). If all impacts occur, 10.4 miles of stream would be restored. Stream restoration would occur within the Reserve System and outside the Reserve System in partnership with private and public landowners as long as the conditions specified in Section 5.2.5 *Land Management*, subsection *Habitat Restoration* are met. The Implementing Entity would conduct additional site assessments during implementation to identify specific restoration project areas based on the site selection guidelines described below. Stream restoration techniques and guidelines are defined below.

Habitat restoration is the establishment of a vegetation community or aquatic habitat in an area that historically supported it, but no longer does because of the loss of one or more required ecological factors or as a result of past disturbance. Unlike other natural communities for which restoration is required, streams are unique—restoration occurs within the footprint of existing streams, rather than the creation of new ones, with some exceptions such as Fisher Creek, where the stream has been historically redirected. Stream restoration is defined as any substantial physical alteration to stream systems to return them to natural or semi-natural conditions and to restore specific ecological function in a site where that function has been lost (see Section 5.2.5 *Land Management* and **Appendix A** for definitions). For example, stream restoration includes removing hardscape features from concrete-lined or rip-rapped stream banks or restoring earthen or otherwise engineered channels to a more natural condition that allows for water infiltration, percolation, and groundwater recharge (STREAM-4). Restoration may also, when absolutely necessary, include stabilizing stream banks to manage fine sediment inputs and preventing excessive erosion (STREAM-6).

All stream restoration construction will be completed by Year 40 according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. All required stream restoration must be initiated (ground breaking) prior to impacts occurring to these land cover types. In addition, the Implementing Entity will complete stream restoration to contribute to species recovery according to the deadlines in **Table 5-14**.

Riparian Restoration

Riparian restoration (STREAM-3) is required to offset any impacts on riparian woodland and scrub land cover types and to contribute to species recovery (e.g., least Bell's vireo). One acre of willow riparian forest and scrub or mixed

riparian forest and woodland, at a variety of successional stages, would be restored for every acre impacted by covered activities (**Table 5-12**).

Riparian restoration is defined as the re-establishment of riparian vegetation in areas where it has been severely degraded and once occurred. Stream restoration is defined for the purposes of this Plan as substantial physical modifications to stream banks or stream channels (see Section 5.2.5 *Land Management* and **Appendix A** for definitions). Riparian restoration and stream restoration may often occur together in the same location.

A minimum of 50 acres of willow riparian forest and scrub or mixed riparian forest and woodland would be restored in the Reserve System to contribute to the recovery of covered species and an estimated 289 acres would be restored to compensate for all impacts. Therefore, a total of 339 acres of these land cover types would be restored if all impacts occurred (**Tables 5-13 and 5-21**). Riparian restoration opportunities have not been evaluated in detail in the study area. Riparian restoration opportunities have been defined for Upper Penitencia Creek (Biotic Resources Group 2001) and within the City of San José (Jones & Stokes 2000).

Riparian restoration would occur within the Reserve System and outside the Reserve System in partnership with private and public landowners as long as the conditions specified in Section 5.2.5 *Land Management*, subheading *Habitat Restoration* are met. The Implementing Entity would conduct additional site assessments during implementation to identify specific restoration project areas based on the site selection guidelines described below. Site assessments are a necessary first step in the restoration design process and therefore will occur approximately one year before restoration projects are to be constructed in order to meet Stay-Ahead requirements and other deadlines (**Table 5-14**). The Implementing Entity would restore riparian woodland using techniques and guidelines described below.

An estimated 14 acres of Central California coastal sycamore alluvial woodland would be restored to compensate for the 7 acres of expected impacts (**Tables 5-13 and 5-21**). Opportunities for restoration of this land cover type are limited to locations where this land cover type can be supported (Keeler-Wolf et al. 1997). Examples include Pacheco Creek, Upper Coyote Creek, San Felipe Creek, and lower Uvas Creek.

Construction of all restoration of these land cover types will be completed by Year 40 and according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. All required restoration of riparian woodland and scrub must be initiated (ground breaking) prior to impacts occurring to these land cover types (see Section 8.6.1 for details). In addition, the Implementing Entity will complete restoration of riparian woodland to contribute to species recovery according to the deadlines in **Table 5-14** (Years 15, 30, and 40).

Guidelines for Selecting Restoration Sites

Potential restoration sites in the study area will be evaluated in coordination with the other local agencies or organizations active in riparian restoration in the study area (e.g., SCVWD, The Nature Conservancy). As described in the Section 5.3.1 *Land Acquisition and Restoration Actions*, the Implementing Entity will likely be conducting most riparian restoration in the locations listed below.

- Coyote Creek and tributaries (including tributaries such as Fisher Creek and Thompson Creek).
- Alamitos Creek and tributaries.
- Los Gatos Creek below Vasona Dam
- Uvas and Carnadero Creeks (including tributaries such as Little Arthur Creek and Bodfish Creek), including reaches above Uvas Dam.
- Llagas Creek, particularly above Chesbro Dam.
- Pajaro River.
- Pacheco Creek.

Restoration sites will be selected according to criteria that include but are not limited to those listed below.

- The potential success of restoration activities, based on site-specific conditions (e.g., hydrology, soils).
- The ability of the site to support covered species after restoration.
- Historic conditions that supported or likely supported the target land cover type (San Francisco Estuary Institute 2007).
- The proximity of the site to the area in which streams or riparian woodland/scrub were (or are predicted to be) lost to covered activities.
- The proximity of the site to other intact riparian corridors that support, or are likely to support, covered species.
- The extent and quality of existing habitats (e.g., percent native vegetation and presence/absence of nonnative wildlife such as bullfrogs or cowbirds).
- Existing wildlife use and the potential for adverse effects of the restoration project (e.g., disturbance to or removal of existing wetland habitat).
- The ability of the restored stream and/or riparian woodland/scrub to contribute to the conservation goals of habitat connectivity in this Plan.

Riverine and riparian restoration sites will be selected using the best available assessments (e.g., Biotic Resources Group 2001 for Alum Rock County Park and Jones & Stokes 2000 for San José streams). Where assessments are not available, the Implementing Entity will, in coordination with the Wildlife Agencies, conduct detailed site assessments to determine the best available restoration sites.

Site Restoration Plans

Detailed restoration plans, including plans and specifications, will be developed for individual sites or stream reaches based on specific geomorphic, hydraulic, and hydrologic conditions; extent and quality of existing habitats; existing wildlife use; and the potential for adverse effects (e.g., disturbance and/or removal of existing habitat or wetlands). Site restoration plans will be developed prior to construction of stream, riparian, and wetland restoration projects. These plans will be prepared consistent with the reserve unit management plan for the site[26]. Restoration plans will satisfy the requirements listed below.

- Define restoration goals and objectives, performance indicators, and success criteria.
- Collect and analyze baseline data (e.g., soil type and suitability for riparian planting, low-flow conditions, past land use history/alterations).
- Identify suitable/feasible restoration measures.
- Develop conceptual restoration designs.
- Develop detailed restoration designs (plans and specifications) that identify and describe construction methods, planting areas and methods, planting species (including collection and propagation methods), and maintenance requirements.
- Prepare an adaptive management and monitoring plan based on the guidelines in Chapter 7 that includes descriptions of responsible parties; monitoring methods and schedule; indicators (e.g., vegetative cover); success criteria (e.g., 20% cover by year 5); and adaptive management measures (e.g., replanting with different species).

Management Techniques and Tools

General Principles for Riverine/Riparian Management

Streams and adjacent riparian forest/scrub communities are dynamic habitats resulting from the confluence of hydrology with the geology, soils, and vegetation of the environment. The management tools discussed below will be used in concert to maintain natural or semi-natural functions or to achieve them in currently degraded communities. In many cases these techniques can also be used to manage existing high-quality habitats to the benefit of streams and riparian communities. Several guidance documents and local programs provide the basis for the selection and application of these management tools and techniques; these are listed below.

- *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 1998).
- *California Salmonid Stream Habitat Restoration Manual*. Part XI, *Riparian Habitat Restoration* (Circuit Rider Productions 2004).

[26] Site restoration plans on newly-acquired lands may be prepared prior to or concurrent with the reserve unit management plan.

- *Federal Stream Corridor Restoration Principles and Practices* (Federal Interagency Stream Restoration Working Group 1999).
- Three Creeks HCP (plan is pending)
- *Watershed Action Plan* (Santa Clara Basin Watershed Management Initiative 2003).
- Upper Llagas Creek Riparian Corridor Assessment (Tetra Tech, Inc. 2006).
- *Coyote Watershed Stream Stewardship Plan* (Santa Clara Valley Water District 2002c).
- *Stream Maintenance Program* (Santa Clara Valley Water District 2010).

Large riparian and stream restoration projects have been conducted or are planned in the permit area by SCVWD and other agencies along Guadalupe Creek, the Guadalupe River, Coyote Creek, Upper Penitencia Creek, and Llagas Creek. Project planning and construction documents and follow-up monitoring reports are excellent sources of information to guide future riparian and stream restoration and enhancement projects. Additional sources are provided below specifically for riparian restoration projects.

In-Channel Habitat Management

In-channel habitat actions may include the complete restoration of the channel to remove anthropogenic features (e.g., concrete, earthen, or otherwise engineered channels), as well as enhancement actions that modify specific elements of in-channel habitat (e.g., large woody debris, gravel placement and cleaning, and laying back steep banks). Only in-channel restoration is covered in this section; each of the specific enhancement actions is covered in separate sections.

Formation and sustainability of riverine habitat is directly related to channel processes and channel form. Where these processes or forms are out of balance with their natural inputs or where they have been disturbed, restoration of the channel may be an appropriate technique to restore a sustainable natural channel and floodplain (STREAM-5).

The Implementing Entity will also reduce chronic anthropogenic sources of sediment and restore balanced input of substrate material within stream reaches. This will be accomplished through the implementation of conditions on covered activities that minimize inputs of fine sediment delivery to streams (STREAM-6; also see Chapter 6, Section 6.4.2, subheading *Condition 4 Stream Avoidance and Minimization for In-Stream Projects*). Stabilizing stream banks on selected reaches could also achieve this goal.

Channel restoration may entail direct restoration (reconstruction of a channel) or incremental process restoration (installation of a natural structural feature to induce change in a channel), consistent with the guidelines of the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 1998; Circuit Rider Productions 2004). Channel restoration can also be used to restore bank stability

and reduce bank erosion; such restoration may improve aquatic habitat and water quality. Channel restoration techniques may affect the local slope, length, sinuosity, and dimensions of the channel, as well as alter basic channel processes related to sediment transport, and are very useful for treating the underlying causes of habitat degradation, as seen within the study area in the restoration of Guadalupe Creek upstream of the confluence with the Guadalupe River near Almaden Lake. Channel restoration under the Habitat Plan would only be considered as a potential solution where there are chronic anthropogenic problems. In implementation, the effects of restoration on local channel geometry will be carefully considered and proper hydraulic analysis performed (Flosi et al. 1998).

Under the Habitat Plan, the Implementing Entity will restore concrete, earthen, or other engineered channels as part of the 10.4 miles of stream restoration (STREAM-4).

Riparian Vegetation Management

Successful implementation of riparian restoration can, over time, result in significant improvements in the cover and diversity of desirable native riparian plant communities.

An excellent example of successful riparian and stream restoration is the Guadalupe Creek restoration project. The project combined channel realignment with retention of existing vegetation, extensive riparian enhancement plantings and placement of in-stream woody debris along more than 12,000 linear feet of the creek. The project was completed in 2002. As of 2007, the riparian vegetation has developed into a multi-storied canopy, indicative of a healthy riparian corridor.

Establishment and recovery of native riparian plants will be faster in sunny, low-elevation, or moist sites than in shady, higher-elevation, or arid sites. However, advantageous growing conditions can also trigger rapid establishment of weedy or undesirable aggressive species; accordingly, weeds at and upstream of project sites will be evaluated before implementation of any treatments. Invasive plant removal will continue until desirable riparian vegetation is established and target invasive pants are substantially eradicated (i.e., greater than 50% eradicated and not expanding in range).

Use of riparian management techniques will consider the land use setting—that is, whether the site is in an urban, agricultural, or wildland environment. Some riparian management treatments may be appropriate in one type of setting and not in another. For example, the allowable height of vegetation may be constrained by its proximity to utilities, to address safety concerns, or to preserve views.

When placing plant materials, fences, offsite watering facilities, plant irrigation systems, and other materials in the riparian zone, the effects of flood flows (e.g., deposition of sediments and debris, scour) must be taken into account. It may be

necessary to install such facilities outside the flood prone area. To address these issues, vegetation management techniques will be developed in consideration of the recommendations presented in Part XI, *Riparian Habitat Restoration*, of the *California Salmonid Stream Habitat Restoration Manual* (Circuit Rider Productions 2004). Irrigation systems may be necessary to help establish riparian vegetation temporarily. However, these systems will be installed so that they can be removed (or left in place non-functioning) once the vegetation becomes self-sustaining and no longer requires supplemental irrigation.

The Implementing Entity will develop a successional management strategy for riparian vegetation communities to ensure that a diverse cross section of successional stages is fostered in the riparian corridor to promote natural stream functions during the permit term. This management strategy will be incorporated into the reserve unit management plans prepared according to Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*. Reserve unit management plans must be prepared within 5 years of acquisition of the first parcel in the reserve unit.

The management strategy for successional riparian vegetation would be of greater importance downstream of reservoirs, where altered flow regimes reduce flood flows and the frequency and intensity of droughts, which would otherwise produce a mosaic of successional stages over time. This strategy may include such actions as girdling trees, moving gravel, or other techniques of managing physical process and vegetation to ensure a variety of successional stages of riparian forest and scrub land cover types. Development of the successional management strategy will be undertaken in consideration of existing plans in the study area, which can vary with the goals of the implementing agency and the context of the stream. Existing plans that could be used to inform this management strategy are listed below.

- *Coyote Creek Parkway County Park—Final Integrated Natural Resources Management Plan and Master Plan* (County of Santa Clara Parks and Recreation Department 2007).
- *Alum Rock Park Riparian Management Plan* (Biotic Resources Group 2001).
- *Riparian Restoration Action Plan for the City of San José* (Jones & Stokes 2000).
- *Stream Maintenance Program* (Santa Clara Valley Water District 2010).
- *Guidelines and Standards for Land Use Near Streams* (Santa Clara Valley Water District 2006).

Invasive Species Management

The Habitat Plan includes objectives to reduce or remove invasive plant and fish species from stream channels to encourage establishment of native plant and wildlife species. Invasive species management will comprise existing actions under SCVWD's existing Stream Maintenance Program and additional actions under the Habitat Plan that are consistent with the Stream Management Program

and the Santa Clara County Integrated Pest Management Program and Pesticide Use Ordinance (Section B28-10). Invasive species management is described above in Section 5.3.2 *Landscape Conservation and Management*.

Livestock Management

As part of the grazing management program (see Section 5.3.3 *Grassland Conservation and Management*) the Implementing Entity will exclude livestock along targeted stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions as needed. This program will be implemented within the Reserve System and could be implemented outside the Reserve System if appropriate willing partners are identified.

Private Landowner Education

The Implementing Entity will develop Stream Management (Riparian Land Use) Guidelines for private landowners, and an educational program to assist in the implementation of the guidelines, within five years of permit issuance. Details are found in Section 5.3.2 *Landscape Conservation and Management* subheading *Public Education and Outreach* above.

Threats and Uncertainties

Within the study area, the San Francisco Regional Board is developing Total Maximum Daily Loads (TMDLs) for mercury and diazinon that could influence the implementation of covered activities and the conservation strategy related to riverine habitats in the Guadalupe River watershed. Instream activities within the Guadalupe watershed (e.g., stream crossings, bank stabilization activities, barrier removal, and stream enhancement and restoration projects) could increase the methylation of mercury that is found in sediments resulting from historic mining operations in the watershed. Final targets and strategies related to mercury TMDLs in the study area will affect the Local Partners' (especially SCVWD's) management of sediment in streams and will potentially affect the cost of restoration and enhancement opportunities in the Guadalupe watershed.

Availability of water from Central Valley Project facilities currently substantially supplements water supply in north county streams. The impact of climate change on the availability of this water is critical to the Habitat Plan conservation activities. In addition, Sacramento-San Joaquin Delta water quality and endangered species concerns (delta smelt and central valley salmon and steelhead) are affecting, and will continue to affect to an unknown degree, the timing and amount of water diversions from the delta. Any loss of water supply as the result of drought conditions could reduce or eliminate water supply allocated for the conservation strategy.

The study area lies in an area with several major and minor faults; moreover, the study area is susceptible to significant wildfires in the dry months of June–October. These natural events have the ability to damage the Reserve System and certain structural elements of the conservation strategy.

Fire would remove vegetation, potentially including riparian vegetation, and, in the event of significant precipitation following the fire, could compromise water quality in streams and reservoirs by increasing turbidity, increasing suspended sediment loads, and introducing high volumes of organic carbon into watersheds. This may affect the suitability of habitat for native fish and covered amphibians. Additionally, loss of riparian vegetation can lead to loss of habitat for terrestrial species found in riparian habitats. See Chapter 10 for additional discussion of foreseeable and unforeseen circumstances addressed by this Plan.

5.3.7 Wetland and Pond Conservation and Management

Biological Goals and Objectives

During Plan implementation, the Implementing Entity will work toward the goal of maintaining and enhancing functional wetland and pond habitats to benefit covered and other native species. The Implementing Entity will accomplish this by protecting lands with predominantly grassland, oak woodland, and conifer woodland land cover and that contain ponds or wetlands through fee title purchase or conservation easement. The Reserve System will contain the full range of pond and seasonal and perennial wetland communities that occur within the study area, and those ponds and wetlands and their adjacent uplands will be managed as part of the Reserve System. In addition, all Reserve System lands will be enhanced. Freshwater perennial and seasonal wetlands and ponds enhancement includes increasing native vegetative cover, biomass, and structural diversity in and around the margins of these aquatic habitats.

Wetland and pond conservation and management will benefit 8 covered species. Wildlife use includes movement, foraging, breeding, and year-round habitat. Seasonal wetlands may provide suitable habitat for one covered plant, fragrant fritillary (see Section 5.4.14 *Fragrant Fritillary*). Bay checkerspot butterfly may use wetland and pond habitat for movement as they move within and between serpentine grassland habitat patches (see Section 5.4.1 *Bay Checkerspot Butterfly*). California tiger salamander uses wetland and pond habitats for breeding and foraging (see Section 5.4.2 *California Tiger Salamander*). California red-legged frog uses perennial wetlands as year-round habitat and seasonal wetlands and ponds for breeding and foraging (see Section 5.4.3 *California Red-legged Frog*). Western pond turtle uses perennial wetlands and ponds as year-round habitat and seasonal wetlands as foraging habitat (see Section 5.4.5 *Western Pond Turtle*). Western burrowing owl uses season wetlands as movement habitat (see Section 5.4.6 *Western Burrowing Owl*). Tricolored blackbird uses wetlands and ponds as foraging and breeding habitat

(see Section 5.4.8 *Tricolored Blackbird*). The acquisition, enhancement, restoration, and creation conservation actions identified in the following sections are intended to benefit these species and the natural communities.

The preservation and restoration/creation mitigation ratios for impacts to ponds and wetlands are additive (**Tables 5-13 and 5-21**). For example, for every one acre of perennial wetland impacted, 2 acres must be preserved and enhanced (2:1) and 1 acre must be restored (1:1). This results in a mitigation ratio of 3:1 for all perennial wetland impacts. For every 1 acre of seasonal wetlands impacted, 2 acres must be preserved and enhanced (2:1) and 2 acres must be restored (2:1). This results in a mitigation ratio of 4:1 for all impacts to seasonal wetlands. For every 1 acre of pond impacted, 2 acres must be preserved and enhanced (2:1) and 1 acre must be created (1:1). This results in a mitigation ratio of 3:1 for all pond impacts.

Regardless of the level of impacts, a minimum of 10 acres of perennial wetlands, 5 acres of seasonal wetlands, and 50 acres of ponds must be preserved to contribute to recovery. As explained above, minimum preservation requirement can be met by the impact ratios. For example, if 5 acres of perennial wetlands are impacted, and 10 acres are preserved, this will fulfill the minimum preservation requirement for perennial wetlands.

There are also minimum wetland restoration and pond creation requirements that must occur regardless of the level of impact (**Table 5-13**). In addition to the mitigation ratios, a total of 20 acres of perennial wetlands must be restored and 20 acres of ponds must be created to contribute to recovery.

Uplands between ponds and wetlands will be similarly managed to attain regional connectivity for native species (See Sections 5.3.3 *Grassland Conservation and Management* and 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*, above). Ultimately the result will be a wetland/pond/upland habitat matrix that will support multiple life stages of covered and other native species (LAND-G2, LAND-OC1, LAND-OC2, LAND-OC3, LAND-OC4, LAND-OC5). Ponds and wetlands will be further enhanced by eradicating or reducing exotic species (e.g., nonnative fish, bullfrogs, nonnative plants) that are detrimental to covered and other native pond and wetland species. These and other specific management prescriptions are discussed below.

Acquisition, Enhancement, Restoration, and Creation

The Implementing Entity will acquire an estimated 184 acres of wetlands and ponds within the Reserve System (**Table 5-12**). The Implementing Entity will enhance all Reserve System lands. The Implementing Entity will also restore or create an estimated 147 acres of wetlands and ponds (**Tables 5-12 and 5-13**).

Wetland and Pond Acquisition

The amount of wetlands and ponds protected will be driven, in part, by the level of impact. Wetland and pond impacts require a 2:1 preservation ratio. During Plan implementation, the Implementing Entity will protect an estimated 50 acres of perennial wetlands (coastal and valley freshwater marsh; LAND-WP1a, LAND-WP1b), 30 acres of seasonal wetlands (LAND-WP2a, LAND-WP2b), and 104 acres of ponds through fee title purchase or conservation easement and manage them as part of the Reserve System (**Table 5-12**).

Regardless of the level of impact, a minimum of 50 acres of ponds must be protected to protect habitat for covered species (tricolored blackbird, California red-legged frog, California tiger salamander, and western pond turtle; **Table 5-12**). Ponds will be protected on both sides of the Santa Clara Valley to ensure that representative populations of pond-associated covered species are included in the Reserve System (LAND-G2, LAND-OC1, LAND-OC2, LAND-OC3, LAND-OC4, LAND-OC5). The land acquisition strategy focuses on land acquisition in areas with higher concentrations of ponds; these areas include, but are not limited to, the area between Alum Rock Park and Joseph D. Grant County Park, the area between Cañada de Oro Preserve and Chesbro Reservoir, and the area south of Henry W. Coe State Park along the Cañada de los Osos. When possible, pond protection will be pursued within designated critical habitat for California tiger salamander and California red-legged frog. Joseph Grant County Park has existing open space that will be added to the Reserve System that includes substantial ponds (**Table 5-5**).

In addition to the pond acquisition described above, a minimum of 10 acres of perennial wetland and 5 acres of seasonal wetland will be acquired, regardless of the level of impact (**Table 5-13**). These land cover types are rare in the study area but occur mostly on the floor of the Santa Clara Valley or in the nearby foothills.

All wetland and pond protection will occur by Year 45 according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. This provision requires that stream woodland and scrub protection requirements be met prior to impacts occurring to these land cover types, with a 10% allowable deviation.

Wetland and Pond Enhancement

The Implementing Entity will enhance all Reserve System lands. All estimated 184 acres of wetlands and ponds acquired for the Reserve System (**Table 5-12**) will be enhanced to benefit covered and other native species. In addition, the estimated 147 acres of wetlands and ponds restored and created will be maintained once they meet their success criteria, and enhanced, as indicated by targeted studies and informed by the monitoring and adaptive management program. Wetland and pond enhancement will begin immediately after reserve unit management plans are completed or updated for each reserve unit.

Habitat enhancement is the improvement of an existing terrestrial vegetation community or aquatic habitat. Within the Reserve System, degraded ponds and wetlands will be improved to increase overall ecological functions and values (e.g., native species richness and diversity, wildlife habitat function) and to enhance the ability of these habitats to support existing and new populations of covered species. Wetland and pond enhancement measures will be designed for specific wetland or pond types (e.g., hydrogeomorphic context, surrounding natural community) and, in some cases, for specific sites. As described below, the success of various techniques depends on the wetland or pond type and the site conditions under which they are applied. Wetlands or ponds that are highly degraded may require more intensive management. Wetlands or ponds already in good condition (e.g., that support healthy populations of covered species) may require little or no enhancement measures.

Perennial and Seasonal Wetland Restoration

Wetland impacts require a 1:1 restoration ratio for perennial wetlands and 2:1 restoration ratio for seasonal wetlands. The Implementing Entity will restore freshwater perennial and seasonal wetlands in-kind within the Reserve System according to the level of impact to these land cover types. If all expected impacts occur, this will result in an estimated total restoration of 25 acres of freshwater marsh and 30 acres of seasonal wetlands, per the required mitigation ratio (**Table 5-12**). In addition to the mitigation ratios, the Implementing Entity will restore at least 20 acres of perennial wetlands within the Reserve System to contribute to recovery (POND-6) (**Table 5-13**). This wetland restoration will occur regardless of the level of impacts and will contribute to the recovery of covered wetland species.

Habitat restoration is the establishment of a vegetation community or aquatic habitat in an area that historically supported it, but no longer does because of the loss of one or more required ecological factors or as a result of past disturbance. Wetland restoration will be carried out in areas that will increase available habitat and enhance connectivity between existing ponds and wetlands within the Reserve System. Potential wetland restoration and pond creation sites will be selected within the same watershed as the expected wetland impacts. This prioritization will ensure that wetland mitigation occurs close to the impact area and preserves and enhances watershed functions. Restoration will occur on suitable soils and in areas where wetlands historically occurred and have since been drained or severely degraded. Additional site selection guidelines are provided below under *Guidelines for Selecting Restoration or Creation Sites*. Restoration may include recreating the historic topography of the site and planting native freshwater emergent and aquatic plants. Seasonal wetlands may be restored along floodplain benches of intermittent streams or in grassland swales. Additional guidelines for restoring wetlands is provided below under *Restoration and Creation Principles and Techniques.*

All restoration of these land cover types will be completed by Year 40 (i.e., construction will be completed) and according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. All required

restoration of perennial or seasonal wetlands must be initiated (ground breaking) prior to impacts occurring to these land cover types. In addition, the Implementing Entity will completerestoration of perennial wetland to contribute to species recovery according to the deadlines in **Table 5-14** (Years 15, 30, and 40).

Pond Creation

Pond impacts require a 1:1 creation ratio (**Table 5-12**). The Implementing Entity will create ponds lost to covered activities, in-kind, within the Reserve System. The total allowable impact on pond land cover during the permit term is 52 acres. In addition to the creation ratio, the Implementing Entity will create a minimum of 20 acres of ponds to contribute to recovery (POND-9) (**Table 5-13**). Pond creation to contribute to recovery is in addition to the mitigation ratio and will occur regardless of the level of impacts on ponds to contribute to the recovery of covered pond species (California red-legged frog, California tiger salamander, western pond turtle). Consequently, an estimated 72 acres of ponds will be created and managed as part of the Reserve System to offset these impacts and contribute to species recovery (52 acres + 20 acres = 72 acres). Pond creation will increase available habitat and enhance connectivity among existing ponds and wetlands within the Reserve System (**Figure 3-13**). Pond creation will only occur off-stream to avoid additional impacts to streams. Additional site selection guidelines are provided below under *Guidelines for Selecting Restoration or Creation Sites.*

The Habitat Plan assumes that ponds will be created (i.e., development of the pond land cover type in an area that did not previously support it). However, if an existing or historic pond were degraded to the point that it lacks certain ecological functions that are essential to support covered species (e.g., a pond is filled with sediment and no longer holds water), then restoration of a pond may be counted toward the Plan's creation requirements for ponds. Whether a pond restoration may be counted toward pond creation requirements will be determined by the Implementing Entity and Wildlife Agencies during the Wildlife Agency review of the proposed restoration design.

New ponds will be sited to improve habitat connectivity for California red-legged frog, California tiger salamander, and western pond turtle. The Implementing Entity will identify gaps between occupied ponds that are greater than typical dispersal distances (e.g., California tiger salamander may travel up to 1.3 miles from a breeding site) but short enough such that the creation of a pond may bridge the gap.

Where feasible, created ponds will rely on passive management (e.g., they will dry on their own periodically) to minimize the need for artificial draining. However, all created ponds will include a mechanism for draining, to control bullfrogs and other invasive nonnative wildlife species (described in Section 5.3.2 *Landscape Conservation and Management*). Pond creation to mitigate for impacts will be accomplished by creating ponds of approximately the same size as those lost. Pond creation to contribute to recovery will be

accomplished by creating ponds with an approximate average size of 0.5 acre, although small isolated ponds may be created that are only a few meters across because such ponds may provide habitat for California red-legged frogs and California tiger salamander, but may not be attractive to bullfrogs (U.S. Fish and Wildlife Service 2002). Native emergent and aquatic vegetation will be planted in ponds to provide suitable breeding habitat for covered species. Additional guidelines for restoring wetlands is provided below under *Restoration and Creation Principles and Techniques.*

Construction of all ponds will be completed by Year 40 and according to the Stay-Ahead provision described in Chapter 8, Section 8.6.1 *Stay-Ahead Provision*. All required pond creation must be initiated (ground breaking) prior to impacts. In addition, the Implementing Entity will complete pond creation to contribute to species recovery according to the deadlines in **Table 5-14** (Years 15, 30, and 40).

Management Techniques and Tools

Wetland Restoration and Pond Creation

All wetlands and ponds restored or created will be designed to support covered aquatic or amphibian species when physical and biological conditions allow. Biologically appropriate management techniques will be determined on a site-specific basis.

Guidelines for Selecting Restoration or Creation Sites

Potential restoration sites will be identified and selected on the basis of their physical processes and hydrologic, geomorphic, and soil conditions to ensure that successful restoration can occur and be self-sustaining. Such an approach increases the likelihood of successful restoration and reduces long-term management and maintenance costs.

Restoration sites will be selected within the same watershed as the expected wetland impacts. This prioritization will ensure that wetland mitigation occurs close to the impact area and preserves and enhances watershed functions. Restoration of perennial and seasonal wetlands will occur on suitable soils and in areas where perennial wetlands historically occurred and have since been drained or severely degraded, if appropriate hydrologic conditions still exist (San Francisco Estuary Institute 2006, 2007).

Restoration sites will also be selected on the basis of their ability to support covered species, support implementation of species-specific conservation actions, and meet species-specific biological goals and objectives. For example, sites designed to support tricolored blackbird will be located a sufficient distance away from black-crowned night-heron rookeries to minimize predation on tricolored blackbirds. Sites designed to support breeding habitat for covered amphibians must have adequate nearby upland habitat. Restoration and creation sites for wetlands and ponds must meet minimum distances from urban

development to receive credit under this Plan (**Table 5-15**). Created ponds will be sited away from busy roads to reduce the likelihood of mortality during periods when frogs, turtles, and salamanders move between ponds and uplands. In accordance with the California red-legged frog Recovery Plan, ponds created to provide red-legged frog habitat shall incorporate the *Guidelines for Voluntary Pond Management for the Benefit of the California Red-legged Frog* or the best available science during Plan implementation. This currently includes the following siting and design criteria.

- Evaluate the distance from known occurrences California red-legged frog to increase the likelihood of species dispersal to the created habitat.
- Place ponds at least one kilometer (0.6 miles) from known occurrences of bullfrogs.

Restoration and Creation Principles and Techniques

Wetland restoration or pond creation will be accomplished using the techniques outlined in this section.

Coastal and Valley Freshwater Marsh Restoration (Perennial Wetlands)

The Implementing Entity will restore perennial freshwater wetlands at a ratio of 1:1 to replace wetlands lost to covered activities (estimated to be 25 acres of compensation) and restore an additional 20 acres of perennial freshwater wetlands to contribute to species recovery (**Table 5-12**).

One of the key principles of successful restoration is the presence of the processes that create and maintain wetlands (Middleton 1999; Keddy 2000; Mitsch and Gosselink 1993). The most important processes are related to the availability of water and appropriate hydrology to create and maintain hydric soils and plants. Therefore, restoration of perennial wetlands will occur on sites with appropriate hydrology. This may include areas where perennial wetlands historically occurred and have since been drained or severely degraded. Additionally, there may be sites that are currently appropriate for perennial wetlands that did not historically support them, because of changing land uses and altered hydrologic flows. It is imperative that perennial wetlands restoration sites be located directly adjacent to or connected to a source of permanent water.

Restoration will occur on suitable soils and may include creating wetland topography. Specifically, this might include site grading and creation of depressions to hold water. The choice of plant species for perennial wetland restoration sites will be based on a palette of native wetland plants including freshwater emergent and aquatic species. The palette will be developed during the implementation process. Ideally, the plants will be grown from soil, seed, or plant stock from local wetland sites. In addition, vegetation is expected to evolve after the original planting such that “volunteer” species may move into the wetland over time. In some cases, this can include nonnative invasive species that are not desirable within the Reserve System. Therefore, restoration plans will include plans for management of nonnative invasions. Additional issues that will be addressed in wetland design include preventing fish from becoming trapped in the ponds if the hydrology source is from a perennial waterbody that supports fish (e.g., by the use of fish screens or other appropriate devices).

Examples of wetland restoration projects in the study area that will be consulted for lessons learned (e.g., the Coyote Creek wetland restoration project (SCVWD), which occurs off-channel on Coyote Creek adjacent to U.S. 101).

Seasonal Wetland Restoration

The Implementing Entity will restore seasonal wetlands at a ratio of 2:1 to replace all functions and values lost to covered activities (estimated to be 30 acres[27] of compensation; **Table 5-12**).

As with perennial wetlands, the most important principle for successful restoration and maintenance of seasonal wetlands is appropriate hydrology. However, for seasonal wetlands, the source of water should be available during the winter rainy season and not available during the dry summer months. Therefore, seasonal wetland restoration will include appropriate hydrologic sources and processes to support the seasonality of the wetland feature. This may occur on sites that supported seasonal wetlands historically, if appropriate hydrologic processes are still in place or can be restored. It may also include sites that have been altered by recent land uses and now support suitable hydrology.

The soils for seasonal wetlands generally will have water-holding capacity. This usually means some amount of clay content. Soils will be examined and tested before seasonal wetlands are sited. The plant palette for seasonal wetlands, as with perennial wetlands, will be developed during the restoration planning process. The choice of plant species for seasonal wetland restoration sites will be based on a palette of native seasonal wetland plants. Plants used for restoration will ideally be grown from local plant sources (soil, seed, and plant stock).

Because plant species composition, along with hydrologic processes, may change after the original planting, “volunteer” species may move into the wetland over time. This is to be expected because wetlands are dynamic systems. In some cases, such changes may include nonnative invasive species that are not desirable within the Reserve System. Therefore, restoration plans will include plans for management of nonnative invasions.

Pond Creation

Ponds will be created to support breeding habitat for California red-legged frog, California tiger salamander, western pond turtle, tricolored blackbird, or a combination of these species. Pond depth will be sufficient to provide suitable breeding habitat for red-legged frogs or tiger salamanders and to preclude dense growth of emergent aquatic vegetation. Pond size will vary depending on the availability of water and site and watershed conditions. Ponds will be created to supplement the existing important network of stock ponds that exist in the study area, particularly in the Diablo Range where livestock grazing is more common. Ponds will not be created in streams to avoid stream impacts, preclude fish-

[27] Actual acreage of seasonal wetland compensation is expected to be less than 30 acres because seasonal wetland impacts and compensation will be tracked based on the wetland delineation submitted to, and verified by, the Local jurisdictions or Implementing Entity (See Chapter 6, Section 6.8.4). This land cover type was mapped at a regional scale using wetland complexes rather than site-specific data.

stranding, and avoid creating predator sinks. Ponds will be created so that they can be drained if necessary to control bullfrogs and other nonnative invasive animals.

Sediment inputs to ponds must be controlled to maintain the pond in the long term and minimize the need for periodic dredging. Upstream in-channel measures and small forebays can be used to reduce sediment delivery to the created ponds.

Ponds will be designed so that they either do not retain water long enough to support establishment of bullfrogs, nonnative fish, or other predators of California red-legged frog and California tiger salamander, or can be artificially drained to deter such establishment. At the same time, they will be designed to remain ponded for sufficient duration to support successful breeding of California red-legged frog and/or California tiger salamander. A deep-water escape portion, deeper than 1 meter (3 feet) and shallow, tadpole- and juvenile rearing portion to provide high quality breeding habitat for California red-legged frog shall be included (U.S. Fish and Wildlife Service 2002). Native emergent and aquatic vegetation will be planted in ponds to provide suitable breeding habitat for these covered species.

Wetland and Pond Enhancement

All wetlands and ponds within in the Reserve System will be enhanced. The Implementing Entity will use the management techniques described below to enhance Reserve System wetlands and ponds.

Vegetation Management

Vegetation management is a critical component of optimizing the habitat function of ponds and wetlands for covered species. Consequently, wetland and pond vegetation will be managed depending on the site-specific conditions of individual wetlands and ponds, and will largely depend on the individual species or group of species targeted for enhancement (or removal in the case of invasive nonnative species). Vegetation management will involve several techniques, often used in concert, to achieve the species composition and habitat structure necessary to benefit covered and other native species.

Some existing ponds or wetlands and all created ponds or restored wetlands will be seeded with native vegetation appropriate for the surrounding natural communities for replacement of lost ecological services and function. Planting of emergent vegetation (POND-3) such as bulrushes or willows in ponds that lack vegetation can improve breeding habitat and cover for California red-legged frog, western pond turtle, and California tiger salamander in the deepwater portions (i.e., greater than 1 meter deep); however, they should be kept clear of the shallow portions as tadpole-rearing portions should remain unshaded and shallow for California red-legged frog breeding habitat (U.S. Fish and Wildlife Service 2002). Further, tall emergent vegetation, such as bulrushes, can provide roost and nest sites for tricolored blackbirds where the wetlands or ponds are located near foraging habitat. Wetlands or ponds with adjacent grasslands or oak

woodlands will benefit from selective seeding of native forbs or grasses in the uplands surrounding the pond/wetland fringe (GRASS-4).

Vegetation may have to be removed from ponds where little open water remains to improve conditions for western pond turtle, California tiger salamander, and California red-legged frog. Vegetation removal can be accomplished through grazing (see below), selective herbicide application using label-approved application technique and in calm winds, or mechanical means (LM-11, LM-14). Where feasible, prescribed burns will be used to control nonnative vegetation around ponds and wetlands and within pond or wetland complexes (GRASS-2). Any herbicide application conducted in ponds or wetlands must use products that have been approved for aquatic communities. Mechanical removal of vegetation would occur after the breeding season for wetland- and pond-dependent wildlife, including nesting migratory birds, to minimize impacts. If surveys identify California red-legged frog presence at a pond requiring vegetation management, such activities would be restricted to between August 30th and October 15th. In cases where covered species are dependent on nonnative vegetation (e.g., tricolored blackbirds nesting in Himalayan blackberry) the removal of nonnative vegetation will be undertaken in phases over a 3 to4-year period and replaced with the appropriate native vegetation.

Overgrazing by cattle and rooting by feral pigs can cause trampling of vegetation, soil compaction, development of “cow contours,” and bank destabilization. Fencing ponds and wetlands (POND-1) has been shown to be a rapid, successful, and cost-effective method of enhancing some wetlands. After fencing, vegetation cover and wetland species diversity can increase substantially in stock ponds and other permanent or near-permanent freshwater wetlands that have been degraded by cattle grazing (Contra Costa Water District 2002). In this Plan, fencing locations and specifications will depend on several factors, including site-specific conditions and the biological objectives that are being addressed. Fencing wetlands may not be appropriate in locations where retaining open water for species such as western pond turtle and California tiger salamander is an objective. In such cases, fencing half of a pond or wetland (split fencing) may accommodate the needs of multiple covered species (U.S. Fish and Wildlife Service 2002).

Livestock grazing (LM-11) will be introduced or continued at some wetlands and ponds to eliminate or reduce cover of exotic plants and to maintain ponds by preventing excessive plant growth when such a technique is consistent with maintaining values for covered species. Grazing rotation and fencing can also reduce the erosive impacts described above. Ford et al. (2012) provide details about pond habitat quality for the special-status California red-legged frog and California tiger salamander. The period of a pond’s inundation is critical to habitat value as well as the livestock operation that is associated with the pond’s establishment and maintenance. Ponds that draw down in the late spring or early summer can become unsuitable for livestock use due to lack of water and dangerous muddy banks.

To support successful reproduction of these special-status amphibians, their pond or stream habitats must remain inundated long enough to support successful

metamorphosis, which for California red-legged frog is December through April, and for California tiger salamander through May (U.S. Fish and Wildlife Service 2010). The California red-legged frog need ponds with a mix of open surface water and vegetated cover in the pond and at the edges. Emergent and edge vegetation provides cover for adult frogs from native and non-native predators, which is especially important if the non-native predators are not controlled. Emergent or submerged vegetation is also important in providing structure for attachment of frog eggs. The California tiger salamander typically use ponds free of emergent vegetation. Aquatic vegetation can be compatible, especially submerged vegetation, but salamander breeding appears to be rare with moderate levels of emergent vegetation. Allowing limited livestock access to a pond will help maintain its usefulness as habitat for covered species by preventing excessive plant growth that can lead to rapid sedimentation of ponds (U.S. Fish and Wildlife Service 2002). Seasonally limited grazing can be effective at reducing competition for nonnative plant species in seasonal wetlands (Marty 2005).

In addition to managing grazing of ponds and wetlands, grazing of surrounding grassland will be managed to maintain optimal habitat conditions. The use of livestock grazing within the Reserve System is discussed above (Section 5.3.3 *Grassland Conservation and Management*).

Water and Other Management

It is assumed that many ponds in the study area are in disrepair. Repairs could be made to improve water retention in ponds created as stock ponds that are not retaining water due to leaks and, as a result, not functioning properly as habitat for covered species. Additionally, pond capacity and water duration can be increased (e.g., by raising spillway elevations) to support covered species populations.

In order to retain the habitat quality of ponds and wetlands over time, occasional sediment removal may be needed to address the buildup of sediment that results from adjacent land use or upstream factors (POND-4). Dredging will be conducted during the non-breeding periods of covered and other native species.

The Implementing Entity will also work with private landowners who own key ponds to secure funding to improve and maintain their ponds as habitat for covered species (e.g., tricolored blackbird, California tiger salamander, California red-legged frog, or western pond turtle). The Implementing Entity will help landowners apply for existing grants to enhance pond and freshwater marsh habitat on their land (e.g., North American Wetlands Conservation Act Small Grants Program [USFWS], or Environmental Quality Incentives Program of the Farm Bill [USDA Natural Resources Conservation Service]) (POND-11, POND-14). The Implementing Entity will work closely with existing organizations that have strong relationships with private landowners such as the Natural Resources Conservation Service, the local Resource Conservation District, and the California Cattlemen's Association. A program could be developed in the study area modeled after the successful Alameda County Conservation Partnership in Alameda County. This program provides technical

assistance, funding, and permit streamlining to private landowners wishing to maintain and enhance stock ponds to benefit endangered species.

Coarse woody debris or anchored basking platforms will be installed in ponds to improve habitat for western pond turtles (Hays et al. 1999) (POND-2). This modification will increase the habitat value in locations with existing western pond turtles and in newly created ponds where it is hoped that new pond turtle populations will establish. These structures may also enhance habitat for native amphibian species.

Nonnative Wildlife Management

The Implementing Entity will work to reduce and, where possible, eradicate nonnative exotic species that adversely affect native pond and wetland species. These efforts will include prescribed methods for removal of bullfrogs, mosqitofish, and nonnative predatory fish from stock ponds and wetlands within the Reserve System. Further, the Implementing Entity will reduce the overall population of feral pigs within the permit area to reduce degradation of pond and wetland habitats. In some cases monitoring exotic species can be best accomplished by documenting the impact of those species on natural landscapes. It would be difficult to census the number of feral pigs within the Reserve System without an extensive effort. However, rooting disturbance can be monitored. The pig population will be controlled to levels that do not preclude the Implementing Entity's ability to successfully reach the Plan's goals and objectives.

Private Landowner Education

The Implementing Entity will establish a landowner education program to provide technical and financial assistance to maintain and enhance ponds and other wetlands on private lands. Wetland enhancement may include pond stabilization, nonnative species control, pond or wetland expansion, or water management structures. Details are found under *Public Education and Outreach* in Section 5.3.2 *Landscape Conservation and Management* above. A similar, successful program operates in Alameda County in similar habitat under the auspices of the Alameda County Resource Conservation District and the USDA National Resource Conservation Service.

Threats and Uncertainties

In general it is anticipated that a greater acreage of ponds than of wetlands will be protected through fee title acquisition or conservation easement because wetland protection and restoration opportunities are likely to be rare on the Santa Clara Valley floor, where most of the study area's wetlands are found. Although pond habitat is not a complete surrogate for wetland habitat in terms of ecological services and function, it does support the necessary life history stages for all the covered pond species in this Plan. However, ponds will not be used as out-of-kind mitigation for impacts to wetlands.

When creating or restoring aquatic habitat, the success of the habitat transformation is always dependent upon adequate water supplies during critical

life stages of covered species. During periods of drought, pond and wetland habitat may dry prior to the completion of covered species' aquatic life stages (i.e., breeding ponds for California tiger salamander and/or California red legged frogs may dry prior to metamorphosis). While ponds and wetlands will be created or restored to periodically dry on their own, periods of extended drought are inevitable and may diminish the quality of the aquatic habitat in some years.

Limitations of Restoration

Restoring or enhancing hydrologic function to the immediate watersheds of wetlands and ponds will enhance habitat function of these features. Upstream factors that may be contributing to the decline of seasonal wetlands in the study area include hydrologic changes that lead to channel incision, changes in channel runoff, hydrologic disconnection of channel and floodplain, lowering of groundwater, and reduction of soil moisture in riparian areas. A variety of methods/approaches are available to arrest channel incision. For example, grazing management and fencing (see above) can be used to curtail negative hydrologic effects. Check dams have been shown to be effective at arresting channel erosion in seasonal wetlands in the Los Vaqueros Watershed in Contra Costa County within 6 months of dam installation (Jones & Stokes Associates 1992). Over time, such small dams may also increase the recharge of the local aquifer, raising the water table and increasing soil moisture levels near the surface. This effect could, in turn, increase the cover and extent of seasonal wetland vegetation along stream channels.

Mosquito Abatement

Enhancement of pond and wetland habitats must be balanced with the need to minimize mosquito production. Encouraging adequate populations of mosquito predators, such as native frogs, swallows, and bats, offers an approach to mosquito control that is compatible with management for covered species. Wetlands will be designed to reduce mosquito production by minimizing suitable habitat for mosquitoes (primarily *Culex torsalis*) and other human disease vectors, particularly between mid-July and late September or October when mosquito productivity is highest. Any mosquito control activities to be performed on Reserve System land will be addressed in the reserve unit management plan in consultation with the Santa Clara County Vector Control District. The reserve unit management plan will detail the nature of mosquito control activities and explain specific measures implemented to avoid and minimize impacts to covered species consistent with the Habitat Plan.

5.4 Benefits of and Additional Conservation Actions for Covered Species

Most species-specific conservation is accomplished by protecting, restoring, and managing natural communities as described above. For 17 of the covered species, a GIS-based approach was used to estimate the amount of modeled habitat to be protected within the Reserve System. The species account for most species contains a section called *Modeled Habitat Distribution in Study Area*

detailing the parameters used to identify modeled species habitat (see **Appendix D**). Modeled species habitat was overlaid with the proposed Reserve System (see Section 5.2.3 *Reserve System*). The amount of modeled species habitat protected within the proposed Reserve System is identified for each covered species below. In addition, the number and size (if known) of covered plant occurrences protected within the proposed Reserve System are also discussed. Some species-specific actions were also included within these natural community management sections. The following section describes the biological goals and objectives for covered species and summarizes the benefits of the conservation actions for each species. When applicable, conservation actions in this Plan are related to federal critical habitat designations and federal Recovery Plan actions.

As discussed in Chapter 1, California State Parks lands are excluded from the permit area. Because of this exclusion, all of the land cover-related analyses in the Plan are based on the study area less State Parks lands unless otherwise noted. The size of the study area less State Parks lands is 460,205 acres.

5.4.1 Bay Checkerspot Butterfly

Biological Goals and Objectives

The Implementing Entity will improve the viability of existing Bay checkerspot butterfly populations, increase the total number of populations, and expand the geographic distribution of the species to ensure its long-term persistence in the study area. This will be accomplished by protecting most serpentine grasslands within the study area to ensure protection of the ranges of slopes, aspects, and microhabitats important to the species. Acquisition, enhancement, and restoration/creation of natural communities adjacent to serpentine grasslands, including grasslands (see Section 5.3.3 *Grassland Conservation and Management*), chaparral and coastal scrub (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*), oak woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*), riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*), and wetlands and ponds (see Section 5.3.7 *Wetland and Pond Conservation and Management* are expected to benefit Bay checkerspot butterfly through the conservation and management of movement habitat.

Additionally, the Implementing Entity will improve management in degraded serpentine grasslands in the Reserve System to enhance populations of the larval host plants and adult nectar sources to benefit Bay checkerspot butterfly populations.

Habitat Acquisition and Enhancement

The 1998 serpentine soils species Recovery Plan prioritizes 8,674 acres of then-unprotected habitat (i.e., not "fully or partially protected park lands") within specific portions of the study area that "are considered essential to the recovery" of the species (U.S. Fish and Wildlife Service 1998a). The 1998 Recovery Plan also states that there are "other current or historic localities or suitable habitat areas, generally larger than" 2.5 acres that are also "essential to the recovery" of the species; however, these areas were not specifically identified (U.S. Fish and Wildlife Service 1998a). These prioritizations for protection were based on habitat mapping that occurred prior to the development of the Habitat Plan. The mapping of Bay checkerspot habitat for the Plan resulted in a new more accurate estimate of unprotected habitat in the study area of a total of 7,285 acres (total habitat modeled less habitat in Type 1 Open Space) (**Table 5-7**; see Chapter 3 and the species account in **Appendix D** for details on the habitat mapping).

Habitat models developed for this Plan estimated 8,621 acres of Bay checkerspot butterfly modeled habitat within the study area; this does not include all serpentine bunchgrass lands within the study area. Areas mapped as serpentine rock outcrop in this Plan are excluded from modeled Bay checkerspot butterfly habitat because these land cover types are assumed to be barren and thus not considered suitable habitat for the species. 2,921 acres (34%) of modeled habitat are located on Type 1, 2, or 3 open space with 1,336 acres (15%) permanently protected as Type 1 open space. The Plan will acquire 3,800 acres of lands modeled as habitat for the Reserve System and add 754 acres of modeled habitat from existing open space to the Reserve System (**Table 5-17**). With the total Reserve System lands (4,554 acres = 3,800 acres + 754 acres) added to land already protected as Type 1 open space (1,336 acres), a total of 5,890 acres of Bay checkerspot butterfly modeled habitat would be protected, or 68% of total modeled habitat in the study area.

The Implementing Entity will protect at least 4,000 acres of serpentine bunchgrass grassland (**Tables 5-19**) (3,800 acres of which includes modeled habitat for Bay checkerspot butterfly) through fee title acquisition or the acquisition of conservation easements. The conservation strategy for the Bay checkerspot butterfly, in combination with existing Type 1 open space, protects 70% of the core habitat on Coyote Ridge, extending from the north end of Coyote Ridge south to Anderson Dam (including the Pigeon Point unit). This acquisition will include the core habitats along the ridge tops, which have historically (since 1984) supported the densest populations of Bay checkerspot butterfly. Of the 4,000 acres of serpentine grassland to be preserved, the proposal is to acquire a minimum of 2,900 acres located on Coyote Ridge (LAND-L5). Extensive land acquisition will occur in all four of the core habitat areas as defined in the Recovery Plan for the species (U.S. Fish and Wildlife Service 1998a): Kirby, Metcalf, San Felipe, and Silver Creek Hills (see **Table 5-7** for a cross-walk of site names between this Plan and the Recovery Plan). The primary focus of land acquisition will be Coyote Ridge. The Plan also protects secondary sites deemed essential for the recovery of the species, including:

- The Santa Teresa Hills, a "potential core area" and "stepping stone" in the Recovery Plan. Approximately 877 acres (53%) of Santa Teresa County Park are proposed for incorporation into the Reserve System and would be managed to improve habitat for this species; most of this area supports serpentine bunchgrass grassland (over 670 acres). Once enhanced through livestock grazing, the improved habitat is expected to attract Bay checkerspot butterfly back to this part to re-establish a lost population (**Table 5-5**)[28].
- Tulare Hill (deemed an important corridor for this species to connect populations in the Diablo Range with populations in the Santa Cruz Mountains),
- West hills of the Santa Clara Valley: 75% of the currently unprotected portions of Hale/Falcon Crest, Kalana Avenue, and Canada Garcia sites.

Land acquisition will protect occupied and potential habitat for the species, and protect critical linkages for the species. Protection of landscape linkages 6 and 8 (**Table 5-9** and **Figure 5-9**) will directly benefit Bay checkerspot butterfly. Protection of the linkage between the Silver Creek and Metcalf populations (LAND-9, LAND-L4) and the linkage between Coyote Ridge and Tulare Hill is critical for the species and will be necessary to meet the biological goals and objectives for this species.

The Implementing Entity will acquire and manage enough habitat to ensure occupancy by Bay checkerspot butterfly of each of the four core habitat units identified in the 1998 Serpentine Recovery Plan (Kirby, Metcalf, San Felipe, and Silver Creek Hills). Occupancy in these four core habitat units will be demonstrated at least four out of every 10 consecutive years of the permit term. The Implementing Entity will also acquire and manage land to ensure occupancy of at least three of the six (50%) satellite habitat units identified in the 1998 serpentine Recovery Plan (**Table 5-7**) by Year 45 (see Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Acquisition of Occupied Habitat for Select Wildlife Species*).

Successful implementation of the Plan will result in the protection of a portion of all Bay checkerspot critical habitat units (**Table 5-21** and **Figure 4-3**) (U.S. Fish and Wildlife Service 2008). In most cases, more than 48% of each of the 9 critical habitat units will be protected.[29] Habitat protection will occur on Coyote Ridge (northwest and southeast of Motorcycle County Park; Units 5 and 13), Tulare Hill (Unit 6), Santa Teresa Hills (Unit 7), west of Calero Reservoir (Unit 8), the Kalanas and Hale/Falcon Crest (Units 9a and 10), and Bear Ranch (Unit 11) (LAND-G3). These acquisitions will permanently protect important linkages between core and satellite habitat units and guarantee standardized management and monitoring, something that has not occurred in the past. Protection of sites will be prioritized according to threat, occupancy history and

[28] Estimates of County Park lands incorporated into the Reserve System are approximations. Final amounts will be determined during implementation when conservation easements are established and more detailed mapping is conducted.

[29] Critical habitat units 9a and 9b are referred to a single unit in this Plan. Reference to % protected includes existing Type 1 Open Space at the time of permit issuance in addition to critical habitat preserved during the permit term.

at the time of acquisition, proximity to occupied habitat, and prevalence of cool microsites with the proper slope, aspect, and microclimate for Bay checkerspot butterflies. All land protected will be enhanced, as described below. See Chapter 4, Section 4.7.1 *Bay Checkerspot Butterfly*, for a discussion regarding the limitations of land acquisition in specific Bay checkerspot critical habitat units.

Most of the serpentine areas in the study area are expected to be acquired as part of the Reserve System (see above). While the allowable impacts to serpentine bunchgrass grassland is limited to 550 acres (**Table 4-2**), impacts to Bay checkerspot butterfly modeled habitat mapped (see **Appendix D** and **Table 5-7**) as "occupied" or "potential" are capped at 300 acres (**Table 4-4**). Impacts to modeled habitat mapped as "historic/unoccupied" and "occupancy unknown" are not subject to this cap. In addition, impacts to Bay checkerspot butterfly modeled habitat is limited to no more than 3% of the unprotected portion (everything except Type 1 open space) of any core or satellite habitat unit targeted for conservation (as defined in **Table 5-7**). The one exception is the Kirby/East Hills core habitat unit which has an 11% allowance to accommodate the Kirby Landfill expansion (80 acres). Therefore, impacts to Bay checkerspot butterfly modeled habitat are limited in total amount (up to 4% of total modeled habitat) and in geographic scope (no more than 3% of any one core or satellite habitat unit targeted for conservation with one exception). These caps do not apply to habitat units in Type 1 open space because loss of habitat will be extremely limited in permanently protected open space (i.e., limited to trail construction and management activities).

Some impacts on serpentine grassland may still occur. Because of the high importance and rarity of serpentine soils and their habitats, these areas will be avoided whenever feasible during project planning (see Chapter 6, Section 6.5, subheading *Condition 13 Serpentine and Associated Covered Species Avoidance and Minimization*).

In the study area, an estimated 12% of designated critical habitat for Bay checkerspot butterfly is currently protected as Type 1 open space and another 25% occurs in open space Types 2, 3, and 4 (**Table 5-21**). Portions of the critical habitat units have been preserved through project compensation (e.g., Silver Creek Hills) and conservation agreements and easements from private entities (e.g., Tulare Hill and Kirby Canyon Landfill). However, this leaves 38% of critical habitat outside any type of open space. The Habitat Plan will protect an estimated 66% of all critical habitat not currently protected under Type 1 open space, including existing parklands that will be incorporated into the Reserve System. When added to the currently protected portions of critical habitat, approximately 70% of Bay checkerspot critical habitat in the study area will be preserved as Type 1 open space upon successful implementation of the Habitat Plan.

Management Techniques and Tools

The general principles for grassland management will be followed in all serpentine grassland areas (Section 5.3.3 *Grassland Conservation and Management*). All management actions in this Plan are consistent with management guidelines in the species' Recovery Plan (U.S. Fish and Wildlife Service 1998a).

Once land is protected it will be beneficially managed for Bay checkerspot butterflies. The Implementing Entity will also enhance degraded areas to benefit serpentine grasses and encourage growth of host plants and nectar sources for the butterfly through techniques such as exotic plant control and removal, beneficial livestock grazing, and prescribed burning (GRASS-2). In the study area, grazing has been shown to benefit most covered plant species and Bay checkerspot butterfly by reducing cover of invasive plants and increasing habitat for dwarf plantain, the butterfly's host plant (Weiss and Wright 2005, 2006; Santa Clara Valley Transportation Authority 2006).

It is expected that Bay checkerspot butterflies from core populations will colonize previously unoccupied areas or areas that historically supported the species but lost its habitat value (i.e., lack of grazing, etc.). If it becomes apparent that site management is adequate and natural dispersal is not occurring, the Implementing Entity may translocate individuals (i.e., assisted migration) to increase the distribution of the species in the study area. The decision of when this should occur would be made in coordination with species experts and the Wildlife Agencies. At a minimum, the Implementing Entity will propose translocation efforts if natural colonization fails after five seasons in which core populations are at above-average population sizes. In such an event, Bay checkerspot butterflies (eggs, larvae, or adults) may be translocated from core populations into suitable but unoccupied sites to reestablish populations (GRASS-7). Translocation proposals will be provided to CDFG and USFWS for review and approval before translocation efforts are implemented and will be carried out experimentally. This is an important action identified in the Recovery Plan (U.S. Fish and Wildlife Service 1998a).

Public education and outreach is also identified as an important action in the species' Recovery Plan. The Habitat Plan provides funding for a full-time public education and outreach specialist, as well as public outreach materials. As described in this chapter, the focus of the public outreach and education campaign will be to work with landowners to minimize their impacts and improve their management to benefit covered species. Because some Bay checkerspot butterfly habitat will remain in private ownership (even after full implementation of this Plan), landowner outreach will be important to ensure populations persist on these sites.

Threats and Uncertainties

Because this Plan will protect in perpetuity the majority of the remaining occupied and suitable habitat for this species, the threat of habitat loss from development will be greatly reduced. However, there will be a continued threat from nitrogen deposition on serpentine grasslands and the encroachment of nonnative grasses and herbs. Active livestock grazing and other management will minimize these on-going (and, over time, increasing) effects. Because management and monitoring for this species has been ongoing for many years, many of the management and monitoring techniques are well established and can be applied immediately following acquisition of new lands for the Reserve System, if funds are available (see Section 5.2.5 *Land Management*). The success of translocation is unknown but it may be attempted experimentally under the Plan to address this uncertainty.

5.4.2 California Tiger Salamander

Biological Goals and Objectives

The Implementing Entity will support viable populations and contribute to the regional recovery of the California tiger salamander by increasing the number of individuals and expanding the distribution of this species within the Reserve System. This will be accomplished by protecting and enhancing land through fee title purchase or by obtaining easements that are managed as part of the Reserve System.

Within the Reserve System the amount and quality of California tiger salamander habitat will be increased and improved through restoration, enhancement and creation of breeding and upland habitat. Lands that are protected will include land cover types that provide breeding habitat like ponds and wetlands and upland habitat like grassland, oak woodland, riparian, or chaparral. Acquisition, enhancement, and restoration/creation conservation actions identified for the following natural communities will benefit California tiger salamander through upland, movement, breeding, and foraging habitat conservation and management:

- grasslands (see Section 5.3.3 *Grassland Conservation and Management*),
- chaparral and coastal scrub (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*),
- oak woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*),
- riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*), and
- wetlands and ponds (see Section 5.3.7 *Wetland and Pond Conservation and Management*).

The Reserve System will be designed to maintain and improve connectivity between breeding habitat and upland habitat and to provide essential upland refugia by protecting areas with existing ground squirrel colonies or promoting new colonies in areas adjacent to known California tiger salamander breeding habitat. The Reserve System will be designed to reduce habitat fragmentation, which in turn will ensure that proper genetic exchange can occur and that the population has the opportunity to expand its distribution within the study area. In addition, the Reserve System will link California tiger salamander habitat within the study area to areas important to the species outside of the study area, such as San Francisco Public Utilities Commission Alameda Watershed properties in Santa Clara and Alameda counties and the Soap Lake region in San Benito County.

Habitat Acquisition, Restoration, and Creation

There are 324,748 acres of California tiger salamander modeled habitat (breeding and non-breeding) within the study area. There are 97,423 acres (30%) of modeled habitat located on Type 1, 2, or 3 open space with 45,767 acres (14%) permanently protected as Type 1 open space. The Plan will acquire a minimum of 30,150 acres of modeled habitat for the Reserve System. In addition, 11,745 acres of modeled habitat will be added to the Reserve System from existing open space. This will nearly double the proportion of California tiger salamander modeled habitat in the study area in Type 1 open space (to 27%) and increase Type 1, 2, or 3 open space to 39% (**Table 5-17**). This includes 195 acres of modeled breeding habitat (150 acres of newly acquired land and 45 acres of existing open space incorporated into the Reserve System) and 41,700 acres of modeled upland habitat (30,000 acres of newly acquired land and 11,700 acres of existing open space incorporated into the Reserve System).

The Implementing Entity will protect (through acquisition or easement) and enhance a minimum of 50 acres of ponds that either support, or have the potential to support, breeding California tiger salamander. In addition, a minimum of 20 acres of ponds will be created that either support or have the potential to support breeding California tiger salamander. Up to 104 acres of ponds will be protected and enhanced and up to 72 acres of ponds will be created if all estimated impacts occur (**Tables 4-4, 5-13, and 5-21**).

Similarly, the Implementing Entity will protect and enhance a minimum of 15 acres of wetlands (perennial and seasonal) that either support or have the potential to support breeding California tiger salamanders. Up to 80 acres of wetlands will be protected and enhanced and up to 75 acres of wetlands (perennial and seasonal) will be restored if all estimated impacts occur. As described in the species account in **Appendix D**, seasonal wetlands are more likely to support adequate breeding habitat for California tiger salamander because nonnative predators and hybrid salamanders are less likely to persist in these habitats. However, some perennial wetlands may still support California tiger salamander if they are periodically drained or nonnative predators are controlled in other ways (see the section below for a discussion of management of these ponds and wetlands to support California tiger salamander.)

By the time the Reserve System is fully acquired (which will be at or before Year 45), a minimum of 30% of all ponds and wetlands in the Reserve System will be or will have been occupied by California tiger salamander, as described in the Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Acquisition of Occupied Habitat for Select Wildlife Species*. By Year 30, at least 25% of all ponds and wetlands will be occupied or will have been occupied by the species.

Further, the Implementing Entity will protect grassland, oak woodland, riparian, or chaparral habitat within California tiger salamander modeled habitat (*California tiger salamander*, **Appendix D**) to provide upland refugia for the species. Land acquisition of modeled upland habitat for California tiger salamander will occur in all of the focus areas described below and will be adjacent to modeled breeding habitat. In most cases when modeled breeding habitat is acquired, modeled upland habitat will also be acquired because it will occur on the same parcel.

Land acquisition will substantially benefit California tiger salamander by protecting existing modeled breeding and upland habitat, protecting known occurrences, enhancing habitat through improved management, and providing opportunities for restoration of breeding habitat (freshwater wetlands) and creation of breeding habitat (ponds). To maximize the benefits of acquisition for this species, the Implementing Entity will acquire aquatic and upland modeled habitat in areas adjacent to existing open space with known occurrences of California tiger salamander such as Joseph D. Grant County Park, Palassou Ridge Open Space Preserve, or Henry W. Coe State Park (LAND-WP5).

Portions of the critical habitat units have already been preserved through acquisition and conservation easements (**Figure 4-4**). **Table 5-21** shows that 23% of all critical habitat in the study area is currently protected as Type 1 open space and another 33% is located in space Types 2–4. However, this leaves 41% of critical habitat outside of any type of open space. The Habitat Plan anticipates protecting an estimated 31% of all critical habitat in the study area within the Reserve System, including existing parklands that will be incorporated into the Reserve System. Land acquisition and incorporation of existing open space into the Reserve System will occur in 7 of 8 critical habitat units within the study area[30], substantially contributing to species recovery in the study area. See Chapter 4, Section 4.7.2 *California Tiger Salamander*, for a discussion regarding the limitations of land acquisition in specific California tiger salamander critical habitat units.

Within the Diablo Range, land acquisition will be focused on protecting the connection between the southern parts of Henry W. Coe State Park, an area with high California tiger salamander densities, to the Soap Lake region in northern San Benito County. Some of the land acquired in this area falls within Critical Habitat Unit 12 and would include up to three known occurrences. Unit 11 is

[30] Subunits EB_10A and B were counted as one unit. The remaining critical habitat unit in the study area (Unit 9) is almost entirely contained within the Palassou Ridge Open Space (owned by the Open Space Authority) and Coyote Lake-Harvey Bear Ranch County Park.

almost entirely within Henry W. Coe State Park (94%), so the unprotected area may or may not be incorporated into the Reserve System (for this analysis, it is assumed to not be incorporated). Land acquisition will also occur within Unit 7 along lower San Felipe Creek and along Coyote Ridge, protecting up to 7 known occurrences. By bringing most of Joseph D. Grant County Park into the Reserve System (**Table 5-5**), protection and management is enhanced within much of Unit 6 (Grant Park supports up to 14 known occurrences, most of which would be brought into the Reserve System). Another connection will be protected between Alum Rock Park and the Blue Oak Ranch in the northeastern part of the study area (Coyote-7 and Alameda-1). Land acquisition in this area would protect a small portion of Critical Habitat Unit 5 and one known occurrence. Additional populations are likely to be found in this area due to a high density of ponds and a high concentration of known occurrences nearby on existing open space.

The Santa Cruz foothills are another area where acquisition will benefit the California tiger salamander. Though salamander densities are low in the Santa Cruz Mountains when compared to the Diablo Range, protecting the remaining breeding and upland habitat is important in order to retain genetic diversity among the populations in the study area. Retaining connectivity between Uvas Reservoir and Calero County Park would benefit many species, including the California tiger salamander. Acquisitions west of Calero Reservoir will buffer California tiger salamander habitats against urban development in southern San José and also protect the only piece of Critical Habitat Unit 8 that falls outside of Calero County Park. By bringing a portion of Calero County Park into the Reserve System (**Table 5-5**), protection and management is enhanced within the rest of Unit 8. Land acquisition in this area also protects two known occurrences of the species.

Acquisitions targeted north of Gilroy would entirely protect Critical Habitat Unit 10b[31], including up to three known occurrences. Substantial land acquisition in the Santa Cruz Mountains at the southern end of the study area (Uvas-5 and 6) would protect large stands of annual grassland (i.e., suitable upland habitat), a high density of ponds (i.e., suitable breeding habitat), and up to four known occurrences.

To ensure habitat connectivity within the study area the Implementing Entity will also protect modeled upland habitat between existing ponds and wetlands to provide a linked matrix of pond, wetland, and upland habitat as part of the Reserve System (LAND-G2, LAND-OC1, LAND-OC2, LAND-OC3, LAND-OC4, LAND-OC5). Acquisition will be prioritized to retain or improve habitat connectivity between breeding California tiger salamanders in the Santa Cruz foothills and in the Diablo Range. To accomplish this, the Implementing Entity will acquire land near the Santa Teresa Hills and Tulare Hill as well as areas along the Pajaro River south of Gilroy (LAND-WP7). The Implementing Entity will create at least 20 acres of ponds at 40 locations to increase available habitat and enhance connectivity among existing ponds and wetlands within the Reserve System (POND-9). Pond creation will occur regardless of the level of impacts on

[31] Unit 10a encompasses many small parcels that are not feasible to acquire at this time.

pond habitat. The purpose is to contribute to the recovery of the California tiger salamander in the study area. In addition to this pond creation the Implementing Entity will create ponds lost to covered activities, in-kind within the Reserve System, at a ratio of 1-acre of conservation to 1-acre of impact (1:1) (estimated to be 52 acres) (POND-10). An estimated 72 acres of ponds will be created to mitigate this impact (**Tables 5-13 and 5-21**). The total allowable impact on California tiger salamander modeled breeding habitat during the permit term is 77 acres of permanent impacts and 14 acres of temporary impacts, for a total of 91 acres (**Table 4-4**). To offset these impacts, a minimum of 195 acres of modeled breeding habitat will be protected and managed as part of the Reserve System to offset these impacts (**Table 5-17**). To achieve the biological goal for the California tiger salamander, acquisition of wetlands and ponds will be prioritized by: (1) sites with documented records of breeding California tiger salamander, (2) sites with known occurrences, though not necessarily breeding, and (3) sites without known occurrences of California tiger salamander but with pond turtle habitat and known occurrences of other covered species.

Within the Reserve System the Implementing Entity will restore 20 acres of perennial wetlands and create 20 acres of ponds (in 40 locations) (**Tables 5-13 and 5-21**) in areas within the typical dispersal distance of known breeding sites to create new breeding opportunities for this species (POND-7, POND-8, POND-9) (**Appendix D**). These wetlands and ponds will contribute to the recovery of the species while additional wetlands and ponds will be created to replace those lost to covered activities. See Section 5.3.7 *Wetland and Pond Conservation and Management* for details on restoration. This will further serve to reduce habitat fragmentation and promote genetic exchange within the population. The locations selected for wetland restoration and pond creation will be determined on the basis of physical processes, including hydrologic, geomorphic, and soil conditions to ensure that successful restoration or creation can occur and be self-sustained.

Management Techniques and Tools

In order to increase the habitat quality of modeled upland habitat the Implementing Entity will continue or introduce livestock grazing within grassland communities in the Reserve System in a variety of grazing regimes (GRASS-1, LM-11). Other techniques that will be employed to reduce nonnative vegetation and increase the quality of upland habitat for California tiger salamander include prescribed burns (GRASS-2) and the selective application of herbicides or other treatments (e.g., hand or mechanical removal) to reduce the biomass of nonnative vegetation and increase the success of native vegetation (LM-14). To further increase the quality of modeled upland habitat, native grasses will be planted around the perimeter of ponds and wetlands (POND-3).

Fencing that allows for covered species passage will be installed on portions of ponds and wetlands to reduce grazing pressure and feral pig access to provide vegetated refuge sites for native amphibians (POND-1). If entire ponds or wetlands need to be fenced, alternate water sources will be provided for livestock. These fences will also serve to protect breeding habitat from

destruction from feral pigs. Additional measures will be implemented like trapping, hunting or other control methods, to reduce the feral-pig when feral pigs are hindering the Implementing Entity's ability to achieve the biological goals and objectives of the Plan (LM-12).

The Implementing Entity will increase the quality of modeled breeding habitat within the permit area by periodically clearing vegetation or removing sediment (POND-4) to create a variety of microhabitats within a single pond or wetland. This will provide shallow areas for California tiger salamander larvae while also accommodating other native aquatic species (POND-13). The Implementing Entity will also reduce nonnative predators (bullfrogs, invasive fish). It will use a variety of management techniques, which include habitat manipulation (e.g., periodic draining of ponds and other wetlands), trapping, hand capturing, and electroshocking to reduce nonnative predator populations (LM-13). Other techniques may be employed upon the approval of the USFWS and CDFG. New ponds will be designed to rely on passive management (e.g., dry on their own periodically), minimizing the need for artificial draining, or minimal management (e.g., stock pond dams fitted with drainage structures).

Threats and Uncertainties

Although expected, it is uncertain whether acquiring and managing land to favor California tiger salamander will ultimately result in the species expanding its range within the study area. One limiting factor might be the presence of fossorial rodents (e.g., California ground squirrels) in upland habitats. California tiger salamanders depend on the underground refugia provided by these burrowing mammals, and without them, upland habitats are less suitable. In general, where burrowing rodents are lacking in the ecosystem it is due to human-caused eradication, but in some cases other environmental factors may influence whether fossorial rodents are present (e.g., soil, slope, water table). In addition, there may be cases where a portion of potential upland habitat is in a parcel adjacent to an acquired parcel containing potential breeding habitat. These factors will be considered when adding lands to the Reserve System to contribute to the recovery of California tiger salamander.

Since this Plan will both increase the connectivity between breeding sites and increase the frequency of surveys in the permit area it also has the potential to facilitate the spread of detrimental environmental factors (e.g., chytrid fungus, nonnative predators). To minimize this impact, Condition 4, *Stream Avoidance and Minimization for In-Stream Projects*, and Condition 12, *Wetland and Pond Avoidance and Minimization*, outline measures to be used by anyone working or studying in aquatic habitats. If ponds, wetlands, and the native amphibian populations that they support, become infected with chytrid fungus or other diseases, the Implementing Entity will use the best scientific information available to manage and stop the spread of the epidemic (STUDIES-7). Further, the Implementing Entity will conduct a risk assessment, using the best information available, when siting California tiger salamander breeding habitat to determine the risk of increasing the nonnative predator population (i.e., potential of bullfrog colonization of the new breeding site).

Hybridization with Nonnative Salamanders

Barred salamander (*Ambystoma tigrinum mavortium*) is native to parts of Texas, eastern New Mexico, Oklahoma, Kansas, Nebraska, eastern Wyoming, and Colorado. It has been found in isolated locations throughout much of California, including Santa Clara County. The barred salamander is much larger than the California tiger salamander (it is the second largest salamander in the United States) and exhibits different behavior and life-history traits than the California tiger salamander. Native California tiger salamanders and introduced barred tiger salamanders are capable of inter-breeding (hybridizing) and have been hybridizing for 50–60 years (Fitzpatrick and Shaffer 2007). This hybridization is a major threat to California tiger salamanders.

Barred tiger salamander adults retain juvenile traits such as gills when they breed in aquatic habitats. These individuals, called "paedomorphs," provide the opportunity to readily distinguish barred salamanders and hybrids from native California tiger salamanders in breeding ponds and wetlands. Hybridization and introgression between the California tiger salamander and the barred tiger salamander is most likely occurring at many breeding sites throughout Santa Clara County, especially in the southern portion of the county (e.g., Bluestone Lake, North Fork Pacheco Creek) at areas located within close proximity to introduction sites (**Appendix K** *California Tiger Salamander Hybridization*).

Appendix K provides a management, monitoring, and adaptive management strategy for California tiger salamanders and hybrids. Key components of the strategy include management, public education, outreach, and targeted studies in close coordination with the Wildlife Agencies.

The initial management strategy for hybrids will focus on restoring and maintaining wetland and pond conditions within the Reserve System that favor California tiger salamanders. Perennial breeding sites studied in the hybrid zone often contained paedomorphic tiger salamanders, relative to more seasonal aquatic sites like vernal pools (Fitzpatrick and Shaffer 2004). Therefore, initial restoration actions will target sites where paedamorphs have been observed because presence of paedamorphs would indicate presence of nonnative alleles in the tiger salamander population. Since different individual tiger salamanders are expected to return to breeding ponds every year, these targeted perennial ponds will be periodically drained to control nonnative introductions. The adaptive management process will be used to adjust monitoring and management as described in **Appendix K**.

New nonnative salamander introductions are caused by humans, and therefore could be decreased with a public education campaign. Public education will be conducted to inform the public that the use of any salamander as bait in the State of California is illegal (POND-12). The Implementing Entity will also conduct education and outreach to pond landowners, provide technical assistance, and offer financial and regulatory (Safe Harbor Agreement) incentives to private landowners to restore, create, and maintain breeding habitat conditions on their land that favor native California tiger salamanders (POND-11). Finally, the Plan will contribute toward research to determine the distribution of, and ecological

effects resulting from, introgression and interbreeding of native and nonnative tiger salamanders (e.g., effects due to competition [lower growth rates, adult survival]; effects due to predation; effects due to reduced fitness of hybrids) and effect on covered amphibians and reptiles (STUDIES-8). These studies will be coordinated with, and be complementary to, similar studies conducted outside of the purview of this Plan. With Wildlife Agency approval, the Implementing Entity will incorporate specific management prescriptions supported by this research, and research conducted by others, in the applicable reserve unit management plans.

5.4.3 California Red-Legged Frog

Biological Goals and Objectives

The Implementing Entity will support viable populations and contribute to the regional recovery of the California red-legged frogs by increasing the number of individuals and expanding the distribution of this species within the Reserve System. This will be accomplished by protecting land through fee title purchase or by obtaining easements that are managed as part of the Reserve System.

Within the Reserve System the amount and quality of California red-legged frog habitat will be increased and improved through restoration, enhancement and creation of breeding and upland habitat. The Reserve System will be designed to maintain connectivity between breeding habitat and upland habitat and to provide essential short-term upland refugia as well as dispersal habitat by protecting landcover types that provide breeding habitat like ponds and wetlands and upland refugia and dispersal habitat like grassland, oak woodland, riparian, or chaparral. Acquisition, enhancement, and restoration/creation conservation actions identified for grasslands (see Section 5.3.3 *Grassland Conservation and Management*), chaparral and coastal scrub (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*), oak woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*), riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*), and wetlands and ponds (see Section 5.3.7 *Wetland and Pond Conservation and Management*) will benefit California red-legged frog through upland, movement, breeding, foraging and year-round habitat conservation and management.

In addition, the Reserve System will link California red-legged frog habitat within the study to areas important to the species outside of the study area, like San Francisco Public Utilities Commission Alameda Watershed properties in Santa Clara and Alameda counties and the Soap Lake region in San Benito County.

Habitat Acquisition, Restoration, and Creation

There are 341,773 acres of California red-legged frog modeled habitat (primary and secondary habitat) within the study area. A total of 101,164 acres (30%) of that modeled habitat are located in Type 1, 2, or 3 open space with 46,253 acres (14%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 31,300 acres of modeled habitat for the Reserve System. In addition, 11,930 acres of modeled habitat for California red-legged frog will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of protected habitat in the study area to about 26% in Type 1 open space and 39% in Type 1, 2, and 3 open space (**Table 5-17**). The Reserve System will include 1,430 acres of modeled primary habitat and 41,800 acres of modeled secondary habitat.

The Implementing Entity will protect (through acquisition or easement) and enhance a minimum of 50 acres of ponds that support or have the potential to support breeding California red-legged frogs. In addition, a minimum of 20 acres of ponds will be created to support aquatic covered species and tri-colored blackbird. Up to 104 acres of ponds will be protected and enhanced and up to 72 acres of ponds will be created if all estimated impacts occur (**Tables 5-13 and 5-21**). Similarly, the Implementing Entity will protect and enhance a minimum of 10 acres of perennial wetlands and up to 50 acres of perennial wetlands that either support or have the potential to support aquatic covered species and tri-colored blackbird. A minimum of 20 acres of perennial wetlands will be restored to support aquatic covered species and tri-colored blackbird. Up to 45 acres of perennial wetlands will be restored if all estimated impacts occur. In addition, a minimum of 100 miles of streams will be protected that either support or have the potential to support breeding California red-legged frogs, breeding foothill yellow-legged frogs, and/or foraging/basking western pond turtles. A minimum of 1 mile of streams will be restored that have the potential to support these same species. Up to 10.4 miles of streams will be restored if all estimated impacts occur. Further, it will protect grassland, oak woodland, riparian, or chaparral habitat within the California red-legged frog modeled habitat (*California red-legged frog*, **Appendix D**) to provide upland refugia and dispersal opportunities for the species. To maximize benefits to the species the Implementing Entity will target acquisitions in the East San Francisco Bay Recovery Unit (U.S. Fish and Wildlife Service 2002) (LAND-WP4) and in areas adjacent to existing open space with known occurrences of California red-legged frog, such as Joseph D. Grant County Park or Palassou Ridge Open Space Preserve (LAND-WP5).

In the Diablo Range, land will be acquired along Coyote Ridge to ensure that an area with high concentrations of California red-legged frogs is protected. Up to 15 known occurrences (breeding sites or movement locations) on Coyote Ridge could be preserved. The Implementing Entity will also target acquisition of parcels northeast of Alum Rock Park to connect Alum Rock Park and Cherry Flat Reservoir (Alameda-1 and Coyote-7) with protected open space outside the study area (i.e., San Francisco Public Utilities Commission Alameda Watershed). This will also protect suitable habitat for this species and up to one known occurrence in Critical Habitat Units STC-1 and STC-2 (75 FR 12815 12959). Incorporation of most of Joseph Grant County Park into the Reserve System will provide

substantial opportunity to enhance suitable and occupied breeding habitat (**Table 5-5**). The portion of Grant Park proposed for the Reserve System supports at least two known occurrences of the species.

Portions of the critical habitat units have already been preserved through acquisition and conservation easements (**Figure 4-5**). **Table 5-21** shows that 24% of all critical habitat in the study area is currently protected as Type 1 open space and another 14% is located in open space Types 2–4. However, this leaves 62% of critical habitat outside of any type of open space. The Habitat Plan anticipates protecting an estimated 14% of all critical habitat in the study area within the Reserve System, including existing parklands that will be incorporated into the Reserve System.

Additional target areas of land acquisition that will benefit this species and support implementation of the Recovery Plan include the area between Henry W. Coe State Park and the Soap Lake region of San Benito County (LAND-WP5). This area is important for many covered species and will help retain a connection between breeding populations in the state park and in areas outside of the study area. Although there are no known occurrences in this area due to a lack of survey effort, there is a high density of ponds, many of which are expected to be suitable breeding habitat.

Land acquisition in the Pacheco Watershed will protect high densities of suitable ponds and other wetlands, including up to three known occurrences of California red-legged frogs. Protection of the creek and the associated riparian areas will increase the level of protection of breeding and movement habitat in this part of the study area. Further, this area likely provides and important movement corridor between the Soap Lake region of San Benito County to areas northeast in Santa Clara County such as Romero Ranch and Pacheco State Park.

By the time the Reserve System is fully acquired (which will be at or before Year 45), a minimum of 40% of all ponds and wetlands in each of the federal Recovery Units 4 and 6 in the Reserve System will be or will have been occupied by California red-legged frog, as described in the Section 5.3.1 *Land Acquisition and restoration Actions* subheading *Acquisition of Occupied Habitat for Select Wildlife Species*. By Year 30, at least 35% of all ponds and wetlands in each of the federal Recovery Units 4 and 6 will be occupied or will have been occupied by the species.

There is no designated critical habitat for California red-legged frog in the Santa Cruz Mountains. However, land acquisition in this area will protect a substantial amount of suitable breeding, aestivation, and movement habitat. For example, land acquisition around Calero Lake, Chesbro Reservoir, and Uvas Reservoir will protect suitable habitat, some of which is within a mile of known occurrences. Land acquisition in the south end of the study area will protect up to four known occurrences and a high density of ponds and other wetlands suitable for California red-legged frog breeding.

To achieve the biological goal for the California red-legged frog, acquisition of wetlands, ponds, and streams will be prioritized by: (1) sites with documented

records of breeding California red-legged frog, (2) sites with known occurrences, though not necessarily breeding, and (3) sites without known occurrences of California red-legged frogs but with pond turtle habitat and known occurrences of other covered species.

The Implementing Entity will create at least 20 acres of ponds at 40 locations to increase available habitat and enhance connectivity among existing ponds and wetlands within the Reserve System (POND-9). Pond creation will occur regardless of the level of impacts on pond habitat by covered activities. The purpose of this habitat creation is to contribute to the recovery of the California red-legged frog in the study area. In addition to pond creation the Implementing Entity will create ponds lost to covered activities, in-kind within the Reserve System, at a ratio of 1-acre of creation to 1-acre of impact (1:1) (estimated to be 52 acres) (POND-10). Together with the minimum creation requirements, up to 72 acres of ponds (minimum of 20 acres plus 52 acres to offset impacts) will be created within the Reserve System (**Tables 5-13 and 5-21**).

The Implementing Entity will also restore at least 20 acres of perennial wetlands within the Reserve System. All of this will be characterized as coastal and valley freshwater marsh (POND-6) and will be restored regardless of the level of impacts to wetlands in the study area from covered activities. In addition to those 20 acres, the Implementing Entity will restore impacted perennial freshwater wetlands "in-kind" at a ratio of one-acre of conservation to one-acre of impact (1:1) (POND-7) (estimated to be 25 acres). The Implementing Entity will also restore impacted seasonal wetlands "in-kind" at a ratio of two-acres of conservation to one-acre of impact (2:1) (POND-8) (estimated to be 30 acres). Restoration will be carried out in areas that will increase available habitat and enhance connectivity among existing ponds and wetlands within the Reserve System.

Management Techniques and Tools

Since the California red-legged frog utilizes pond and wetland habitats, as well as riverine habitats within the study area, management actions that enhance and restore those natural communities will benefit this species. In addition, many of the management actions outlined for the California tiger salamander will benefit the California red-legged frog. For a description of the management techniques that will be implemented to increase the quality and quantity of California red-legged frog habitat within the Reserve System refer to Section 5.4.2, *California Tiger Salamander* subheading *Management Techniques and Tools*, above. In addition, the Implementing Entity may utilize translocation of California red-legged frog to help establish new populations in the study area. This activity will only be undertaken with the approval of the Wildlife Agencies, and when biologically appropriate and necessary to meet biological goals and objectives of the Plan.

For a general description of pond, wetland, and riverine restoration, creation, and management refer to Sections 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management* and 5.3.7 *Wetland and Pond Conservation and*

Management, above. All management actions in this Plan are consistent with management guidelines in the species' Recovery Plan (U.S. Fish and Wildlife Service 2002).

Uncertainties and Threats

Since this Plan will both increase the connectivity between breeding sites and increase the frequency of surveys in the permit area it also has the potential to facilitate the spread of detrimental environmental factors (e.g., chytrid fungus, nonnative predators). If ponds, wetlands, and the native amphibian populations that they support, become infected with chytrid fungus or other diseases, the Implementing Entity will use the best scientific information available to manage and stop the spread of the epidemic (STUDIES-7). Further, the Implementing Entity will use the best information available to determine whether the benefits of creating more California red-legged frog breeding habitat in an area outweighs the risk of increasing the nonnative predator (i.e., bullfrogs) population along with it.

5.4.4 Foothill Yellow-Legged Frog

Biological Goals and Objectives

The goal of the Implementing Entity will be to maintain or increase the population of foothill yellow-legged frog in the study area. The objectives toward meeting that goal are to acquire, through fee title or conservation easement, streams that have or historically had perennial flows. Additionally, the Implementing Entity will enhance or restore perennial streams to provide higher quality habitat for all riverine species, including foothill yellow-legged frog. Acquisition, enhancement, and restoration/creation conservation actions identified for streams and riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*), and redwood forests (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*) will benefit foothill yellow-legged frog through movement, foraging, and year-round habitat conservation and management.

Acquisition, Restoration, and Enhancement

There are 690 miles of foothill yellow-legged frog modeled primary and secondary habitat within the study area. A total of 222 stream miles (32%) of modeled primary and secondary habitat are located on Type 1, 2, or 3 open space with 119 stream miles (17%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 80 miles of primary and secondary modeled habitat for the Reserve System. In addition, 24 miles of primary and secondary modeled habitat will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of total

protected primary and secondary modeled habitat in the study area to about 32% in Type 1 open space and 44% in Type 1, 2, or 3 open space (**Table 5-17**).

The Implementing Entity will target acquisition of streams that currently have, or historically had, perennial flows and cobblestone substrate (LAND-R5) along with intermittent and ephemeral streams that connect to those perennial streams. A recent study in Tehama County has revealed that foothill yellow-legged frogs utilize perennial systems primarily but also use associated intermittent and ephemeral streams within the same watershed (Bourque 2008). These stream reaches will be located along:

- Uvas/Carnadero Creek above Uvas Reservoir,
- small creeks above Calero Reservoir,
- Alamitos and Guadalupe Creeks upstream and outside of urban San José,
- Llagas Creek above Chesbro Reservoir,
- San Felipe Creek, above Anderson Reservoir,
- Uvas Creek below Uvas Reservoir,
- Little Arthur Creek,
- Upper Penitencia Creek.

Occupied habitat for foothill yellow-legged frog will be protected in the Reserve System in at least four of the watersheds in **Figure 3-6**, in both the Diablo Range and in the Santa Cruz Mountains (as described in the Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Acquisition of Occupied Habitat for Select Wildlife Species*). The Reserve System is expected to protect at least four known occurrences of the species, three on Llagas Creek above Chesbro Reservoir, and one on San Felipe Creek above Anderson Reservoir. Additional occurrences may be found in the Reserve System on Upper Penitencia Creek, Uvas Creek below Uvas Reservoir, and Little Arthur Creek due to their proximity to known occurrences in the same stream systems and the lack of survey effort for the species in those areas. To achieve the biological goal for the foothill yellow-legged frog, acquisition of streams will be prioritized by:
(1) sites with documented records of breeding foothill yellow-legged frog,
(2) sites with known occurrences, though not necessarily breeding, and (3) sites without known occurrences of foothill yellow-legged frogs but with pond turtle habitat and known occurrences of other covered amphibian species.

The Implementing Entity will restore a minimum of 1 mile of stream to support breeding yellow-legged frogs, breeding California red-legged frogs, and/or foraging/basking western pond turtles regardless of the level of impact (**Table 5-13**). Up to 10.4 miles of stream will be restored if all estimated impacts occur (**Table 5-13**). This could include the perennial stream reaches mentioned above. For foothill yellow-legged frogs this restoration will involve adding sufficient sediment to stream courses so that sand bars will form to create egg laying substrate, or adding large rocks to the stream course for the same purpose. Management will include selectively applying herbicides or other treatments to

control nonnative invasive vegetation along creek corridors (LM-14) that might inhibit sediment movement and restrict the creation of egg laying habitat.

Management Techniques and Tools

Foothill yellow-legged frogs require streams with fast moving water and cobblestone substrate. Channel rehabilitation will increase the amount of this type of habitat that is available in the study area. The Implementing Entity will replace concrete, earthen or other engineered channels to restore floodplain connectivity (STREAM-4, STREAM-5). This gives the frog some areas of slower flow or other a natural habitats adjacent to the stream, in which to take refuge during high water. It also allows the streams to form gravel bars, behind which this species often lays eggs. To further enhance these rehabilitated channels the Implementing Entity will plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature (STREAM-2). This can be done in other reaches as well, where there is an unnatural void in riparian vegetation. In all streams mentioned above there will be opportunities to increase the amount of cobblestone substrate by actually adding rocky substrate to the stream channel (STREAM-8). Gravel augmentation will avoid the breeding season. This management action will be applied to areas close to known occurrence(s) of foothill yellow-legged frog or immediately upstream or downstream of known occurrences or other high quality foothill yellow-legged frog breeding habitat.

The Implementing Entity may utilize translocation of foothill yellow-legged frog to help establish new populations in the study area. This activity will only be undertaken with the approval of the Wildlife Agencies, and when biologically appropriate and necessary to meet biological goals and objectives of the Plan.

Threats and Uncertainties

The biggest threat to foothill yellow-legged frog is continued alteration of the hydroperiod of streams within the study area. Managing for this species downstream of reservoirs in northern watersheds is difficult because flows are controlled as part of a water delivery system to the City of San José. Restoration and management efforts will always be subject to whether there is enough water to support perennial flows in these watersheds. In the southern watershed there are fewer limitations on how and when the water is released out of reservoirs. Still managing riverine systems downstream of reservoirs is not a guaranteed solution every year. Augmenting streams with cobblestone substrate to increase the amount of breeding habitat for this species is a short-term solution unless accompanied by complimentary land management practices upstream that can sustain the flows and sediment delivery. If there are uncontrolled sources of sediment upstream then the habitat quality will continue to be diminished, eggs could be silted in, or egg laying habitat could be removed as the stream changes course in reaction to high sediment deposition. If the stream is not in a relatively

natural condition then flows during high water events will continue to degrade the habitat even after cobblestone substrate is added.

Global climate change could impact this species through changes in the amount of precipitation and therefore the amount of surface water in occupied streams. Areas that receive less rainfall will support less high-quality habitat for foothill yellow-legged frog in the future. One benefit of the Reserve System is that species will have more ability to move away from areas that are less suitable and into areas that are more suitable over the long-term. Protecting small, isolated breeding locations for this species might not adequately protect the species over the long term if rainfall patterns change stream hydrology.

Watersheds with a high level of agricultural production were associated with the decline of the species, due to airborne agro-chemicals (Lind 2005). In general, the Reserve System is far from agricultural production that uses pesticides, raising the chance of achieving the biological goals and objectives for this species.

5.4.5 Western Pond Turtle

Biological Goals and Objectives

The Implementing Entity will support viable populations and contribute to the regional recovery of the western pond turtle by maintaining or increasing the number of individuals and expanding the distribution of this species within the Reserve System. This will be accomplished by protecting land through fee title purchase or by obtaining easements that are managed as part of the Reserve System. Within the Reserve System the amount and quality of western pond turtle habitat will be increased and improved through restoration, enhancement, and creation of basking habitat and breeding sites. Acquisition, enhancement, and restoration/creation conservation actions identified for grasslands (see Section 5.3.3 *Grassland Conservation and Management*), chaparral and coastal scrub (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*), oak woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*), riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*), and wetlands and ponds (see Section 5.3.7 *Wetland and Pond Conservation and Management*) will benefit western pond turtle through movement, breeding, foraging and year-round habitat conservation and management.

Habitat Acquisition, Restoration, and Creation

There are 314,916 acres of western pond turtle modeled habitat (primary and secondary) within the study area. A total of 98,060 acres (31%) of that modeled habitat are located in Type 1, 2, or 3 open space with 44,967 acres (14%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 27,000 acres of modeled habitat for the Reserve System. In

addition, 11,900 acres of modeled habitat will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of protected modeled habitat in the study area to about 27% in Type 1 open space and about 40% in Type 1, 2, or 3 open space (**Table 5-17**).

The Implementing Entity will protect, through acquisition or easement, and enhance a minimum of 50 acres of ponds, 10 acres perennial freshwater wetlands, and 100 miles of stream that either support or have the potential to support covered aquatic species, including western pond turtle. Up to 104 acres of ponds and 50 acres of perennial freshwater wetlands will be protected and enhanced if all estimated impacts (LAND-WP2a, LAND-WP2b, LAND-WP3a, LAND-WP3b, LAND-WP6a, LAND-WP6b). To achieve the biological goal for the western pond turtle, acquisition of wetlands, ponds, and streams will be prioritized by: (1) sites with documented records of breeding western pond turtles, (2) sites with known occurrences, though not necessarily breeding, and (3) sites without known occurrences of western pond turtle but with pond turtle habitat and known occurrences of other covered species. Most of the land acquisition that will benefit western pond turtle will occur along the Pacheco Creek riparian corridor and between Henry W. Coe State Park and the Soap Lake region of San Benito County. Additional acquisitions west of Chesbro reservoir and west and east of Calero Reservoir will also benefit this species, where both ponds will be acquired as well as perennial reaches of streams.

During the course of Plan implementation, the Implementing Entity will protect and enhance a minimum of 100 miles of streams and 250 acres of riparian forest and scrub to benefit aquatic covered species and least Bell's vireo. Up to 592 acres of riparian forest and scrub (including California alluvial sycamore woodland) will be protected and enhanced if all estimated impacts occur. In addition, a minimum of 1 mile of stream and 50 acres of riparian forest and scrub (including California alluvial sycamore woodland) will be restored. Up to 10.4 miles of streams and 353 acres of riparian forest and scrub will be restored if all estimated impacts occur (STREAM-4, STREAM-5).

Ponds that are lost to covered activities will be created at a ratio of 1:1 (estimated at 52 acres) within the Reserve System in (POND-10) (**Table 5-12**). In addition, the Implementing Entity will create a minimum of 20 acres of new ponds at approximately 40 locations to create new breeding opportunities for aquatic covered species and tri-colored blackbird (POND-9). The intent of these new ponds is to contribute to the recovery of the species beyond the replacement of pond habitat lost to covered activities.

By the time the Reserve System is fully acquired (which will be at or before Year 45), a minimum of 25% of all ponds and wetlands in the Reserve System will be or will have been occupied by western pond turtle, as described in the Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Acquisition of Occupied Habitat for Select Wildlife Species*. By Year 30, at least 20% of all ponds and wetlands will be occupied or will have been occupied by the species.

Management Techniques and Tools

For a detailed discussion of the management techniques that will be implemented to increase the quality and quantity of western pond turtle habitat within the study area refer to Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation Management* and Section 5.3.7 *Wetland and Pond Conservation Management*.

In addition, the Implementing Entity will install artificial basking substrate and add woody debris to ponds that otherwise lack suitable basking sites to enhance habitat for western pond turtles (POND-2). Woody debris and artificial basking substrate enhance habitat by providing areas for turtles to thermoregulate, an essential biological function. Basking platforms might also be used when natural debris in not suitable. Basking platforms differ from woody debris in that they can be anchored, are durable, and will not be submerged by rising water levels. The basking platforms and added woody debris will also facilitate species-level monitoring by providing a consistent and stable point at which to count pond turtles. Populations of nonnative competitors such as red-eared sliders will also be reduced (Objective 19.3).

The Implementing Entity may utilize translocation of western pond turtle to help establish new populations in the study area. This activity will only be undertaken with the approval of the Wildlife Agencies, and when biologically appropriate and necessary to meet biological goals and objectives of the Plan.

Threats and Uncertainties

A lack of nesting sites is likely the limiting factor for this species in the study area. Identifying and protecting potential nesting habitat is important to ensure recruitment of juveniles into the population (STUDIES-9). In order to accomplish that, the Implementing Entity will focus on protecting buffers around aquatic habitats that might support nesting pond turtles. That in turn should increase the productivity of this species during the permit term, though there is some uncertainty that an increase in productivity will occur. Continued alteration of streams and wetlands and continued disconnection of streams and their floodplains is the greatest threat to pond turtles. Adequate time will be given to determine whether newly created habitat is successfully replacing habitat that is lost to covered activities.

5.4.6 Western Burrowing Owl

A complete conservation strategy for western burrowing owl, including background information, conservation region descriptions, and expanded biological goals and objectives discussion, is provided as **Appendix M**, *Western Burrowing Owl Conservation Strategy*. A summary of this strategy is provided below. Because of the unique nature of the conservation strategy for this species,

this section is organized differently than the rest of the covered species sections in this chapter.

Background

Nesting burrowing owls in the greater San Francisco Bay Area, and the South Bay area in particular, are a dwindling resource. In the early 1990s there were an estimated 150–170 breeding pairs in the San Francisco Bay Area (DeSante and Ruhlen 1995; DeSante et al. 1993). It was estimated that these numbers represented a 53% decline from the previous census period of 1986–1990 (DeSante et al. 1997) and more recent numbers indicate that, if anything, the downward trend is increasing. In those estimates it was assumed that 75% of the San Francisco Bay Area burrowing owl population occurred in Santa Clara County and nearly all of those owls were congregated around the southern edge of the San Francisco Bay (DeSante et al. 1997). Surveys in the early 1990s revealed that about a third (43–47 pairs) of Santa Clara County breeding pairs occurred inside what is now the Santa Clara Valley Habitat Plan study area (Albion Environmental Inc. 2000).

Overview of Burrowing Owl Conservation Strategy

The Plan proposes to undertake an aggressive suite of measures aimed at reversing the declining trend of the burrowing owl population in Santa Clara County. The goal of the Plan is to establish a burrowing owl population in the study area and the expanded study area (**Figure 5-10**) that is first stable, then increasing over time, while accounting for normal fluctuations in population levels. The general approach will be to increase the numbers, distribution, and connectivity of burrowing owl colonies in the permit area. This will be accomplished by using a phased conservation approach, initially focusing efforts on areas within immediate flight distance from known colonies while gathering data to inform future efforts. Later phases, triggered as more resources are available and in response to initial results, will focus on lands further out to allow for growth in both numbers and range. Initial techniques will include data gathering and analysis to inform management decisions, utilizing current best management practices, testing newly proposed management techniques through pilot scientific studies, acquisition of existing and potential breeding and foraging areas, management (both permanent and temporary agreements) of burrowing owl habitat and, and population augmentation.

These measures will be applied in four burrowing owl conservation regions: North San José/Baylands, South San José, Morgan Hill, and Gilroy (**Figure 5-10**). Opportunities to conduct meaningful burrowing owl conservation inside the Habitat Plan study area are limited because the most effective conservation measures must take place in near proximity to the remaining burrowing owl occurrences. Since those occurrences are clustered around the southern part of the Bay and northern San José, there is little unused land available and that which is not built on has high land values. As a result the conservation focus for

burrowing owls was expanded to include the entire Baylands region, in addition to the Habitat Plan study area (**Figure 5-10**).

Acquisition and permanent protection of land is generally infeasible in the areas most valuable for this species because of the limited availability of land and its high cost. What land is available and likely most suitable for the species is already publically owned. Therefore, to ensure enhanced management on sites to support the species and meet population growth goals, the Implementing Entity will either acquire in fee title, secure conservation easements, or secure management agreements. At least initially, limited burrowing owl habitat acquisition and/or management will occur along the southern edge of the study area and more limited conservation activities will occur in the two middle regions because of the current lack of occupied nesting burrowing owl colonies in these areas (**Figure 5-10**). If conservation actions in the North San José/Baylands region prove successful, it is reasonable to assume the nesting burrowing owl population will expand into suitable habitat in the South San José, Morgan Hill, and Gilroy regions. Management of overwintering habitat will also occur in the Reserve System.

Conservation targets for western burrowing owl that are based on habitat availability (similar to what was done for other covered wildlife species) are likely to be inadequate to ensure population recovery in the study area because of the relatively low existing population size. Instead, conservation targets for population size were developed. These population targets were then used to develop targets for the amount of habitat needed to support that population.

To determine the population target needed for burrowing owls in the Plan, a count-based population viability analysis (PVA) was used. This analysis was used to determine the probability of persistence of three burrowing owl nest colonies in the South Bay. This analysis was performed on the three largest remaining burrowing owl colonies in the South Bay Area (Moffett Airfield, San José International Airport, and Shoreline at Mountain View) using survey data of adult burrowing owls from the 11-year period of 1999–2009. These sites were chosen because they are the primary remaining population clusters and because data was available for the period of time recommended for the analysis (i.e., at least 10 years). The intent of the analysis was to quantify population size, trend, growth rate, and variance in the three burrowing owl colonies and to evaluate the probability of persistence of these colonies (individually and combined) during that 11-year period. It was assumed that the population performance at these three sites can be used as an index for population performance for burrowing owls in the Habitat Plan study area.

In order to develop a burrowing owl population size goal for the Habitat Plan, the annual population size of adult owls was artificially increased in a statistical model to determine the rate at which the numbers of adult burrowing owls at the three baseline colonies (San José International Airport, Moffett and Shoreline) would need to increase and over what period of time to change the PVA probability of extinction trend from a negative growth rate to a positive growth rate. It was determined that if currently measured population characteristics held true (i.e., growth rate and variance were constant) changing the overall number of

adult burrowing owls in this type of model did not change the probability of persistence significantly (**Appendix N**). Instead, increasing the change of population persistence was best achieved by a steady increase in the number of adult burrowing owls. Therefore, for the purposes of this Plan, growth rate is a more correct predictor of persistence than an ultimate population size.

During 2009, there were 51 adult burrowing owls observed at the three reference nest colonies. Based on these numbers and the PVA, it was determined that in order to change the population trend in the South Bay from negative to positive within a 10-year time period, there would have to be an increase of three adult owls per year. A period of at least 10 years is also needed to allow time for collection of data at occupied nest sites in the permit area and integration of that data into the PVA model. To account for these factors and to provide additional time to achieve the population targets, the Plan has a goal to achieve a positive growth rate in the burrowing owl population in South Bay Population by Year 15.

The total population of burrowing owls in the South Bay is estimated at 70 adults (51 adults at the three reference sites plus 19 adults observed in 2008 in other parts of the study area). If three burrowing owls were recruited to the population every year for the permit term, an additional 150 adults would be added, for a total population size of 220 adults. The Habitat Plan would be responsible for 70% of this population growth (154 adults at the end of the permit term) based on its proportion of the South Bay and burrowing owl population. This equates to a land management need of 5,300 acres of occupied or potential nesting habitat (see **Appendix M** for calculations) in the permit area. Of the 5,300 acres, a minimum of 600 acres of occupied nesting habitat will be protected in fee title or conservation easement. Similar to the conservation strategy for other covered species, these lands will be under permanent management agreements administered by the Implementing Entity no later than Year 45. The Plan also provides a species-specific Stay-Ahead provision for the burrowing owl (see Section 8.6.1). Priority will be given towards management on occupied habitat (**Figure 5-11**), followed by potential nesting habitat (see Chapter 4, Section 4.6.4 *Western Burrowing Owl* for habitat definitions).

Specific burrowing owl conservation actions that would occur on the 5,300 acres of occupied and potential nesting habitat are grouped into three "tiers" of priority:

- **Tier 1 conservation actions** are designed to stabilize the existing population by protecting and/or managing occupied burrowing owl nesting habitat. Tier 1 actions may indirectly increase the numbers of owls in extant colonies. Tier 1 conservation actions will take place initially in the North San José/Baylands Region where owls currently occur. Tier 1 conservation actions will occur immediately upon Plan implementation.
- **Tier 2 conservation actions** are designed to facilitate growth and expansion of existing colonies, the number of colonies, and the range of the species in the permit area by managing potential burrowing owl nesting habitat in all portions of the permit area. Tier 2 conservation actions will also take place

immediately and will initially be implemented in the North San José/Baylands Region where owls currently occur.

- **Tier 3 conservation actions** consist of more experimental and active methodologies such as population augmentation and owl relocation within the permit area to increase owl numbers and expand distribution. Tier 3 actions will be implemented in response to population performance at the three index sites (Shoreline Park in Mountain View, San José International Airport, and Moffett Federal Airfield) but these actions could occur in any of the burrowing owl conservation regions. These actions will be coordinated with the Wildlife Agencies and will only be implemented upon their approval. Upon approval, these actions could occur immediately upon implementation of the Plan and are not dependent upon the grant awards.

Appendix M describes the specific conservation actions proposed for the western burrowing owl conservation strategy. Examples include:

- Protect existing colonies through fee title acquisition, purchase of a conservation easement, or management agreements (Tier 1).
- Increase survival rates at existing nest colonies through focused management actions (Tier 1).
- Survey all undeveloped parcels within 7.5-miles of documented nest colonies and complete an opportunities and constraints assessment of each for the potential of the site to function as a burrowing owl reserve (Tier 2).
- Employ population augmentation techniques to increase the local population size (Tier 3).

Biological Goals and Objectives

The Implementing Entity will work to increase the size and sustainability of the breeding and overwintering burrowing owl population and increase the distribution of breeding and overwintering burrowing owls in the permit area (**Figure 5-10**). This goal will be met by achieving a positive growth rate by Year 15 of the Plan using annual data for the San José International Airport, Moffett and Shoreline colonies or other colonies formed in the permit area. This will be accomplished by protecting land on the valley floor and in the Diablo Range in fee title purchase or by obtaining easements as part of the Reserve System, or through management agreements. Target areas will include modeled overwintering only, occupied nesting, and potential nesting habitat (LAND-G6, G7, and G8). As a result, nesting habitat will be protected or managed within four distinct geographical regions: North San José /Baylands, Gilroy, Morgan Hill, and South San José (**Figure 5-11**).

All sites protected within the Reserve System and on lands where management agreements exist will be enhanced to encourage the expansion of burrowing owls (GRASS-5, 6, 8, and 9). Acquisition, enhancement, and restoration conservation actions identified for grasslands (see Section 5.3.3 *Grassland Conservation and Management*), valley oak woodlands (see Section 5.3.5 *Oak and Conifer*

Woodland Conservation and Management), and seasonal wetlands (see Section 5.3.7 *Wetland and Pond Conservation and Management*) are intended to benefit western burrowing owl through breeding and foraging habitat conservation and management.

Habitat Acquisition and Enhancement

As indicated above, the Implementing Entity will manage a minimum of 5,300 acres for the western burrowing owl nesting habitat (occupied and potential) by Year 45. Of this acreage, a minimum of 600 acres of occupied nesting habitat must be protected in fee title or conservation easement in accordance to the rough proportionality provision for the burrowing owl, described in Section 8.6.1. For the remaining 4,700 acres, land acquisition (fee title or easement) or management agreements may be used. The Implementing Entity will prioritize land acquisition over management agreements. All 5,300 acres of western burrowing owl nesting habitat will be acquired or under a permanent management agreement by Year 45.

The 5,300 acres will include burrowing owl nesting habitat within 5 miles of the San José water Pollution Control Plant bufferlands, north of Highway 237 (LAND-G6) and burrowing owl nesting habitat within 5 miles of the San José International Airport or other important northern San José breeding sites (LAND-G7). Because the North San José/Baylands region is the most important for burrowing owl conservation and has the most conservation opportunities, a goal is set for 70% (3,700 acres) of the total land management commitment occurring in that region and the expanded permit area. Further, a recommended 15% (800 acres) of the total land managed would occur in the Gilroy region. The remaining 15% should remain flexible and could occur in any of the regions, but it is assumed that 5% (270 acres) occur in the South San José region and 10% (530 acres) occur in the Morgan Hill region.

Management agreements may be used in place of land acquisition on up to 4,700 acres, if the specified regional targets cannot be met through land acquisition. During the permit term, temporary management agreements may be put into place rather than permanent management agreements. Temporary management agreements (e.g., 10–20 year agreements as opposed to agreements in perpetuity) may be used to protect nesting habitat on areas not immediately planned for development as long as the amount of land permanently protected in fee title or conservation easement is consistent with the Stay-Ahead provision (Chapter 8, Section 8.6.1 *Stay-Ahead Provision*, subheading *Rough Proportionality and Stay-Ahead for the Burrowing Owl Conservation Strategy*). By Year 45 of the permit term, all management agreements must be permanent.

The management agreements must be legally binding documents to which the Wildlife Agencies are parties. Their establishment will follow a process similar to land acquisition described in Chapter 8, Section 8.6 *Land Acquisition*. The management agreements will be consistent with the land acquisition process; however, the Implementing Entity would work with the land owner to establish the management agreement rather than acquiring the land in fee title or with a

conservation easement. The duration and management requirements will be agreed upon by all parties and specified in the management agreement document. For the permanent management agreements, management must be assured in perpetuity. For temporary management agreements, management must be assured for the duration of the agreement. As parties to the management agreements, the Wildlife Agencies will have review and approval authority.

Although the Implementing will protect and/or manage a minimum of 5,300 acres no later than Year 45 of the permit term, the preliminary goals described above regarding the distribution of these lands in the amongst the burrowing owl conservation zones may shift during the permit term upon close coordination with the Wildlife Agencies. However, the total amount of lands managed for the burrowing owl will be maintained or increase until the goals of the Plan are achieved. In other words, parcels where management for burrowing owls is discontinued need to be replaced prior to discontinuation of management with parcels of equal or better habitat value and size. The Implementing Entity will track management agreements to ensure the amount of managed lands for the burrowing owl at no time decrease during the permit term.

To ensure the burrowing owl conservation strategy's progress, the Implementing Entity will confer with the Wildlife Agencies no later than Year 15 to assess how well the strategy is meeting its intended purpose. This coordination will be in addition to the annual reporting described in Chapter 8. If it becomes evident that portions of the burrowing owl strategy will not be feasible, a Plan amendment, as described in Chapter 10, may be necessary.

In addition to managing 5,300 acres of occupied and potential nesting habitat, the Implementing Entity will also protect, through fee title or easement, modeled overwintering habitat. There are 132,770 acres of western burrowing owl overwintering modeled habitat within the permit area. A total of 28,517 acres (21%) of that modeled habitat are located in Type 1, 2, or 3 open space with 12,584 acres (9%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 17,000 acres of modeled overwintering habitat for the Reserve System. In addition, 4,310 acres of modeled habitat will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of protected overwintering habitat in the permit area to 26% in Type 1 open space and about 34% in Type 1, 2, or 3 open space (**Table 5-17**).

Modeled overwintering habitat for western burrowing owl will be permanently preserved, managed, and enhanced throughout the Reserve System in all major watersheds in the permit area. Overwintering habitat will be protected in low elevation grassland valleys in the Diablo Range that currently support California ground squirrels, have supported California ground squirrels since 1997, or are adjacent to lands with existing California ground squirrel colonies (LAND-G8). Low elevation valleys within the Reserve System that are located on the valley floor or in the Diablo Range will be managed to benefit nesting and overwintering burrowing owls. Some locations on the southern edges of the City of San José could support burrowing owls in the future. In addition, several acres will be acquired in the southern part of the permit area in the Pescadero

watershed that could be converted to annual grassland and managed for western burrowing owls. Nearly all land acquisition in areas dominated by annual grassland has the potential to benefit overwintering owls. Most of that land acquisition will occur along Coyote Ridge, west of Chesbro Reservoir, west and east of Calero Reservoir, and between Henry W. Coe State Park and the San Benito County line. This land acquisition has been primarily targeted for other covered species but will have incidental conservation benefit for western burrowing owls, especially during the winter months.

Land that is acquired through fee title purchase or easement to meet biological goals and objectives for burrowing owl occupied nesting and overwintering habitat in the permit area will be selected using the reserve design principles described in Chapter 5. Lands acquired and/or managed for burrowing owl nesting habitat will also meet the following criteria.

Location Criteria

When identifying and acquiring the 600 acres for permanent protection and enrollment into the Reserve System, the Implementing Entity will use the following guidelines.

1. The Implementing Entity will preferentially select a parcel that is inside of the Habitat Plan study area over a parcel that is inside of the expanded study area for burrowing owl conservation.
2. The Implementing Entity will preferentially select parcels that are closer (i.e., within 0.5 mile) to documented nest locations over those that are farther away.
3. Parcels that do not meet criteria 2 (above) may be considered on a case-by-case basis to allow the Implementing Entity to take advantage of opportunities that better fit the conservation strategy[32].

Habitat Criteria

The 600 acres of occupied nesting habitat acquired for the Reserve System must have the following:

1. Documented nesting burrowing owls on the parcel in at least one of the previous 3 years. Parcels that are currently occupied should be selected first, followed by parcels that have been occupied in the previous 3 three years.
2. Be surrounded by at least 140 acres of foraging habitat within 0.5 mile of a nest site (including the parcel where nesting was documented). If there is no potential for foraging habitat to be protected through future acquisition, conservation easement, or management agreement, the nest site should not be

[32] It is not the intent of the burrowing owl conservation strategy to permanently protect or permanently manage lands in urban areas that are anticipated to be developed (e.g., the North First Street area of San José).

acquired unless long-term viability of the site can be in some other way demonstrated.

3. Currently supports ground squirrels or is located adjacent to another parcel with ground squirrels.
4. Currently support grassland, barren, or other land cover types that can be managed or modified to enhance the site to increase the habitat quality for burrowing owls.

Management Techniques and Tools

The general principles for grassland management will be followed in all grassland or barren areas (Section 5.3.3, *Grassland Conservation and Management*). Management techniques may include any or all of those outlined in Section 5.3.3 *Grassland Conservation and Management*, and those that will be most beneficial to burrowing owls are grazing and mowing. See **Appendix M** for more details on management techniques and tools for western burrowing owl.

Uncertainties and Threats

Urbanization has been a threat to western burrowing owls in the South Bay Area for many years and as suitable habitat is developed that threat remains. All of the remaining nesting locations are very near urban development and are located on vacant lands that either have a high potential to be developed in the future, or are managed for purposes other than burrowing owl (e.g., airports). As such, nesting habitat will be subject to many threats typically associated with urban areas, feral cats, pets, commensally wildlife (e.g., skunks, raccoons), and disturbance from humans. Because many of the conservation actions will occur in proximity to urban areas, these threats will continue.

Because population numbers are so low and the number of nesting locations is less than 10, the PVA in this Plan (**Appendix N**) has demonstrated that there is considerable danger of the local population going extinct. While the conservation strategy is designed to reverse this trend, there is uncertainty in its likelihood of success. The success of the strategy is contingent on the remaining colonies being viable over the long term through protection and improved management. This strategy must also be implemented over a shorter time period than for other covered species in order to be successful. This time constraint creates additional uncertainty.

5.4.7 Least Bell's Vireo

Biological Goals and Objectives

The Implementing Entity will work to facilitate the expansion of breeding least Bell's vireos into the study area and increase reproductive success of the bird. This will be done by acquiring and restoring riparian woodland and forest with an open canopy and understory of willows. Acquisition, enhancement, and restoration conservation actions identified for riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*) will benefit least Bell's vireo through breeding and foraging habitat conservation and management.

Habitat Acquisition, Restoration, and Enhancement

There are 3,097 acres of primary least Bell's vireo modeled habitat in the study area. A total of 330 acres (11%) of modeled habitat are located on Type 1, 2, or 3 open space with 65 acres (2%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 460 acres of least Bell's vireo primary modeled habitat (as described in **Appendix D**) for the Reserve System (**Table 5-17**). In addition, 2 acres of primary modeled habitat will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of protected modeled habitat in the study area to about 17% in Type 1 open space and 26% in Type 1, 2, or 3 open space (**Table 5-17**).

Least bell's vireo primary modeled habitat is defined as willow and mixed riparian forest and scrub, including California sycamore alluvial woodland, in the Uvas, Llagas, Pacheco, and Pajaro watersheds in south Santa Clara County (see **Appendix D**). Riparian land cover types preserved in these watersheds will meet the commitment to acquire 460 acres of least Bell's vireo modeled habitat (**Table 5-17**). Least Bell's vireo acquisition will focus on specific areas within each designated watershed based on historic occurrence information and known range.

In the Pacheco watershed protection will be focused along Pacheco Creek, including the confluence of Little Pacheco Creek and Pacheco Creek. Acquisitions and easements along Uvas Creek will be focused above Uvas Reservoir and intermittently along the creek as it flows southeast to the Pajaro River. Acquisition along lower Uvas-Carnadero Creek will benefit the least Bell's vireo. The only nesting occurrence of least Bell's vireo in Santa Clara County in the last 40-years was along lower Llagas Creek.

The Implementing Entity will focus first on protection of riparian corridors that either have existing nesting habitat for the least Bell's vireo or have the potential to be restored to a riparian condition in the short term. Specific areas of acquisition commitments are listed below.

- 1.6-mile extension of the Uvas Creek Park Preserve upstream to the Hecker Pass Highway (LAND-R1).
- 2.0 miles along the main stem of Pacheco Creek that are in Santa Clara County between Pacheco Lake and San Felipe Lake (LAND-R1).

Additional protection and restoration of riparian corridors in south County watersheds are expected to benefit least Bell's vireo. Similarly, protection and restoration of riparian woodland on Coyote Creek may also benefit least Bell's vireo if that species expands its range to the north into the Coyote Creek watershed. Riparian restoration planned on Coyote Creek under the proposed Three Creeks HCP is likely to count towards Habitat Plan requirements and has potential to benefit this species.

In addition to habitat acquisition into the Reserve System, the Implementing Entity will also restore or create a minimum of 50 acres of willow riparian forest and scrub or mixed riparian forest and woodland to contribute to natural community recovery (**Table 5-12**). If all allowable impacts occur, the Implementing Entity would restore these land cover types at a ratio of 1:1 (an additional 289 acres), for a maximum of 339 acres of restoration or creation. Most of this restoration would occur in south Santa Clara County due to the greater restoration opportunities there. Therefore, most of the 50–289 acres of riparian restoration would create additional foraging and nesting habitat for least Bell's vireo.

Management Techniques and Tools

Several riparian restoration and enhancement techniques will increase the amount and quality of nesting and foraging habitat for least Bell's vireo. In general, returning riverine systems to a more natural condition (i.e., flow and function) will maintain an array of successional stages for riparian vegetation in associated riparian corridors. This in turn will increase the total acreage of nesting habitat available for least Bell's vireo at any given time. In many cases these restoration efforts will constitute replacing concrete channels, to restore geomorphic and ecological functions to stream reaches that currently do not provide those functions (STREAM-4). Channels that are not necessarily concrete but that are similarly confined will also be replaced, to restore floodplain benches and commensurate functions within stream reaches that currently do not provide those functions (STREAM-5). Specific stream and riparian conservation and management goals, objectives, and actions are discussed above (Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*), but they are reiterated below.

In order to provide structural heterogeneity the Implementing Entity will plant and/or seed in native understory and overstory riparian vegetation in riparian restoration sites (STREAM-2). In most cases planting or seeding will occur in existing gaps in native riparian vegetation to promote continuity of riparian corridors (STREAM-3). This will ensure that there are various successional stages along these corridors, rather than a corridor that is dominated by mature

trees. In a natural setting vegetation succession is controlled by natural events like scouring floods and fires. Absent those events, succession is not interrupted and mature trees dominate the community while early successional vegetation is lost. Without early successional vegetation in a riparian community, species like the least Bell's vireo will not occur. In order to retain some level of all successional stages of vegetation within a riparian community, activities that mimic natural physical processes, such as girdling trees, will be implemented to encourage early successional vegetation to grow (STREAM-5).

A brown-headed cowbird management program will be implemented if least Bell's vireos become regular nesters in the study area (>3 nests over at least two consecutive years) and brown-headed cowbird eggs are discovered in vireo nests (STREAM-7). The monitoring and management program will be implemented consistent with guidelines of the North American Cowbird Advisory Council, or the best scientific information available at the time, and with oversight from CDFG and USFWS. If other predators are shown to adversely affect the nest success of vireo's (e.g., feral cats, raccoons, skunks), additional predator control may be necessary (LM-13). If monitoring shows that cowbirds are not reducing the nest success of vireos then the cowbird management program will be terminated.

Uncertainties and Threats

An ongoing threat to songbird breeding success is the brown-headed cowbird. This brood parasite reduces the total number of young produced per breeding songbird pair and lowers the overall success rate for the population. Attempts to control brown-headed cowbirds through trapping or shooting have shown short-term benefits to riparian songbird species, including the Bell's vireo. Implementation of a brown-headed cowbird control program was discussed above.

5.4.8 Tricolored Blackbird

Biological Goals and Objectives

The Implementing Entity will work to increase the population size of tricolored blackbird in the study area. This will be accomplished by protecting at least four sites that support, historically supported, or could support tricolored blackbird colonies. Each protected site will have at least 2 acres of breeding (marsh) habitat and will have at least 200 acres of foraging habitat within 2 miles. These breeding sites will either be enhanced or restored breeding habitat in historically/currently occupied areas within the Reserve System or newly created ponds suitable for breeding tricolored blackbirds. Acquisition, enhancement, and restoration/creation conservation actions identified for grasslands (see Section 5.3.3 *Grassland Conservation and Management*), valley oak woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*), riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and*

Scrub Conservation and Management), and wetlands and ponds (see Section 5.3.7 *Wetland and Pond Conservation and Management*) will benefit tricolored blackbird through breeding, foraging, and year-round habitat conservation and management.

Acquisition, Restoration, and Creation

There are 140,291 acres of tricolored blackbird modeled habitat within the study area. A total of 29,435 acres (21%) of that habitat are located in Type 1, 2, or 3 open space with 11,037 acres (8%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 19,000 acres of modeled primary and secondary habitat for the Reserve System. In addition, 3,840 acres of modeled primary and secondary habitat will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of modeled habitat in the study area to about 24% in Type 1 open space and 35% Type 1, 2, or 3 open space (**Table 5-17**).

As part of the preservation acreages above, the Implementing Entity will acquire 5 acres of modeled breeding habitat within dry land farming or ranching complexes in Coyote Valley and the Diablo Hills (LAND-WP8). A high priority will be given to currently occupied sites or sites that have been occupied since 1997. Additional preference will be given to historic breeding sites that could be restored. Land acquisition to benefit tricolored blackbird will occur in the areas between Henry W. Coe State Park and San Felipe Lake in San Benito County. Historically San Benito Lake has supported nesting tricolored blackbirds so protection of modeled breeding and foraging habitat near there will benefit the species over the long term. Additional protection in the Pescadero and Tar Creek watersheds southwest of Gilroy will simultaneously protect modeled nesting habitat and adjacent foraging habitat near two historic occurrences. There are also areas that will be protected along the Pacheco Creek corridor where there is modeled breeding habitat surrounded by agricultural lands or annual grasslands, which provide the necessary breeding and foraging habitat combination. Additional modeled habitat will be preserved, enhanced, and monitored west and south of Chesbro Reservoir.

In order to ensure adequate breeding and foraging habitat is available for future breeding colonies the Implementing Entity will offer financial incentives to private landowners to enhance pond and marsh habitat to suit breeding tricolored blackbirds and to modify farming or ranching techniques to ensure that dry-land farming and ranching activities are executed in a way that is compatible with nesting and foraging tricolored blackbirds (POND-14, POND-15). The Implementing Entity will help landowners apply for existing grants (e.g., North American Wetlands Conservation Act Small Grants Program [USFWS], or Environmental Quality Incentives Program of the Farm Bill [USDA Natural Resources Conservation Service]) as well as provide supplemental funds in the event that grants are unsuccessful. In addition, the Implementing Entity will ensure that there is at least 200 acres of permanently protected modeled foraging habitat within 2-miles of tricolored blackbird breeding sites protected under the Plan (LAND-WP9). If there is not adequate modeled foraging habitat available

in existing Type 1 open space within 2 miles of breeding sites protected under the Plan, the difference in acreage, up to 200 acres per breeding site, will be protected through acquisition or easement within 2 miles of each breeding site.

In addition to protecting new breeding habitat the Implementing Entity will also restore freshwater marsh that will support dense reed-like vegetation (cattails) or other native vegetation (nettles) that will attract nesting tricolored blackbirds (POND-16). Each of these areas will include at least 2 acres of breeding habitat surrounded by sufficient foraging habitat. Of the 20 acres of newly created ponds within the permit area (POND-10), and the estimated 52 acres of ponds to mitigate for the loss of ponds to covered activities, those surrounded by suitable tricolored blackbird foraging habitat will be managed to support dense-reed like vegetation adequate for tricolored blackbird nesting.

In areas with nonnative vegetation (e.g., Himalayan blackberry) that supports existing tricolored blackbird colonies, the Implementing Entity will initiate a gradual (3–4-year) transition from nonnative vegetation to native vegetation that is structurally similar (POND-17). This would only be implemented if the USFWS and CDFG determined that the colony was large enough and stable enough to accommodate the change. In most cases the vegetation would not be altered unless the colony was abandoned for at least three breeding seasons. In riparian areas, constrained channels will be replaced with more natural channels to restore geomorphic and ecological functions to stream reaches that currently do not provide those functions (STREAM-4). This will ensure that a variety of successional stages are supported within riparian corridors, including side channels and benches where slower water supports marsh-like vegetation.

Management Techniques and Tools

The management techniques that will be utilized to promote tricolored blackbird nesting colony success are captured above (Section 5.3.7 *Wetland and Pond Conservation and Management*). Those management techniques include:

- Planting of native emergent vegetation.
- Fencing off portions of ponds or wetlands to reduce grazing pressure and exclude feral pig activity.
- Implementation or continuation of a grazing program in potential foraging habitat within 2-miles of known breeding colonies.

Uncertainties and Threats

Tricolored blackbird colonies are an ephemeral resource. Nest colonies can persist for many years in the same location or sites can be occupied irregularly over time. In order to control for this uncertainty when attempting to protect or reestablish nesting colonies it is important to concentrate protection and management efforts in areas that either support or have some documentation of

historical breeding colonies. It is highly likely that breeding habitat can be protected, restored, or created and breeding blackbirds will never occupy it.

5.4.9 San Joaquin Kit Fox

Biological Goals and Objectives

The Implementing Entity will work to increase the ability of San Joaquin kit fox to move within and through the study area and increase the likelihood of breeding. Because the study area is outside the three San Joaquin kit fox core areas,[33] land acquisition and habitat enhancement focuses on building connections between the more isolated satellite populations in order to contribute to the *Level A Strategy* to "work toward the establishment of a viable complex of kit fox populations (i.e., a viable metapopulation) on private and public lands throughout its geographic range", as identified in *Recovery Plan for Upland Species of the San Joaquin Valley* (U.S. Fish and Wildlife Service 1998a). In addition, the Plan supports the *Habitat Protection and Population Interchange Recovery Action xiv* to "Protect existing kit fox habitat in the northern, northeastern, and northwestern segments of their geographic range..." (U.S. Fish and Wildlife Service 1998a).

This will be accomplished by protecting land through fee title purchase or easement and managing those lands as part of the Reserve System. Protection will be focused in areas with land cover types such as annual grasslands and oak woodlands, where this species has the highest potential to occur (see **Appendix D**). In accordance with the *Level A Strategy*, these protected areas will have a diversity of soils types, topography, aspect, and other environmental gradients to account for movement, foraging, and resting habitat (U.S. Fish and Wildlife Service 1998a). The Reserve System will benefit San Joaquin kit fox in the Pacheco Creek watershed in the uplands between Pacheco State Park and the Romero Ranch in the southeastern corner of the study area. Additional Reserve lands will be acquired between Henry W. Coe State Park and San Felipe Lake that will also benefit the species. The Reserve System will help to ensure that if San Joaquin kit fox are able to cross SR 152 that they will be able to fully utilize the lowland hills of the Diablo Range. In line with in the *Population Ecology and Management Recovery Action*, the Implementing Entity will enhance grassland and oak woodland habitat within the Reserve System to support a more abundant prey base (i.e., California ground squirrels) for San Joaquin kit fox (U.S. Fish and Wildlife Service 1998a).

Outside of the Reserve System the Plan will also contribute to the *Level A Strategy* goal on private land (U.S. Fish and Wildlife Service 1998a). The Implementing Entity will work to influence land-uses that are compatible with kit fox movement. Most importantly the Implementing Entity will identify

[33] As identified by the *Recovery Plan for Upland Species of the San Joaquin Valley*, there are three identified core populations of San Joaquin kit fox: Carrizo Plain Natural Area, Natural lands of western Kern County, and Fresno and eastern San Benito Counties (U.S. Fish and Wildlife Service 1998a).

important habitat linkages across SR 152, between the SR 152/156 interchange and the Santa Clara/Merced County line. Working with road operators (VTA and Caltrans), the Implementing Entity will improve passage along this highway when future road improvements are designed and implemented. Improvements will include removal or "perforation" of sections of median barriers along roadways to improve successful wildlife crossings and, if biologically appropriate, installation of fencing or other features to direct wildlife to those open sections (LM-5).

Acquisition, enhancement, and restoration of grasslands (see Section 5.3.3 *Grassland Conservation and Management*), oak woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*), riparian forest and scrub (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*), and seasonal wetlands (see Section 5.3.7 *Wetland and Pond Conservation and Management*) in the southern portion of the County are expected benefit to San Joaquin kit fox through foraging and movement habitat conservation and management.

Acquisition and Enhancement

There are 40,892 acres of modeled San Joaquin kit fox habitat (includes secondary and low-use secondary habitat) within the study area. Although not modeled, some of this habitat may also be potential breeding habitat. A total of 6,315 acres (15%) of modeled habitat are located in Type 1, 2, or 3 open space with 5,067 acres (12%) permanently protected as Type 1 open space. The Plan proposes to add a minimum of 4,100 acres of modeled habitat to the Reserve System, increasing the proportion of protected modeled habitat in the study area to about 22% as Type 1 open space and 25% as Type 1, 2, or 3 open space (**Table 5-17**).

As stated above, land acquisition and habitat enhancement will contribute to species recovery by building connections among the satellite populations in the northern part of the species' range (U.S. Fish and Wildlife Service 1998a). The Implementing Entity will protect through fee title acquisition or easements annual grassland and associated oak woodland land cover types (e.g., oak savanna and oak woodland within 500 feet of annual grassland) north and south of SR 152, east of the SR 152/156 interchange (LAND-G9).

This portion of the study area has the highest potential to support San Joaquin kit fox, though SR 152 is a considerable barrier across the landscape. Land acquisition along Pacheco Creek would benefit kit fox by preserving likely movement routes, foraging habitat, and possible (although unlikely) den sites (i.e., breeding sites). Specific areas where enhancement could occur to increase the permeability of SR 152 include the undercrossing where Little Pacheco Creek flows into Pacheco Creek and several other small drainages that flow under the roadway before connecting with Pacheco Creek on the south side of the road (**Figure 5-7b**). This will ensure that if costly enhancements are made to roadway infrastructure to create better connections for this species, that the natural lands on either side of the roadway will also remain high quality habitat in perpetuity.

Several grassland restoration and enhancement techniques will increase the amount and quality of movement habitat for San Joaquin kit fox. In general, managing nonnative vegetation and overtime increasing the amount of native vegetation in the ecosystem will have a positive effect on grassland ecosystem function. In turn this will benefit predators like the San Joaquin kit fox by supporting a more sustainable prey population. The Implementing Entity will introduce livestock grazing where it is not currently used, and where conflicts with covered activities will be minimized, to reduce vegetative cover and biomass that currently excludes ground squirrels facilitate colonization of new areas by ground squirrels within the Reserve System (GRASS-6). Specific grassland conservation and management goals, objectives, and actions are discussed above (Section 5.3.3 *Grassland Conservation and Management*).

Management Techniques and Tools

Several specific actions will be taken by the Implementing Entity to improve passage for San Joaquin kit fox. At locations indicated by pre-acquisition assessments and targeted studies and informed by the monitoring and adaptive management program, the Implementing Entity in coordination with the road operator will remove fences, replace culvert, and install free span bridges to allow wildlife to move freely under and over roadways (LM-1, LM-2, LM-3). To increase the probability that wildlife will use these crossings fencing or other features will be installed that will direct wildlife attempting to cross the roadway towards the culvert or other safe crossing (LM-4). Further, road operators will be required to remove or perforate median barriers, where allowable and safe, to improve successful wildlife crossings and, as indicated by targeted studies and informed by the monitoring and adaptive management program, install fencing or other features to direct wildlife to those open sections (LM-5).

To ensure that California ground squirrels and other rodents are as abundant as possible within the Reserve System the Implementing Entity will cease the use of rodenticides within the Reserve System except when necessary to maintain structures (e.g., levees, roads, stock pond dams) or to prevent nuisance populations (as defined in the Fish and Game Code Sections 4150 and 4152) from moving onto adjacent private lands (GRASS-5). Further, the Implementing Entity in coordination with road operators will remove fences and roads where they are no longer needed and to increase landscape permeability for wildlife movement (LM-1). Road removal may include road removal and decommission (i.e., returned to a natural condition) or road stabilization and abandonment to reduce hazards to wildlife and to reduce the erosion potential associated with dirt and gravel roads. This will allow many native species, including San Joaquin kit fox, to move more freely within the Reserve System.

In addition to protecting and restoring modeled habitat and improving structures the Implementing Entity will conduct a public education campaign in the southeastern portion of the study area to provide landowners with information about management and land use techniques that are more compatible with movement and use by San Joaquin kit fox (GRASS-10).

Uncertainties and Threats

The level to which San Joaquin kit fox uses the study area for movement, foraging, or denning is uncertain. San Joaquin kit fox have been documented moving through the lowlands just east of the study area and it is likely that individuals occasionally move into Santa Clara County. Also it will be difficult to monitor and measure the effectiveness of crossings structures. Other wildlife species (e.g., coyote, bobcat) will likely be used as surrogate species to determine whether these crossing structure adequately facilitating movement, since San Joaquin kit fox occur at such low numbers.

5.4.10 Tiburon Indian Paintbrush

There are a total nine known occurrences of Tiburon Indian paintbrush throughout its range. There are two occurrences in the study area. Population estimates for this species exist for all except one of the occurrences (see Chapter 4, Section 4.6.8 *Serpentine Plants* for population estimates). In the study area, one occurrence is located on a mitigation site, under a temporary easement, for creation of the Kirby Canyon Landfill. The second occurrence, located in the North Canyon, is privately owned. At the time this Plan was being developed, the landfill operator was in the process of finalizing a conservation easement as compensation for the recent expansion of the landfill. Impacts from management activities to the one occurrence currently under temporary easement, consistent with the conservation strategy of the Plan, are the only impacts allowed to the species in the permit area. These impacts will be temporary in nature and will result in overall benefits to the occurrence. This Plan does not cover impacts to additional occurrences of Tiburon Indian paintbrush that may be discovered during the permit term (**Tables 4-6 and 5-16**).

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and enhance Tiburon Indian paintbrush by acquiring the occurrence currently under a temporary easement at the Kirby Canyon Landfill, and by increasing the size of the occurrence within the permit area to at least 2,000 individuals (**Table 5-16**).

Tiburon Indian paintbrush is expected to benefit from acquisition and enhancement of grassland natural communities that serve as primary habitat and/or provide suitable habitat for occurrence expansion (see Section 5.3.3 *Grassland Conservation and Management*).

Occurrence Acquisition

The two known occurrences of Tiburon Indian paintbrush in the study area will be permanently protected upon successful implementation of the Plan. The

North Canyon occurrence is anticipated to be permanently protected with a conservation easement by the landfill operator prior to the finalization of this Plan and permit issuance. The Implementing Entity will acquire the other occurrence of Tiburon Indian paintbrush, which is under a temporary easement to mitigate effects of Kirby Canyon Landfill. Although the current easement expires in 2034, the Implementing Entity may permanently protect this occurrence at any time before Year 45 of the permit term.

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses. Adverse land uses include permanent land uses that could endanger the long-term viability of the occurrence; including urban development, landfill, and other intensive land uses. This buffer may be reduced or increased in specific circumstances where, based on documented site conditions, plant occurrences are protected from adverse land uses by another means or site conditions warrant a larger buffer. For example, if a major physical barrier separates the occurrence from the land use or the occurrence is located upslope from the adverse land use, the buffer may be reduced. Conversely, if there are certain adverse land uses upslope from the occurrence and effects to the occurrence are expected, a buffer greater than 500 feet may be needed. A 500-foot buffer was recommended in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c).

Management Techniques and Tools

The one occurrence protected under this Plan will be increased to or maintained at least 2,000 individuals in order to ensure the yearly viability of the occurrences (U.S. Fish and Wildlife Service 1998c). In order to successfully manage the Reserve System's occurrence of Tiburon Indian paintbrush, targeted studies will be conducted to identify factors limiting the expansion of the occurrence (STUDIES-5). These studies may focus on various factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5). Additional studies to determine the effects of livestock grazing on Tiburon Indian paintbrush will exclude livestock and monitor the effects on occurrences; control sites will be incorporated into these studies (STUDIES-16), unless the Implementing Entity demonstrates that the required action is biologically inappropriate. Results of all research studies will be incorporated into reserve unit management plans to mitigate or remove the limiting factors.

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for the Tiburon Indian paintbrush will be established. To assist the long-term viability of this species, a permanent conservation seed bank for Tiburon Indian paintbrush will be established in the National Collection of Endangered Plants operated by the Center for Plant Conservation as a national repository of endangered plant seed stock. Seeds will be deposited at a local custodial institution (e.g., a botanic garden) designated by the Center for Plant Conservation. A permanent conservation seed bank provides long-term storage in an accredited facility of a

representative sample of seeds from wild occurrences. All known occurrences in the Reserve System will be represented in the conservation seed bank unless collection would pose a threat to the occurrence's continued existence. Occurrences will be maintained in the seed bank separately to ensure the genetic diversity of the bank. The seed bank will be replenished as necessary to maintain the genetic integrity of the stock. The conservation seed bank will serve as a repository of the species to guard against extinction of the species from chance catastrophic events and to provide potential material for enhancement efforts in existing occurrences, repatriations, or introductions to new sites (STUDIES-14).

Uncertainties and Threats

There is still much to learn regarding the management of Tiburon Indian paintbrush. Because management and conservation decisions for this species are limited in their potential efficacy, the Implementing Entity has little information with which to design and plan specific management and monitoring protocols. Accordingly, directed studies are needed to successfully establish and maintain new occurrences in perpetuity (STUDIES-5).

Potential threats to these occurrences appear to be minimal (S. Weiss pers. comm. b). One threat may be cattle grazing; however, it is not clear whether grazing benefits or adversely affects Tiburon Indian paintbrush. Recent evidence suggests the Paintbrush Hill occurrence of Tiburon paintbrush is being predated upon by black-tailed jackrabbit. This predation may be the cause of occurrence decline at this location. Exclosure experiments are currently being conducted to determine the validity of this hypothesis (C. Niederer pers. comm.). For these reasons, the Tiburon paintbrush occurrence will be monitored to assess the impacts of grazing or predation (STUDIES-16). Adaptive management decisions can then be developed on the basis of monitoring results.

5.4.11 Coyote Ceanothus

There are a total of three known occurrences of Coyote ceanothus throughout its range. One additional reported occurrence, from Croy Canyon in 1929, is believed to be erroneous and will not be discussed further in this section (see **Appendix D** *Species Accounts* for more information). All known occurrences are located in the study area. One of these occurrences is located northwest and southeast of Anderson Dam, east of U.S. 101. The two other occurrences are located on private property near Kirby Canyon Landfill and in Morgan Hill. All three of the known occurrences have population estimates (see Chapter 4, Section 4.6.8 *Serpentine Plants* for more information). Impacts by covered activities are limited to 3,650 individuals or 5%, whichever is less, of the Anderson Dam occurrence (**Tables 4-6 and 5-16**). This standard will be applied to the population as it existed during the 2009 surveys. It will not be applied to any new recruits that are a result of natural or artificial disturbance event such as fire.

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and increase the number and size of populations of Coyote ceanothus by protecting a total of five occurrences in the permit area (**Table 5-16**). Included in the five occurrences protected will be the three known extant occurrences. Protection of the remaining two occurrences will be accomplished through two possible methods, in order of priority: (1) acquire land for the Reserve System that supports a new occurrence by Year 45, or (2) create new occurrences by Year 40.

Within 5 years of the impact at Anderson Dam, one occurrence will be protected or created. The timing of the seismic retrofit of Anderson Dam is currently uncertain, but is expected to occur within the first 5 years of the permit term. Project implementation may need to occur sooner than anticipated due to public safety concerns. If the impacts of the project on Coyote ceanothus are greater than what was evaluated in the Plan, additional mitigation may be required to offset the additional impacts. This may also require a Plan amendment as described in Chapter 10, Section 10.3 *Modifications to the Plan*.

The total number of Coyote ceanothus occurrences protected by this Plan deviates from the number suggested in the species' Recovery Plan. The Recovery Plan (U.S. Fish and Wildlife Service 1998c) recommends the protection of eight populations prior to the consideration of delisting. There have only been three populations of this species ever discovered[34], even prior to extensive development of the Santa Clara Valley. In addition, the characteristics of existing populations suggest that finding five new occurrences is highly unlikely. The Plan assessed the potential for creation of new occurrences by examining soil types, proximity to known populations, and other features of habitat suitability. It was determined that creation of two occurrences is feasible but not more. Therefore, the Habitat Plan is justified in deviating from the recommendations of the Recovery Plan.

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

In addition, Coyote ceanothus may benefit from acquisition and enhancement of natural communities that serve as primary habitat and may contain known or undiscovered occurrences, and/or provide suitable habitat for occurrence creation, including serpentine grasslands (see Section 5.3.3 *Grassland Conservation and Management*) and serpentine chaparral (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*).

[34] The Recovery Plan considers the Anderson Dam population as two separate occurrences, consistent with data in the CNDDB (resulting in 5 total occurrences). For the purposes of this Plan, the Anderson Dam population is considered a single occurrence that was split by the construction of the dam (resulting in a total of 3 occurrences). A genetic study underway will help to understand the population structure of this species.

Occurrence Acquisition

Regardless of the level of impact, the three known occurrences in the study area will be incorporated into the Reserve System (LAND-P1). Protection of occurrences will be accomplished by acquiring land for the Reserve System that supports the three unprotected occurrences. In addition, the Implementing Entity will protect two new occurrences. If new occurrences cannot be found or acquired in the Reserve System, then the Implementing Entity will create occurrences to reach this target, as described below. Acquisition may occur through fee title purchase or by obtaining conservation easements. Acquisition of the three known occurrences must occur by Year 45 (the deadline for all Reserve System acquisition).

Occurrence Creation

If acquisition of two new occurrences is infeasible, the Implementing Entity will create up to two new occurrences of Coyote ceanothus (i.e., if no new occurrences are acquired, two will be created and if one new occurrence is acquired, one will be created). The Implementing Entity will develop a plan with the Wildlife Agencies for each occurrence creation. Each plan will include a process for creating the occurrence (e.g., use of propagules vs. use of cuttings), monitoring the created occurrence, and determining viability.

If the creation is not needed to fulfill requirements associated with covered activity implementation, the creation may occur later in the permit term but no later than by Year 40. Creation may be delayed until later in the permit term because of the need to: (1) exhaust opportunities to discover new occurrences (which are the first priority), (2) assemble enough of the Reserve System to provide suitable habitat for occurrence creation, and (3) allow sufficient time to study optimum habitat conditions, target occurrence size and structure, and propagation techniques. The decision to focus conservation efforts on occurrence creation will be made jointly with the Wildlife Agencies. The Implementing Entity, in coordination with the Wildlife Agencies, will determine the target occurrence size and structure for created occurrences based on empirical data collected on occurrences in the Reserve System and other best available science.

Population creation for Coyote ceanothus should occur on suitable sites within the Reserve System if possible. However, if no suitable sites are available in the Reserve System when they are needed to meet the deadlines (either within 5 years of the Anderson Dam impact or prior to Year 40), population creation could occur on suitable sites outside of the Reserve System if the site meets the definition of Type 1 open space and the site is managed and monitored according to the Plan.

Suitable habitat for created occurrences will be identified based on the habitat of known occurrences and any other available data at the time of acquisition (STUDIES-5). Because two of the three known extant occurrences of Coyote

ceanothus are on the east side of the Coyote Valley, the focus will be to increase the range of the species by creating the new occurrences on the west side of the valley unless the Implementing Entity demonstrates to the Wildlife Agencies that such occurrence creation is biologically infeasible. This effort will involve identifying a suitable creation site and determining biologically appropriate and viable propagation or planting techniques for this species (STUDIES-13, STUDIES-14). It will also entail studies to determine the biologically appropriate seed sampling techniques and harvest numbers for acquisition of seed from existing occurrences (STUDIES-14). In addition, field experiments will be conducted (if the number of propagules allows) to test alternative techniques for occurrence establishment using seeds (STUDIES-15) or through other mechanisms such as use of cuttings.

Coyote ceanothus is a large, woody shrub that often grows in dense, monotypic stands. Because of the possibility that a new creation could displace serpentine grasslands, created occurrences will be sited to minimize the potential for displacement of habitat for other covered species.

Anderson Dam Seismic Retrofit

One occurrence will be created within 5 years of the Anderson Dam impact if a known or new occurrence has not been protected. The Anderson Dam impact is anticipated to occur in 2016. Because of the challenges of protecting one occurrence early in the permit term, the SCVWD has started efforts that will support creation of a Coyote ceanothus occurrence including the following.

- Communicating with Pepperdine University which is conducting a genetic (microsatellite) study to determine population structure.
- Communicating with UC Davis on its study of genetics (S-allele) to assess breeding system/reproductive success/population viability; and Frankia soils study to examine potential microsymbiont relationship and importance of native soil to population creation.
- Identified and mapped potentially suitable introduction sites on land recently purchased by the SCVWD on Coyote Ridge.
- Seed collection and storage from the Anderson Dam population occurrences.

Based on the studies, SCVWD will prepare a draft occurrence creation plan. Some key components include the following.

- Documentation of successful propagation methods from seed and/or cuttings in test plots by December 2013.
- Verification of site suitability and potential introduction sites through soil analysis of sites with known populations by July 2017.
- Full-scale planting effort (will involve additional seed collection and propagation) with survival monitoring; implemented between July 2017 and February 2018.

The work being conducted by SCVWD may help support the studies requirements of the Plan for this species.

Management Techniques and Tools

To successfully manage existing occurrences and create new occurrences of Coyote ceanothus, targeted studies will be conducted to determine factors limiting the expansion of extant occurrences, as well as those necessary for establishment and maintenance of a created occurrence (STUDIES-5). Such studies will include the effect of fire on seed germination and other possible germination requirements. If necessary, studies may also be conducted to determine requirements for successful transplanting to augment new occurrences. Other studies may focus on various factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5).

The targeted studies will be used to inform the target occurrence size for managed occurrences. A preliminary goal of 5,000 individuals per occurrence will be implemented as recommended in *Ceanothus ferrisiae (Coyote ceanothus) 5-Year Review: Summary and Evaluation* (U.S. Fish and Wildlife Service 2011); if approved by the Wildlife Agencies, this number will be adjusted as necessary pending research carried out during Plan implementation to assure viable occurrences of this species.

Prescribed burns (CHAP-1) or an appropriate fire-management policy (LM-8) in chaparral, as well as managed grazing or mechanic thinning of chaparral (CHAP-2), may result in improved habitat or occurrence longevity for Coyote ceanothus. Although fire appears to be beneficial to recruitment and regeneration, burning will not be implemented on a large scale in areas with Coyote ceanothus occurrences until additional monitoring or other data collection has occurred to determine if these occurrences would be likely to benefit by being burned. The management actions above are targeted to maintain structural diversity and canopy gaps and to promote regeneration of chaparral species, which may directly or indirectly benefit Coyote ceanothus.

At least one prescribed burn (CHAP-1) will be implemented at a site yet to be identified. This area will be burned to facilitate the species' re-growth within 5 years of implementation of the Anderson Dam seismic retrofit covered activity. Subsequent burns may be conducted during the permit term, as appropriate, through the adaptive management process described in Chapter 7. Prescribed burns will promote regeneration and improve stand health. A qualified biologist will oversee the prescribed burn.

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for Coyote ceanothus will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12). Coyote ceanothus is the only covered plant species where created occurrences could be counted toward the mitigation component of

the Plan. In all other cases, created plant occurrences will only count toward the conservation component of the Plan. If creation is used to meet the impact mitigation component of the conservation strategy for this species, seed banking will be completed prior to the impacts.

Uncertainties and Threats

Very little precise information about the ecology of this species exists, including information on the relationship between life history stages, population dynamics, and fire. Recent information and observations have indicated that the absence of fire may be detrimental to recovery and long-term persistence of this species (U.S. Fish and Wildlife Service 2011). It is unknown, however, if Coyote ceanothus seeds require fire for germination and establishment; accordingly, directed studies are needed to successfully establish and maintain new occurrences in perpetuity (STUDIES-5).

It is not clear if general management actions (i.e., burning or clearing chaparral) will in fact benefit or adversely affect Coyote ceanothus. For this reason, any such actions in or adjacent to Coyote ceanothus occurrences will include a monitoring component to assess impacts. Adaptive management decisions can then be developed on the basis of monitoring results (STUDIES-11).

5.4.12 Mt. Hamilton Thistle

There are a total of 48 known occurrences of Mt. Hamilton thistle throughout its range. There are 40 known occurrences in the study area. Only 34 of the 48 known occurrences have population estimates (see Chapter 4, Section 4.6.8 *Serpentine Plants* for more information). Impacts to six known occurrences are allowed by covered activities if no additional occurrences are discovered during the permit term (**Tables 4-6 and 5-16**).

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and increase the number and size of populations of Mt. Hamilton thistle by acquiring and enhancing at least 22 known, extant occurrences (**Table 5-16**) if no additional occurrences are discovered during the permit term. Two of the 22 occurrences are located in Santa Teresa County Park and Anderson Lake County Park and will be incorporated into the Reserve System.

The Implementing Entity will manage and monitor the 22 occurrences so that each maintains a minimum occurrence size of 2,000 individuals as recommended by the Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area (U.S. Fish and Wildlife Service 1998c). The Recovery Plan's conservation strategy for Mt. Hamilton thistle recommends preserving a total of

23 populations, 55% of which should be in the "San José area" (13 populations) and 35% of which should be in "northeastern Santa Clara County and northwestern Stanislaus Counties" (eight populations). The Habitat Plan will protect and manage 22 occurrences of Mt. Hamilton thistle in perpetuity, exceeding the Recovery Plan conservation recommendations for populations in and around Santa Clara County. As such, implementation of the Plan will not cause jeopardy to, or preclude recovery of, Mt. Hamilton thistle.

Mt. Hamilton thistle is expected to benefit from acquisition and enhancement of the grassland natural communities, as these land cover types include the serpentine seeps and streams that serve as primary habitat and contain known or undiscovered occurrences (see Section 5.3.3 *Grassland Conservation and Management)*.

Acquisition of Modeled Habitat

There are 487 acres of primary modeled habitat for Mt. Hamilton thistle within the study area. A total of 204 acres (42%) of modeled habitat are located in Type 1, 2, or 3 open space with 55 acres (11%) permanently protected as Type 1 open space. The Plan will acquire a minimum of 150 acres of modeled habitat for the Reserve System. In addition, 60 acres of primary modeled habitat will be added to the Reserve system from existing open space. These acquisitions and additions will increase the proportion of protected modeled habitat in the study area to about 54% in Type 1 open space and 73% in Type 1, 2, or 3 open space (**Table 5-17**).

Mt. Hamilton thistle is one of eight Covered Species addressed in the Recovery Plan for Serpentine Soil Species of the Bay Area (U.S. Fish and Wildlife Service 1998c). At the time the Recovery Plan was written, known occurrences of Mt. Hamilton thistle were distributed nearly evenly on the east and west side of U.S. 101. Since the writing the Recovery Plan, and during the writing of this Plan, many more occurrences have been identified. Most new occurrences are located on the serpentine areas in and around Coyote Ridge on the east side of U.S. 101. The occurrences on the east side of the valley follow a network of drainages unique to Coyote Ridge. These drainages do not occur on the west side of the valley. As such, the Plan will focus conservation efforts for Mt. Hamilton thistle on acquiring occurrences along Coyote Ridge on the eastside of the valley (J. Hillman pers. comm. and Hillman 2007). Acquisition will also be located in similar drainages that flow into San Felipe Creek. In addition, acquisition, as well as enhancement, will occur in the Santa Cruz Mountains between Calero County Park and Almaden Quicksilver County Park and on Tulare Hill.

Occurrence Acquisition

Regardless of the level of impact, 22 known occurrences in the permit area will be acquired and incorporated into the Reserve System (LAND-P6). An effort

will be made to acquire sites in the study area on both sides of Coyote Valley to ensure geographic diversity in protected occurrences in accordance with recommendations made in the Serpentine Recovery Plan (U.S. Fish and Wildlife Service 1998c). Target acquisitions include known occurrences along Coyote Ridge (an estimated 9 of 22 occurrences). Two other occurrences in Santa Teresa and Anderson Lake County parks will be acquired, enhanced, and monitored.

There are size estimates for 36 of the known occurrences of this species, from as early as 1983 up to as recently as 2008. These estimates range from 1 to 4,500 individuals, and the total estimated size of all occurrences is 28,962 (California Natural Diversity Database 2009). Only 12 of the 22 occurrences to be protected in the Reserve System have size estimates, and these total 7,810 individuals. The total number to be protected is likely to be much larger than this estimate. In addition, since this is a short-lived, two-year perennial species that depends on local hydrology, these numbers are likely to fluctuate from year to year in response to annual fluctuations in rainfall and runoff into serpentine seeps.

As described in Chapter 4, the impact limit for this species could increase from 6 occurrences if no additional occurrences are discovered during the permit term to 8 occurrences if additional occurrences are discovered during the permit term. A minimum of 3 occurrences have to be acquired prior to any newly discovered occurrence being impacted during the permit term. In other words, a minimum of 21 occurrences will be acquired and protected in the Reserve System before a 7th occurrence is impacted and a minimum of 24 occurrences will be acquired and protected in the Reserve System before an 8th occurrence is impacted. "Minimums" are referenced here because the Implementing Entity will protect 22 occurrences, regardless of impacts. The timing of acquisition of 18 of the 22 occurrences are linked to impacts, while the remaining 4 occurrences will be acquired for recovery purposes only and thus acquisition timing of these 4 occurrences are not linked to impacts. The newly discovered and acquired occurrences must be in better condition than the impacted occurrences, according to the criteria in Section 5.3.1 *Land Acquisition and restoration Actions* subheading *Incorporating Covered Plant Species*. In addition, new occurrences must be acquired before the impacts occur and by Year 45 (the deadline for all Reserve System acquisition).

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

Management Techniques and Tools

To successfully manage existing occurrences of Mt. Hamilton thistle, targeted studies will be conducted to determine factors limiting the expansion of extant occurrences (STUDIES-5). Such studies will include examining the effects of livestock grazing on the species by experimentally excluding livestock and

monitoring the effects on occurrences; control sites will be incorporated into these studies (STUDIES-16). Other studies may focus on various factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5).

The targeted studies will be used to inform the target occurrence size for managed occurrences. The definition of an occurrence for this species depends on the location: an occurrence on the east side of Coyote Valley is defined as all occurrences in a discrete drainage, while an occurrence on the west side of Coyote Valley is defined as a specific occurrence point because the western occurrences are more likely to occur at isolated points rather than in a network of drainages (J. Hillman pers. comm.). Specific target occurrence size will be developed by Year 10 of implementation, based on empirical data collected on occurrences in the Reserve System and other best available science. The Implementing Entity, in coordination with the Wildlife Agencies, will determine the target occurrence size.

Because Mt. Hamilton thistle only occurs along creeks and drainages, the hydrologic systems that maintain these features are critical to the survival and occurrence growth of this species. Therefore, the Implementing Entity will manage and maintain the hydrologic systems (e.g., springs, streams, ponds) that support Mt. Hamilton thistle.

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for Mt. Hamilton thistle will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

Uncertainties and Threats

Very little precise information about the ecology and population biology of this species is available, including information on the species' reproductive biology and demography. Its highly restricted habitat requirements in serpentine seeps, springs and drainages are likely limiting factors in the species' distribution and abundance. The hydrologic systems that maintain this habitat will be managed and maintained by the Plan. It is also possible that invasive weeds and insects have adverse effects and pose significant threats to the species. Further research into these threats is necessary to successfully manage this species (STUDIES-5).

It is not clear whether grazing benefits or adversely affects Mt. Hamilton thistle. For this reason, grazing in or adjacent to Mt. Hamilton thistle occurrences will include experimental exclusions and control sites, where feasible, to evaluate impacts (STUDIES-16). Adaptive management decisions can then be developed on the basis of monitoring results.

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for Mt. Hamilton thistle will

be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

5.4.13 Santa Clara Valley Dudleya

There are a total of 209 known occurrences of Santa Clara Valley dudleya, 207 of which are in the study area. Only 47 of the 209 known occurrences have population estimates (see Chapter 4, Section 4.6.8 *Serpentine Plants* for more information). Impacts are allowed to 11 known occurrences by covered activities (**Tables 4-6 and 5-16**) if additional occurrences are not discovered during the permit term.

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and increase the number and size of populations of Santa Clara Valley dudleya by acquiring and enhancing a minimum of 55 occurrences in the permit area (**Table 5-16**), if no additional occurrences are discovered during the permit term. Eleven of the 55 occurrences are located in County parks and will be protected when these parks are added to the Reserve System.

Santa Clara Valley dudleya is expected to benefit from the acquisition and enhancement of those grasslands (see Section 5.3.3 *Grassland Conservation and Management*) and oak woodlands that include serpentine rock outcrops (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*).

Occurrence Acquisition

Regardless of the level of impact, the Implementing Entity will acquire (through acquisition or conservation easement) lands that support 55 extant occurrences of Santa Clara Valley dudleya throughout its entire range in the permit area (LAND-P2). In accordance with the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c), occurrences will be distributed throughout the range of the species (north, central, and south). The Implementing Entity will stratify protection and acquire sites in the study area on both sides of Coyote Valley to ensure geographic diversity in protected occurrences. The majority of the known occurrences will be acquired, enhanced through improved management, and monitored along Coyote Ridge in Coyote-4, 5, and 6. The number of occurrences in parentheses after each location name will also be acquired: Santa Teresa Hills and Tulare Hill (4), west of Calero County Park (2), and north of Morgan Hill (1). Incorporation of portions of Santa Teresa, Calero, Anderson Lake and Almaden Quicksilver County parks into the Reserve System (**Table 5-5**) will protect 11 of the 55 occurrences and provide opportunities for improved management and

monitoring. This will bring total protection of this species to 57 occurrences in Type 1 open space.

The Recovery Plan recommends the protection of one occurrence in the San Martin Area because this represented the southern extent of the species range known at the time. There are two extant occurrences of Santa Clara dudleya near San Martin. One is located on a highly-parcelized, privately-owned plot and is not practical for acquisition consideration. The other occurrence is, at the writing of this Plan, in the process of being protected by a conservation easement for mitigation associated with the Corde Valle Golf Course[35]. Since the finalization of the Recovery Plan, the species' known range expanded south of the San Martin area (i.e., to Mount Madonna County Park). In response to new information collected since the finalization of the Recovery Plan, the Implementing Entity will acquire at least one occurrence (either known or found during the permit term) of Santa Clara Valley dudleya in the southern end of its range in the study area. This could include either the southwest or southeast portion of the study area. Therefore, the Implementing Entity will not focus on acquiring occurrences in the San Martin area.

As described in Chapter 4, the impact limit for this species could increase from 11 occurrences, if no additional occurrences are discovered during the permit term, to 14 occurrences, if additional occurrences are discovered during the permit term. A minimum of 4 occurrences have to be acquired prior to any newly discovered occurrence being impacted during the permit term. In other words, a minimum of 48 occurrences will be acquired and protected in the Reserve System before a 12th occurrence is impacted, a minimum of 52 occurrences will be acquired and protected in the Reserve System before a 13th occurrence is impacted, and a minimum of 56 occurrences will be acquired and protected in the Reserve System before a 14th occurrence is impacted. "Minimums" are referenced here because the Implementing Entity will protect 55 occurrences, regardless of impacts. The timing of acquisition of 44 of the 55 occurrences are linked to impacts, while the remaining 11 occurrences will be acquired for recovery purposes only and thus acquisition timing of these 11 occurrences are not linked to impacts. The newly discovered and acquired occurrences must be in better condition than the impacted occurrences, according to the criteria in Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Incorporating Covered Plant Species*. In addition, new occurrences must be acquired before the impacts occur and by Year 45 (the deadline for all Reserve System acquisition).

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

[35] This will be considered a protected occurrence once a conservation easement holder is identified and the conservation easement recorded.

Management Techniques and Tools

To successfully manage existing occurrences of Santa Clara Valley dudleya, targeted studies will be conducted to determine the biological definition of a population and the relationship between known occurrences and genetically-defined populations. Studies will also be conducted to determine factors limiting the expansion of extant occurrences (STUDIES-5). Such studies may include examining the effects of livestock grazing on the species by experimentally excluding livestock and monitoring the effects on occurrences (STUDIES-16). Other studies may focus on various factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5).

The targeted studies will be used to inform the target occurrence size for managed occurrences. For this species, the relationship between population and recorded occurrence is unclear. It is possible that multiple occurrences compromise a single population. A preliminary goal of 2,000 individuals per population will be implemented as recommended in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c); if approved by the wildlife agencies, this number will be adjusted as necessary pending research carried out during Plan implementation to assure viable occurrences of this species.

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for Santa Clara Valley dudleya will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

Uncertainties and Threats

Santa Clara Valley dudleya is a relatively well-studied plant, and more information and research is available for this species than for most of the other covered species. However, outstanding questions remain regarding the definition of a population and management issues. Research will be conducted to better define a population for this species to understand the effects of grazing. Management research will be conducted on grazing effects on Santa Clara Valley dudleya as discussed above (STUDIES-16) and on other limiting factors (STUDIES-5).

5.4.14 Fragrant Fritillary

There are a total of 59 known occurrences of fragrant fritillary throughout its range. There are eight known occurrences in the study area. Thirty-five of the 59 known occurrences have population estimates (see Chapter 4, Section 4.6.8 *Serpentine Plants* for more details). One of these known occurrences is expected

to be impacted by covered activities, if no additional occurrences are discovered during the permit term (**Tables 4-6 and 5-16**).

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and increase the size of populations of fragrant fritillary by acquiring and enhancing a total of four occurrences in the permit area, if no additional occurrences are discovered during the permit term (**Table 5-16**). Of these four occurrences, two will be located in the Diablo Range and two in the Santa Cruz Mountains to protect occurrences of this species across its range and across different environmental gradients.

Fragrant fritillary is expected to benefit from acquisition and enhancement of natural communities that serve as its primary or secondary modeled habitat, may contain known or undiscovered occurrences, and/or provide suitable habitat for occurrence creation, including grasslands (see Section 5.3.3 *Grassland Conservation and Management*), chaparral and coastal scrub (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*), oak and conifer woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*), and seasonal wetlands (see Section 5.3.7 *Wetland and Pond Conservation and Management*).

Acquisition of Modeled Habitat

There are 165,455 acres of fragrant fritillary modeled habitat (primary and secondary) within the study area. A total of 42,317 acres (26%) of modeled habitat are located on Type 1, 2, or 3 open space with 16,371 acres (10%) permanently protected as Type 1 open space. The Plan will acquire a minimum of 23,000 acres of modeled habitat for the Reserve System. In addition, 4,000 acres will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of protected modeled habitat in the study area about 26% in Type 1 open space and 39% in Type 1, 2, or 3 open space (**Table 5-17**). Land acquisition that would protect primary and secondary modeled habitat would occur in almost all Conservation Analysis Zones in the study area in which land acquisition would occur.

Occurrence Acquisition

Regardless of the level of impact, four known extant occurrences of fragrant fritillary will be acquired for the Reserve System. Of these four, two occurrences will be protected along Coyote Ridge southeast of Metcalf Canyon and northeast of Morgan Hill (LAND-P8). The third occurrence is located in Calero County Park and will be protected through the incorporation of a portion of the park into the Reserve System (**Table 5-5**). The fourth occurrence will be located in the Santa Cruz Range.

As described in Chapter 4, the impact limit for this species could increase from 1 occurrence, if no additional occurrences are discovered during the permit term, to 3 occurrences, if additional occurrences are discovered during the permit term. A minimum of 3 occurrences have to be acquired prior to any newly discovered occurrence being impacted during the permit term. In other words, a minimum of 6 occurrences will be acquired and protected in the Reserve System before a 2nd occurrence is impacted and a minimum of 9 occurrences will be acquired and protected in the Reserve System before a 3rd occurrence is impacted. "Minimums" are referenced here because the Implementing Entity will protect 4 occurrences, regardless of impacts. The timing of acquisition of 3 of the 4 occurrences are linked to impacts, while the remaining 1 occurrence will be acquired for recovery purposes only and thus acquisition timing of this 1 occurrence is not linked to impacts. The newly discovered and protected occurrences must be in better condition than the impacted occurrences, according to the criteria in Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Incorporating Covered Plant Species*. In addition, new occurrences must be acquired before the impacts occur and by Year 45 (the deadline for all Reserve System acquisition).

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

Management Techniques and Tools

To successfully manage newly acquired occurrences of fragrant fritillary, targeted studies will be conducted to determine factors that limit occurrence expansion as well as those necessary for establishment and maintenance of new occurrences (STUDIES-5). Such studies may include specific seed germination requirements and successful transplantation requirements to create or augment new occurrences. Other studies may examine various factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5). Adaptive management decisions can then be developed on the basis of monitoring results.

The targeted studies will be used to inform the target occurrence size for each managed occurrence. The specific target occurrence size will be developed by Year 10 of implementation, based on empirical data collected on occurrences in the Reserve System and other best available science. The Implementing Entity, in coordination with the Wildlife Agencies, will determine the target occurrence size.

To help the long-term viability of this species, a permanent conservation seed bank for fragrant fritillary will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

Uncertainties and Threats

Very little precise information about the ecology of this species exists, including details of its life history stages, population dynamics, microhabitat requirements (e.g., edaphic factors), demography, and pollination biology. Directed studies to determine limiting factors on survival and reproduction will help to successfully maintain and increase the size of occurrences of fragrant fritillary in perpetuity (STUDIES-5).

The actual occurrence size and age structure of the extant occurrences of fragrant fritillary in the study area are currently unknown. A key management action will be to survey extant occurrences as they are added to the Reserve System and to monitor these occurrences regularly to quantify and track the occurrence structure over time (STUDIES-5). This information will also be used to determine the targeted viable occurrence size of managed occurrences.

It is not clear whether grazing benefits or adversely affects fragrant fritillary. For this reason, grazing in or adjacent to fragrant fritillary occurrences will include experimental exclusions and control sites, where feasible, to evaluate impacts (STUDIES-16). Adaptive management decisions can then be developed on the basis of monitoring results.

5.4.15 Loma Prieta Hoita

There are a total of 26 known occurrences of Loma Prieta hoita throughout its range. There are 14 known occurrences in the study area. Only 18 of the 26 occurrences have population estimates (see Chapter 4, Section 4.6.9 *Non-Serpentine Plants* for more details). No impacts are allowed to these occurrences by covered activities (**Tables 4-6 and 5-16**).

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and increase the number and size of populations of Loma Prieta hoita by acquiring and enhancing four extant occurrences within the study area (**Table 5-16**), if no additional occurrences are found during the permit term. Of the four occurrences, three are currently located in County parks. Loma Prieta hoita is expected to benefit from acquisition and enhancement of natural communities that serve as primary or secondary modeled habitat and/or contain known or undiscovered occurrences, including chaparral and coastal scrub (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*), oak and conifer woodlands (see Section 5.3.5 *Oak and Conifer Woodland Conservation and Management*), and mixed riparian forest and woodland (see Section 5.3.6 *Riverine and Riparian Forest and Scrub Conservation and Management*).

Acquisition of Modeled Habitat

There are 121,871 acres of Loma Prieta hoita modeled habitat (primary and secondary) within the study area. A total of 38,667acres (32%) of modeled habitat are located on Type 1, 2, or 3 open space with 17,276acres (14%) permanently protected as Type 1 open space. The Plan will acquire a minimum of 10,000 acres of modeled habitat for the Reserve System. In addition, 4,100 acres of modeled habitat will be added to the Reserve System from existing open space. These additions and acquisitions will increase the proportion of protected modeled habitat in the study area to about 26% in Type 1 open space and 40% in Type 1, 2, or 3 open space (**Table 5-17**).

Occurrence Acquisition

Regardless of impact, 4 occurrences will be acquired or added to the Reserve System. Of these, three occurrences will be permanently protected by inclusion of portions of Santa Teresa, Almaden Quicksilver and Calero County parks (**Table 5-5** and **Figure 5-4**), and a fourth occurrence will be acquired on the east side of the Santa Clara Valley, just east of U.S. 101, south of Motorcycle Park. It does not have a size estimate (California Natural Diversity Database 2009).

As described in Chapter 4, the impact limit for this species could increase from 0 occurrences if no additional occurrences are discovered during the permit term to 2 occurrences if additional occurrences are discovered during the permit term. A minimum of two occurrences have to be acquired prior to any newly discovered occurrence being impacted during the permit term. In other words, a minimum of 2 occurrences will be acquired and protected in the Reserve System before the 1st occurrence is impacted and a minimum of 4 occurrences will be acquired and protected in the Reserve System before the 2nd occurrence is impacted. "Minimums" are referenced here because the Implementing Entity will protect four occurrences, regardless of impacts. The timing of these recovery efforts are not linked to impacts. The newly discovered and protected occurrences must be in better condition than the impacted occurrences, according to the criteria in Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Incorporating Covered Plant Species*. In addition, new occurrences must be acquired before the impacts occur and by Year 45 (the deadline for all Reserve System acquisition).

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

Management Techniques and Tools

To successfully manage existing occurrences of Loma Prieta hoita, targeted studies will be conducted to determine factors limiting the expansion of extant

occurrences (STUDIES-5). Other studies may focus on factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5). Adaptive management decisions can then be developed on the basis of monitoring results.

The targeted studies will be used to inform the target occurrence size for managed occurrences. The specific target occurrence size will be developed by Year 10 of implementation, based on empirical data collected on occurrences in the Reserve System and other best available science. The Implementing Entity, in coordination with the Wildlife Agencies, will determine the target occurrence size.

A permanent conservation seed bank for Loma Prieta hoita will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

Uncertainties and Threats

Loma Prieta hoita has not been well studied, and little is known about its population biology or ecological effects and needs. Because management and conservation decisions for this species are limited in their potential efficacy, the Implementing Entity has little information with which to design and plan specific management and monitoring protocols. Accordingly, directed studies are needed to successfully establish and maintain new occurrences in perpetuity (STUDIES-5).

The actual occurrence size and age structure of the extant occurrences of Loma Prieta hoita in the study area are currently unknown. A key management action will be to survey and monitor the new occurrence when it is added to the Reserve System and at regular intervals thereafter to quantify and track the occurrence structure over time (STUDIES-5). This information will also be used to determine the targeted viable occurrence size of managed occurrences.

Threats to Loma Prieta hoita are thought to include cattle grazing and trampling, feral pig rooting, development, and vegetation clearing. Studies may be conducted to investigate the details of these threats and the best measures to mitigate them (STUDIES-5).

5.4.16 Smooth Lessingia

There are a total of 39 known occurrences of smooth lessingia throughout its range. All known occurrences are located in the study area. Only 22 of the 39 known occurrences have population estimates (see Chapter 4, Section 4.6.8 *Serpentine Plants* for more information). Impacts are allowed to six known occurrences by covered activities, if no additional occurrences are discovered during the permit term (**Tables 4-6 and 5-16**).

Biological Goals and Objectives

Regardless of impact, the Implementing Entity will protect, maintain the viability of, and increase the number and size of occurrences of smooth lessingia by protecting and enhancing a total of 24 occurrences in the permit area (**Table 5-16**) if no additional occurrences are discovered during the permit term. Twelve of the 24 protected occurrences must be naturally-occurring populations and will fulfill mitigation requirements for the impact of up to six occurrences. Five of these twelve natural occurrences will be protected through the incorporation of County Park lands into the Reserve System. To contribute to recovery, an additional 12 occurrences will be protected by the Implementing Entity through two possible methods, in the order of priority: (1) acquire land for the Reserve System that supports new or rediscovered historical occurrences by Year 45, or (2) create new occurrences within the Reserve System by Year 40.

Smooth lessingia is expected to benefit from acquisition and enhancement of grassland natural communities that serve as primary habitat, may contain known occurrences, and/or provide suitable for occurrence expansion (see Section 5.3.3 *Grassland Conservation and Management*).

Acquisition of Modeled Habitat

There are 10,491 acres of primary smooth lessingia modeled habitat within the study area. A total of 3,659 acres (35%) of modeled habitat are located on Type 1, 2, or 3 open space with 1,268 acres (12%) permanently protected as Type 1 open space. The Plan will acquire a minimum of 4,000 acres of modeled habitat, including seven new occurrences, for the Reserve System. In addition, 1,100 acres of modeled habitat will be added to the Reserve System from existing open space, including five known occurrences. These acquisitions and additions will increase the proportion of protected modeled habitat in the study area to about 61% as Type 1 open space and 73% as Type 1, 2 or 3 open space (**Table 5-17**).

Occurrence Acquisition

Regardless of impacts, five known occurrences will be acquired through the incorporation of portions of Santa Teresa, and Calero County parks into the Reserve System (**Table 5-5** and **Figure 5-4**) to improve management, habitat enhancement, and long-term monitoring. The Implementing Entity will also acquire seven additional natural occurrences of smooth lessingia (LAND-P7) regardless of impacts.

Only two of the protected occurrences have size estimates, which total 1,815. The seven additional new occurrences that would be acquired by Plan implementation are located on the west side of U.S. 101 in the Santa Cruz Mountains foothills, on serpentine areas between Tulare Hill and Mount Madonna County Park. The Implementing Entity will also protect an additional

twelve new occurrences in the Reserve System to contribute to species recovery (LAND-P7; **Table 5-16**). If these twelve occurrences cannot be found or acquired in the Reserve System, then the Implementing Entity will create occurrences (i.e., if no occurrences are acquired, twelve occurrences will be created, if one occurrence is acquired, eleven occurrences will be created, etc.) as described below.

As described in Chapter 4, the impact limit for this species could increase from 6 occurrences, if no additional occurrences are discovered during the permit term, to 9 occurrences, if additional occurrences are discovered during the permit term (**Table 5-16**). A minimum of two occurrences have to be acquired prior to any newly discovered occurrence being impacted during the permit term. In other words, a minimum of 14 occurrences will be protected in the Reserve System before a seventh occurrence is impacted, a minimum of 16 occurrences will be protected in the Reserve System before a eighth occurrence is impacted, and a minimum of 18 occurrences will be protected in the Reserve System before a ninth occurrence is impacted. "Minimums" are referenced here because the Implementing Entity will protect 24 occurrences, regardless of impacts. The timing of acquisition of 12 of the 24 occurrences are linked to impacts (as described in Chapter 4), while the remaining 12 occurrences will be acquired to contribute to recovery and can be acquired at any time before Year 45. The newly discovered and protected occurrences must be in better condition than the impacted occurrences, according to the criteria in Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Incorporating Covered Plant Species*. In addition, new occurrences must be acquired before the impacts occur and by Year 45 (the deadline for all Reserve System acquisition).

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

Occurrence Creation

If 12 new occurrences of smooth lessingia are not acquired for the purposes of recovery, the Implementing Entity will create up to 12 occurrences of smooth lessingia (i.e., if no occurrences are acquired, 12 will be created; if one occurrence is acquired, 11 will be created, etc.). Creation is only considered as a conservation action, not mitigation.

Occurrence creation is expected to occur later in the permit term (but no later than by Year 40) because of the need to: (1) exhaust opportunities to discover new occurrences (which are the first priority), (2) assemble enough of the Reserve System to provide suitable habitat for occurrence creation, and (3) allow sufficient time to study optimum habitat conditions, target occurrence size and structure, and propagation techniques. The decision to focus conservation effort on occurrence creation will be made jointly with CDFG and USFWS. The Implementing Entity, in coordination with the Wildlife Agencies, will determine the target occurrence size and structure for created occurrences based on

empirical data collected on occurrences in the Reserve System and other best available science.

Suitable habitat for created occurrences will be identified based on the habitat of known occurrences and any other available data at the time of acquisition (STUDIES-5). Suitable propagation and/or planting techniques will be researched and identified to create new occurrences of smooth lessingia from existing occurrences within Santa Clara County or adjacent watersheds (STUDIES-14). Biologically appropriate seed sampling techniques from existing occurrences, including sustainable harvest amounts, will also be determined through field and literature research (STUDIES-14). Additionally, if the number of propagules allow, field experiments will be conducted to test alternative techniques for occurrence establishment (STUDIES-15).

Management Techniques and Tools

Targeted studies will be used to inform the target occurrence size for managed occurrences. A preliminary goal of 2,000 individuals per occurrence will be implemented as recommended in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c); if approved by the wildlife agencies, this number will be adjusted as necessary pending research carried out during Plan implementation to assure viable occurrences of this species.

Targeted studies will be conducted to determine factors limiting the expansion of extant occurrences (STUDIES-5). Such studies will include examining the effects of livestock grazing on the species by experimentally excluding livestock and monitoring the effects on occurrences (STUDIES-16). Other studies may focus on various factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5).

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for smooth lessingia will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

Uncertainties and Threats

Very little information about the ecology and general habitat requirements of this species exists, including details of its life history stages, population dynamics, microhabitat requirements, demography, and pollination biology. Accordingly, directed studies are needed to successfully establish and maintain new occurrences in perpetuity (STUDIES-5). The management needs of the species also need investigation.

The actual size of the extant occurrences of smooth lessingia are mostly unknown. A key management action will be to survey extant occurrences as they are added to the Reserve System and monitor these occurrences regularly to quantify and track the occurrence structure over time (STUDIES-5).

Threats to smooth lessingia are thought to include cattle grazing, foot traffic (trampling), competition from invasive nonnative plants, and road and trail maintenance. Studies may be conducted to investigate the details of these threats and the best measures to mitigate them (STUDIES-5). It is not clear whether grazing benefits or adversely affects smooth lessingia. For this reason, grazing in or adjacent to smooth lessingia occurrences will include experimental exclusions and control sites, where feasible, to evaluate impacts (STUDIES-16). Adaptive management decisions can then be developed on the basis of monitoring results.

5.4.17 Metcalf Canyon Jewelflower

There are 11 known occurrences of Metcalf Canyon jewelflower throughout its range, 10 of which are in the study area. Only four of the 10 known occurrences have population estimates (see Chapter 4, Section 4.6.8 *Serpentine Plants* for more information). Impacts are allowed to two of the known occurrences by covered activities (**Tables 4-6 and 5-16**).

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and increase the number and size of populations of Metcalf Canyon jewelflower by protecting a total of 13 occurrences in the permit area. To do this, the Implementing Entity will acquire and enhance at least three known occurrences in the permit area (**Table 5-16**). The Implementing Entity will also protect 10 new occurrences through two possible methods, in order of priority: (1) acquire land for the Reserve System that supports new or rediscovered historical occurrences by Year 45, or (2) create new occurrences within the Reserve System by Year 40.

Metcalf Canyon Jewelflower is expected to benefit from acquisition and enhancement of grassland natural communities that serve as its primary habitat, contain known occurrences, and/or provide suitable habitat for occurrence creation (see Section 5.3.3 *Grassland Conservation and Management*).

Acquisition of Modeled Habitat

There are 8,105 acres of primary modeled habitat for Metcalf Canyon jewelflower within the study area. A total of 2,843 acres (35%) of modeled habitat are located on Type 1, 2, or 3 open space with 984 acres (12%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 3,200 acres of modeled habitat for the Reserve System. In addition,

1,000 acres of modeled habitat will be added to the Reserve System from existing open space. These acquisitions and additions will increase the proportion of protected modeled habitat in the study area to about 64% as Type 1 open space and 75% as Type 1, 2, or 3 open space (**Table 5-17**).

Land acquired for the Reserve System will protect suitable habitat for Metcalf Canyon jewelflower on the north side of Tulare Hill on the west side of Coyote Valley (LAND-P4). Suitable habitat in this area includes serpentine grasslands and serpentine outcrops and road cuts that have little soil development and are surrounded by grasslands. Target areas include Coyote Ridge near Metcalf Canyon where 68 occurrences of an unidentified jewelflower have been found (Arcadis 2008). It is unclear how many of these are Metcalf Canyon jewelflower but due to the proximity of known occurrences, many are likely to be this subspecies (the other likely candidate is most beautiful jewelflower).

Occurrence Acquisition

Regardless of the level of impact, the Implementing Entity will acquire at least three known extant occurrences of Metcalf Canyon jewelflower (LAND-P3). Acquisition of the three known occurrence must occur prior to the first impact. The Implementing Entity will also identify and protect an additional 10 new occurrences in the Reserve System to contribute to species recovery by Year 45 (the deadline for all Reserve System acquisition). If 10 new occurrences cannot be found and acquired in the Reserve System, then the Implementing Entity will create occurrences (i.e., if no occurrences are acquired, 10 will be created; if one occurrence is acquired, nine will be created, etc.) as described in the section below.

The *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c) calls for the acquisition of nine natural occurrences of Metcalf Canyon jewelflower to meet recovery criteria. At the time the Recovery Plan was written there were 13 known, extant occurrences of Metcalf Canyon jewelflower in the study area. Currently, there are 10 known, extant occurrences within the study area. Several of these occurrences are located on private lands that are highly parcelized and urbanized, making them low-priority targets for conservation.

The Habitat Plan will protect the highest quality natural occurrences. In combination with the one existing occurrence protected in Type 1 open space, there will be four protected natural occurrences in the study area prior to the first impact to the species or by Year 45 of the Plan, whichever comes first. There are several “jewelflower” occurrences that have yet to be determined to be Metcalf Canyon jewelflower or most beautiful jewelflower. Some of these occurrences are likely to be Metcalf Canyon jewelflower. Acquisition of these or other natural occurrences would be prioritized to meet the requirement to acquire or create ten more occurrences to contribute to species recovery.

In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as

described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

Occurrence Creation

If new occurrences of Metcalf Canyon jewelflower are not found and preserved, the Implementing Entity will create up to 10 occurrences of Metcalf Canyon jewelflower (i.e., if no occurrences are acquired, 10 will be created; if one existing occurrence is acquired, nine will be created, etc.). Creation is only considered as a conservation action, not mitigation.

Occurrence creation is expected to occur later in the permit term (but no later than by Year 40) because of the need to: (1) exhaust opportunities to discover new occurrences (which are the first priority), (2) assemble enough of the Reserve System to provide suitable habitat for occurrence creation, and (3) allow sufficient time to study optimum habitat conditions, target occurrence size and structure, and propagation techniques. The decision to focus conservation effort on occurrence creation will be made jointly with CDFG and USFWS. The Implementing Entity, in coordination with the Wildlife Agencies, will determine the target occurrence size and structure for created occurrences based on empirical data collected on occurrences in the Reserve System and other best available science.

Targeted studies and current research will be used to inform new occurrence establishment. Suitable habitat for created occurrences will be identified based on the habitat of known occurrences and any other available data at the time of acquisition (STUDIES-5). This will involve identifying suitable locations in the Reserve System and researching and identifying biologically appropriate and viable propagation or planting techniques for this species (STUDIES-13, STUDIES-14). It will also entail conducting field and literature research to determine the biologically appropriate seed sampling techniques and harvest numbers for acquisition of seed from existing occurrences (STUDIES-14). In addition, field experiments will be conducted (if the number of propagules allows) to test alternative techniques for occurrence establishment (STUDIES-15). Extensive research is being done on the propagation needs and responses of this species by Justen Whittall and co-investigators at Santa Clara University (Whittall 2008, 2011); preliminary results indicate that successful occurrence creation is feasible. In addition, their field surveys suggest that sites for 10 occurrences should be available (J. Whittall pers. comm.; Whittall 2011). Their results and expertise, along with other scientific data available during Plan implementation, will be consulted during Plan implementation.

The Recovery Plan (U.S. Fish and Wildlife Service 1998c) recommends that protected populations be distributed throughout the range of the species, including at least 25% west of U.S. 101 and 75% in the Metcalf Canyon area, east of U.S. 101. The Implementing Entity will consider these guidelines as associated with protection and creation efforts for this Plan unless best available science indicates that a different distribution would be more beneficial to the

conservation of the species. There are currently no known occurrences west of U.S. 101.

Management Techniques and Tools

To successfully manage and create new occurrences of Metcalf Canyon jewelflower, targeted studies will be conducted to determine factors that limit occurrence expansion, as well as those necessary for establishment and maintenance of new occurrences (STUDIES-5). Such studies may include specific seed germination requirements and successful transplantation requirements to create or augment new occurrences. Other studies may examine factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5).

The targeted studies will be used to inform the target occurrence size for managed occurrences. A preliminary goal of 2,000 individuals per occurrence will be implemented as recommended in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c); if approved by the Wildlife Agencies, this number will be adjusted as necessary pending research carried out during Plan implementation to assure viable occurrences of this species.

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for Metcalf Canyon jewelflower will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

Uncertainties and Threats

Metcalf Canyon jewelflower has not been well studied, and little is known about its population biology or ecological effects and needs. Because management and conservation decisions for this species are limited in their potential efficacy, the Implementing Entity has little information with which to design and plan specific management and monitoring protocols. Accordingly, directed studies are needed to successfully establish and maintain new occurrences in perpetuity (STUDIES-5).

The actual size and age structure of the extant occurrences of Metcalf Canyon jewelflower in the study area are currently unknown. A key management action will be to survey extant occurrences as they are added to the Reserve System and regularly monitor these occurrences, as well as the newly created occurrence, to quantify and track occurrence structure over time (STUDIES-5).

Threats to Metcalf Canyon jewelflower are thought to include cattle grazing, urban development, off-road motorcycles, garbage dumping, and road

construction and maintenance. Studies may be conducted to investigate the details of these threats and the best measures to mitigate them (STUDIES-5).

5.4.18 Most Beautiful Jewelflower

There are a total of 86 most beautiful jewelflower known occurrences throughout its range. There are 39 known occurrences within the study area. Only 40 of the 86 known occurrences have population estimates (see Chapter 4, Section 4.6.8 *Serpentine Plants* for more information). Impacts to six known occurrences are allowed by covered activities (**Tables 4-6 and 5-16**) if no additional occurrences are discovered during the permit term.

Biological Goals and Objectives

The Implementing Entity will protect, maintain the viability of, and increase the number and size of populations of most beautiful jewelflower by acquiring and enhancing 17 known extant occurrences in the permit area, if no additional occurrences are discovered during the permit term (**Table 5-16**). This includes acquisition of nine known occurrences for the Reserve System and the addition of eight known occurrences when portions of Alamaden Quicksilver, Calero, and Santa Teresa County parks are added into the Reserve System.

Most beautiful jewelflower is expected to benefit from acquisition and enhancement of natural communities that serve as its primary or secondary habitat and/or contain known extant occurrences, including grasslands (see Section 5.3.3 *Grassland Conservation and Management*) and chaparral and coastal scrub (see Section 5.3.4 *Chaparral and Northern Coastal Scrub Conservation and Management*).

Acquisition of Modeled Habitat

There are 14,362 acres of most beautiful jewelflower modeled habitat (primary and secondary) within the study area. A total of 5,042 acres (35%) of modeled habitat are located on Type 1, 2, or 3 open space with 1,500 acres (10%) permanently protected as Type 1 open space. The Plan proposes to acquire a minimum of 4,000acres of modeled habitat for the Reserve System. In addition, 1,700 acres of modeled habitat will be added to the Reserve System from existing open space. These acquisitions and addition will increase the proportion of protected modeled habitat in the study area to about 50% as Type 1 open space and 63% as Type 1, 2, or 3 open space (**Table 5-17**).

Land acquired for the Reserve System will protect suitable habitat along Coyote Ridge, in the Santa Teresa Hills, and west of Chesbro Reservoir, as well as, near Morgan Hill and in the southern end of the study area in the Santa Cruz Mountain foothills. Target areas include Coyote Ridge near Metcalf Canyon

where 68 occurrences of an unidentified jewelflower have been found (Arcadis 2008). It is unclear how many of these are most beautiful jewelflower but due to the proximity of known occurrences, many are likely to be this subspecies (the other likely candidate is Metcalf Canyon jewelflower).

Occurrence Acquisition

Regardless of the level of impact, 17 occurrences will be protected in the Reserve System (**Table 5-16**). Eight occurrences will be incorporated into the Reserve System to improve management and monitoring, and expand each occurrence, if biologically feasible, when portions of Alamaden Quicksilver, Calero, and Santa Teresa County parks are added to the Reserve System. In addition, the Implementing Entity will acquire nine occurrences of most beautiful jewelflower (LAND-P5).

As described in Chapter 4, the impact limit for this species could increase from 6 occurrences, if no additional occurrences are discovered during the permit term, to 8 occurrences, if additional occurrences are discovered during the permit term. A minimum of 2 occurrences have to be acquired prior to any newly discovered occurrence being impacted during the permit term. In other words, a minimum of 14 occurrences will be acquired and protected in the Reserve System before the 7th occurrence is impacted and a minimum of 16 occurrences will be acquired and protected in the Reserve System before the 8th occurrence is impacted. "Minimums" are referenced here because the Implementing Entity will protect 17 occurrences, regardless of impacts. The timing of acquisition of 12 of the 17 occurrences are linked to impacts, while the remaining 5 occurrences will be acquired for recovery purposes only and thus acquisition timing of these 5 occurrences are not linked to impacts. The newly discovered and protected occurrences must be in better condition than the impacted occurrences, according to the criteria in Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Incorporating Covered Plant Species*. In addition, new occurrences must be acquired before the impacts occur and by Year 45 (the deadline for all Reserve System acquisition).

There is a high potential to acquire additional natural populations under the Plan. As stated in section above, there are several "jewelflower" occurrences that have yet to be determined to be Metcalf Canyon jewelflower or most beautiful jewelflower. Some of these occurrences are likely to be most beautiful jewelflower. In order for an occurrence to count as protected under the Plan, there will be a buffer of at least 500 feet between the occurrence and adverse land uses, as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush*.

Management Techniques and Tools

To successfully manage occurrences of most beautiful jewelflower, targeted studies will be conducted to determine factors that limit occurrence expansion

(STUDIES-5). Such studies may examine factors related to management and microsite needs of the species at all life stages from germination through maturity (STUDIES-5). Adaptive management decisions can then be developed on the basis of monitoring results to mitigate, minimize, or eliminate limiting factors.

The targeted studies will be used to inform the target size for managed occurrences. A preliminary goal of 2,000 individuals per occurrence will be implemented as recommended in the *Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area* (U.S. Fish and Wildlife Service 1998c); if approved by the Wildlife Agencies, this number will be adjusted as necessary pending research carried out during Plan implementation to assure viable occurrences of this species.

To help implement the Recovery Plan for this species (U.S. Fish and Wildlife Service 1998c), a permanent conservation seed bank for most beautiful jewelflower will be established in the same manner as described for Tiburon Indian paintbrush in Section 5.4.10 *Tiburon Indian Paintbrush* subheading *Management Techniques and Tools* (STUDIES-12).

Uncertainties and Threats

Most beautiful jewelflower has been studied; however, little is known about its reproductive biology or demography. Herbivory and its impacts on the species are also poorly understood. Because management and conservation decisions for this species are limited in their potential efficacy, the Implementing Entity has little information with which to design and plan specific management and monitoring protocols. Accordingly, directed studies are needed to successfully establish and maintain new occurrences in perpetuity (STUDIES-5).

The age structure and occurrence trends of the extant occurrences of most beautiful jewelflower in the study area are currently unknown. An important management action will be to survey extant occurrences as they are added to the Reserve System and regularly monitor these occurrences to quantify and track the occurrence structure over time (STUDIES-5).

Threats to most beautiful jewelflower are thought to include cattle grazing, competition from invasive nonnative species (notably yellow star-thistle), habitat loss from residential development and road construction, rooting by feral pigs, and disturbance from landfill operations. Studies may be conducted to investigate the details of these threats and the best measures to mitigate them (STUDIES-5).

Table 5-1a. Biological Goals, Objectives and Conservation Actions: Landscape Level

Biological Goals and Objectives	Conservation Actions[1,2]	Monitoring Action
Goal 1a. Protect and maintain natural and semi-natural landscapes.[1]		
Objective 1a.1. Establish a reserve system of at least 46,496 acres and 100 stream miles within the study area (see Figure 5-05 for acquisition target areas by Conservation Analysis Zones).[2, 3]	LAND-L1. Acquire in fee title or obtain easements on 100 stream miles within the study area.	Compliance monitoring and annual reports
	LAND-L2a. Acquire in fee title or obtain easements on at least 33,205 acres of land for the Reserve System.	Compliance monitoring and annual reports
	LAND-L2b. Incorporate 13,291 acres of existing open space into the Reserve System.	Compliance monitoring and annual reports
Objective 1a.2. Protect streams (100 miles), ponds (50 acres) freshwater wetlands (10 acres), and seasonal wetlands (5 acres) within the Reserve System.	LAND-L3. Acquire in fee title or obtain easements on streams (100 miles), ponds (50 acres), freshwater wetlands (10 acres), and seasonal wetlands (5 acres) in all watersheds of the study area.	Compliance monitoring and annual reports
Goal 1b. Protect and maintain ecological (natural) processes.		
Objective 1b.1. Protect a range of environmental gradients (such as slope, elevation, aspect, rainfall) across a diversity of natural communities within the Reserve System.[2, 3]	LAND-L2c. Acquire in fee title or obtain easements on 33,205 acres of land for the Reserve System that includes the full range of topographic and geographic diversity in the study area.	Compliance monitoring and annual reports
	LAND-L2d. Incorporate 13,291 acres of existing open space into the Reserve System that includes the full range of topographic and geographic diversity in the study area.	Compliance monitoring and annual reports
Goal 2. Maintain or improve opportunities for movement and genetic exchange of native organisms within and between natural communities inside and connecting to areas outside of the study area.[4]		
Objective 2.1. Determine wildlife movement across Coyote Creek downstream of Anderson Reservoir, Pacheco Creek (SR 152), and the Pajaro River when adequate monitoring data exist on wildlife movement in the three focal areas or by year 10 of implementation, whichever comes first.	STUDIES-1. Conduct feasibility study to determine wildlife movement across Coyote Creek downstream of Anderson Reservoir, Pacheco Creek (SR 152), and the Pajaro River.	Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
Objective 2.2. Protect and enhance important habitat linkages for covered species and other native species within the Reserve System and protect connectivity to habitat outside the study area (Figure 5-6 and Table 5-9).[2]	LAND-L4. Acquire and enhance natural and semi-natural landscapes between the Santa Teresa Hills and Metcalf Canyon to the south that will contribute to providing connectivity between the Santa Cruz Mountains and the Diablo Range to promote the movement of covered and other native species at many spatial scales (Linkage 10 in Table 5-9 and Figure 5-6).	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
	LAND-L5. Acquire in fee title or obtain easements on 2,900 acres of serpentine grassland along Coyote Ridge to link existing protected areas and to create a large core reserve for serpentine grassland species to move within (Linkage 6 in Table 5-9 and Figure 5-6). These acreages are inclusive of, not in addition to, acquisition targets set in LAND-G3.	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
	LAND-L6. Acquire in fee title or obtain easements on at least 3,000 acres of grassland, chaparral & coastal scrub, and oak woodland natural communities south of Henry W. Coe State Park to link this core reserve with extensive wetlands surrounding San Felipe Lake in San Benito County (Linkage 14 in Table 5-9 and Figure 5-6).	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.

Biological Goals and Objectives	Conservation Actions[1,2]	Monitoring Action
	LAND- L7. Acquire in fee title or obtain easements on at least 2,300 acres of grassland, chaparral & coastal scrub, and oak woodland natural communities in the NE corner of the study area to link the core reserve that includes Joseph Grant County Park with SFPUC lands and other protected lands in Alameda County (Linkage 4 in Table 5-9 and Figure 5-6).	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
	LAND-L8. Acquire in fee title or obtain easements on at least 500 acres of grassland, chaparral & coastal scrub, and oak woodland natural communities to connect Almaden Quicksilver County Park with protected open space to the east near Calero Lake (Linkage 9 in Table 5-9 and Figure 5-6).	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
	LAND-L9. Acquire in fee title or obtain easements on 2,000 acres of conifer woodland, riparian forest & scrub, oak woodland, and grassland natural communities, in the portion of the Pescadero Watershed that is in the study area and along the Pajaro River, to maintain wildlife connections between the Santa Cruz Mountains and the Gabilan Range outside the study area (Linkages 18, 19, and 20 in Table 5-9 and Figure 5-6).	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
	LAND-L10. Acquire in fee title or obtain easements on serpentine grassland along Coyote Ridge to protect the connection between Silver Creek and Kirby Canyon (Linkage 6 in Table 5-9 and Figure 5-6) as part of the acquisition targets set in LAND-G3.	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
Objective 2.3. Increase the permeability of Highway 152 for species movement across Pacheco Creek and Highway 152 from the Highway 152/156 interchange east to the Santa Clara/Merced county line with structures that have the potential to most benefit movement of a variety of native species by year 20 (Linkage 15 in Figure 5-6 and Table 5-9).[6,7]	LM-1. Remove fences and private roads in areas where they are no longer needed and where their removal could increase the permeability of the study area for wildlife.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-2. When replacing small culverts ensure that the culvert has a natural bottom and is large enough for larger mammals such as deer and mountain lions to pass, if feasible. Culverts must provide direct movement from one side of the road to the other and ensure that the culvert is visible to the target species (i.e., do not obscure entrance with vegetation). Install fencing or other features that will direct wildlife towards the culvert or other safe crossing within the first 20 years of implementation.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-3. Where structurally possible, replace culverts with free span bridges to ensure free movement for wildlife under roadways.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-4. Ensure that median barrier removal and/or median perforations are considered as alternatives during project design.	Compliance monitoring for infrastructure/structure removal, replacement, or installation.

Biological Goals and Objectives	Conservation Actions[1,2]	Monitoring Action
	LM-5. Remove median barriers or perforate sections of median barriers along roadways to improve successful wildlife crossings and install fencing or other features to direct wildlife to those open sections within first 20 years of implementation. Use feasibility study to determine location and length of barrier removal.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
Objective 2.4. Increase the permeability for species movement across Santa Clara Valley between the Diablo Range and the Santa Cruz Mountains and between Coyote Ridge and Diablo Range to the Santa Cruz Mountains via Coyote Valley, Tulare Hill, or Fisher Creek with structures that have the potential to most benefit movement of a variety of covered and other native species by year 20 (Linkages 8 and 10 in Figure 5-6 and Table 5-9).[6]	LM-1. Remove fences and private roads in areas where they are no longer needed and where their removal could increase the permeability of the study area for wildlife.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-2. When replacing small culverts ensure that the culvert has a natural bottom and is large enough for larger mammals such as deer and mountain lions to pass, if feasible. Culverts must provide direct movement from one side of the road to the other and ensure that the culvert is visible to the target species (i.e., do not obscure entrance with vegetation). Install fencing or other features that will direct wildlife towards the culvert or other safe crossing within the first 20 years of implementation.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-3. Where structurally possible, replace culverts with free span bridges to ensure free movement for wildlife under roadways.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-4. Ensure that median barrier removal and/or median perforations are considered as alternatives during project design.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-5. Remove median barriers or perforate sections of median barriers along roadways to improve successful wildlife crossings and install fencing or other features to direct wildlife to those open sections within first 20 years of implementation. Use feasibility study to determine location and length of barrier removal.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
Objective 2.5 (not used)		
Objective 2.6. Increase the permeability for species movement from the Santa Cruz Mountains to the Pajaro River with structures that have the potential to most benefit movement of a variety of covered and other native species by year 20 (Linkage 18, 19, and 20 in Figure 5-6 and Table 5-9).[6]	LM-1. Remove fences and private roads in areas where they are no longer needed and where their removal could increase the permeability of the study area for wildlife.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.

Biological Goals and Objectives	Conservation Actions[1,2]	Monitoring Action
	LM-2. When replacing small culverts ensure that the culvert has a natural bottom and is large enough for larger mammals such as deer and mountain lions to pass, if feasible. Culverts must provide direct movement from one side of the road to the other and ensure that the culvert is visible to the target species (i.e., do not obscure entrance with vegetation). Install fencing or other features that will direct wildlife towards the culvert or other safe crossing within the first 20 years of implementation.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-3. Where structurally possible, replace culverts with free span bridges to ensure free movement for wildlife under roadways.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-4. Ensure that median barrier removal and/or median perforations are considered as alternatives during project design.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-5. Remove median barriers or perforate sections of median barriers along roadways to improve successful wildlife crossings and install fencing or other features to direct wildlife to those open sections within first 20 years of implementation. Use feasibility study to determine location and length of barrier removal.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
Objective 2.7. Increase the permeability for species movement from Highway 152 to the confluence with the Pajaro River with structures that have the potential to most benefit movement of a variety of covered and other native species by year 20 (Linkages 12 in Figure 5-6 and Table 5-9).[6]	LM-1. Remove fences and private roads in areas where they are no longer needed and where their removal could increase the permeability of the study area for wildlife.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-2. When replacing small culverts ensure that the culvert has a natural bottom and is large enough for larger mammals such as deer and mountain lions to pass, if feasible. Culverts must provide direct movement from one side of the road to the other and ensure that the culvert is visible to the target species (i.e., do not obscure entrance with vegetation). Install fencing or other features that will direct wildlife towards the culvert or other safe crossing within the first 20 years of implementation.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.

Biological Goals and Objectives	Conservation Actions[1,2]	Monitoring Action
	LM-3. Where structurally possible, replace culverts with free span bridges to ensure free movement for wildlife under roadways.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-4. Ensure that median barrier removal and/or median perforations are considered as alternatives during project design.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-5. Remove median barriers or perforate sections of median barriers along roadways to improve successful wildlife crossings and install fencing or other features to direct wildlife to those open sections within first 20 years of implementation. Use feasibility study to determine location and length of barrier removal.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
Goal 3. Enhance or restore representative natural and semi-natural landscapes to maintain or increase native biological diversity.		
Objective 3.1. To increase the total area of quality habitat for covered and other native species and to improve hydrologic function, enhance 33,205 acres of terrestrial and aquatic land cover types and 100 miles of streams, and restore 1 mile of stream and restore or create 90 acres of aquatic land cover types within the Reserve System. If all predicted impacts occur, restore 10.4 miles of streams and restore or create 501 acres of aquatic land cover types within the Reserve System.[3]	LM-6. Enhance or restore an estimated 17,440 acres of grassland, 2,500 acres of chaparral and northern coastal scrub, 12,900 acres of oak woodland, 290 acres of riparian forest and scrub, and 10 acres of conifer woodland within the Reserve System.	Compliance monitoring with additional monitoring for effectiveness of restoration/enhancement/creation developed at natural community level.
	LM-7a. Restore a minimum of 1.0 miles of stream, 50 acres of riparian forest and scrub, and 20 acres of freshwater marsh, and create 20 acres of ponds to contribute to species recovery.	Compliance monitoring. Monitor baseline hydrologic function against future changes.
	LM-7b. If all predicted impacts occur, restore 10.4 miles of streams, 339 acres of riparian forest and scrub, 45 acres of freshwater marsh, and 30 acres of seasonal wetlands, and create 72 acres of ponds within all watersheds of the study area to maintain and when necessary improve stream hydrologic functions.	Compliance monitoring. Monitor baseline hydrologic function against future changes.
Objective 3.2a. Ensure natural fire disturbance regimes required for natural community regeneration and structural diversity, and covered species germination and recruitment occur within the Reserve System or implement management actions that mimic those natural disturbances through development of a fire management component of each reserve unit management plan.[3,8]	LM-8. Negotiate with Cal Fire and other local fire-fighting agencies the use of management response measures for all fire events and fire-dependent ecosystems that minimize impacts to natural communities and covered species while protecting human life and property. All burns will be responded to, and prescribed burns will be conducted, with minimum impact suppression tactics. Burn response will take into consideration ignition location and method, seasonality, weather and availability of suppression forces.	Compliance monitoring including effects of burning monitored as part of natural community enhancement. For management actions that mimic natural fire regimes, compare post-fire vegetation to baseline conditions at periodic intervals to assess the effect of various fire frequencies and intensities at promoting native plants and reducing non-native plants. Monitor target covered species response.
	LM-9. In identified “no burn” areas implement the biologically appropriate management actions that mimic the natural effects of fire (e.g., mowing, grazing, hand pulling) to subsequently improve habitat for native vegetation.	Analyze and quantify effectiveness of burning vs. other management actions in increasing diversity and quantity of native vegetation. Monitor target covered species response, if applicable.

Biological Goals and Objectives	Conservation Actions[1,2]	Monitoring Action
Objective 3.2b. Ensure natural flooding disturbance regimes required for natural community regeneration and structural diversity, and covered species germination and recruitment occur within the Reserve System or implement management actions that mimic those natural disturbances through adoption of the SCVWD Natural Flood Protection Plan (2000).[3]	LM-10. Integrate adopted policies for natural flood protection (i.e., Ordinance O6-1, *Clean, Safe Creeks and Natural Flood Protection Plan* , *Coyote Watershed Stream Stewardship Plan*) into flood protection projects to protect habitat for covered fish, amphibians, and reptiles.	Compliance monitoring
Objective 3.3. Eradicate or reduce the cover, biomass, and distribution of existing target, non-native invasive plants and reduce the number and distribution of non-native, invasive animals to enhance natural communities and covered species habitat within the Reserve System.[3]	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	LM-12. Eradicate or reduce nonnative pig disturbance within the Reserve System through trapping, hunting, or other control methods. Success criteria is achieved through ensuring disturbances by nonnative pigs do not impair the ability of the Reserve System from meeting the biological goals and objectives.	Analyze and quantify numbers of pigs eradicated and evidence of remaining population (e.g., pig observations or signs of damage).
	LM-13. Eradicate or reduce nonnative predators (bullfrogs, invasive fish, feral cats) within the Reserve System through habitat manipulation (e.g., periodic draining of ponds), trapping, hand capturing, electroshocking or other control methods to achieve targets identified in reserve unit management plans.	Monitor response of nonnative predators to habitat manipulation and assess efficacy of various techniques.
	LM-14. Selectively apply herbicides or other treatments to invasive plants.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	STUDIES-2. Experimentally manage oak woodlands to reduce seedling mortality, increase seedling and sapling survival and determine factors relevant to regeneration, including browsing by mammals, birds, and insects.	Monitor research results.

Notes:

[1] Habitat enhancement, monitoring, and adaptive management program, will continue in perpetuity. Restoration and creation must occur in rough step with impacts as required by the Stay-Ahead provision (see Chapter 8, Section 8.6.1). All habitat restoration will be completed by Year 40.

[2] Land acquisition must occur in rough step with impacts as required by the Stay-Ahead provision (see Chapter 8, Section 8.6.1). All land acquisition must be complete by Year 45. Land acquisition requiring restoration or creation of habitat for Covered Species must be complete by Year 40.

[3] See Tables 5-4 and Figure 5-4. Existing open space requirements for the Reserve System may be substituted with new acquisition in addition to the minimum of 33,205 acres of new acquisition required by the Plan.

[4] Excerpted from NCCP Act and revised for the Plan.

[6] Specific locations and structures will be identified as part of a feasibility study.

[7] Design will be based on the best available science and be consistent with Condition 6 described in Chapter 6, Section 6.4.4, subheading *Condition 6 Design and Construction Requirements for Covered*

[8] Fire management will be incorporated into the reserve unit management plans within 5 years of the first acquisition of the land for the reserve unit.

Table 5-1b. Biological Goals, Objectives, and Conservation Actions: Natural Community Level

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Grassland		
Goal 4. Maintain and enhance grassland communities that benefit covered species and promote native biodiversity.		
Objective 4.1. Protect 4,130 acres of serpentine grassland containing the full range of serpentine grassland associations and species including serpentine seeps and serpentine rock outcrops as part of the Reserve System within the study area.[1]	LAND-G1. Acquire 4,130 acres of serpentine grassland by fee title or conservation easement with the full range of serpentine grassland associations and vegetation diversity found throughout the study area. This includes 4,000 acres of serpentine bunchgrass grassland, 120 of serpentine rock outcrops/barrens, and 10 acres of serpentine seeps.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 4.2. Protect 13,300 acres of annual grassland in a diversity of soils types and other environmental gradients including areas suitable for enhancing native species, provide a matrix of pond, wetland, and upland habitat, and those containing native grassland as part of the Reserve System within the study area.[1]	LAND-G2. Acquire 13,300 acres of annual grassland by fee title or conservation easement as part of the Reserve System. Target areas on both sides of Santa Clara Valley with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored. Acquisition of native grassland will be given priority.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 4.3a. Reduce cover and biomass of non-native plants.[2]	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on reducing nonnative plants and increasing diversity and biomass of native plants. In oak woodlands, monitor effects of various grazing regimes on oak woodland regeneration and recruitment. Monitor target covered species responses.
	GRASS-2. Conduct prescribed burns. Use targeted studies to inform methods, timing, location, and frequency.	Monitor effects of burning on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species responses.
	GRASS-3. Conduct mowing in selected areas to mimic grazing where use of livestock is impractical.	Monitor effects of mowing on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species response.
	GRASS-4. Conduct selected seeding of native forbs and grasses in the Reserve System.	Monitor success of seeding efforts in promoting native forbs and grasses. Monitor target covered species responses.
	LM-8. Negotiate with Cal Fire and other local fire-fighting agencies the use of management response measures for all fire events and fire-dependent ecosystems that minimize impacts to natural communities and covered species while protecting human life and property. All burns will be responded to, and prescribed burns will be conducted, with minimum impact suppression tactics. Burn response will take into consideration ignition location and method, seasonality, weather and availability of suppression forces.	Compare post-fire vegetation to baseline conditions at periodic intervals to assess the effect of various fire frequencies and intensities at promoting native plants and reducing non-native plants. Monitor target covered species response.
	LM-9. In identified “no burn” areas implement the biologically appropriate management actions that mimic the natural effects of fire (e.g., mowing, grazing, hand pulling) to subsequently improve habitat for native vegetation.	Analyze and quantify effectiveness of burning vs. other management actions in increasing diversity and quantity of native vegetation. Monitor target covered species response, if applicable.
	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	LM-14. Selectively apply herbicides or other treatments to invasive plants.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.

Table 5-1b. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 4.3b. Decrease nitrogen deposition in serpentine grasslands to reduce non-native, invasive plant growth.	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on reducing nonnative plants and increasing diversity and biomass of native plants. In oak woodlands, monitor effects of various grazing regimes on oak woodland regeneration and recruitment. Monitor target covered species responses.
	GRASS-2. Conduct prescribed burns. Use targeted studies to inform methods, timing, location, and frequency.	Monitor effects of burning on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species responses.
	GRASS-3. Conduct mowing in selected areas to mimic grazing where use of livestock is impractical.	Monitor effects of mowing on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species response.
	GRASS-4. Conduct selected seeding of native forbs and grasses in the Reserve System.	Monitor success of seeding efforts in promoting native forbs and grasses. Monitor target covered species responses.
	LM-8. Negotiate with Cal Fire and other local fire-fighting agencies the use of management response measures for all fire events and fire-dependent ecosystems that minimize impacts to natural communities and covered species while protecting human life and property. All burns will be responded to, and prescribed burns will be conducted, with minimum impact suppression tactics. Burn response will take into consideration ignition location and method, seasonality, weather and availability of suppression forces.	Compare post-fire vegetation to baseline conditions at periodic intervals to assess the effect of various fire frequencies and intensities at promoting native plants and reducing non-native plants. Monitor target covered species response.
Objective 4.3c. Increase the diversity of native plants within the Reserve System.[2]	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on reducing nonnative plants and increasing diversity and biomass of native plants. In oak woodlands, monitor effects of various grazing regimes on oak woodland regeneration and recruitment. Monitor target covered species responses.
	GRASS-2. Conduct prescribed burns. Use targeted studies to inform methods, timing, location, and frequency.	Monitor effects of burning on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species responses.
	GRASS-3. Conduct mowing in selected areas to mimic grazing where use of livestock is impractical.	Monitor effects of mowing on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species response.
	GRASS-4. Conduct selected seeding of native forbs and grasses in the Reserve System.	Monitor success of seeding efforts in promoting native forbs and grasses. Monitor target covered species responses.
	LM-8. Negotiate with Cal Fire and other local fire-fighting agencies the use of management response measures for all fire events and fire-dependent ecosystems that minimize impacts to natural communities and covered species while protecting human life and property. All burns will be responded to, and prescribed burns will be conducted, with minimum impact suppression tactics. Burn response will take into consideration ignition location and method, seasonality, weather and availability of suppression forces.	Compare post-fire vegetation to baseline conditions at periodic intervals to assess the effect of various fire frequencies and intensities at promoting native plants. Monitor target covered species response.
	LM-9. In identified “no burn” areas implement the biologically appropriate management actions that mimic the natural effects of fire (e.g., mowing, grazing, hand pulling) to subsequently improve habitat for native vegetation.	Analyze and quantify effectiveness of burning vs. other management actions in increasing diversity and quantity of native vegetation. Monitor target covered species response, if applicable.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 4.4. Increase the distribution and availability of California ground squirrels to increase the prey base for San Joaquin kit fox and to increase burrow availability within grassland for California tiger salamander, California red-legged frog, western burrowing owl, San Joaquin kit fox, and other native species within the Reserve System.[2]	GRASS-5. Prohibit use of rodenticides within the Reserve System, except when needed to protect the integrity of structures, such as levees, stock ponds and dams.	Monitor population trend of California ground squirrels. Track changes in burrowing mammal colony size over time.
	GRASS-6. Introduce livestock grazing where it is not currently used, and where conflicts with covered activities are minimized, to reduce vegetative cover and biomass that currently excludes ground squirrel and encourage ground squirrel colonization of new areas within the Reserve System.	Monitor population trend of California ground squirrels. Analyze and quantify changes in burrowing mammal colony size over time.
Chaparral and Northern Coastal Scrub		
Goal 5. Maintain and enhance functional chaparral and northern coastal scrub communities to benefit covered species and promote native biodiversity.		
Objective 5.1. Protect 2,500 acres of chaparral and northern coastal scrub containing the full range of chaparral and northern coastal scrub community associations and manage it as part of the Reserve System within the study area.[1]	LAND-C1. Acquire 400 acres of northern mixed chaparral/chamise chaparral by fee title or conservation easement.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-C2. Acquire 700 acres of mixed serpentine chaparral by fee title or conservation easement.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-C3. Acquire 1,400 acres of northern coastal scrub/Diablan sage scrub by fee title or conservation easement.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 5.2. Enhance all acquired chaparral and northern coastal scrub land cover types by promoting regeneration and succession to sustain the natural processes and native species diversity found in these communities within the Reserve System.[2]	STUDIES-2. Determine factors relevant to the health and regeneration of native chaparral/scrub species. Targeted studies will be imitated within first 10 years of plan implementation. Use results of targeted studies to revise and improve management actions.	Conduct targeted research that identifies key factors affecting regeneration and succession of chaparral/scrub.
	CHAP-1. Conduct prescribed burns in chaparral and northern coastal scrub to maintain canopy gaps and promote regeneration. Use targeted studies to inform locations and frequency.	Monitor effects of burning on promoting canopy gaps, regeneration, and succession in chaparral and northern coastal scrub.
	CHAP-2. Mechanically thin chaparral and northern coastal scrub to promote structural diversity. Use targeted studies to inform location and frequency.	Monitor effects of mechanical thinning on promoting canopy gaps, regeneration, and succession in chaparral and northern coastal scrub.
	CHAP-3. Identify areas in the Santa Cruz Mountains and eastern mountains where adjacent natural communities (e.g. grassland, oak woodland, conifer forests) are encroaching on chaparral and scrub land cover and, if appropriate, work to reduce the spread through manual reduction.	Analyze and quantify spread of adjacent natural communities into chaparral and scrub land cover types. Study spread rate after manual reduction.
	LM-8. Negotiate with Cal Fire and other local fire-fighting agencies the use of management response measures for all fire events and fire-dependent ecosystems that minimize impacts to natural communities and covered species while protecting human life and property. All burns will be responded to, and prescribed burns will be conducted, with minimum impact suppression tactics. Burn response will take into consideration ignition location and method, seasonality, weather and availability of suppression forces.	Compare post-fire vegetation to baseline conditions at periodic intervals to assess the effect of various fire frequencies and intensities at promoting native plants and reducing non-native plants. Monitor target covered species response.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Oak and Conifer Woodland		
Goal 6. Maintain and enhance functional oak woodland communities to benefit covered species and promote native biodiversity.		
Objective 6.1. Protect 1,700 acres of valley oak woodland, 7,100 acres of mixed oak woodland and forest, 2,900 acres of coast live oak woodland and forest, 1,100 acres of blue oak woodland, 80 acres of foothill pine-oak woodland, and 20 acres of mixed evergreen forest, containing the full range of oak woodland associations and species, and that provide a matrix of pond, wetland, and upland habitat as part of the Reserve System within the study area.[1]	LAND-OC1. Acquire in fee title or obtain conservation easements on 7,100 acres of mixed oak woodland and forest, including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-OC2. Acquire 2,900 acres of coast live oak woodland and forest by fee title or conservation easement, including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-OC3. Acquire 1,100 acres of blue oak woodland and 1,700 acres of valley oak woodland by fee title or conservation easement including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-OC4. Acquire 80 acres of foothill pine-oak woodland and forest by fee title or conservation easement, including land in both the Santa Cruz Mountains and Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-OC5. Acquire 20 acres of mixed evergreen forest by fee title or conservation easement including land in both the Santa Cruz Mountains and Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 6.2a. Enhance all acquired oak woodland land cover types by reducing invasive plant and animal species.[2]	LM-12. Eradicate or reduce nonnative pig disturbance within the Reserve System through trapping, hunting, or other control methods. Success criteria is achieved through ensuring disturbances by nonnative pigs do not impair the ability of the Reserve System from meeting the biological goals and objectives.	Monitor effectiveness of pig removal efforts and response of oak woodlands once pigs are removed.
	LM-14. Selectively apply herbicides or other treatments to invasive plants.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	OAK-1. Conduct prescribed burns in low-density oak woodlands to enhance the community and to reduce non-native, invasive grass cover beneath oaks and encourage growth of a native understory and oak seedlings.	Monitor effects of burning on promoting regeneration and recruitment of oak woodlands and understory land cover. Monitor covered species response.
	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on reducing nonnative plants and increasing diversity and biomass of native plants. In oak woodlands, monitor effects of various grazing regimes on oak woodland regeneration and recruitment. Monitor target covered species responses.

Table 5-1b. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 6.2b. Promote regeneration and recruitment of all acquired oak woodland land cover types by promoting regeneration and recruitment of component species.[2]	OAK-1. Conduct prescribed burns in low-density oak woodlands to enhance the community and to reduce non-native, invasive grass cover beneath oaks and encourage growth of a native understory and oak seedlings.	Monitor effects of burning on promoting regeneration and recruitment of oak woodlands and understory land cover. Monitor covered species response.
	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on reducing nonnative plants and increasing diversity and biomass of native plants. In oak woodlands, monitor effects of various grazing regimes on oak woodland regeneration and recruitment. Monitor target covered species responses.
Objective 6.2c. Enhance all acquired oak woodland and cover types by sustaining the natural processes found in these communities.[2]	STUDIES-3. Experimentally manage oak woodlands to reduce seedling mortality, increase seedling and sapling survival and determine factors relevant to regeneration, including browsing by mammals, birds, and insects.	Conduct targeted research that identifies key factors affecting seedling mortality, seedling and sapling survival and factors relevant to oak woodland regeneration.
	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on reducing nonnative plants and increasing diversity and biomass of native plants. In oak woodlands, monitor effects of various grazing regimes on oak woodland regeneration and recruitment. Monitor target covered species responses.
	OAK-1. Conduct prescribed burns in low-density oak woodlands to enhance the community and to reduce non-native, invasive grass cover beneath oaks and encourage growth of a native understory and oak seedlings.	Monitor effects of burning on promoting regeneration and recruitment of oak woodlands and understory land cover. Monitor covered species response.
Goal 7. Maintain and enhance functional conifer woodland communities to benefit covered species and promote native biodiversity.		
Objective 7.1. Protect 10 acres of redwood forest as part of the Reserve System within the study area.[1]	LAND-OC6. Acquire 10 acres of redwood forest by fee title or conservation easement.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 7.2. Enhance all acquired conifer woodland communities by promoting ecologically appropriate structure, density, and species composition to preserve and sustain the natural processes and native species diversity found in these communities.[3]	STUDIES-4. Experimentally manage redwood forest to determine factors relevant to regeneration and maintenance; possibly including prescribed burning, selective thinning, and other management actions to meet this objective.	Conduct targeted research in redwood forest, ponderosa pine woodland, and knobcone pine woodland to guide management actions and other factors relevant to regeneration and maintenance.
	OAK-2. Conduct prescribed burns in redwood forest to maintain or enhance native species diversity in the mid-canopy and understory.	Monitor effects of burning on promoting native species diversity.
	OAK-3. Mechanically thin the understory of redwood forest in target areas to promote a healthy understory/canopy.	Monitor effects of mechanical thinning on regeneration and succession in the understory and canopy of conifer woodlands. Monitor target covered species response, if applicable.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Riverine and Riparian Forest and Scrub		
Goal 8. Improve the quality of streams and the hydrologic and geomorphic processes that support them to maintain a functional aquatic and riparian community to benefit covered species and promote native biodiversity.		
Objective 8.1. Protect 100 miles of streams to promote habitat function, wildlife movement, and stream temperature moderation as part of the Reserve System within the study area.[1, 3]	STREAM-1. Exclude livestock access to target stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
	LAND-R1. Extend the Uvas Creek Park Preserve 1.6 miles upstream to Hecker Pass Highway and setback expected development adjacent to this stream segment by a minimum of 100 feet to protect the Uvas Creek Corridor consistent with Goals 5-5, 5-7, and 5-8 of the approved City of Gilroy Hecker Pass Specific Plan. Target acquisitions will to contribute to the protection of a total of 800 acres of riparian woodland and forest in the Uvas, Llagas, and Pacheco watersheds.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 8.2. If all impacts occur, restore 10.4 stream miles on acquired fish bearing stream, as identified in Figure 3-12, within the Reserve System.[2]	STREAM-1. Exclude livestock access to target stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
	STREAM-2. Plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature at all riparian restoration sites.	Monitor the efficacy of seeding efforts with respect to structural diversity, overhead cover, and water temperature compared to designated reference locations. Indicator species will be selected and success criteria developed for large-scale restoration projects from the reference locations.
	STREAM-3. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors, or re-establish severally degraded or historic riparian corridors, to promote continuity within conservation lands.	STREAM-4. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors to promote continuity.
	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
Objective 8.3. Enhance all miles of streams within the Reserve System to promote natural community functions, and habitat heterogeneity and connectivity.[2]	STREAM-4. Replace concrete, earthen or other engineered channels as part of the 10.4 miles of stream restoration to restore floodplain connectivity. Location and length will be determine by site-specific conditions.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	STREAM-5. Replace confined channels to restore floodplain connectivity and commensurate functions as part of the 10.4 miles of stream restoration. Location and length will be determine by site-specific conditions.	Conduct pre- and post-treatment monitoring of community function (performance of ecological processes); habitat composition, structure and pattern; and connectivity as part of a targeted study.
	STREAM-6. Manage watershed-wide fine sediment inputs by conditioning controls on runoff from all development projects (see Condition 3) to improve riverine habitat functions and geomorphic processes.	Conduct annual spot checks on new developments to determine whether sediment run-off provisions are consistent with the Conditions outlined in this Plan.

Table 5-1b. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Goal 9. Maintain a functional riparian forest and scrub community at a variety of successional stages and improve these communities to benefit covered species and promote native biodiversity.		
Objective 9.1. Protect a minimum of 250 acres of large (at least 10 acres), contiguous stands of willow riparian forest and scrub or mixed riparian forest and woodland within the 100-year floodplain to maximize the width of native vegetation below dams to promote habitat function, wildlife movement, and stream temperature moderation as part of the Reserve System within the study area. Up to 578 acres of riparian forest and scrub will be protected if all estimated impacts occur.[1]	LAND-R2. Acquire in fee title or obtain conservation easements on lands that protect at least 250 acres and up to 578 acres of existing willow riparian forest and scrub or mixed riparian forest and woodland, including areas that provide key connectivity between existing riparian habitats in upper Coyote Creek, San Felipe Creek, Uvas Creek, Tar Creek, Little Arthur Creek, and Pacheco Creek.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	STREAM-1. Exclude livestock access to target stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
Objective 9.2. Protect a minimum of 40 acres of large (at least 10 acres), contiguous stands of Central California sycamore alluvial woodland within the 100-year floodplain to maximize the width of native vegetation below dams to promote habitat function, wildlife movement, and stream temperature moderation as part of the Reserve System within the study area.[1]	LAND-R3. Acquire in fee title or obtain conservation easements on lands that protect at least 40 acres of existing Central California sycamore alluvial woodland to ensure that this very rare and threatened land cover type is preserved in the study area.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	STREAM-1. Exclude livestock access to target stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
Objective 9.3. Restore an acre of high-quality willow riparian forest and scrub and mixed riparian forest and woodland and two acres of Central California sycamore alluvial woodland at a variety of successional stages within the Reserve System for every acre removed by covered activities (up to 339 acres of willow and mixed riparian forest and up to 14 acres of sycamore woodland if all impacts occur).[2]	STREAM-2. Plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature at all riparian restoration sites.	Monitor the efficacy of seeding efforts with respect to structural diversity, overhead cover, and water temperature compared to designated reference locations. Indicator species will be selected and success criteria developed for large-scale restoration projects from the reference locations.
	STREAM-3. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors, or re-establish severally degraded or historic riparian corridors, to promote continuity within conservation lands.	STREAM-4. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors to promote continuity.
Objective 9.4. Enhance all riparian forest and scrub at a variety of successional stages within the Reserve System.[2]	STREAM-1. Exclude livestock access to target stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
Objective 9.5. Restore at least 50 acres of willow riparian forest and scrub and mixed riparian woodland to increase available habitat species and enhance connectivity within the Reserve System to contribute to species recoverey.[2]	STREAM-2. Plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature at all riparian restoration sites.	Monitor the efficacy of seeding efforts with respect to structural diversity, overhead cover, and water temperature compared to designated reference locations. Indicator species will be selected and success criteria developed for large-scale restoration projects from the reference locations.
	STREAM-3. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors, or re-establish severally degraded or historic riparian corridors, to promote continuity within conservation lands.	STREAM-4. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors to promote continuity.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Wetland and Pond		
Goal 10. Maintain, enhance, and create or restore functional pond, freshwater perennial wetland, and seasonal wetland habitats that benefit covered species and promote native biodiversity.		
Objective 10.1. Protect a minimum of 10 acres total of perennial wetlands, 5 acres total of seasonal wetlands, and 50 total acres of ponds as part of the Reserve System within the study area to contribute to species recovery, regardless of impacts.[1]Aquatic habitat preserved for the purposes of the Plan must be adjacent to permanently protected upland habitat for covered species.	LAND-WP1a. Acquire in fee title or conservation easement 10 acres of perennial freshwater wetlands suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-WP2a. Acquire in fee title or conservation easement 5 acres of seasonal freshwater wetlands suitable for covered or native species and/or other seasonal wetlands capable of being enhanced or restored to support covered species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-WP3a. Acquire in fee title or conservation easement 50 acres of ponds suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 10.2. Protect up to 50 acres of perennial wetlands, 30 acres of seasonal wetlands, and 104 acres of ponds as part of the Reserve System if all estimated impacts occur.[1] Aquatic habitat preserved for the purposes of the Plan must be adjacent to permanently protected upland habitat for covered species	LAND-WP1b. Acquire in fee title or conservation easement up to 50 acres of perennial freshwater wetlands suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-WP2b. Acquire in fee title or conservation easement up to 30 acres of seasonal freshwater wetlands suitable for covered or native species and/or other seasonal wetlands capable of being enhanced or restored to support covered species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-WP3b. Acquire in fee title or conservation easement up to 104 acres of ponds suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 10.3. As determined by covered and native species needs, enhance all freshwater and seasonal wetlands and ponds by increasing native vegetative cover, biomass, and structural diversity in and around the margins within five years of pond or wetland acquisition within the Reserve System.[2]	POND-1. Install fencing that will reduce grazing pressure and exclude feral pigs on portions of ponds and wetlands and provide vegetated refuge sites for covered species. Fence installation will be carefully applied to avoid negative impacts on small mammal movement and upland habitat.	Monitor effectiveness of fencing to exclude livestock and feral pigs and compare vegetation inside of fencing to vegetation outside of fencing. Evaluate success of wetland and pond enhancement using established success criteria.
	POND-2. Install woody debris around perimeter and in submerged banks of ponds and wetlands to create basking habitat and cover for native juvenile amphibians and turtles. Materials imported from outside of the watershed shall be treated for chytrid and other potential pathogens prior to installation.	Analyze and quantify effectiveness of created basking site through routine monitoring in ponds with known western pond turtle occupancy.
	POND-3. Plant native emergent vegetation around the perimeter and in ponds and wetlands.	Monitor survivorship of planting, quantify vegetated perimeter of pond, describe habitat quality and periodically survey for species response from covered amphibians and reptiles. Evaluate success of wetland and pond enhancement using established success criteria.
	POND-4. Clear vegetation and/or remove sediment in a way that minimizes negative effects on covered species when vegetation and/or sediment restricts the ability of the aquatic environment from meeting the biological goals and objectives of the Plan.	Evaluate success of wetland and pond enhancement using established success criteria.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	LM-12. Eradicate or reduce nonnative pig disturbance within the Reserve System through trapping, hunting, or other control methods. Success criteria is achieved through ensuring disturbances by nonnative pigs do not impair the ability of the Reserve System from meeting the biological goals and objectives.	Analyze and quantify numbers of pigs eradicated and evidence of remaining population (e.g., pig observations or signs of damage).
Objective 10.4. Enhance all ponds by reducing the cover and biomass of non-native, invasive plants in the adjacent uplands between the functional perimeter of the ponds and within 0.5 miles. Pond enhancement will begin immediately after reserve unit management plans are completed or updated for each reserve unit.[2]	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Evaluate success of wetland and pond enhancement using established success criteria.
	LM-14. Selectively apply herbicides or other treatments to invasive plants.	Evaluate success of wetland and pond enhancement using established success criteria.
	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor research results.
	POND-3. Plant native emergent vegetation around the perimeter and in ponds and wetlands.	Monitor survivorship of planting, quantify vegetated perimeter of pond, describe habitat quality and periodically survey for species response from covered amphibians and reptiles. Evaluate success of wetland and pond enhancement using established success criteria.
	POND-5. If biologically appropriate, graze or mechanically thin around pond perimeter to mimic grazing and promote native species.	Evaluate success of wetland and pond enhancement using established success criteria.
Objective 10.5. Enhance all ponds and wetlands within the Reserve System by eradicating or reducing density of exotic species by 95% that are detrimental to native pond and wetland biodiversity to increase number of ponds and wetlands occupied by covered species. Wetland and pond enhancement will begin immediately after reserve unit management plans are completed or updated for each reserve unit.[2]	LM-12. Eradicate or reduce nonnative pig disturbance within the Reserve System through trapping, hunting, or other control methods. Success criteria is achieved through ensuring disturbances by nonnative pigs do not impair the ability of the Reserve System from meeting the biological goals and objectives.	Analyze and quantify numbers of pigs eradicated and evidence of remaining population (e.g., pig observations or signs of damage).
	LM-13. Eradicate or reduce nonnative predators (bullfrogs, invasive fish, feral cats) within the Reserve System through habitat manipulation (e.g., periodic draining of ponds), trapping, hand capturing, electroshocking or other control methods to achieve targets identified in reserve unit management plans.	Monitor response of nonnative predators to habitat manipulation. Evaluate effect of predator abatement on native pond and wetland biodiversity. Determine presence of covered species.
	POND-1. Install fencing that will reduce grazing pressure and exclude feral pigs on portions of ponds and wetlands and provide vegetated refuge sites for covered species. Fence installation will be carefully applied to avoid negative impacts on small mammal movement and upland habitat.	Monitor effectiveness of fencing to exclude livestock and feral pigs and compare vegetation inside of fencing to vegetation outside of fencing. Evaluate success of wetland and pond enhancement using established success criteria.
Objective 10.6. Restore at least 20 acres of freshwater and seasonal wetlands to increase available habitat species and enhance connectivity among existing ponds and wetlands for covered species within the Reserve System to contribute to species recovery.[2]	POND-6. Restore 20 acres of perennial freshwater marsh within the Reserve System in suitable sites and those likely to support covered species.	Compliance monitoring. Monitor freshwater marsh and wetland restoration and assess whether success criteria are being met. Assess connectivity of restored complexes.
Objective 10.7. In addition to the restoration of wetlands described in **Objective 10.6**, restore up to 55 acres of perennial freshwater and seasonal wetlands in-kind within the Reserve System to increase available habitat and enhance connectivity among existing ponds and wetlands for covered species if all anticipated impacts occur.[2]	POND-7. In addition to the perennial freshwater marsh restoration described in **POND-6**, restore up to 25 acres of perennial freshwater marsh within the Reserve System in the Santa Cruz Mountains, Santa Clara Valley, and Diablo Range.	Compliance monitoring. Monitor freshwater marsh and wetland restoration and assess whether success criteria are being met. Assess connectivity of restored complexes.
	POND-8. Restore up to 30 acres of seasonal wetlands within the Reserve System in the Santa Cruz Mountains, Santa Clara Valley, and Diablo Range.	Compliance monitoring. Monitor freshwater marsh and wetland restoration and assess whether success criteria are being met. Assess connectivity of restored complexes.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 10.8. Create at least 20 acres of ponds at 40 sites to increase available covered species habitat and enhance connectivity among existing ponds and wetlands within the Reserve System. [2]	POND-9. Create at least 20 acres of ponds at 40 sites, at least 10 sites in the Santa Cruz Mountains and 20 sites in the Diablo Range.	Compliance monitoring. Monitor pond construction and assess whether success criteria are being met.
Objective 10.9. In addition to the creation of ponds described in **Objective 10.8**, create up to 52 acres of ponds in-kind within the Reserve System to increase the amount available habitat and enhance connectivity among existing ponds and wetlands if all anticipated impacts occur.[2]	POND-10. In addition to the creation of ponds described in POND-9, create up to 52 acres of ponds in-kind within the Reserve System to increase the amount available habitat and enhance connectivity among existing ponds and wetlands if all anticipated impacts occur.3	Compliance monitoring. Monitor pond construction and assess whether success criteria are being met.

Notes:

[1] Land acquisition must occur in rough step with impacts as required by the Stay-Ahead provision (see Chapter 8, Section 8.6.1). All land acquisition must be complete by Year 45. Section 5.3 of the Plan provides more detail on areas targeted for acquisition for each natural community. Reserve lands will be managed in accordance with reserve unit management plans, completed within 5 years of the acquisition of the 1st parcel within the reserve unit. The conservation strategy for aquatic land cover types includes preservation/enhancement, restoration, and/or creation. See Tables 5-14 and 5-15 for details.

[2] Habitat enhancement, monitoring, and adaptive management program, will continue in perpetuity. Restoration and creation must occur in rough step with impacts as required by the Stay Ahead provision (see Chapter 8, Section 8.6.1). All habitat restoration will be completed by Year 40 unless otherwise noted in this table. Reserve lands will be managed in accordance with reserve unit management plans, completed within 5 years of the acquisition of the 1st parcel within the reserve unit. The conservation strategy for aquatic land cover types are three fold and include preservation/enhancement, restoration, and/or creation. See Tables 5-14 and 5-15 for details.

[3] Watershed-specific targets are established for certain stream reaches within each watershed.

Table 5-1c. Biological Goals, Objectives and Conservation Actions: Wildlife

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Goal 11. Improve the viability of existing Bay checkerspot butterfly populations, increase the number of populations, and expand the geographic distribution to ensure the long-term persistence of the species in the study area.		
Objective 11.1. Protect 4,554 acres of modeled Bay Checkerspot butterfly habitat, including 4,000 acres of serpentine grasslands in core populations of Bay checkerspot buttery, to protect a range of slopes, aspects, and microhabitats as part of the Reserve System within the study area.[1]	LAND-G3. Acquire in fee title or obtain conservation easements on 4,000 acres of suitable serpentine grassland habitat along ridges for Bay checkerspot butterfly on Silver Creek Hills, Coyote Ridge, Pigeon Point, Tulare Hill, Santa Theresa Hills, areas west of Calero Reservoir, and the Kalanas, and Hale/Falcon Crest in fee title or conservation easement. Habitat acquisition on Coyote Ridge and Tulare Hill is top priority. For other sites totaling 554 acres, prioritize sites, threat, patch size, current occupancy and prevalence of cool microsites for Bay checkerspot butterflies.	Compliance monitoring and yearly reporting. Assess habitat quality of acquired land and prioritize areas for management according to threat, patch size, current occupancy and prevalence of cool microsites for Bay checkerspot butterflies.
	LAND-L5. Acquire in fee title or obtain easements on 2,900 acres of serpentine grassland along Coyote Ridge to link existing protected areas and to create a large core reserve for serpentine grassland species to move within (Linkage 6 in Table 5-9 and Figure 5-6). These acreages are inclusive of, not in addition to, acquisition targets set in LAND-G3.	Compliance monitoring for land acquisition. Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
Objective 11.2. Increase the number of larval host plant populations and adult nectar sources and reduce the amount of thatch to a level that supports the long term viability of the Bay checkerspot butterfly on sites with degraded serpentine grassland within the Reserve System.[2]	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on increasing larval host plants and numbers of Bay checkerspot butterflies.
	GRASS-2. Conduct prescribed burns. Use targeted studies to inform methods, timing, location, and frequency.	Monitor effects of prescribed burns on increasing larval host plants and numbers of Bay checkerspot butterflies.
	GRASS-3. Conduct mowing in selected areas to mimic grazing where use of livestock is impractical.	Monitor effects of mowing on larval host plants, adult host plants, numbers of Bay checkerspot butterflies, and non-native invasive plant species.
Objective 11.3 Decrease nitrogen deposition in serpentine grassland to reduce non-native, invasive plant growth in the Reserve System.	GRASS-4. Conduct selected seeding of native forbs and grasses in the Reserve System.	Monitor effects of mowing on larval host plants, adult host plants, numbers of Bay checkerspot butterflies, and non-native invasive plant species.
	GRASS-7. Implementing Entity will initiate translocation efforts if natural colonization fails after five seasons in which core populations are at above-average population sizes. Through coordination with species experts and regulatory agencies translocate Bay checkerspot butterflies (eggs, larvae, or adults) from core populations into suitable but unoccupied sites if natural dispersal fails to reestablish population.	Monitor at periodic intervals the success of translocation efforts in establishing new populations of Bay checkerspot butterfly.
	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Monitor relationship between nonnative plant abundance and Bay checkerspot butterfly.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Goal 13. Increase the size and sustainability of the breeding population and increase the distribution of breeding and wintering burrowing owls in the study area and the expanded burrowing owl conservation area.		
Objective 13.1. Protect 21,310 acres of modeled western burrowing owl overwintering habitat (i.e., grassland, oak woodland, or barren land) and protect or manage 5,300 acres of nesting habitat (occupied or potential) on the valley floor and in the Diablo Range within the permit area. The geographic breakdown should be: 3,700 acres in the North San Jose/Baylands region, 800 acres in the Gilroy region, 530 acres in the Morgan Hill region, and 270 acres in the South San Jose region as shown in Figure 5-10. Prioritize sites that contain occupied burrowing owl breeding sites. Management agreements on non-reserve lands may be placed on up to 4,700 acres of the 5,300 acres of nesting habitat.	LAND-G6. Acquire, obtain easements, or retain management agreements on burrowing owl nesting habitat within 2 miles the San Jose Water Pollution Control Plant Bufferlands, north of Highway 237.	Compliance monitoring and yearly reporting. Monitor presence/absence of burrowing owl in target areas.
	LAND-G7. Acquire, obtain easements, or retain management agreements on burrowing owl nesting habitat within 2 miles of the San Jose International Airport or other important northern San Jose breeding sites.	Compliance monitoring and yearly reporting. Monitor presence/absence of burrowing owl in target areas.
	LAND-G8. Acquire or obtain easements on 21,310 acres of suitable overwintering habitat in the Diablo Range that support ground squirrel populations or could support them with improved management. This acreage is in addition to of the targets identified in LAND-G6 and LAND-G7.	Compliance monitoring and yearly reporting. Monitor presence/absence of burrowing owl in target areas.
Objective 13.2. Enhance through improved management 3,700 acres of burrowing owl nesting habitat in the North San Jose/Baylands burrowing owl conservation region, 800 acres in the Gilroy burrowing owl conservation region, 530 acres in the Morgan Hill burrowing owl conservation region, and 270 acres in the South San Jose burrowing owl conservation region to encourage expansion of burrowing owls within the permit area.[2]	GRASS-5. Prohibit use of rodenticides within the Reserve System, except when needed to protect the integrity of structures, such as levees, stock ponds and dams.	Monitor population trend (i.e., number, density, range) of California ground squirrels in target areas.
	GRASS-6. Introduce livestock grazing where it is not currently used, and where conflicts with covered activities are minimized, to reduce vegetative cover and biomass that currently excludes ground squirrel and encourage ground squirrel colonization of new areas within the Reserve System.	Identify candidate grassland sites within the Reserve System to provide expansion areas for ground squirrel colonies.
	GRASS-8. Implement vegetation management (i.e., graze/mow) that reduces vegetation height and density to optimal conditions for burrowing owls.	Monitor status of burrowing owl population and correlate species response to vegetation management.
	GRASS-9. Create and maintain artificial burrows to encourage colonization of sites where ground squirrels establishment is not feasible or during the interim before ground squirrel colonies naturally establish.	Monitor artificial burrow for occupancy twice annually, during the breeding season.
Objective 13.3. Establish a positive growth trend for burrowing owls in the permit area by Year 15 of the permit term and maintain the positive growth trend for each year thereafter.	LAND-G6. Acquire, obtain easements, or retain management agreements on burrowing owl nesting habitat within 2 miles the San Jose Water Pollution Control Plant Bufferlands, north of Highway 237.	Compliance monitoring and yearly reporting. Monitor presence/absence of burrowing owl in target areas.
	LAND-G7. Acquire, obtain easements, or retain management agreements on burrowing owl nesting habitat within 2 miles of the San Jose International Airport or other important northern San Jose breeding sites.	Compliance monitoring and yearly reporting. Monitor presence/absence of burrowing owl in target areas.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	LAND-G8. Acquire or obtain easements on 21,310 acres of suitable overwintering habitat in the Diablo Range that support ground squirrel populations or could support them with improved management. This acreage is in addition to of the targets identified in	Compliance monitoring and yearly reporting. Monitor presence/absence of burrowing owl in target areas.
	GRASS-5. Prohibit use of rodenticides within the Reserve System, except when needed to protect the integrity of structures, such as levees, stock ponds and dams.	Monitor population trend (i.e., number, density, range) of California ground squirrels in target areas.
	GRASS-6. Introduce livestock grazing where it is not currently used, and where conflicts with covered activities are minimized, to reduce vegetative cover and biomass that currently excludes ground squirrel and encourage ground squirrel colonization of new areas within the	Identify candidate grassland sites within the Reserve System to provide expansion areas for ground squirrel colonies.
	GRASS-8. Implement vegetation management (i.e., graze/mow) that reduces vegetation height and density to optimal conditions for burrowing owls.	Monitor status of burrowing owl population and correlate species response to vegetation management.
	GRASS-9. Create and maintain artificial burrows to encourage colonization of sites where ground squirrels establishment is not feasible or during the interim before ground squirrel colonies naturally establish.	Monitor artificial burrow for occupancy twice annually, during the breeding season.
Goal 14. Increase the ability of San Joaquin kit fox to move into and within the study area and provide habitat to increase the likelihood of breeding.		
Objective 14.1. Protect 4,100 acres of annual grassland and suitable oak woodland land cover types in a diversity of soils types and other environmental gradients to improve San Joaquin kit fox movement and potential breeding habitat as part of the Reserve System within the study area.[1]	LAND-G9. Acquire in fee title or obtain easements on 4,100 acres of annual grassland and suitable oak woodland types (e.g., oak savanna and oak woodland within 500 feet of annual grassland) north and south of Highway 152 in modeled San Joaquin kit fox habitat.	Compliance monitoring and yearly reporting. Monitor presence/absence of kit fox in target areas.
Objective 14.2. Increase the population size and density of the prey base for San Joaquin kit fox.[2]	GRASS-5. Prohibit use of rodenticides within the Reserve System, except when needed to protect the integrity of structures, such as levees, stock ponds and dams.	Monitor population trend (i.e., number, density, range) of California ground squirrels in target areas.
	GRASS-6. Introduce livestock grazing where it is not currently used, and where conflicts with covered activities are minimized, to reduce vegetative cover and biomass that currently excludes ground squirrel and encourage ground squirrel colonization of new areas within the Reserve System.	Identify candidate grassland sites within the Reserve System to provide expansion areas for ground squirrel colonies.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 14.3. Educate the public about land management techniques that are compatible with kit fox movement within the southeastern portion of the study area.[2]	GRASS-10. Conduct at least one public education campaign in the southeastern portion of the study area within the first 10 years of implementation to provide landowners with information about management and land use techniques that are more compatible with movement and use by San Joaquin kit fox. Conduct additional meetings as needed.	Ensure that at least one educational meeting is conducted within the first two years of implementation and then as needed after that.
Objective 14.4. Increase the number of undercrossings, by a minimum of one, that are considered passable and safe for San Joaquin kit fox or increase the safety of at least two existing crossings across Highway 152 between the Highway 152/156 interchange and the Santa Clara/Merced County line. Identify target crossings by conducting a feasibility study by year 5 of Plan implementation (see Objective 2.1).[2, 3]	LM-1. Remove fences and private roads in areas where they are no longer needed and where their removal could increase the permeability of the study area for wildlife.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-2. When replacing small culverts ensure that the culvert has a natural bottom and is large enough for larger mammals such as deer and mountain lions to pass, if feasible. Culverts must provide direct movement from one side of the road to the other and ensure that the culvert is visible to the target species (i.e., do not obscure entrance with vegetation). Install fencing or other features that will direct wildlife towards the culvert or other safe crossing within the first 20 years of implementation.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-3. Where structurally possible, replace culverts with free span bridges to ensure free movement for wildlife under roadways.	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
	LM-4. Ensure that median barrier removal and/or median perforations are considered as alternatives during project design.	Monitor wildlife movement in target areas. Monitor movement of indicator species for connectivity.
	LM-5. Remove median barriers or perforate sections of median barriers along roadways to improve successful wildlife crossings and install fencing or other features to direct wildlife to those open sections within first 20 years of implementation. Use feasibility study to determine location and length of barrier removal.	Compliance monitoring. Monitor wildlife movement in target areas. Monitor movement of indicator species for connectivity.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Goal 15. Provide for the expansion of a breeding population of least Bell's vireos into the study area and increase reproductive success of least Bell's vireo.		
Objective 15.1. Protect 462 acres of modeled Least Bell's vireo habitat (i.e., riparian woodland or forest with a dense understory (<3m tall) in the Uvas, Llagas, Pajaro, or Pacheco Watersheds in south Santa Clara County) as part of the Reserve System.[1] Target areas will contain occupied or potential least Bell's vireo habitat.	LAND-R1. Extend the Uvas Creek Park Preserve 1.6 miles upstream to Hecker Pass Highway and setback expected development adjacent to this stream segment by a minimum of 100 feet to protect the Uvas Creek Corridor consistent with Goals 5-5, 5-7, and 5-8 of the approved City of Gilroy Hecker Pass Specific Plan. Target acquisitions will to contribute to the protection of a total of 800 acres of riparian woodland and forest in the Uvas, Llagas, and Pacheco watersheds.	Compliance monitoring and yearly reporting. Assess habitat quality of acquired land and prioritize areas for management.
Objective 15.2. Restore a minimum of 50 acres of riparian woodland and forest and up to 339 acres in the Uvas, Llagas, or Pacheco Watersheds within the Reserve System.[2] Target areas that contain occupied or potential least Bell's vireo habitat.	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	STREAM-2. Plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature at all riparian restoration sites.	Monitor survivorship of plantings/seedings as part of restoration and enhancement efforts and periodically survey for species response from least Bell's vireo, yellow-legged frog and other covered species.
	STREAM-3. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors, or re-establish severally degraded or historic riparian corridors, to promote continuity within conservation lands.	Monitor survivorship of plantings/seedings as part of restoration and enhancement efforts and periodically survey for species response from least Bell's vireo, yellow-legged frog and other covered species.
	STREAM-4. Replace concrete, earthen or other engineered channels as part of the 10.4 miles of stream restoration to restore floodplain connectivity. Location and length will be determine by site-specific conditions.	Compliance monitoring. Conduct pre- and post-treatment monitoring of riparian vegetation as part of a targeted study.
	STREAM-5. Replace confined channels to restore floodplain connectivity and commensurate functions as part of the 10.4 miles of stream restoration. Location and length will be determine by site-specific conditions.	Compliance monitoring. Conduct pre- and post-treatment monitoring of riparian vegetation as part of a targeted study.
Objective 15.3. Reduce the abundance of nest predators in target areas (i.e., occupied and potential habitat) in order to increase reproductive success of least Bell's vireo in riparian areas within the Reserve System.[2]	STREAM-7. Implement a brown-headed cowbird control program in coordination with species experts and regulatory agencies that will reduce the impact of brood parasitism on least Bell's vireo nest success, if least Bell's vireos become regular nesters in the study area (>3 nests over at least two consecutive years) and brown-headed cowbird eggs are discovered in vireo nests.	Compliance monitoring. Monitor for riparian song bird nesting within least Bell's vireo modeled habitat. Periodically, every 5 years, monitor for least Bell's vireo outside of modeled habitat to document range expansion. Quantify the number of occurrences of brood parasitism that are occurring and if/when brown-headed cowbird control program is initiated and efficacy of program.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Goal 16. Conserve existing populations of the foothill yellow-legged frog population where possible and increase the overall population of foothill yellow-legged frog in biologically appropriate locations in the study area.		
Objective 16.1. Protect 104 stream miles of modeled foothill yellow-legged frog habitat that currently have, or historically had, perennial flows as part of the Reserve System within the study area.[1] Target streams that contain occupied or potential foothill yellow-legged frog habitat.	LAND-R5. Acquire or obtain easements along 104 miles of perennial streams located above Uvas, Calero, Chesbro, Anderson, or in Uvas Creek below Uvas Reservoir, Upper Penitencia Creek, Alamitos Creek or Guadalupe Creek that have or could be restored to have cobblestone substrate and consistent, gentle flows from late March to late May.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
Objective 16.2. Enhanced all acquired stream miles and restore 10.4 stream miles of perennial streams located above Uvas, Calero, Chesbro, Anderson, or Coyote Reservoirs or in Uvas Creek below Uvas Reservoir, Upper Penitencia Creek, Alamitos Creek or Guadalupe Creek.[2] Target streams that contain occupied or potential foothill yellow-legged frog habitat.	LM-14. Selectively apply herbicides or other treatments to invasive plants.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	STREAM-2. Plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature at all riparian restoration sites.	Monitor survivorship of plantings/seedings as part of restoration and enhancement efforts and periodically survey for species response from least Bell's vireo, yellow-legged frog and other covered species.
	STREAM-4. Replace concrete, earthen or other engineered channels as part of the 10.4 miles of stream restoration to restore floodplain connectivity. Location and length will be determine by site-specific conditions.	Compliance monitoring. Conduct pre- and post-treatment monitoring of in-stream habitat as part of a targeted study.
	STREAM-5. Replace confined channels to restore floodplain connectivity and commensurate functions as part of the 10.4 miles of stream restoration. Location and length will be determine by site-specific conditions.	Compliance monitoring. Conduct pre- and post-treatment monitoring of floodplain function as part of a targeted study.
	STREAM-8. Increase the amount of cobblestone substrate suitable to support breeding foothill yellow-legged frogs to 2,000 ft. to areas close to known occurrence(s) of foothill yellow-legged frog or immediately upstream or downstream of known occurrences or other high quality foothill yellow-legged frog breeding habitat.	Assess yellow-legged frog response to increase in cobblestone substrate as part of a targeted study.
	STUDIES-6. Conduct a directed study to censuses egg masses in breeding habitat downstream of reservoirs before and after releases to determine whether eggs masses were lost.	Monitor effects of pulse flows on foothill yellow-legged frog.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Goal 17: Conserve existing populations of California red-legged frog, California tiger salamander, and western pond turtle populations where possible, and increase the number of individuals and expand the overall distribution of populations of these species in biologically appropriate locations within the study area to maintain viable populations and contribute to the regional recovery of these species.		
Objective 17.1. Protect California red-legged frog modeled primary (1,430 acres) and secondary (41,800) habitat, California tiger salamander modeled breeding (195 acres) and non-breeding (41,700 acres) habitat, and western pond turtle primary (9,800 acres) and secondary (29,100 acres) habitat as part of the Reserve System within the study area. Aquatic habitat will only be protected if adjacent upland habitat suitable for the terrestrial needs of these species are also protected.[1, 4]	LAND-WP4. Acquire habitat that is adjacent to permanently protected aquatic resources with a high potential to support CRLF and is in the East San Francisco Bay Recovery Unit for red-legged frog *(USFWS 2002)* (Coyote Creek, Pacheco, and Pescadero Watersheds).	Compliance monitoring and yearly reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-WP5. Acquire habitat that contains a matrix of aquatic and upland habitats and is also adjacent to Joseph D. Grant County Park, Palassou Ridge Open Space Preserve, southeast of Henry Coe State Park, Santa Cruz Mountain foothills, and Calero County Park in areas where dense forest is absent to reduce competition with other native amphibians (e.g., California newts).	Compliance monitoring and yearly reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-WP6a. Acquire stream segments or ponds that currently provide or could provide high quality basking, breeding, and nesting habitat (vegetated banks and at least 150 feet of adjacent upland habitat) for western pond turtle.	Compliance monitoring and yearly reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-WP6b. Acquire stream segments or ponds that currently provide or could provide high quality basking, breeding, and nesting habitat (vegetated banks and at least 0.5 miles of adjacent upland habitat) for California tiger salamander.	Monitor the removal of barriers within the reserve system to ensure that the highest priority barriers are removed first. Analyze and quantify any potential positive (native fish movement) and negative (spread of exotic species) effects of barrier removal during targeted study phase of implementation.
Objective 17.2. Protect corridors between existing protected areas to ensure genetic exchange within and movement between populations of covered amphibians and aquatic reptiles as part of the Reserve System within the study area.[1] Target corridors include Linkages 4, 5, 12, 13, 14, 15, and 16 (Table 5-6, Figure 5-6).	LAND-WP7. Acquire habitat near Santa Teresa Hills and Tulare Hill to provide connectivity between populations in the Diablo Range and the Santa Cruz foothills.	Compliance monitoring and yearly reporting. Assess habitat quality of acquired land and prioritize areas for management.
	LAND-G2. Acquire 13,300 acres of annual grassland by fee title or conservation easement as part of the Reserve System. Target areas on both sides of Santa Clara Valley with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored. Acquisition of native grassland will be given priority.	Compliance monitoring and yearly reporting. Assess use by covered amphibians and aquatic reptiles and experimentally manage to improve habitat for movement.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	LAND-OC1. Acquire in fee title or obtain conservation easements on 7,100 acres of mixed oak woodland and forest, including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and yearly reporting. Assess use by covered amphibians and aquatic reptiles and experimentally manage to improve habitat for movement.
	LAND-OC2. Acquire 2,900 acres of coast live oak woodland and forest by fee title or conservation easement, including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and yearly reporting. Assess use by covered amphibians and aquatic reptiles and experimentally manage to improve habitat for movement.
	LAND-OC3. Acquire 1,100 acres of blue oak woodland and 1,700 acres of valley oak woodland by fee title or conservation easement including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and yearly reporting. Assess use by covered amphibians and aquatic reptiles and experimentally manage to improve habitat for movement.
	LAND-OC4. Acquire 80 acres of foothill pine-oak woodland and forest by fee title or conservation easement, including land in both the Santa Cruz Mountains and Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and yearly reporting. Assess use by covered amphibians and aquatic reptiles and experimentally manage to improve habitat for movement.
	LAND-OC5. Acquire 20 acres of mixed evergreen forest by fee title or conservation easement including land in both the Santa Cruz Mountains and Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	Compliance monitoring and yearly reporting. Assess use by covered amphibians and aquatic reptiles and experimentally manage to improve habitat for movement.
Objective 17.3. Enhance a minimum of 50 acres of ponds, 15 acres of wetlands, and 100 miles of streams in the Reserve System by eradicating or reducing exotic species and competitor species (such as nonnative pet-store turtles) that are detrimental to covered amphibians, aquatic reptiles, and native pond biodiversity. Enhance up to 104 acres of ponds and 80 acres of wetlands if all estimated impacts occur.[2]	LM-12. Eradicate or reduce nonnative pig disturbance within the Reserve System through trapping, hunting, or other control methods. Success criteria is achieved through ensuring disturbances by nonnative pigs do not impair the ability of the Reserve System from meeting the biological goals and objectives.	Conduct surveys every 5 years in areas of traditionally high feral pig populations to determine what the population levels are relative to baseline. Monitor response of California red-legged frog, California tiger salamander, and western pond turtle to control of exotic and competitor species as part of a targeted study.
	LM-13. Eradicate or reduce nonnative predators (bullfrogs, invasive fish, feral cats) within the Reserve System through habitat manipulation (e.g., periodic draining of ponds), trapping, hand capturing, electroshocking or other control methods to achieve targets identified in reserve unit management plans.	Monitor response of nonnative predators to habitat manipulation. Monitor response of California red-legged frog, California tiger salamander, and western pond turtle to control of exotic and competitor species

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	STREAM-1. Exclude livestock access to target stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
	STREAM-2. Plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature at all riparian restoration sites.	Monitor the efficacy of seeding efforts with respect to structural diversity, overhead cover, and water temperature compared to designated reference locations. Indicator species will be selected and success criteria developed for large-scale restoration projects from the reference locations.
	STREAM-3. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors, or re-establish severally degraded or historic riparian corridors, to promote continuity within conservation lands.	STREAM-4. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors to promote continuity.
	POND-11. Offer financial and regulatory (Safe Harbor Agreement) incentives to private landowners to enhance pond and wetland habitat to suit breeding California red-legged frog, California tiger salamander, and western pond turtle.	Compliance monitoring.
	POND-12. Educate the public that the use of any salamander species as bait is illegal in the State of California.	Compliance monitoring.
Objective 17.4. Restore a minimum of 20 acres of perennial wetlands and 1 mile of streams for the California red-legged frog, California tiger salamander, and western pond turtle to maintain or increase breeding populations of covered amphibians and reptiles. Restore up to 45 acres of perennial wetlands, 30 acres of seasonal wetlands, and 10.4 miles of streams if all estimated impacts occur. [2]	POND-1. Install fencing that will reduce grazing pressure and exclude feral pigs on portions of ponds and wetlands and provide vegetated refuge sites for covered species. Fence installation will be carefully applied to avoid negative impacts on small mammal movement and upland habitat.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
	POND-2. Install woody debris around perimeter and in submerged banks of ponds and wetlands to create basking habitat and cover for native juvenile amphibians and turtles. Materials imported from outside of the watershed shall be treated for chytrid and other potential pathogens prior to installation.	Analyze and quantify effectiveness of created basking site through routine monitoring in ponds with known western pond turtle occupancy.
	POND-3. Plant native emergent vegetation around the perimeter and in ponds and wetlands.	Monitor survivorship of planting, quantify vegetated perimeter of pond, describe habitat quality and periodically survey for species response from covered amphibians and reptiles. Evaluate success of wetland and pond enhancement using established success criteria.
	POND-4. Clear vegetation and/or remove sediment in a way that minimizes negative effects on covered species when vegetation and/or sediment restricts the ability of the aquatic environment from meeting the biological goals and objectives of the Plan.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	POND-13. Excavate sections of ponds to provide deeper pools that will be utilized by California red-legged frog adults and sub-adults and western pond turtles, while maintaining shallow areas to provide rearing habitat for California red-legged frog tadpoles, California tiger salamander larvae, and western pond turtle hatchlings.	Monitor use of excavated pond by red-legged frog and western pond turtles as part of a targeted study.
	STUDIES-7. In the case of ponds, wetlands, and/ or amphibian populations becoming infected with chytrid fungus or other diseases, use the best scientific information available to manage and stop spread of epidemic.	Monitor for the presence of disease. Monitor efficacy of disease control actions.
	STUDIES-8. Identify the distribution and risk to existing indigenous populations of covered amphibians and reptiles from hybridization (e.g., California tiger salamander hybridizing with Texas salamander) within the Reserve System. Appendix K, California Tiger Salamander Hybridization, will serve as the Management Plan for CTS hybridization issues and will be updated throughout the permit term for adaptive management purposes.	Monitor for the presence of non-natives and hybrids. Test and document efficacy of management plan.
	STUDIES-9. Annually identify and maintain upland breeding sites (even if sites are not "natural") for western pond turtle because of the high fidelity of use from year to year .	Monitor use of protected sites to determine factors influencing nest success in areas of known turtle use.
	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on increasing habitat for red-legged frog, western pond turtle and California tiger salamander
	GRASS-2. Conduct prescribed burns. Use targeted studies to inform methods, timing, location, and frequency.	Monitor effects of prescribed burning on increasing habitat for red-legged frog, western pond turtle and California tiger salamander
	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	LM-14. Selectively apply herbicides or other treatments to invasive plants.	Monitor effects of herbicide application on reducing nonnative species and ensure that herbicide use has no unwanted effects on native amphibian population.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 17.5. Create a minimum of 20 acres of ponds to provide new breeding sites for California red-legged frog, California tiger salamander, and western pond turtle within the Reserve System. Create up to 72 acres of ponds if all estimated impacts occur.[2]	POND-1. Install fencing that will reduce grazing pressure and exclude feral pigs on portions of ponds and wetlands and provide vegetated refuge sites for covered species. Fence installation will be carefully applied to avoid negative impacts on small mammal movement and upland habitat.	Monitor pond creation and assess whether success criteria are being met. Monitor use of created ponds by covered amphibians and western pond turtle.
	POND-2. Install woody debris around perimeter and in submerged banks of ponds and wetlands to create basking habitat and cover for native juvenile amphibians and turtles. Materials imported from outside of the watershed shall be treated for chytrid and other potential pathogens prior to installation.	Analyze and quantify effectiveness of created basking site through routine monitoring in ponds with known western pond turtle occupancy.
	POND-3. Plant native emergent vegetation around the perimeter and in ponds and wetlands.	Monitor survivorship of planting, quantify vegetated perimeter of pond, describe habitat quality and periodically survey for species response from covered amphibians and reptiles. Evaluate success of wetland and pond enhancement using established success criteria.
	POND-4. Clear vegetation and/or remove sediment in a way that minimizes negative effects on covered species when vegetation and/or sediment restricts the ability of the aquatic environment from meeting the biological goals and objectives of the Plan.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	POND-9. Create at least 20 acres of ponds at 40 sites, at least 10 sites in the Santa Cruz Mountains and 20 sites in the Diablo Range.	Monitor pond creation and assess whether success criteria are being met. Monitor use of created ponds by covered amphibians and western pond turtle.
	POND-10. In addition to the creation of ponds described in POND-9, create up to 52 acres of ponds in-kind within the Reserve System to increase the amount available habitat and enhance connectivity among existing ponds and wetlands if all anticipated impacts occur.3	Monitor pond creation and assess whether success criteria are being met. Monitor use of created ponds by covered amphibians and western pond turtle.
	POND-11. Offer financial and regulatory (Safe Harbor Agreement) incentives to private landowners to enhance pond and wetland habitat to suit breeding California red-legged frog, California tiger salamander, and western pond turtle.	Compliance monitoring.
	POND-13. Excavate sections of ponds to provide deeper pools that will be utilized by California red-legged frog adults and sub-adults and western pond turtles, while maintaining shallow areas to provide rearing habitat for California red-legged frog tadpoles, California tiger salamander larvae, and western pond turtle hatchlings.	Monitor use of excavated pond by red-legged frog and western pond turtles as part of a targeted study.
	STUDIES-7. In the case of ponds, wetlands, and/ or amphibian populations becoming infected with chytrid fungus or other diseases, use the best scientific information available to manage and stop spread of epidemic.	Monitor for the presence of disease. Monitor efficacy of disease control actions.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	STUDIES-8. Identify the distribution and risk to existing indigenous populations of covered amphibians and reptiles from hybridization (e.g., California tiger salamander hybridizing with Texas salamander) within the Reserve System. Appendix K, California Tiger Salamander Hybridization, will serve as the Management Plan for CTS hybridization issues and will be updated throughout the permit term for adaptive management purposes.	Monitor for the presence of non-natives and hybrids. Test and document efficacy of management plan.
	STUDIES-9. Annually identify and maintain upland breeding sites (even if sites are not "natural") for western pond turtle because of the high fidelity of use from year to year .	Monitor use of protected sites to determine factors influencing nest success in areas of known turtle use.
	GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	Monitor effects of various grazing regimes on increasing habitat for red-legged frog, western pond turtle and California tiger salamander
	GRASS-2. Conduct prescribed burns. Use targeted studies to inform methods, timing, location, and frequency.	Monitor effects of prescribed burning on increasing habitat for red-legged frog, western pond turtle and California tiger salamander
	LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
	LM-14. Selectively apply herbicides or other treatments to invasive plants.	Monitor effects of herbicide application on reducing nonnative species and ensure that herbicide use has no unwanted effects on native amphibian population.
Goal 18. Increase the population size of tricolored blackbird to enhance the viability of the species in the study area.		
Objective 18.1. Protect and enhance at least 4 tricolored blackbird breeding sites that support, historically supported, or could support tricolored blackbird colonies as part of the Reserve System within the study area.[1] Each site must include at least 2-acres of breeding habitat and have foraging habitat within 2 miles.	LAND-WP8. Acquire in fee title or through a conservation easement at least 4 tricolored blackbird breeding sites that support, historically supported, or could support tricolored blackbird colonies each with at least 2-acres of breeding habitat and foraging habitat within 2 miles. Target at least 5 acres of suitable breeding habitat for tricolored blackbird within dry land farming or ranching complexes in the Santa Clara Valley and the Diablo Range	Compliance monitoring and yearly reporting. Assess habitat quality of acquired land and prioritize areas for management.
	POND-14. Offer financial or regulatory incentives (Safe Harbor Agreement, if listed) to private landowners to enhance pond and marsh habitat to suit breeding tricolored blackbirds, and to ensure that dry-land farming and ranching activities support breeding tricolored blackbirds.	Compliance Monitoring.

Table 5-1c. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 18.2. Protect and enhance 200 acres of suitable tricolored blackbird foraging habitat within 2 miles of protected and occupied breeding sites as part of the Reserve System within the study area.[1]	LAND-WP9. Acquire 200 acres of foraging habitat for tricolored blackbird in areas where there are protected breeding sites within 2 miles.	Compliance monitoring and yearly reporting. Monitor presence/absence of foraging habitat.
	POND-15 Offer financial incentives to private landowners to ensure that dry-land farming and ranching activities support foraging tricolored blackbirds.	Compliance Monitoring.
Objective 18.3. Enhance or restore 5 acres of suitable tricolor blackbird breeding habitat in historically/currently occupied areas within the Reserve System.[2]	POND-1. Install fencing that will reduce grazing pressure and exclude feral pigs on portions of ponds and wetlands and provide vegetated refuge sites for covered species. Fence installation will be carefully applied to avoid negative impacts on small mammal movement and upland habitat.	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
	POND-16. Restore freshwater marsh, seasonal wetlands, and/or ponds that will support dense reed-like vegetation (cattails) or other native vegetation that will attract nesting tricolored blackbirds.	Compliance monitoring. Monitor habitat restoration and assess whether success criteria are being met. Monitor use of restored habitat by tricolored blackbird.
	POND-17. In areas with non-native vegetation (e.g., Himalayan blackberry) that supports existing tricolored blackbird colonies, initiate a gradual (3-4 year) transition from non-native vegetation to native vegetation that is structurally similar.	Determine areas where tricolored blackbirds are using non-native vegetation and ensure that there is a management plan in place to control the spread of the non-native vegetation and transition the colony to native vegetation if necessary.
	POND-18. Restore up to 30 acres of seasonal wetlands within the Reserve System in the Santa Clara Valley.	Compliance monitoring. Monitor habitat restoration and assess whether success criteria are being met. Monitor use of restored habitat by tricolored blackbird.
	STREAM-4. Replace concrete, earthen or other engineered channels as part of the 10.4 miles of stream restoration to restore floodplain connectivity. Location and length will be determine by site-specific conditions.	Compliance monitoring. Conduct pre- and post-treatment monitoring of riparian vegetation as part of a targeted study.
Objective 18.4. Restore a minimum of 20 acres of freshwater wetland suitable for tricolored blackbird breeding habitat within 2 miles of suitable and foraging habitat to encourage colonization of new sites within the Reserve System. Restore up to 45 acres of freshwater wetlands if all estimated impacts occur.[2] The acreage targets in this objective are inclusive of targets identified in Objective 20.3.	POND-19. Restore a minimum of 20 acres and up to 45 acres of freshwater marsh within the Reserve System in the Santa Cruz Mountains, Santa Clara Valley, and Diablo Range.	Compliance monitoring. Monitor habitat restoration and assess whether success criteria are being met. Monitor use of restored habitat by tricolored blackbird.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 18.5. Create a minimum of 20 acres of ponds to provide new nest colony sites for tricolored blackbird within the Reserve System. Create up to 72 acres of ponds if all estimated impacts occur.[2]	POND-9. Create at least 20 acres of ponds at 40 sites, at least 10 sites in the Santa Cruz Mountains and 20 sites in the Diablo Range.	Monitor pond creation and assess whether success criteria are being met. Monitor use of created ponds by covered amphibians, western pond turtle, and tricolored blackbird.
	POND-10. In addition to the creation of ponds described in POND-9, create up to 52 acres of ponds in-kind within the Reserve System to increase the amount available habitat and enhance connectivity among existing ponds and wetlands if all anticipated impacts occur.3	Monitor pond creation and assess whether success criteria are being met. Monitor use of created ponds by covered amphibians, western pond turtle, and tricolored blackbird.

Notes:

[1] Land acquisition must occur in rough step with impacts as required by the Stay-Ahead provision (see Chapter 8, Section 8.6.1). All land acquisition must be completed by Year 45. Section 5.4 of the Plan provides more detail on areas targeted for acquisition for each species. Reserve lands will be managed in accordance with reserve unit management plans, completed within 5 years of the acquisition of the 1st parcel within the reserve unit.

[2] Habitat enhancement, monitoring, and adaptive management program, will continue in perpetuity. Restoration and creation must occur in rough step with impacts as required by the Stay Ahead provision (see Chapter 8, Section 8.6.1). All habitat restoration will be completed by year 40 unless otherwise noted in this table. Reserve lands will be managed in accordance with reserve unit management plans, completed within 5 years of the acquisition of the 1st parcel within the reserve unit. All plans will be reviewed and approved by the Wildlife Agencies. The conservation strategy for aquatic land cover types includes preservation/enhancement, restoration, and/or creation. See Tables 5-14 and 5-15 for details.

[3] Design will be based on the best available science and be consistent with Condition 6 described in Chapter 6, Section 6.4.4, subheading *Condition 6 Design and Construction Requirements for Covered Transportation Projects*

[4] These occupied acreages are minimum requirements for each species that utilizes each referenced land cover type.

Table 5-1d. Biological Goals, Objectives and Conservation Actions: Plants

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Goal 20. Maintain viability, protect, and increase the size and number of populations of covered serpentine plant species, including Coyote ceanothus, Santa Clara Valley dudleya, Metcalf Canyon jewelflower, most beautiful jewelflower, smooth lessingia, fragrant fritillary, Mt. Hamilton thistle, Loma Prieta hoita, and Tiburon Indian paintbrush, within the study area.[1]		
Objective 20.1. Protect and enhance the known extant occurrences of Coyote ceanothus as part of the Reserve System within the study area, including a buffer zone of 500 feet around each occurrence to reduce external influences and a minimum occurrence size of 5,000 individuals.[4,5,7]	LAND-P1. Acquire in fee title or conservation easement sites in the study area that support three unprotected occurrences of Coyote ceanothus and provide the necessary buffer between incompatible land uses.	Compliance monitoring and annual reports.
	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor results of research and the effects of its application.
	STUDIES-11. Conduct experimental burning in protected occurrences of targeted covered plant species to determine the importance of fire for plant regeneration.	Monitor burning on known occurrences of Coyote ceanothus and species response.
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.
	CHAP-1. Conduct prescribed burns in chaparral and northern coastal scrub to maintain canopy gaps and promote regeneration. Use targeted studies to inform locations and frequency.	Monitor burning on known occurrences of Coyote ceanothus and species response.
	CHAP-2. Mechanically thin chaparral and northern coastal scrub to promote structural diversity. Use targeted studies to inform location and frequency.	Monitor the impacts of grazing or other vegetation management techniques on known occurrences of Coyote ceanothus.
	LM-8. Negotiate with Cal Fire and other local fire-fighting agencies the use of management response measures for all fire events and fire-dependent ecosystems that minimize impacts to natural communities and covered species while protecting human life and property. All burns will be responded to, and prescribed burns will be conducted, with minimum impact suppression tactics. Burn response will take into consideration ignition location and method, seasonality, weather and availability of suppression forces.	Monitor all covered plants following a wildfire.

Table 5-1d. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 20.2. Establish two new occurrences of Coyote ceanothus in the Reserve System to reduce risk of extinction. Conduct targeted studies to determine feasibility of occurrence creation and identify locations and propagation/planting techniques.[6]	STUDIES-13. Identify suitable locations for and establish target number of new covered plant occurrences in the Reserve System.	Compliance monitoring and annual reports.
	STUDIES-14. Determine suitable propagation or planting techniques for targeted covered plant species and determine biologically appropriate seed sampling techniques from existing occurrences.	Monitor newly established and source occurrences.
	STUDIES-15. Design and implement field experiments (if the number of propagules will not be significantly impacted) to test alternative techniques for establishment of targeted covered plant occurrences. Field experiments will be continue until target number of occurrences are established.	Monitor the results of all experiments.
Objective 20.3. Protect at least 55 occurrences of Santa Clara Valley dudleya as part of the Reserve System within the study area, including a buffer zone of 500 feet around each occurrence to reduce external influences and promote expansion of occurrences.[2,4,5]	LAND-P2. Acquire in fee title or conservation easement sites in the study area that support 55 occurrences of Santa Clara Valley dudleya across a range of elevational gradients on both sides of Coyote Valley to ensure geographic diversity in protected occurrences.	Compliance monitoring and annual reports.
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.
Objective 20.4. Increase the size of Santa Clara Valley dudleya occurrences to ensure each occurrence has at least 2,000 individuals within the Reserve System.[4,6,7]	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on Santa Clara Valley dudleya
	STUDIES-16. Monitor the effects of livestock grazing (or predation by other species, e.g., black-tailed jackrabbit) on targeted covered plant species by conducting exclusion experiments and monitoring effects on occurrences, including control sites in the monitoring plan.	Monitor the effects of grazing on management on covered plant species.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 20.5. Protect at least three currently unprotected occurrences and adequate lands to create ten new occurrences of Metcalf Canyon jewelflower, including a buffer zone of 500 feet around each occurrence to reduce external influences and promote expansion of occurrences.[4,5]	LAND-P3. Acquire in fee title or conservation easement sites in the study area that support three occurrences of Metcalf Canyon jewelflower.	Compliance Monitoring; Yearly Reports
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.
Objective 20.6. Create at least ten new occurrences and expand the size of all Metcalf Canyon jewelflower occurrences in the Reserve System to at least 2,000 individuals.[4,6,7]	LAND-P4. Acquire north side of Tulare Hill to promote reintroduction of Metcalf Canyon jewelflower on west side of Valley.	Compliance Monitoring; Yearly Reports
	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on Metcalf Canyon jewelflower
	STUDIES-14. Determine suitable propagation or planting techniques for targeted covered plant species and determine biologically appropriate seed sampling techniques from existing occurrences.	Monitor newly established and source occurrences.
	STUDIES-15. Design and implement field experiments (if the number of propagules will not be significantly impacted) to test alternative techniques for establishment of targeted covered plant occurrences. Field experiments will be continue until target number of occurrences are established.	Monitor the results of all experiments.
	STUDIES-17. Monitor Metcalf Canyon jewelflower and most beautiful jewelflower introgression and develop protocols to protect the genetic integrity of both species.	Monitor the results of research and success of developed protocols.
Objective 20.7. Protect at least 17 occurrences of most beautiful jewelflower, including a buffer zone of 500 feet around each occurrence to reduce external influences and promote expansion of occurrence.[4,5]	LAND-P5. Acquire sites in the study area that support 17 occurrences of most beautiful jewelflower.	Compliance monitoring and annual reports.
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.

Table 5-1d. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	STUDIES-17. Monitor Metcalf Canyon jewelflower and most beautiful jewelflower introgression and develop protocols to protect the genetic integrity of both species.	Monitor the results of research and success of developed protocols.
Objective 20.8. Increase the size of most beautiful jewelflower occurrences to ensure each occurrence has at least 2,000 individuals.[4,6,7]	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on most beautiful jewelflower
	STUDIES-14. Determine suitable propagation or planting techniques for targeted covered plant species and determine biologically appropriate seed sampling techniques from existing occurrences.	Monitor newly established and source occurrences.
Objective 20.9. Protect at least 22 occurrences of Mount Hamilton thistle as part of the Reserve System within the study area, including a buffer zone of 500 feet around each occurrence to reduce external influences and promote expansion of occurrence.[3,4,5]	LAND-P6. Acquire sites in the study area that support Mount Hamilton thistle in drainages or spring systems and stratify protection on both sides of Coyote Valley to ensure geographic diversity in protected occurrences.	Compliance monitoring and annual reports.
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.
Objective 20.10. Increase the size of Mt. Hamilton thistle occurrences within the Reserve System to at least 2,000 individuals to ensure each occurrence has a viable number of individuals each year. Conduct targeted studies to determine feasibility of expanding occurrences.[4,6,7]	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on Mt. Hamilton thistle.
	STUDIES-16. Monitor the effects of livestock grazing (or predation by other species, e.g., black-tailed jackrabbit) on targeted covered plant species by conducting exclusion experiments and monitoring effects on occurrences, including control sites in the monitoring plan.	Monitor the effects of grazing on management on covered plant species.

Table 5-1d. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 20.11. Protect at least 12 occurrences of smooth lessingia as part of the Reserve System within the study area, including a buffer zone of 150-meter (500 foot) buffer around each occurrence to reduce external influences and promote expansion of occurrences.[4,5]	LAND-P7. Acquire sites in the Reserve System that support eight occurrences of smooth lessingia.	Compliance monitoring and annual reports.
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.
Objective 20.12. Locate or create at least 12 new occurrences of smooth lessingia and increase the size of all occurrence to ensure each occurrence has at least 2,000 individuals within the Reserve System.[4,6,7]	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on smooth lessingia.
	STUDIES-14. Determine suitable propagation or planting techniques for targeted covered plant species and determine biologically appropriate seed sampling techniques from existing occurrences.	
	STUDIES-16. Monitor the effects of livestock grazing (or predation by other species, e.g., black-tailed jackrabbit) on targeted covered plant species by conducting exclusion experiments and monitoring effects on occurrences, including control sites in the monitoring plan.	Monitor the effects of grazing on management on covered plant species.
Objective 20.13. Protect at least four occurrences of fragrant fritillary as part of the Reserve System within the study area, including a buffer zone of 500 feet around each occurrence to reduce external influences and promote expansion of occurrences.[5]	LAND-P8. Acquire sites along Coyote Ridge that support the four remaining unprotected fragrant fritillary occurrences.	Compliance monitoring and annual reports.
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.
Objective 20.14. Increase the size of fragrant fritillary occurrences within the Reserve System to ensure each occurrence has a viable number of individuals each year.[7]	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on fragrant fritillary.

Biological Goals and Objectives	Conservation Actions	Monitoring Action
	STUDIES-16. Monitor the effects of livestock grazing (or predation by other species, e.g., black-tailed jackrabbit) on targeted covered plant species by conducting exclusion experiments and monitoring effects on occurrences, including control sites in the monitoring plan.	Monitor the effects of grazing on management on covered plant species.
Objective 20.15. Protect the one known occurrence of Tiburon Indian Paintbrush within the permit area that is not currently permanently protected as part of the Reserve System, including a buffer zone of 500 feet around each occurrence to reduce external influences.[4]	LAND-P9. Acquire the Tiburon Indian paintbrush occurrence located at the Kirby Canyon landfill mitigation site prior to or at the time the temporary conservation easement expires.	
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.
Objective 20.16. Increase the size of the protected Tiburon Indian paintbrush occurrence within the Reserve System to ensure occurrence has at least 2,000 individuals.[4,6,7]	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on Tiburon Indian paintbrush.
	STUDIES-16. Monitor the effects of livestock grazing (or predation by other species, e.g., black-tailed jackrabbit) on targeted covered plant species by conducting exclusion experiments and monitoring effects on occurrences, including control sites in the monitoring plan.	Monitor the effects of grazing on management on covered plant species.
Goal 21. Protect and increase the size and number of Loma Prieta hoita within the study area.		
Objective 21.1 (not used) **Objective 21.2** (not used) **Objective 21.3** (not used) **Objective 21.4** (not used) **Objective 21.5** (not used) **Objective 21.6** (not used)		
Objective 21.7. Protect four currently unprotected occurrences of Loma Prieta hoita in the study area as part of the Reserve System including a buffer zone of 500 feet around each occurrence to reduce external influences.[4,5]	LAND-P11. Acquire four sites in the study area that supports Loma Prieta hoita.	Compliance monitoring and annual reports.
	STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Monitor viability of seed collection and refresh collection, as necessary.

Table 5-1d. Continued

Biological Goals and Objectives	Conservation Actions	Monitoring Action
Objective 21.8. Increase the size of protected Loma Prieta hoita occurrences within the Reserve System.[6,7]	STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Monitor the results and application of research on Loma Prieta hoita.

Notes:

[1] For the purposes of this Plan, a plant occurrence is defined as a group of individuals that are separated by at least 0.25 mile from other groups of individuals of the same species or subspecies, consistent with how plants are tracked by the CNDDB. In some cases, an occurrence may be equivalent to a population; in other cases, multiple occurrences may form a single population. A biological population is defined differently for each of the covered plants and is often unknown due to a lack of population data. Therefore, an occurrence provides a single standard by which to measure impacts and conservation for all covered plants. During implementation, the Implementing Entity may conduct monitoring or management actions based on populations, which is a more biologically meaningful unit.

[2] Objectives that require protection of plant occurrence require that those occurrences be in currently unprotected land.

[3] For Mount Hamilton thistle population on the east side of Coyote Valley are defined as all occurrences in a discrete drainage; while population on the west side of Coyote Valley are defined as each occurrence point.

[4] Source for buffer width and minimum population size: USFWS Recovery Plan for Serpentine Soil Species of the San Francisco Bay Area (1998c)

[5] Land acquisition must occur in rough step with impacts as required by the Stay Ahead provision (see Chapter 8, Section 8.6.1). All land acquisition must be complete by Year 45 . Land acquisition requiring restoration or creation of habitat for Covered Species must be complete by Year 40. Reference Table 5-29 for interim land acquisition timelines.

[6] Habitat enhancement, monitoring, and adaptive management program, will continue in perpetuity. Restoration and creation must occur in rough step with impacts as required by the Stay-Ahead provision (see Chapter 8, Section 8.6.1). All habitat restoration will be completed by year 40.

[7] The target number of individuals per occurrence will be adjusted or established as necessary pending research carried out during Plan implementation to assure viable occurrences of each covered plant species.

Table 5-2a. Land Acquisition Actions

Acquisition Action	Target Species
Landscape (L)	
LAND-L1. Acquire in fee title or obtain easements on 100 stream miles within the study area.	All covered species
LAND-L2a. Acquire in fee title or obtain easements on at least 33,205 acres of land for the Reserve System.	All covered species
LAND-L2b. Incorporate 13,291 acres of existing open space into the Reserve System.	All covered species
LAND-L2c. Acquire in fee title or obtain easements on 33,205 acres of land for the Reserve System that includes the full range of topographic and geographic diversity in the study area.	All covered species
LAND-L2d. Incorporate 13,291 acres of existing open space into the Reserve System that includes the full range of topographic and geographic diversity in the study area.	All covered species
LAND-L3. Acquire in fee title or obtain easements on streams (100 miles), ponds (50 acres), freshwater wetlands (10 acres), and seasonal wetlands (5 acres) in all watersheds of the study area.	California red-legged frog, California tiger salamander, western pond turtle, least Bell's vireo,
LAND-L4. Acquire and enhance natural and semi-natural landscapes between the Santa Teresa Hills and Metcalf Canyon to the south that will contribute to providing connectivity between the Santa Cruz Mountains and the Diablo Range to promote the movement of covered and other native species at many spatial scales (Linkage 10 in Table 5-9 and Figure 5-6).	Bay checkerspot butterfly, covered serpentine plants
LAND-L5. Acquire in fee title or obtain easements on 2,900 acres of serpentine grassland along Coyote Ridge to link existing protected areas and to create a large core reserve for serpentine grassland species to move within (Linkage 6 in Table 5-9 and Figure 5-6). These acreages are inclusive of, not in addition to, acquisition targets set in LAND-G3.	Bay checkerspot butterfly, covered serpentine plants, western burrowing owl
LAND-L6. Acquire in fee title or obtain easements on at least 3,000 acres of grassland, chaparral & coastal scrub, and oak woodland natural communities south of Henry W. Coe State Park to link this core reserve with extensive wetlands surrounding San Felipe Lake in San Benito County (Linkage 14 in Table 5-9 and Figure 5-6).	San Joaquin kit fox, California tiger salamander, California red-legged frog

Acquisition Action	Target Species
LAND- L7. Acquire in fee title or obtain easements on at least 2,300 acres of grassland, chaparral & coastal scrub, and oak woodland natural communities in the NE corner of the study area to link the core reserve that includes Joseph Grant County Park with SFPUC lands and other protected lands in Alameda County (Linkage 4 in Table 5-9 and Figure 5-6).	California tiger salamander, California red-legged frog
LAND-L8. Acquire in fee title or obtain easements on at least 500 acres of grassland, chaparral & coastal scrub, and oak woodland natural communities to connect Almaden Quicksilver County Park with protected open space to the east near Calero Lake (Linkage 9 in Table 5-9 and Figure 5-6).	California tiger salamander, California red-legged frog, western pond turtle
LAND-L9. Acquire in fee title or obtain easements on 2,000 acres of conifer woodland, riparian forest & scrub, oak woodland, and grassland natural communities, in the portion of the Pescadero Watershed that is in the study area and along the Pajaro River, to maintain wildlife connections between the Santa Cruz Mountains and the Gabilan Range outside the study area (Linkages 18, 19, and 20 in Table 5-9 and Figure 5-6).	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-L10. Acquire in fee title or obtain easements on serpentine grassland along Coyote Ridge to protect the connection between Silver Creek and Kirby Canyon (Linkage 6 in Table 5-9 and Figure 5-6) as part of the acquisition targets set in LAND-G3.	Bay checkerspot butterfly, covered serpentine plants
Grassland (G)	
LAND-G1. Acquire 4,130 acres of serpentine grassland by fee title or conservation easement with the full range of serpentine grassland associations and vegetation diversity found throughout the study area. This includes 4,000 acres of serpentine bunchgrass grassland, 120 of serpentine rock outcrops/barrens, and 10 acres of serpentine seeps.	Covered serpentine plants, Bay checkerspot butterfly
LAND-G2. Acquire 13,300 acres of annual grassland by fee title or conservation easement as part of the Reserve System. Target areas on both sides of Santa Clara Valley with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored. Acquisition of native grassland will be given priority.	California tiger salamander, western burrowing owl

Acquisition Action	Target Species
LAND-G3. Acquire in fee title or obtain conservation easements on 4,000 acres of suitable serpentine grassland habitat along ridges for Bay checkerspot butterfly on Silver Creek Hills, Coyote Ridge, Pigeon Point, Tulare Hill, Santa Theresa Hills, areas west of Calero Reservoir, and the Kalanas, and Hale/Falcon Crest in fee title or conservation easement. Habitat acquisition on Coyote Ridge and Tulare Hill is top priority. For other sites totaling 554 acres, prioritize sites, threat, patch size, current occupancy and prevalence of cool microsites for Bay checkerspot butterflies.	Covered serpentine plants, Bay checkerspot butterfly
LAND-G4. (not used)	
LAND-G5. (not used)	
LAND-G6. Acquire, obtain easements, or retain management agreements on burrowing owl nesting habitat within 2 miles the San Jose Water Pollution Control Plant Bufferlands, north of Highway 237.	western burrowing owl, San Joaquin kit fox, California tiger salamander
LAND-G7. Acquire, obtain easements, or retain management agreements on burrowing owl nesting habitat within 2 miles of the San Jose International Airport or other important northern San Jose breeding sites.	western burrowing owl
LAND-G8. Acquire or obtain easements on 21,310 acres of suitable overwintering habitat in the Diablo Range that support ground squirrel populations or could support them with improved management. This acreage is in addition to of the targets identified in LAND-G6 and LAND-G7.	western burrowing owl, San Joaquin kit fox, California tiger salamander
LAND-G9. Acquire in fee title or obtain easements on 4,100 acres of annual grassland and suitable oak woodland types (e.g., oak savanna and oak woodland within 500 feet of annual grassland) north and south of Highway 152 in modeled San Joaquin kit fox habitat.	western burrowing owl, San Joaquin kit fox, California tiger salamander
Chaparral and Northern Coastal Scrub (C)	
LAND-C1. Acquire 400 acres of northern mixed chaparral/chamise chaparral by fee title or conservation easement.	California tiger salamander
LAND-C2. Acquire 700 acres of mixed serpentine chaparral by fee title or conservation easement.	California tiger salamander
LAND-C3. Acquire 1,400 acres of northern coastal scrub/Diablan sage scrub by fee title or conservation easement.	California tiger salamander

Table 5-2a. Continued

Acquisition Action	Target Species
Oak and Conifer Woodland (OC)	
LAND-OC1. Acquire in fee title or obtain conservation easements on 7,100 acres of mixed oak woodland and forest, including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	western burrowing owl, San Joaquin kit fox, California tiger salamander, California red-legged frog
LAND-OC2. Acquire 2,900 acres of coast live oak woodland and forest by fee title or conservation easement, including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	western burrowing owl, San Joaquin kit fox, California tiger salamander, California red-legged frog
LAND-OC3. Acquire 1,100 acres of blue oak woodland and 1,700 acres of valley oak woodland by fee title or conservation easement including land in both the Santa Cruz Mountains and the Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	western burrowing owl, San Joaquin kit fox, California tiger salamander, California red-legged frog
LAND-OC4. Acquire 80 acres of foothill pine-oak woodland and forest by fee title or conservation easement, including land in both the Santa Cruz Mountains and Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	western burrowing owl, San Joaquin kit fox, California tiger salamander, California red-legged frog
LAND-OC5. Acquire 20 acres of mixed evergreen forest by fee title or conservation easement including land in both the Santa Cruz Mountains and Diablo Range. Target areas with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored.	California tiger salamander, California red-legged frog, foothill yellow-legged frog
LAND-OC6. Acquire 10 acres of redwood forest by fee title or conservation easement.	California tiger salamander, California red-legged frog, foothill yellow-legged frog

Acquisition Action	Target Species
Riverine and Riparian Forest and Scrub (R)	
LAND-R1. Extend the Uvas Creek Park Preserve 1.6 miles upstream to Hecker Pass Highway and setback expected development adjacent to this stream segment by a minimum of 100 feet to protect the Uvas Creek Corridor consistent with Goals 5-5, 5-7, and 5-8 of the approved City of Gilroy Hecker Pass Specific Plan. Target acquisitions will to contribute to the protection of a total of 800 acres of riparian woodland and forest in the Uvas, Llagas, and Pacheco watersheds.	California red-legged frog, California tiger salamander, western pond turtle, foothill yellow-legged frog, least Bell's vireo
LAND-R2. Acquire in fee title or obtain conservation easements on lands that protect at least 250 acres and up to 578 acres of existing willow riparian forest and scrub or mixed riparian forest and woodland, including areas that provide key connectivity between existing riparian habitats in upper Coyote Creek, San Felipe Creek, Uvas Creek, Tar Creek, Little Arthur Creek, and Pacheco Creek.	California red-legged frog, California tiger salamander, western pond turtle, foothill yellow-legged frog, least Bell's vireo
LAND-R3. Acquire in fee title or obtain conservation easements on lands that protect at least 40 acres of existing Central California sycamore alluvial woodland to ensure that this very rare and threatened land cover type is preserved in the study area.	California red-legged frog, California tiger salamander, western pond turtle, foothill yellow-legged frog, least Bell's vireo
LANS-R4. (not used)	
LAND-R5. Acquire or obtain easements along 104 miles of perennial streams located above Uvas, Calero, Chesbro, Anderson, or in Uvas Creek below Uvas Reservoir, Upper Penitencia Creek, Alamitos Creek or Guadalupe Creek that have or could be restored to have cobblestone substrate and consistent, gentle flows from late March to late May.	California red-legged frog, California tiger salamander, western pond turtle, foothill yellow-legged frog, least Bell's vireo
Wetland and Pond (WP)	
LAND-WP1a. Acquire in fee title or conservation easement 10 acres of perennial freshwater wetlands suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP1b. Acquire in fee title or conservation easement up to 50 acres of perennial freshwater wetlands suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird

Acquisition Action	Target Species
LAND-WP2a. Acquire in fee title or conservation easement 5 acres of seasonal freshwater wetlands suitable for covered or native species and/or other seasonal wetlands capable of being enhanced or restored to support covered species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP2b. Acquire in fee title or conservation easement up to 30 acres of seasonal freshwater wetlands suitable for covered or native species and/or other seasonal wetlands capable of being enhanced or restored to support covered species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP3a. Acquire in fee title or conservation easement 50 acres of ponds suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP3b. Acquire in fee title or conservation easement up to 104 acres of ponds suitable for covered or native species in the Santa Cruz Mountains, Santa Clara Valley, and the Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-G2. Acquire 13,300 acres of annual grassland by fee title or conservation easement as part of the Reserve System. Target areas on both sides of Santa Clara Valley with a high concentration of ponds occupied by covered species or native species and/or other ponds capable of being restored. Acquisition of native grassland will be given priority.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP4. Acquire habitat that is adjacent to permanently protected aquatic resources with a high potential to support CRLF and is in the East San Francisco Bay Recovery Unit for red-legged frog (USFWS 2002) (Coyote Creek, Pacheco, and Pescadero Watersheds).	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP5. Acquire habitat that contains a matrix of aquatic and upland habitats and is also adjacent to Joseph D. Grant County Park, Palassou Ridge Open Space Preserve, southeast of Henry Coe State Park, Santa Cruz Mountain foothills, and Calero County Park in areas where dense forest is absent to reduce competition with other native amphibians (e.g., California newts).	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird

Acquisition Action	Target Species
LAND-WP6a. Acquire stream segments or ponds that currently provide or could provide high quality basking, breeding, and nesting habitat (vegetated banks and at least 150 feet of adjacent upland habitat) for western pond turtle.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP6b. Acquire stream segments or ponds that currently provide or could provide high quality basking, breeding, and nesting habitat (vegetated banks and at least 0.5 miles of adjacent upland habitat) for California tiger salamander.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP7. Acquire habitat near Santa Teresa Hills and Tulare Hill to provide connectivity between populations in the Diablo Range and the Santa Cruz foothills.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP8. Acquire in fee title or through a conservation easement at least 4 tricolored blackbird breeding sites that support, historically supported, or could support tricolored blackbird colonies each with at least 2-acres of breeding habitat and foraging habitat within 2 miles. Target at least 5 acres of suitable breeding habitat for tricolored blackbird within dry land farming or ranching complexes in the Santa Clara Valley and the Diablo Range	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
LAND-WP9. Acquire 200 acres of foraging habitat for tricolored blackbird in areas where there are protected breeding sites within 2 miles.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird
Specific Plant Occurrences (P)	
LAND-P1. Acquire in fee title or conservation easement sites in the study area that support three unprotected occurrences of Coyote ceanothus and provide the necessary buffer between incompatible land uses.	Coyote ceanothus
LAND-P2. Acquire in fee title or conservation easement sites in the study area that support 55 occurrences of Santa Clara Valley dudleya across a range of elevational gradients on both sides of Coyote Valley to ensure geographic diversity in protected occurrences.	Santa Clara Valley dudleya
LAND-P3. Acquire in fee title or conservation easement sites in the study area that support three occurrences of Metcalf Canyon jewelflower.	Metcalf canyon jewelflower
LAND-P4. Acquire north side of Tulare Hill to promote reintroduction of Metcalf Canyon jewelflower on west side of Valley.	Metcalf canyon jewelflower

Table 5-2a. Continued

Acquisition Action	Target Species
LAND-P5. Acquire sites in the study area that support 17 occurrences of most beautiful jewelflower.	Most beautiful jewel flower
LAND-P6. Acquire sites in the study area that support Mount Hamilton thistle in drainages or spring systems and stratify protection on both sides of Coyote Valley to ensure geographic diversity in protected occurrences.	Mount Hamilton thistle
LAND-P7. Acquire sites in the Reserve System that support eight occurrences of smooth lessingia.	Smooth lessingia
LAND-P8. Acquire sites along Coyote Ridge that support the four remaining unprotected fragrant fritillary occurrences.	Fragrant fritillary
LAND-P9. Acquire the Tiburon Indian paintbrush occurrence located at the Kirby Canyon landfill mitigation site prior to or at the time the temporary conservation easement expires.	Tiburon Indian paintbrush
LANS-P10. (not used)	
LAND-P11. Acquire four sites in the study area that supports Loma Prieta hoita.	Loma Prieta hoita

Table 5-2b. Land Management Actions

Management Action	Target Species	Monitoring Action
Landscape Management (LM)		
LM-1. Remove fences and private roads in areas where they are no longer needed and where their removal could increase the permeability of the study area for wildlife.	San Joaquin kit fox, American badger, Tule elk	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
LM-2. When replacing small culverts ensure that the culvert has a natural bottom and is large enough for larger mammals such as deer and mountain lions to pass, if feasible. Culverts must provide direct movement from one side of the road to the other and ensure that the culvert is visible to the target species (i.e., do not obscure entrance with vegetation). Install fencing or other features that will direct wildlife towards the culvert or other safe crossing within the first 20 years of implementation.	San Joaquin kit fox, western pond turtle, foothill yellow-legged frog	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
LM-3. Where structurally possible, replace culverts with free span bridges to ensure free movement for wildlife under roadways.	San Joaquin kit fox, western pond turtle, foothill yellow-legged frog	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
LM-4. Ensure that median barrier removal and/or median perforations are considered as alternatives during project design.	San Joaquin kit fox, American badger, bobcat	Compliance monitoring for infrastructure/structure removal, replacement, or installation.
LM-5. Remove median barriers or perforate sections of median barriers along roadways to improve successful wildlife crossings and install fencing or other features to direct wildlife to those open sections within first 20 years of implementation. Use feasibility study to determine location and length of barrier removal.	San Joaquin kit fox, mule deer, Tule elk	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
LM-6. Enhance or restore an estimated 17,440 acres of grassland, 2,500 acres of chaparral and northern coastal scrub, 12,900 acres of oak woodland, 290 acres of riparian forest and scrub, and 10 acres of conifer woodland within the Reserve System.	California tiger salamander, western burrowing owl, San Joaquin kit fox, covered plant species	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
LM-7a. Restore a minimum of 1.0 miles of stream, 50 acres of riparian forest and scrub, and 20 acres of freshwater marsh, and create 20 acres of ponds to contribute to species recovery.	Least Bell's vireo, foothill yellow-legged frog, California red-legged frog, western pond turtle	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
LM-7b. If all predicted impacts occur, restore 10.4 miles of streams, 339 acres of riparian forest and scrub, 45 acres of freshwater marsh, and 30 acres of seasonal wetlands, and create 72 acres of ponds within all watersheds of the study area to maintain and when necessary improve stream hydrologic functions.	Least Bell's vireo, tricolored blackbird, foothill yellow-legged frog, California red-legged frog, western pond turtle	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
LM-8. Negotiate with Cal Fire and other local fire-fighting agencies the use of management response measures for all fire events and fire-dependent ecosystems that minimize impacts to natural communities and covered species while protecting human life and property. All burns will be responded to, and prescribed burns will be conducted, with minimum impact suppression tactics. Burn response will take into consideration ignition location and method, seasonality, weather and availability of suppression forces.	Covered plants, California tiger salamander, western burrowing owl	Compliance monitoring for infrastructure/structure removal, replacement, or installation. Monitor wildlife movement (or plant distribution if applicable) in target areas. Monitor movement of indicator species for connectivity.
LM-9. In identified “no burn” areas implement the biologically appropriate management actions that mimic the natural effects of fire (e.g., mowing, grazing, hand pulling) to subsequently improve habitat for native vegetation.	Covered plants, California tiger salamander, western burrowing owl	Analyze and quantify effectiveness of burning vs. other management actions in increasing diversity and quantity of native vegetation. Monitor target covered species response, if applicable.
LM-10. Integrate adopted policies for natural flood protection (i.e., Ordinance O6-1, Clean, Safe Creeks and Natural Flood Protection Plan, Coyote Watershed Stream Stewardship Plan) into flood protection projects to protect habitat for covered fish, amphibians, and reptiles.	Least Bell's vireo, foothill yellow-legged frog, California red-legged frog, western pond turtle	Compliance monitoring
LM-11. Graze, mow, hand-pull, to reduce non-native invasive plant species, both terrestrial and aquatic, to a level where native plants can reestablish and remain dominant within the Reserve System.	Covered plant species, California tiger salamander, western burrowing owl	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
LM-12. Eradicate or reduce nonnative pig disturbance within the Reserve System through trapping, hunting, or other control methods. Success criteria is achieved through ensuring disturbances by nonnative pigs do not impair the ability of the Reserve System from meeting the biological goals and objectives.	Covered plant California tiger salamander, California red-legged frog, western pond turtle, oak woodlands	Analyze and quantify numbers of pigs eradicated and evidence of remaining population (e.g., pig observations or signs of damage).
LM-13. Eradicate or reduce nonnative predators (bullfrogs, invasive fish, feral cats) within the Reserve System through habitat manipulation (e.g., periodic draining of ponds), trapping, hand capturing, electroshocking or other control methods to achieve targets identified in reserve unit management plans.	California tiger salamander, California red-legged frog, western pond turtle, foothill yellow-legged frog	Monitor response of nonnative predators to habitat manipulation. Evaluate effect of predator abatement on native pond and wetland biodiversity. Determine presence of covered species.
LM-14. Selectively apply herbicides or other treatments to invasive plants.	Covered plants	Monitor status of non-native invasive plants in target eradication areas and assess efficacy of various techniques. Monitor covered species response.
Grassland Management (GRASS)		
GRASS-1. Continue or introduce livestock and native herbivore (e.g., elk) grazing in a variety of grazing regimes.	California tiger salamander, western burrowing owl, San Joaquin kit fox, covered plant species	Monitor effects of various grazing regimes on reducing nonnative plants and increasing diversity and biomass of native plants. In oak woodlands, monitor effects of various grazing regimes on oak woodland regeneration and recruitment. Monitor target covered species responses.
GRASS-2. Conduct prescribed burns. Use targeted studies to inform methods, timing, location, and frequency.	California tiger salamander, western burrowing owl, San Joaquin kit fox, covered plant species	Monitor effects of burning on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species responses.
GRASS-3. Conduct mowing in selected areas to mimic grazing where use of livestock is impractical.	California tiger salamander, western burrowing owl, San Joaquin kit fox, covered plant species	Monitor effects of mowing on reducing nonnative plants and increasing diversity and biomass of native plants. Monitor target covered species response.
GRASS-4. Conduct selected seeding of native forbs and grasses in the Reserve System.	California tiger salamander, western burrowing owl, San Joaquin kit fox, covered plant species	Monitor success of seeding efforts in promoting native forbs and grasses. Monitor target covered species responses.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
GRASS-5. Prohibit use of rodenticides within the Reserve System, except when needed to protect the integrity of structures, such as levees, stock ponds and dams.	California tiger salamander, western burrowing owl, San Joaquin kit fox	Monitor population trend of California ground squirrels. Track changes in burrowing mammal colony size over time.
GRASS-6. Introduce livestock grazing where it is not currently used, and where conflicts with covered activities are minimized, to reduce vegetative cover and biomass that currently excludes ground squirrel and encourage ground squirrel colonization of new areas within the Reserve System.	western burrowing owl, San Joaquin kit fox, California tiger salamander, California red-legged frog	Monitor population trend of California ground squirrels. Analyze and quantify changes in burrowing mammal colony size over time.
GRASS-7. Implementing Entity will initiate translocation efforts if natural colonization fails after five seasons in which core populations are at above-average population sizes. Through coordination with species experts and regulatory agencies translocate Bay checkerspot butterflies (eggs, larvae, or adults) from core populations into suitable but unoccupied sites if natural dispersal fails to reestablish population.	Bay checkerspot butterfly	Monitor at periodic intervals the success of translocation efforts in establishing new populations of Bay checkerspot butterfly.
GRASS-8. Implement vegetation management (i.e., graze/mow) that reduces vegetation height and density to optimal conditions for burrowing owls.	California tiger salamander, covered grassland plants, western burrowing owl	Monitor status of burrowing owl population and correlate species response to vegetation management.
GRASS-9. Create and maintain artificial burrows to encourage colonization of sites where ground squirrels establishment is not feasible or during the interim before ground squirrel colonies naturally establish.	Western burrowing owl	Monitor artificial burrow for occupancy twice annually, during the breeding season.
GRASS-10. Conduct at least one public education campaign in the southeastern portion of the study area within the first 10 years of implementation to provide landowners with information about management and land use techniques that are more compatible with movement and use by San Joaquin kit fox. Conduct additional meetings as needed.	San Joaquin kit fox	Ensure that at least one educational meeting is conducted within the first two years of implementation and then as needed after that.
Chaparral and Northern Coastal Scrub Management (CHAP)		
CHAP-1. Conduct prescribed burns in chaparral and northern coastal scrub to maintain canopy gaps and promote regeneration. Use targeted studies to inform locations and frequency.	California tiger salamander, California red-legged frog, western pond turtle, western burrowing owl, Coyote ceanothus	Monitor effects of burning on promoting canopy gaps, regeneration, and succession in chaparral and northern coastal scrub.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
CHAP-2. Mechanically thin chaparral and northern coastal scrub to promote structural diversity. Use targeted studies to inform location and frequency.	California tiger salamander, California red-legged frog, western pond turtle, western burrowing owl, Coyote ceanothus	Monitor effects of mechanical thinning on promoting canopy gaps, regeneration, and succession in chaparral and northern coastal scrub.
CHAP-3. Identify areas in the Santa Cruz Mountains and eastern mountains where adjacent natural communities (e.g. grassland, oak woodland, conifer forests) are encroaching on chaparral and scrub land cover and, if appropriate, work to reduce the spread through manual reduction.		Analyze and quantify spread of adjacent natural communities into chaparral and scrub land cover types. Study spread rate after manual reduction.
Oak and Conifer Woodland Management (OAK)		
OAK-1. Conduct prescribed burns in low-density oak woodlands to enhance the community and to reduce non-native, invasive grass cover beneath oaks and encourage growth of a native understory and oak seedlings.	California tiger salamander, California red-legged frog, western pond turtle	Monitor effects of burning on promoting regeneration and recruitment of oak woodlands and understory land cover. Monitor covered species response.
OAK-2. Conduct prescribed burns in redwood forest to maintain or enhance native species diversity in the mid-canopy and understory.	California tiger salamander, California red-legged frog, western pond turtle, San Joaquin kit fox	Monitor effects of burning on promoting native species diversity.
OAK-3. Mechanically thin the understory of redwood forest in target areas to promote a healthy understory/canopy.	California tiger salamander, California red-legged frog	Monitor effects of mechanical thinning on regeneration and succession in the understory and canopy of conifer woodlands. Monitor target covered species response, if applicable.
Riverine and Riparian Forest and Scrub Management (STREAM)		
STREAM-1. Exclude livestock access to target stream segments (e.g., Pacheco Creek, floodplain of Coyote Creek) using exclusion fencing, off-channel water sources, and other potential actions.	California red-legged frog, foothill yellow-legged frog, western pond turtle, least Bell's vireo	Conduct pre- and post-treatment monitoring to document vegetation and covered-species response to exclusion.
STREAM-2. Plant and/or seed in native understory and overstory riparian vegetation within 15 feet of the edge of the low-flow channel to create structural diversity, provide overhead cover, and moderate water temperature at all riparian restoration sites.	California red-legged frog, foothill yellow-legged frog, western pond turtle, least Bell's vireo	Monitor the efficacy of seeding efforts with respect to structural diversity, overhead cover, and water temperature compared to designated reference locations. Indicator species will be selected and success criteria developed for large-scale restoration projects from the reference locations.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
STREAM-3. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors, or re-establish severally degraded or historic riparian corridors, to promote continuity within conservation lands.	California red-legged frog, foothill yellow-legged frog, western pond turtle, least Bell's vireo	STREAM-4. Plant and/or seed in native riparian vegetation in gaps in existing riparian corridors to promote continuity.
STREAM-4. Replace concrete, earthen or other engineered channels as part of the 10.4 miles of stream restoration to restore floodplain connectivity. Location and length will be determine by site-specific conditions.	California red-legged frog, foothill yellow-legged frog, western pond turtle, least Bell's vireo	Compliance monitoring and annual reporting. Assess habitat quality of acquired land and prioritize areas for management.
STREAM-5. Replace confined channels to restore floodplain connectivity and commensurate functions as part of the 10.4 miles of stream restoration. Location and length will be determine by site-specific conditions.	California red-legged frog, foothill yellow-legged frog, western pond turtle	Conduct pre- and post-treatment monitoring of community function (performance of ecological processes); habitat composition, structure and pattern; and connectivity as part of a targeted study.
STREAM-6. Manage watershed-wide fine sediment inputs by conditioning controls on runoff from all development projects (see Condition 3) to improve riverine habitat functions and geomorphic processes.	California red-legged frog, foothill yellow-legged frog, western pond turtle, least Bell's vireo	Conduct annual spot checks on new developments to determine whether sediment run-off provisions are consistent with the Conditions outlined in this Plan.
STREAM-7. Implement a brown-headed cowbird control program in coordination with species experts and regulatory agencies that will reduce the impact of brood parasitism on least Bell's vireo nest success, if least Bell's vireos become regular nesters in the study area (>3 nests over at least two consecutive years) and brown-headed cowbird eggs are discovered in vireo nests.	Least Bell's vireo	Compliance monitoring. Monitor for riparian song bird nesting within least Bell's vireo modeled habitat. Periodically, every 5 years, monitor for least Bell's vireo outside of modeled habitat to document range expansion. Quantify the number of occurrences of brood parasitism that are occurring and if/when brown-headed cowbird control program is initiated and efficacy of program.
STREAM-8. Increase the amount of cobblestone substrate suitable to support breeding foothill yellow-legged frogs to 2,000 ft. to areas close to known occurrence(s) of foothill yellow-legged frog or immediately upstream or downstream of known occurrences or other high quality foothill yellow-legged frog breeding habitat.	Foothill yellow-legged frog	Assess yellow-legged frog response to increase in cobblestone substrate as part of a targeted study.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
Wetland and Pond Management (POND)		
POND-1. Install fencing that will reduce grazing pressure and exclude feral pigs on portions of ponds and wetlands and provide vegetated refuge sites for covered species. Fence installation will be carefully applied to avoid negative impacts on small mammal movement and upland habitat.	California tiger salamander, California red-legged frog, western pond turtle	Monitor effectiveness of fencing to exclude livestock and feral pigs and compare vegetation inside of fencing to vegetation outside of fencing. Evaluate success of wetland and pond enhancement using established success criteria.
POND-2. Install woody debris around perimeter and in submerged banks of ponds and wetlands to create basking habitat and cover for native juvenile amphibians and turtles. Materials imported from outside of the watershed shall be treated for chytrid and other potential pathogens prior to installation.	California tiger salamander, California red-legged frog, western pond turtle	Analyze and quantify effectiveness of created basking site through routine monitoring in ponds with known western pond turtle occupancy.
POND-3. Plant native emergent vegetation around the perimeter and in ponds and wetlands.	California tiger salamander, California red-legged frog, western pond turtle	Monitor survivorship of planting, quantify vegetated perimeter of pond, describe habitat quality and periodically survey for species response from covered amphibians and reptiles. Evaluate success of wetland and pond enhancement using established success criteria.
POND-4. Clear vegetation and/or remove sediment in a way that minimizes negative effects on covered species when vegetation and/or sediment restricts the ability of the aquatic environment from meeting the biological goals and objectives of the Plan.	California tiger salamander, California red-legged frog, western pond turtle	Evaluate success of wetland and pond enhancement using established success criteria.
POND-5. If biologically appropriate, graze or mechanically thin around pond perimeter to mimic grazing and promote native species.	California tiger salamander, California red-legged frog, western pond turtle	Evaluate success of wetland and pond enhancement using established success criteria.
POND-6. Restore 20 acres of perennial freshwater marsh within the Reserve System in suitable sites and those likely to support covered species.	California tiger salamander, California red-legged frog, western pond turtle	Compliance monitoring. Monitor freshwater marsh and wetland restoration and assess whether success criteria are being met. Assess connectivity of restored complexes.
POND-7. In addition to the perennial freshwater marsh restoration described in POND-6, restore up to 25 acres of perennial freshwater marsh within the Reserve System in the Santa Cruz Mountains, Santa Clara Valley, and Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird	Compliance monitoring. Monitor freshwater marsh and wetland restoration and assess whether success criteria are being met. Assess connectivity of restored complexes.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
POND-8. Restore up to 30 acres of seasonal wetlands within the Reserve System in the Santa Cruz Mountains, Santa Clara Valley, and Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird	Compliance monitoring. Monitor habitat restoration and assess whether success criteria are being met. Monitor use of restored habitat by tricolored blackbird.
POND-9. Create at least 20 acres of ponds at 40 sites, at least 10 sites in the Santa Cruz Mountains and 20 sites in the Diablo Range.	California tiger salamander, California red-legged frog, western pond turtle, tricolored blackbird	Compliance monitoring. Monitor pond construction and assess whether success criteria are being met.
POND-10. In addition to the creation of ponds described in POND-9, create up to 52 acres of ponds in-kind within the Reserve System to increase the amount available habitat and enhance connectivity among existing ponds and wetlands if all anticipated impacts occur.3	California tiger salamander, California red-legged frog, western pond turtle	Compliance monitoring. Monitor pond construction and assess whether success criteria are being met.
POND-11. Offer financial and regulatory (Safe Harbor Agreement) incentives to private landowners to enhance pond and wetland habitat to suit breeding California red-legged frog, California tiger salamander, and western pond turtle.	California tiger salamander, California red-legged frog, western pond turtle	Compliance monitoring.
POND-12. Educate the public that the use of any salamander species as bait is illegal in the State of California.	California tiger salamander	Compliance monitoring.
POND-13. Excavate sections of ponds to provide deeper pools that will be utilized by California red-legged frog adults and sub-adults and western pond turtles, while maintaining shallow areas to provide rearing habitat for California red-legged frog tadpoles, California tiger salamander larvae, and western pond turtle hatchlings.	California tiger salamander, California red-legged frog, western pond turtle	Monitor use of excavated pond by red-legged frog and western pond turtles as part of a targeted study.
POND-14. Offer financial or regulatory incentives (Safe Harbor Agreement, if listed) to private landowners to enhance pond and marsh habitat to suit breeding tricolored blackbirds, and to ensure that dry-land farming and ranching activities support breeding tricolored blackbirds.	Tricolored blackbird	Compliance Monitoring.
POND-15 Offer financial incentives to private landowners to ensure that dry-land farming and ranching activities support foraging tricolored blackbirds.	Tricolored blackbird	Compliance Monitoring.
POND-16. Restore freshwater marsh, seasonal wetlands, and/or ponds that will support dense reed-like vegetation (cattails) or other native vegetation that will attract nesting tricolored blackbirds.	Tricolored blackbird	Compliance monitoring. Monitor habitat restoration and assess whether success criteria are being met. Monitor use of restored habitat by tricolored blackbird.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
POND-17. In areas with non-native vegetation (e.g., Himalayan blackberry) that supports existing tricolored blackbird colonies, initiate a gradual (3-4 year) transition from non-native vegetation to native vegetation that is structurally similar.	Tricolored blackbird	Determine areas where tricolored blackbirds are using non-native vegetation and ensure that there is a management plan in place to control the spread of the non-native vegetation and transition the colony to native vegetation if necessary.
POND-18. (not used)		
POND-19. Restore a minimum of 20 acres and up to 45 acres of freshwater marsh within the Reserve System in the Santa Cruz Mountains, Santa Clara Valley, and Diablo Range.	Tricolored blackbird	Compliance monitoring. Monitor habitat restoration and assess whether success criteria are being met. Monitor use of restored habitat by tricolored blackbird.
Directed Studies		
STUDIES-1. Conduct feasibility study to determine wildlife movement across Coyote Creek downstream of Anderson Reservoir, Pacheco Creek (SR 152), and the Pajaro River.	Covered wildlife species	Analyze and quantify movement of indicator species to determine whether linkages are functioning as intended.
STUDIES-2. Determine factors relevant to the health and regeneration of native chaparral/scrub species. Targeted studies will be imitated within first 10 years of plan implementation. Use results of targeted studies to revise and improve management actions.	California tiger salamander, California red-legged frog, western pond turtle, western burrowing owl	Conduct targeted research that identifies key factors affecting regeneration and succession of chaparral/scrub.
STUDIES-3. Experimentally manage oak woodlands to reduce seedling mortality, increase seedling and sapling survival and determine factors relevant to regeneration, including browsing by mammals, birds, and insects.	California tiger salamander, California red-legged frog, western pond turtle, San Joaquin kit fox	Conduct targeted research that identifies key factors affecting seedling mortality, seedling and sapling survival and factors relevant to oak woodland regeneration.
STUDIES-4. Experimentally manage redwood forest to determine factors relevant to regeneration and maintenance; possibly including prescribed burning, selective thinning, and other management actions to meet this objective.	California red-legged frog, foothill yellow-legged frog, western pond turtle	Conduct targeted research in redwood forest, ponderosa pine woodland, and knobcone pine woodland to guide management actions and other factors relevant to regeneration and maintenance.
STUDIES-5. Conduct targeted studies to determine factors limiting the expansion of the covered plant species, including but not limited to its management and micro-site needs, and implement measures to mitigate or eliminate these factors to promote occurrence expansion.	Coyote ceanothus, Santa Clara Valley dudleya, Metcalf Canyon jewelflower, most beautiful jewelflower, Mount Hamilton thistle, smooth lessingia, fragrant fritillary, Tiburon Indian paintbrush, Loma Prieta hoita	Monitor results of research and the effects of its application.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
STUDIES-6. Conduct a directed study to censuses egg masses in breeding habitat downstream of reservoirs before and after releases to determine whether eggs masses were lost.	Foothill yellow-legged frog	Monitor effects of pulse flows on foothill yellow-legged frog.
STUDIES-7. In the case of ponds, wetlands, and/ or amphibian populations becoming infected with chytrid fungus or other diseases, use the best scientific information available to manage and stop spread of epidemic.	California tiger salamander, California red-legged frog, western pond turtle, foothill yellow-legged frog	Monitor for the presence of disease. Monitor efficacy of disease control actions.
STUDIES-8. Identify the distribution and risk to existing indigenous populations of covered amphibians and reptiles from hybridization (e.g., California tiger salamander hybridizing with Texas salamander) within the Reserve System. Appendix K, California Tiger Salamander Hybridization, will serve as the Management Plan for CTS hybridization issues and will be updated throughout the permit term for adaptive management	California tiger salamander	Monitor for the presence of non-natives and hybrids. Test and document efficacy of management plan.
STUDIES-9. Annually identify and maintain upland breeding sites (even if sites are not “natural”) for western pond turtle because of the high fidelity of use from year to year .	Western pond turtle	Monitor use of protected sites to determine factors influencing nest success in areas of known turtle use.
STUDIES-10. (not used)		
STUDIES-11. Conduct experimental burning in protected occurrences of targeted covered plant species to determine the importance of fire for plant regeneration.	California tiger salamander, western burrowing owl, San Joaquin kit fox, Coyote ceanothus	Monitor effects of burns on covered species
STUDIES-12. Ensure seeds from natural occurrences in the Study Area are stored and maintained at a minimum of one Center for Plant Conservation certified botanic garden.	Coyote ceanothus, Santa Clara Valley dudleya, Metcalf Canyon jewelflower, most beautiful jewelflower, Mount Hamilton thistle, smooth lessingia,	Monitor viability of seed collection and refresh collection, as necessary.

Table 5-2b. Continued

Management Action	Target Species	Monitoring Action
STUDIES-13. Identify suitable locations for and establish target number of new covered plant occurrences in the Reserve System.	Coyote ceanothus, Metcalf Canyon jewelflower	Compliance monitoring and annual reports.
STUDIES-14. Determine suitable propagation or planting techniques for targeted covered plant species and determine biologically appropriate seed sampling techniques from existing occurrences.	Coyote ceanothus, Metcalf Canyon jewelflower	Monitor newly established and source occurrences.
STUDIES-13. Identify suitable locations for and establish target number of new covered plant occurrences in the Reserve System.	Coyote ceanothus, Metcalf Canyon jewelflower	Monitor the results of all experiments.
STUDIES-14. Determine suitable propagation or planting techniques for targeted covered plant species and determine biologically appropriate seed sampling techniques from existing occurrences.	Coyote ceanothus, Metcalf Canyon jewelflower	Monitor newly established and source occurrences.
STUDIES-15. Design and implement field experiments (if the number of propagules will not be significantly impacted) to test alternative techniques for establishment of targeted covered plant occurrences. Field experiments will be continue until target number of occurrences are established.	Coyote ceanothus, Metcalf Canyon jewelflower	Monitor the results of all experiments.
STUDIES-16. Monitor the effects of livestock grazing (or predation by other species, e.g., black-tailed jackrabbit) on targeted covered plant species by conducting exclusion experiments and monitoring effects on occurrences, including control sites in the monitoring plan.	Santa Clara Valley dudleya, Mount Hamilton Thistle, smooth lessingia, Tiburon Indian paintbrush, fragrant fritillary	Monitor the effects of grazing on management on covered plant species.
STUDIES-17. Monitor Metcalf Canyon jewelflower and most beautiful jewelflower introgression and develop protocols to protect the genetic integrity of both species.	Metcalf Canyon jewelflower, most beautiful jewelflower,	Monitor the results of research and success of developed protocols.

Table 5-3. Guidelines Used to Set Quantitative Objectives for Species Habitat Protection in the Absence of Species-Specific Data

Proportion of Species' Current Range in the Study Area	General Range of Conservation Obligation of Plan[1, 2]	Example Covered Species
96–100%	80–100%	Bay checkerspot butterfly, Coyote ceanothus, Santa Clara Valley dudleya, smooth lessingia, Metcalf Canyon jewelflower, most beautiful jewelflower
66–95%	65–90%	Mount Hamilton thistle
36–65%	40–75%	Loma Prieta hoita
11–35%	20–50%	California tiger salamander
1–10%	10–35%	California red-legged frog, foothill yellow-legged frog, least Bell's vireo
<1%	5–20%	San Joaquin kit fox, tricolored blackbird, Western burrowing owl, Western pond turtle

Notes:

1: Values expressed as a percentage of the available habitat in the study area and used as guidelines only in the absence of species-specific data. Actual conservation obligations were determined based on a variety of biological, economic, land use, and regulatory factors; see text for more explanation. Quantitative objectives were set using land cover types rather than species habitat.

2: Quantitative biological objectives were developed at the lower or higher end of these ranges based on a series of additional factors, or "modifiers."

A conservation obligation was set at the higher end of the guideline (or beyond it) if one or more of the following factors applied:
-species' historic range was much greater than current range (i.e., a substantial range contraction has occurred);
-species is highly sensitive to management or human disturbance, or management needs are uncertain;
-species population sizes are relatively low or unknown;
-threats to species are severe or widespread;
-impacts from covered activities affect a relatively high proportion of species occurrences or potential habitat.

A conservation obligation was set near the low end of the scale if one or more of the following factors applied:
-species' habitat is abundant in the study area;
-there are a relatively large number of extant occurrences in the study area;
-the proportion of the species' range in the study is at the low end of the scale.

Table 5-4. Gap Analysis for Land Cover Types (acres)

		Open Space Classification (acres, unless otherwise noted)						% of Total in StudyArea	
Land Cover Type	Total in Study Area	Type 1	Type 2	Type 3	Type 4	Total Type 1, 2, 3	Total Open Space	Type 1	Type 1, 2, 3
California Annual Grassland	81,795	8,538	2,290	9,988	568	20,816	21,383	10%	25%
Serpentine Bunchgrass Grassland	10,308	1,262	183	2,160	407	3,605	4,012	12%	35%
Serpentine Rock Outcrop / Barrens	260	6	2	48	2	56	58	2%	22%
Serpentine Seep	34	1	0	12	4	13	16	2%	37%
Rock Outcrop	87	10	0	2	8	12	20	12%	14%
Northern Mixed Chaparral / Chamise Chaparral	23,763	3,766	1,525	475	37	5,766	5,804	16%	24%
Mixed Serpentine Chaparral	3,712	221	356	791	67	1,369	1,436	6%	37%
Northern Coastal Scrub / Diablan Sage Scrub	10,306	574	1,083	1,260	102	2,918	3,019	6%	28%
Coyote Brush Scrub	180	10	0	47	6	56	63	5%	31%
Valley Oak Woodland	12,895	3,460	249	1,320	19	5,029	5,048	27%	39%
Mixed Oak Woodland and Forest	84,488	16,522	5,463	11,934	485	33,920	34,405	20%	40%
Blue Oak Woodland	11,160	4,263	124	946	33	5,333	5,366	38%	48%
Coast Live Oak Forest and Woodland	31,652	3,155	1,454	3,826	265	8,434	8,700	10%	27%
Foothill Pine - Oak Woodland	10,960	3,053	578	505	2	4,136	4,138	28%	38%
Mixed Evergreen Forest	5,775	14	767	1,025	0	1,806	1,806	0%	31%
Willow Riparian Forest and Scrub	2,544	23	204	805	311	1,032	1,343	1%	41%
Central California Sycamore Alluvial Woodland	373	0	111	56	0	167	168	0%	45%
Mixed Riparian Forest and Woodland	3,766	183	61	591	263	834	1,097	5%	22%
Redwood Forest	9,693	4	138	3,006	0	3,148	3,148	0%	32%
Ponderosa Pine Woodland	419	411	1	1	0	414	414	98%	99%
Knobcone Pine Forest	711	0	50	87	0	137	137	0%	19%
Coastal and Valley Freshwater Marsh	381	24	42	140	11	206	217	6%	54%
Seasonal Wetland	201	37	3	55	5	95	100	18%	47%
Pond	1,110	65	28	316	169	410	579	6%	37%
Reservoir	2,767	0	78	2,337	49	2,415	2,465	0%	87%
Streams (miles; not included in totals)	2,392	376	134	293	51	803	854.3	16%	34%

Table 5-4. Continued

Land Cover Type	Total in Study Area	Open Space Classification (acres, unless otherwise noted)						% of Total in StudyArea	
		Type 1	Type 2	Type 3	Type 4	Total Type 1, 2, 3	Total Open Space	Type 1	Type 1, 2, 3
Subtotal All Natural or Water Land Cover Types	**309,338**	**45,604**	**14,790**	**41,732**	**2,816**	**102,126**	**104,942**		
Orchard	2,697	3	0	91	99	94	193	0%	3%
Vineyard	1,393	1	8	0	95	9	104	0%	1%
Grain, Row-crop, Hay & Pasture, Disked/short-te	33,648	873	381	923	2,371	2,177	4,548	3%	6%
Agriculture developed / Covered Ag	1,935	11	0	2	10	13	24	1%	1%
Subtotal All Agricultural Land Cover Types	**39,673**	**887**	**389**	**1,016**	**2,576**	**2,293**	**4,869**		
Urban - Suburban	89,438	67	243	742	1,271	1,052	2,323		
Rural - Residential	12,414	9	16	231	157	256	414		
Golf Courses / Urban Parks	8,673	10	13	1,322	3,763	1,345	5,108		
Ornamental Woodland	95	0	0	0	11	0	11		
Landfill	364	0	0	0	0	0	0		
Barren	211	0	0	19	0	19	19		
Subtotal All Development Land Cover Types	**111,194**	**85**	**272**	**2,315**	**5,203**	**2,672**	**7,875**		
Grand Total	**460,205**	**46,577**	**15,451**	**45,063**	**10,595**	**107,091**	**117,686**		

Table 5-5. Existing Open Space and Interim Conservation Lands Proposed for the Reserve System and Specific Conservation Actions within Each Site

Ownership	Area in Study Area (acres)	Proposed for Reserve System[1] (acres)	Existing Resources that Contribute Substantially to Biological Goals and Objectives of Habitat Plan	Conservation Actions Proposed
Existing Open Space				
County Parks				
Almaden Quicksilver County Park	4,138	653	• Extensive stands of mixed oak woodland (2,100 acres) and over 200 acres of blue oak woodland • Over 300 acres of mixed evergreen forest • Provides habitat connectivity within the Santa Cruz Mountains and to extensive protected open space outside of study area • Important populations of covered plants including most beautiful jewelflower, Santa Clara Valley dudleya, and Loma Prieta hoita. • Suitable habitat present for fragrant fritillary and smooth lessingia.	• Enhance serpentine grassland and chaparral • Improved management of covered plant populations
Anderson Lake County Park	3,144	486	• Small stands of serpentine grassland (33 acres) and serpentine chaparral (37 acres) as well as coast live oak and mixed oak woodland and forest • Provides watershed protection for Anderson Reservoir and subsequently Coyote Creek • Provides important wildlife linkage between Coyote Creek, Coyote Ridge and Henry W. Coe State Park • Two of four populations of Coyote ceanothus (all of one, a portion of another) • Populations of Mt. Hamilton thistle, Santa Clara dudleya, and smooth lessingia	• Protect and enhance two populations of Coyote ceanothus, including a portion of the largest known population • Protect and enhance smooth lessingia populations • Enhance serpentine chaparral • Protect and enhance of Mt. Hamilton population • Protect and enhance Santa Clara dudleya population

Table 5-5. Continued

Ownership	Area in Study Area (acres)	Proposed for Reserve System[1] (acres)	Existing Resources that Contribute Substantially to Biological Goals and Objectives of Habitat Plan	Conservation Actions Proposed
Calero County Park	4,455	1,690	• Extensive stands of mixed oak woodland (1,562 acres) and over 620 acres of California annual grassland • 268 acres of serpentine grassland, much of which may be suitable for Bay checkerspot butterfly • Provides important habitat connectivity within the Santa Cruz Mountains • California tiger salamander and Bay checkerspot butterfly critical habitat • Populations of most beautiful jewelflower, Santa Clara Valley dudleya, Loma Prieta hoita, smooth lessingia and fragrant fritillary	• Enhance breeding habitat for California tiger salamander and Western pond turtle in 3 ponds • Stream enhancement in upper Llagas Creek and tributaries to benefit known population of foothill yellow-legged frog • Enhancement of potential Bay checkerspot butterfly habitat • Enhance covered serpentine plant populations: Santa Clara Valley dudleya, most beautiful jewelflower, Loma Prieta hoita, and fragrant fritillary • Protect key landscape linkage between Diablo Range and Santa Cruz Mountains
Coyote Lake-Harvey Bear Ranch County Park	4,595	825	• Over 2,400 acres of California annual grassland and extensive stands of oak woodland and willow riparian forest and scrub (154 acres) • Provides watershed protection for Coyote Reservoir and subsequently Coyote Creek • California tiger salamander critical habitat • Bay checkerspot butterfly habitat occupied in recent past • Extensive ponds and aquatic habitat for covered amphibians and reptiles	• Enhance serpentine grassland to create potential satellite population of Bay checkerspot butterfly • Improve breeding habitat for California tiger salamander
Joseph D. Grant County Park	9,560	7,760	• Over 5,000 acres of mixed oak woodland, 920 acres of valley oak woodland, and 350 acres of blue oak woodland • Extensive annual grassland (2,800 acres) • Core protected area between Henry W. Coe State Park to the south and protected lands both inside and outside of the study area to the north • California tiger salamander and California red-legged frog critical habitat and likely provides important regional connectivity for both species • Many ponds and other aquatic habitat for red-legged frog, tiger salamander, pond turtle • Stream habitat for foothill yellow-legged frog • Important stands of riparian woodland • 20% of seasonal wetland in study area (40 acres)	• Restoration and enhancement of valley oak woodland • Increase breeding and upland habitat quality for both California red-legged frog and California tiger salamander • Riparian restoration and enhancement along San Felipe Creek and tributaries that will improve habitat for foothill yellow-legged frog • Freshwater marsh restoration, possibly to support tricolored blackbird

Table 5-5. Continued

Ownership	Area in Study Area (acres)	Proposed for Reserve System[1] (acres)	Existing Resources that Contribute Substantially to Biological Goals and Objectives of Habitat Plan	Conservation Actions Proposed
Santa Teresa County Park	1,646	877	• Over 670 acres of serpentine bunchgrass grassland, 164 acres of mixed oak woodland, and 179 acres of coast live oak woodland • Extensive potential habitat Bay checkerspot butterfly; core site on west side of Valley • Large populations of most beautiful jewelflower, Santa Clara Valley dudleya, Loma Prieta hoita, smooth lessingia, and Mount Hamilton thistle • Provides habitat connectivity on the west side of the narrowest point in the valley and likely is important for wildlife movement	• Enhance serpentine bunchgrass grassland through livestock grazing • Best opportunity to create large amount of Bay checkerspot butterfly habitat • Enhance serpentine covered plant populations
Open Space Authority[2]				
Palasou Ridge	782	TBD	• 310 acres of mixed oak woodland and forest, 114 acres of coast live oak forest and woodland, 89 acres of mixed evergreen forest, 61 acres of sycamore alluvial woodland, 26 acres of foothill pine-oak woodland, 23 mixed serpentine chaparral, foothill pine-oak woodland, and willow riparian forest and scrub • 782 acres of California red-legged frog critical habitat (STC-1B) • One occurrence of smooth lessingia • Includes modeled habitat for foothill yellow-legged frog, western pond turtle, California red-legged frog, California tiger salamander, western pond turtle, and golden eagle • 1.5 stream miles of upper Coyote Creek (above Coyote Reservoir)	• Habitat enhancement along upper Coyote Creek for least Bell's vireo • Maintain and enhance sycamore alluvial woodland • Enhance pond habitat for California tiger salamander and California red-legged frogs; control bullfrog populations

Table 5-5. Continued

Ownership	Area in Study Area (acres)	Proposed for Reserve System[1] (acres)	Existing Resources that Contribute Substantially to Biological Goals and Objectives of Habitat Plan	Conservation Actions Proposed
Sierra Vista	984	TBD	• 388 acres of mixed oak woodland and forest, 109 acres coast live oak forest, 95 acres northern coastal scrub/Diablan sage scrub, 38 acres northern mixed chaparral/chamise chaparral, 2.4 acres of ponds, and 0.8 acres of willow riparian and scrub • 984 acres of California red-legged frog critical habitat (STC-1A) • Bordered completely on the east by proposed Reserve System lands • Includes modeled habitat for California red-legged frog, foothill yellow-legged frog, California tiger salamander, western pond turtle, and golden eagle. • 2.2 stream miles of upper Penitencia Creek and tributaries	• Enhance pond habitat for California tiger salamander and California red-legged frogs; control bullfrog populations • Enhance willow riparian habitat for least Bell's vireo and tri-colored blackbird • If needed, enhance stream habitat for foothill yellow-legged frog
Rancho Cañada del Oro	626	TBD	• 401 acres of mixed evergreen forest, 99 acres of northern mixed chaparral/chamise chaparral, 70 acres of mixed oak woodland and forest, 53 acres of redwood forest, and 1.6 acres of knobcone pine woodland • Includes modeled habitat for foothill yellow-legged frog, California red-legged frog, western pond turtle, and golden eagle • Proposed Reserve System lands abut property to the west and to the south • 1.3 stream miles of upper Uvas-Carnadero Creek (above Calero Reservoir) that has suitable habitat for foothill yellow-legged frog	• Fire management for knobcone pine • If needed, enhance stream habitat for foothill yellow-legged frog
County Parks subtotal	27,538	12,291		
Open Space Authority subtotal	2,392	1,000		
Total Existing Open Space	29,930	13,291[3]		

Ownership	Area in Study Area (acres)	Proposed for Reserve System[1] (acres)	Existing Resources that Contribute Substantially to Biological Goals and Objectives of Habitat Plan	Conservation Actions Proposed
Interim Conservation Lands[4]				
County Parks				
Tulare Hill (October 2009)	141	134	• Habitat for Bay checkerspot butterfly, known locations of smooth lessingia and Santa Clara Valley dudleya, reintroduction site for Metcalf Canyon jewelflower, critical corridor connecting Diablo Range with Santa Cruz Mountains (Linkage 8).	• Conservation Analysis Zone Guadalupe-3
Rancho San Vicente (October 2009)	966	966	• Extensive serpentine grassland, serpentine chaparral, blue oak woodland, valley oak woodland, and riparian woodland; supports known populations of at least four covered species: Santa Clara Valley dudleya, most beautiful jewelflower, smooth lessingia, and Mt. Hamilton thistle; supports habitat for at least five covered species: Bay checkerspot butterfly, California red-legged frog (upland), California tiger salamander (upland), and Western burrowing owl (foraging); completes landscape linkage between Almaden Quicksilver County Park and complex of open space surrounding Calero Lake (Linkage 9).	• Conservation Analysis Zone Guadalupe-1
Total Interim Lands	1,107	1,100		

Notes:

[1] Estimated amount to be added to the Reserve System based on air photo and land cover map analysis. Final acreage may differ (but will not exceed 13,291 acres). See Section 5.2.3, subheading *Existing Open Space in the Reserve System* and Section 9.4.2, subheading *Santa Clara County Open Space Authority* for a detailed discussion regarding incorporation of existing open space into the Reserve System.

[2] As described in Section 9.4.2 subheading *Santa Clara County Open Space Authority*, the Open Space Authority intends to enroll up to 1,000 acres of its existing lands into the Reserve System. These 1,000 acres may come from any of the Open Space Authority land identified.

[3] This is the maximum acreage of existing open space that would be credited toward the Reserve System size under the Plan. Additional acres of existing open space could be incorporated into the Reserve System; however, they would not receive credit toward the Reserve System size. Alternatively, the Implementing Entity may acquire new lands for the Reserve System in place of adding this acreage from existing open space, as long as the total Reserve System size requirements are met.

[4] Following the issuance of permits, lands acquired during Plan preparation may count toward permit obligations once the partner agency completes its recreation plans and the Wildlife Agencies approve of their incorporation into the Reserve System. Rancho San Vicente and Tulare Hill (acquired October 2009 using County Park Charter Fund) are considered interim conservation and could be incorporated into the Reserve System after recreation plans have been completed for those lands.

Table 5-6. Gap Analysis for Covered Species with Habitat Distribution Models (acres)

		Open Space Classification (acres, unless otherwise noted)						% of Total Modeled Habitat in Study Area	
Species and Habitat Type	Total Modeled Habitat in Study Area	Type 1	Type 2	Type 3	Type 4	Total Type 1, 2, 3	Total Open Space	Type 1	Type 1, 2, 3
Bay Checkerspot Butterfly									
Primary Habitat	8,621	1,336	34	1,550	384	2,921	3,304	15%	34%
California Tiger Salamander									
Breeding Habitat	1,027	100	32	271	29	403	432	10%	39%
Non-breeding Habitat	323,721	45,667	13,770	37,583	4,567	97,020	101,587	14%	30%
Total	324,748	45,767	13,802	37,853	4,596	97,423	102,019	14%	30%
California Red-Legged Frog									
Primary Habitat	10,101	730	576	1,924	633	3,230	3,863	7%	32%
Secondary Habitat	331,672	45,523	14,479	37,932	4,203	97,934	102,137		
Total	341,773	46,253	15,055	39,856	4,836	101,164	106,000	14%	30%
Foothill Yellow-Legged Frog (length in miles)									
Primary Habitat	244	37	9	24	7	70	77	15%	29%
Secondary Habitat	447	82	18	52	6	152	158	18%	34%
Total	690	119	28	76	13	222	235	17%	32%
Western Pond Turtle									
Primary Habitat	82,895	13,900	4,566	10,102	1,233	28,568	29,802	17%	34%
Secondary Habitat	232,021	31,067	10,346	28,078	3,048	69,491	72,539	13%	30%
Total	314,916	44,967	14,912	38,180	4,281	98,060	102,341	14%	31%
Western Burrowing Owl[1]									
Overwintering Habitat	132,770	12,584	2,710	13,224	3,507	28,517	32,024	9%	21%
Occupied Nesting Habitat	1,348	0	179	26	287	204	491	0%	15%
Potential Nesting Habitat	63,751	1,003	904	7,174	6,353	9,080	15,433	2%	14%
Total	197,869	13,586	3,792	20,423	10,146	37,802	47,948	7%	19%
Tricolored Blackbird									
Primary Habitat	7,933	295	440	1,811	676	2,546	3,222	4%	32%
Secondary Habitat	132,358	10,742	2,867	13,280	3,570	26,888	30,459	8%	20%
Total	140,291	11,037	3,307	15,091	4,246	29,435	33,681	8%	21%

Table 5-6. Continued

Species and Habitat Type	Total Modeled Habitat in Study Area	Open Space Classification (acres, unless otherwise noted)						% of Total Modeled Habitat in Study Area	
		Type 1	Type 2	Type 3	Type 4	Total Type 1, 2, 3	Total Open Space	Type 1	Type 1, 2, 3
Least Bell's Vireo									
Primary Habitat	3,097	65	62	203	179	330	509	2%	11%
San Joaquin Kit Fox									
Secondary Habitat	38,543	5,067	293	652	1	6,012	6,013	13%	16%
Secondary Habitat (Low Use)	2,349	0	303	0	11	303	314	0%	13%
Total	40,892	5,067	596	652	11	6,315	6,326	12%	15%
Mt. Hamilton Thistle									
Primary Habitat	487	55	6	144	10	204	214	11%	42%
Fragrant Fritllary									
Primary Habitat	8,820	1,025	122	1,927	305	3,074	3,379	12%	35%
Secondary Habitat	156,635	15,346	6,931	16,967	957	39,243	40,201	10%	25%
Total	165,455	16,371	7,053	18,894	1,263	42,317	43,580	10%	26%
Loma Prieta Hoita									
Primary Habitat	104,126	15,133	6,405	12,888	734	34,426	35,160	15%	33%
Secondary Habitat	17,745	2,143	924	1,174	104	4,241	4,345	12%	24%
Total	121,871	17,276	7,328	14,063	839	38,667	39,506	14%	32%
Smooth Lessingia									
Primary Habitat	10,491	1,268	185	2,207	410	3,659	4,069	12%	35%
Metcalf Canyon Jewelflower									
Primary Habitat	8,105	984	48	1,811	306	2,843	3,149	12%	35%
Most Beautiful Jewelflower									
Primary Habitat	14,277	1,490	541	2,999	477	5,030	5,506	10%	35%
Secondary Habitat	85	10	0	2	8	12	20	12%	14%
Total	14,362	1,500	541	3,000	485	5,042	5,527	10%	35%

[1] Western burrowing owl modeled habitat includes occupied and potential nesting habitat only in the study area.

Table 5-7. Gap Analysis of Bay Checkerspot Butterfly Populations (acres)

Bay Checkerspot Butterfly Habitat Units[1]	Habitat unit Status[2]	Core or Satellite Habitat Unit[3]	Consevation Target for Habitat Plan[4]	Site Name in USFWS Recovery Plan (1998)	Total Habitat unit (acres)	Open Space (OS) (acres)						% of Total Habitat unit in		Total Outside OS (acres)
						Type 1	Type 2	Type 3	Type 4	Total Type 1, 2,3	Total in OS (acres)	Type 1	Type 1, 2, 3	
UTC	Occupied	Core	Yes	Kirby	1,607	96		16	134	112	246	6%	7%	1,361
Kirby/East Hills	Occupied	Core	Yes	Kirby	1,334	588	8	43	2	640	641	44%	48%	693
Pigeon Point	Occupied	Core	Yes	Kirby	117			11		11	11	0%	10%	106
Silver Creek Hills Central	Occupied	Core	Yes	Silver Creek	208					0	0	0%	0%	208
Metcalf North Ridge	Occupied	Core	Yes	San Felipe	518			0		0	0	0%	0%	518
Metcalf	Occupied	Core	Yes	Metcalf	629	3			0	3	3	0%	0%	626
Hale/Falcon Crest	Occupied	Satellite	Yes	W Hills of Santa Clara Valley	371	4				4	4	1%	1%	366
Cañada Garcia	Occupied	Satellite	Yes	W Hills of Santa Clara Valley	180	23	19			42	42	13%	23%	137
Kalana Avenues (1-4)	Occupied	Satellite	Yes	W Hills of Santa Clara Valley	110			2		2	2	0%	2%	109
Tulare Hill	Occupied	Satellite	Yes	Tulare Hill	336	144		125	0	269	269	43%	80%	67
Santa Teresa Main	Occupied	Satellite	Yes	Santa Teresa Hills	936			464	169	464	633	0%	50%	303
Santa Teresa North	Potential (no records)	Satellite	Yes	Santa Teresa Hills	190			186	0	186	186	0%	98%	4
Coyote-Bear Ranch County Park	Occupied	Satellite	Yes	None	60			60		60	60	0%	100%	0
Calero	Occupied	Satellite	Yes	Calero	359			352		352	352	0%	98%	7
Subtotal: Target Areas					6,955	858	28	1,260	305	2,146	2,450	12%	31%	4,505
Silver Creek Hills North #1	Occupied	Core	No	Silver Creek	382	345			5	345	350	90%	90%	32
Silver Creek Hills North #2	Potential (no records)	Core	No	Silver Creek	406	103		27	27	130	156	25%	32%	249
Pound Site	Occupied	Core	No[5]	Metcalf	216			216		216	216	0%	100%	0
Communications Hill 1	Historic/Unoccupied	Satellite	No	Communications Hill	230				2	0	2	0%	0%	229
Communications Hill 2	Historic/Unoccupied	Satellite	No	Communications Hill	25				4	0	4	0%	0%	21
San Martin/Hayes Valley	Occupancy Unknown[6]	Satellite	No	W Hills of Santa Clara Valley?	201	29			0	29	29	14%	14%	172
Southwest Anderson Reservoir	Occupancy Unknown	Satellite	No[7]	North of Llagas Ave.	189		7	48	36	55	90	0%	29%	99
Valley Christian High School	Historic/Unoccupied	Satellite	No	None	15				6	0	6	0%	0%	9
Subtotal: Non-Target Areas					1,665	477	7	291	79	775	854	29%	47%	811
Grand Total					**8,621**	**1,336**	**34**	**1,551**	**384**	**2,921**	**3,304**	**15%**	**34%**	**5,316**

Notes:

[1] See species account in Appendix D for key to habitat units and map of their locations. Habitat Unit names are derived from the long-term monitoring conducted by Stanford University.

[2] Occupied = known to be occupied at least in some years; Occupancy Unknown = site has not been surveyed thoroughly or surveyed in last 10 years; Historic/Unoccupied = individuals present historically but now unoccupied and site likely no longer suitable; Potential (no records) = Site contains habitat that could be made suitable with proper management (currently unoccupied).

[3] Core habitat units are defined as moderate to large areas of suitable habitat that support persistent populations of the species. Satellite habitat units are defined as smaller areas of lower-quality habitat that are not consistently occupied and rely on recolonization from core habitat units to be sustained (U.S. Fish and Wildlife Service 1998).

[4] Habitat units targeted for conservation were determined through consultations with experts through the biological goals and objectives workshop and were based on factors such as population size, distance from Coyote Ridge, land ownership patterns, and overall long-term population viability.

[5] The majority of this habitat unit is not suitable habitat and is not targeted for conservation. However, portions of this site that support suitable habitat may be targeted for conservation to support connectivity to the Tulare Hill habitat unit.

[6] Population documented in late 1980s but no recent surveys.

[7] A small portion (less than 1 acre) of this habitat unit is expected to be added to the Reserve System from existing open space for Coyote ceanothus conservation. It is not considered a conservation target for Bay checkerspot butterfly.

Table 5-8. Gaps in Conservation Identified by San Francisco Bay Area Gap Analysis Project for Land Cover Types in the Habitat Plan Study Area[1]

Vegetation Community (Holland 1986)	Equivalent Land Cover Type in Habitat Plan (see Table 3-2)	Protection Estimated in Bay Area (Wild 2002)	Protection Estimated in California (Wild 2002)
Non-native grassland	Annual grassland	18%	5%
Northern mixed chaparral	Northern mixed chaparral / chamise chaparral	1%	8%
Mixed serpentine chaparral	Mixed serpentine chaparral	0%	1%
Diablan sage scrub	Northern coastal scrub/ Diablan sage scrub	12%	2%
Valley oak woodland	Valley oak woodland	18%	1%
Blue oak woodland	Blue oak woodland	19%	4%
Coast live oak woodland[2]	Coast live oak forest and woodland	20%	4%
Coast live oak forest[2]	Coast live oak forest and woodland	12%	5%
Foothill pine-oak woodland	Foothill pine-oak woodland	18%	3%
Great Valley cottonwood riparian forest	Mixed riparian forest and woodland	0%[3]	19%
North coast riparian scrub	Willow riparian woodland and scrub	0%	4%
Coast range ponderosa pine forest	Ponderosa pine forest	13%	23%
Coastal and valley freshwater marsh	Coastal and valley freshwater marsh	21%	38%

Notes:

[1] Vegetation communities are those in Wild (2002) with less than 20% protection for most types or less than 100% protection for those communities with a range-wide historic decline of more than 80%.

[2] These vegetation communities were also identified as having >25% of the state's extent within the San Francisco Bay Area (i.e., high endemism).

[3] Due to large minimum mapping unit, actual protection is likely higher.

Table 5-9. Landscape Linkages in and Near the Study Area Considered for the Reserve Design

Ref. # (Fig. 5-6)	Linkage (Listed Generally from North to South)	Approx. Length[1] (miles)	General Linkage Purpose	Covered and Other Native Species Likely to Use Linkage[2]	Sources
1	Guadalupe River and Guadalupe Creek	33	Connection between San Francisco Bay/Pacific Ocean and spawning habitat for native resident and anadromous fish. Provides regional linkage for riparian birds into the study area. Upper watershed provides local linkages for many wildlife species.	Steelhead trout, Chinook salmon, Pacific lamprey, and Sacramento sucker.	Leidy et al. 2005; FAHCE 2000
2	Coyote Creek from San Francisco Bay to Anderson Dam	32	Connection between San Francisco Bay/Pacific Ocean and spawning habitat for native resident and anadromous fish. Provides regional linkage for riparian birds into the study area. Also provides linkages for native amphibians and aquatic reptiles between off-stream breedings sites in Diablo Range and Santa Cruz Mountains.	Steelhead trout, Chinook salmon, Pacific lamprey, Sacramento sucker, California red-legged frog, Western pond turtle, foothill yellow-legged frog (?)	Leidy et al. 2005; FAHCE 2000; County of Santa Clara Parks & Recreation Department 2007; EDAW 2001; California Wilderness Coalition 2002
3	Upper Penitencia Creek	11.5	Connection between San Francisco Bay/Pacific Ocean and spawning habitat for native resident and anadromous fish.	Steelhead trout, Pacific lamprey, Sacramento sucker.	Leidy et al. 2005; Stillwater Sciences 2006; Biotic Resource Group 2001
4	Joseph D. Grant County Park to SFPUC Alameda Watershed (outside study area)	3	Provide linkage between protected lands in northeast corner of study area and protected lands in Alameda County (land owned by SFPUC and East Bay Regional Park District). Primary route may be along upper Calaveras Creek or Arroyo Hondo.	California red-legged frog, California tiger salamander, American badger, mountain lion, bobcat	L. Serpa pers. comm.; Jones & Stokes 2006; Thorne et al. 2002
5	Joseph Grant Co. Park to Henry W. Coe State Park	11.5	Provide connection between two large blocks of protected lands across a variety of land-cover types, possibly along San Felipe Creek.	California red-legged frog, California tiger salamander, American badger, Tule elk, mountain lion, bobcat, pronghorn,	State of California 1985; H. Coletto pers. comm.; Thorne et al. 2002
6	Coyote Ridge from Silver Creek Hills to Anderson Dam	9.5	Provide connectivity for serpentine species within core habitat along Coyote Ridge. Link patches of protected lands along the ridge.	Bay checkerspot butterfly, Mt. Hamilton thistle, Metcalf Canyon jewelflower, most beautiful jewelflower, smooth lessingia, Santa Clara Valley dudleya, fragrant fritillary, Tiburon paintbrush, Opler's longhorn moth, Hom's and Jung's microblind harvestman	USFWS 1998c; J. Hillman pers. comm.; Weiss and Wright 2005; T. Marker pers. comm.; Also see species accounts in Appendix D

Ref. # (Fig. 5-6)	Linkage (Listed Generally from North to South)	Approx. Length[1] (miles)	General Linkage Purpose	Covered and Other Native Species Likely to Use Linkage[2]	Sources
7	Coyote Ridge to Anderson Lake County Park and Henry W. Coe State Park	7.5	Provide connectivity along an elevation gradient and between protected open space along Coyote Ridge and large blocks of protected open space centered on Henry W. Coe State Park. Provide connectivity among stands of valley oak woodland at different elevations.	Tule elk, American badger, bobcat, Mt. Hamilton thistle, Santa Clara Valley dudleya	H. Coletto pers. comm.; Diamond 2006; T. Diamond pers. comm.; Also see species accounts in Appendix D
8	Santa Teresa Hills to Metcalf Canyon	3	Most northerly and narrowest connection between Diablo Range and the Santa Cruz Mountains. Provides important linkages for variety of mammals and invertebrates.	Bay checkerspot butterfly, Mt. Hamilton thistle, American badger, bobcat	Spencer et al. 2006; Diamond 2006; T. Diamond, pers. comm.; Coastal Training Program 2006; The Nature Conservancy 2006a
9	Calero Co. Park to Almaden Quicksilver County Park	1.5	Provides short linkage between two large County parks (and Open Space Authority lands) and provides linkage outside the study area to extensive protected lands in the Santa Cruz Mountains owned by Midpeninsula Regional Open Space District and the Peninsula Open Space Trust. May be the only viable grassland connection between extensive grassland in the two County parks.	American badger (?), bobcat, mountain lion, Mt. Hamilton thistle, most beautiful jewelflower, smooth lessingia, Loma Prieta hoita, Santa Clara Valley dudleya	See plant species accounts in Appendix D
10	Calero County Park to Coyote Lake-Harvey Bear Ranch County Park, across Tulare Hill/Santa Teresa Hills	18	Provides linkage from Coyote Ridge and Diablo Range to Santa Cruz Mountains via Tulare Hill or Fisher Creek.	Bay checkerspot butterfly, American badger, bobcat, mule deer	City of San Jose 2007; Coastal Training Program 2006; California Wilderness Coalition 2002
11	Llagas Creek from headwaters to confluence with Pajaro River	32	Provides access in wet years from Pajaro River to current and historic spawning and rearing habitat for resident and anadromous fish. Provides regional linkage for riparian birds into the study area from the south and the west. Also may provide local linkages for native amphibians and aquatic reptiles.	Steelhead trout, Pacific lamprey, Monterey roach, Sacramento sucker, Sacramento pikeminnow, western pond turtle, foothill yellow-legged frog, least Bell's vireo, bobcat, California red-legged frog (?)	Smith 2007; Also see species accounts in Appendix D

Ref. # (Fig. 5-6)	Linkage (Listed Generally from North to South)	Approx. Length[1] (miles)	General Linkage Purpose	Covered and Other Native Species Likely to Use Linkage[2]	Sources
12	Uvas Creek from headwaters to confluence with Pajaro River	25.5	Provides access from Pajaro River to spawning habitat for resident and anadromous fish. Provides regional linkage for riparian birds into the study area from the south and the west. Also provides local linkages for native amphibians and aquatic reptiles. Provides linkage to outside the study area in Santa Cruz County and to the large and diverse Forest of Nisene Marks State Park.	Steelhead trout, Pacific lamprey, Monterey roach, Sacramento sucker, Sacramento pikeminnow, western pond turtle, least Bell's vireo, bobcat, California red-legged frog, foothill yellow-legged frog	Smith 2007; Also see species accounts in Appendix D
13	Uvas Canyon County Park to Pajaro River through Santa Cruz Mountains	15.5	Provides long-distance connection along spine of Santa Cruz Mountains within the study area (similar linkages identified nearby outside the study area). Provides important connectivity for redwood forest and associated plants. Links Mount Madonna County Park with Uvas Canyon County Park.	Bobcat, mountain lion, California red-legged frog, California tiger salamander, coast redwood	The Nature Conservancy 2006a; Thorne et al. 2002
14	Henry W. Coe State Park to San Felipe Lake	5	Provides closest link between upland habitat and San Felipe Lake, an important large wetland complex in San Benito County. Also provides linkage with high density of ponds between high-elevation habitats in Henry W. Coe State Park and low elevation uplands at edge of study area (i.e., strong environmental gradient).	California tiger salamander, California red-legged frog, western pond turtle, American badger (?), tricolored blackbird (?)	See species accounts in Appendix D
15	Henry W. Coe State Park southeast to San Benito County line	9	Provides linkage across Pacheco Creek and Highway 152 within the Diablo Range. Highway 152 is permeable to wildlife only in certain places (see text for details).	San Joaquin kit fox, mountain lion, bobcat, Tule elk (?), California tiger salamander, California red-legged frog, western pond turtle	Thorne et al. 2002; Also see species accounts in Appendix D
16	Romero Ranch to Henry W. Coe State Park	3.5	Provides connectivity between two large blocks of protected open space.	Mountain lion, bobcat, California tiger salamander, California red-legged frog, western pond turtle	See species accounts in Appendix D

Table 5-9. Continued

Ref. # (Fig. 5-6)	Linkage (Listed Generally from North to South)	Approx. Length[1] (miles)	General Linkage Purpose	Covered and Other Native Species Likely to Use Linkage[2]	Sources
17	Main stem of Pacheco Creek	12	Provides passage for resident and anadromous fish between Monterey Bay, the Pajaro River, and potential spawning and rearing habitat on south fork of Pacheco Creek and Cedar Creek. Passage through main stem of Pacheco Creek is restricted in dry years.	Steelhead trout, Pacific lamprey, California red-legged frog, Sacramento sucker, western pond turtle, mountain lion, bobcat, least Bell's vireo	Smith 2007; Also see species accounts in Appendix D
18	Santa Cruz Mountains to Diablo Range along Pajaro River	9.5	Provides movement habitat for anadromous fish between Monterey Bay and spawing habitat in the Pacheco Creek watershed. Also provides important linkage for upland and riparian wildlife between Diablo Range and Santa Cruz Mountains.	Steelhead trout, Pacific lamprey, California red-legged frog, western pond turtle, mountain lion, bobcat, least Bell's vireo, tricolored blackbird (?)	The Nature Conservancy 2006a; also see species accounts in Appendix D
19	Santa Cruz Mountains to Gabilan Range	4	Provides linkage from the Santa Cruz Mountains to the Gabilan Range in San Benito County. The only connection south from the Santa Cruz Mountains to the Santa Lucia Ranges to the south.	Mountain lion, bobcat, California red-legged frog	Coastal Training Program 2006; The Nature Conservancy 2006a; Thorne et al. 2002
20	Santa Cruz Mountains to Lomerias Muertas Range	4.5	Provides linkage from the Santa Cruz Mountains to the Lomerias Muertas Range in San Benito County.	Mountain lion, bobcat	The Nature Conservancy 2006a; Thorne et al. 2002

Notes:

[1] Approximate length within the study area.

[2] Other native species identified in this column include species that depend on linkages for long-distance movement or to maintain large home ranges and for which data are available indicating the species may use the particular linkage. Common native species such as raccoon, opossum, coyote, and skunk would likely use all of the linkages and are less sensitive to land use changes within the linkages than the other native species identified.

Table 5-10. Conservation Analysis Zones and Land Cover Types (acres)

	Conservation Analysis Zone								
Land Cover Type	Alameda	Coyote	Guadalupe	Llagas	Pacheco	Pescadero	San Tomas	Uvas	Grand Total
California Annual Grassland	514	20,980	1,283	6,515	23,641	2,779	-	5,537	61,249
Serpentine Bunchgrass Grassland	-	4,535	991	930	123	7	-	419	7,005
Serpentine Rock Outcrop / Barrens	-	132	4	20	19	-	-	31	207
Serpentine Seep	-	4	3	7	7	-	-	-	21
Rock Outcrop	-	6	25	1	39	2	-	0	74
Northern Mixed Chaparral / Chamise Chaparral	-	8,728	101	1,216	4,901	193	-	2,551	17,691
Mixed Serpentine Chaparral	-	376	159	472	555	-	-	843	2,406
Northern Coastal Scrub / Diablan Sage Scrub	18	2,226	370	807	702	753	-	2,765	7,641
Coyote Brush Scrub	-	71	6	10	-	-	-	36	123
Valley Oak Woodland	256	2,955	104	285	3,887	17	-	454	7,958
Mixed Oak Woodland and Forest	299	13,337	1,395	3,193	22,605	1,337	-	8,397	50,563
Blue Oak Woodland	62	1,362	194	1,014	2,326	2	-	1,068	6,029
Coast Live Oak Forest and Woodland	179	8,571	731	3,746	4,148	998	-	5,050	23,421
Foothill Pine - Oak Woodland	-	3,688	-	10	1,942	-	-	797	6,437
Mixed Evergreen Forest	-	1	158	1,538	-	-	-	2,378	4,075
Willow Riparian Forest and Scrub	8	421	202	317	73	98	37	345	1,499
Central California Sycamore Alluvial Woodland	-	3	-	-	195	-	-	9	207
Mixed Riparian Forest and Woodland	-	548	226	453	586	56	-	1,053	2,921
Redwood Forest	-	-	-	108	-	927	-	5,576	6,611
Ponderosa Pine Woodland	-	4	-	0	-	-	-	-	5
Knobcone Pine Woodland	-	-	-	1	-	-	-	591	592
Coastal and Valley Freshwater Marsh	-	38	42	56	8	0	-	31	176
Seasonal Wetland	1	88	7	15	13	1	-	7	131
Pond	1	153	157	122	163	7	-	101	704
Reservoir	-	166	-	-	140	-	-	45	352

Table 5-10. Continued

	Conservation Analysis Zone								
Land Cover Type	Alameda	Coyote	Guadalupe	Llagas	Pacheco	Pescadero	San Tomas	Uvas	Grand Total
Orchard	-	659	114	1,252	172	-	-	406	2,603
Vineyard	2	1	-	846	307	-	-	228	1,385
Grain, Row-crop, Hay & Pasture, Disked/short-term	25	6,827	1,627	16,642	1,155	40	-	5,629	31,945
Agriculture developed / Covered Ag	-	450	-	1,149	23	-	-	300	1,922
Urban - Suburban	12	31,549	37,588	11,599	317	8	5,890	1,404	88,369
Rural - Residential	25	2,633	754	7,049	160	-	-	1,539	12,161
Golf Courses / Urban Parks	-	3,702	2,194	915	-	-	189	309	7,309
Landfill	-	208	73	-	82	-	-	-	364
Ornamental Woodland	-	6	-	14	20	-	-	55	95
Barren	-	152	-	-	-	-	-	40	191
Grand Total	**1,402**	**114,580**	**48,510**	**60,300**	**68,311**	**7,225**	**6,116**	**47,999**	**354,443**

Table 5-11. Land Acquisition and Enhancement Requirements within the Study Area for Selected Terrestrial Land-Cover Types (acres)

Land Cover Type[1]	Total in Study Area	Outside Type 1, 2, 3, 4 Open Space	Estimated and Allowable Impact[2]	Estimated Impact (% of Total)	Remain Outside Type 1, 2, 3, 4 Open Space	Protection Requirements for Compensation & Contribution to Recovery[3]	Minimum Open Space Protected[4]			
							Habitat Plan Protection Requirements & Type 1		Habitat Plan Protection Requirements & Type 1, 2, 3	
							Area (acres)	% of Study Area	Area (acres)	% of Study Area
California Annual Grassland	81,795	60,411	2,006	2.5%	58,405	13,300	21,838	27%	34,116	42%
Serpentine Bunchgrass Grassland	10,308	6,296	550	5.3%	5,746	4,000	5,262	51%	7,605	74%
Serpentine Rock Outcrop/ Barrens	260	202	22	8.5%	180	120	126	49%	176	68%
Serpentine Seep	34	18	0.5	1.5%	17	10	11	32%	23	67%
Rock Outcrop	87	67	0.5	0.6%	66	10	20	23%	22	25%
Northern Mixed Chaparral/ Chamise Chaparral	23,763	17,959	86	0.4%	17,873	400	4,166	18%	6,166	26%
Mixed Serpentine Chaparral	3,712	2,276	131	3.5%	2,145	700	921	25%	2,069	56%
Northern Coastal Scrub/ Diablan Sage Scrub	10,306	7,286	178	1.7%	7,108	1,400	1,974	19%	4,318	42%
Valley Oak Woodland	12,895	7,847	201	1.6%	7,646	1,700	5,160	40%	6,729	52%
Mixed Oak Woodland and Forest	84,488	50,083	1,441	1.7%	48,642	7,100	23,622	28%	41,020	49%
Blue Oak Woodland	11,160	5,793	131	1.2%	5,662	1,100	5,363	48%	6,433	58%
Coast Live Oak Forest and Woodland	31,652	22,953	840	2.7%	22,113	2,900	6,055	19%	11,334	36%
Foothill Pine—Oak Woodland	10,960	6,822	46	0.4%	6,776	80	3,133	29%	4,216	38%
Mixed Evergreen Forest	5,775	3,970	50	0.9%	3,920	20	34	1%	1,826	32%
Redwood Forest	9,693	6,546	109	1.1%	6,437	10	14	0%	3,158	33%
Ponderosa Pine Woodland	419	5	0	0.0%	5	0	411	98%	414	99%
Knobcone Pine Woodland	711	573	8	1.1%	565	0	0	0%	137	19%
Total	**298,016**	**199,105**	**5,800**	**1.9%**	**193,305**	**32,850**	**78,112**	**26%**	**129,760**	**44%**

Notes:

[1] All terrestrial natural land cover types with permanent impacts have land acquisition requirements except for coyote brush scrub and knobcone pine woodland. Coyote brush scrub is not important for any covered species and it is an early-successional community. It will be acquired anyway in the course of meeting other requirements. Knobcone pine woodlands do not provide important habitat for the covered species; as such they are not targeted for acquisition. For ponderosa pine, no permanent impacts are anticipated to occur and nearly all of this terrestrial natural land cover type is protected as Type 1 open space. As such, it is not targeted for acquisition.

[2] Permanent impact only. Source = Table 4-2.

[3] These acreage requirements are the minimum necessary to compensate for impacts of covered activities and contribute to the recovery of covered species. Actual acquisitions of these land cover types is likely to be greater than these minimum requirements because the Plan also includes requirements for connectivity, protection of plant occurrences, and others that will result in additional acquisitions and because parcels purchased to meet a specific requirement will include additional acres of non-target land cover types.

[4] Minimum Open Space = Habitat Plan requirement + existing open space.

Table 5-12. Required Preservation, Enhancement, Restoration and Creation Mitigation Ratios and Estimated Acquisition, Enhancement, Restoration, and Creation Requirements for Aquatic Land Cover Types

Land Cover Type	Maximum Allowable Permanent Impacts[1] (acres)	Preservation and Enhancement Requirements		Restoration or Creation Requirements		
		Required Preservation Ratio	Preservation Requirement to Offset Impacts[1] (acres)	Required Mitigation Ratio (in addition to preservation)		Estimated Total Restoration or Creation (acres)
				Restoration	Creation	
Riparian forest and scrub						
Willow riparian forest and scrub or mixed riparian forest and woodland[3]	289	2:1	578[2]	1:1	–	289
Central California sycamore alluvial woodland	7	2:1	14	2:1	–	14
Wetland						
Coastal and valley freshwater marsh (perennial wetland)	25	2:1	50	1:1	–	25
Seasonal wetland[3]	15	2:1	30[3]	2:1	–	30
Open Water						
Pond[4]	52	2:1	104	–	1:1	52
Total Aquatic Land Cover Types (acres)	388		776			410
Stream (miles)	9.4	3:1	28.2	1:1	–	9.4

Notes:

1 Impact limits are based on Table 4-2 for permanent impacts only. Actual acquisition requirements will be based on field-delineated resources at impact sites and application of the required preservation ratios in this table. Restoration, creation, and enhancement of aquatic land cover is required in addition to preservation of aquatic land cover as mitigation for impacts. See Chapter 5 for details.

2 Because these land cover types are dynamic and represent different points on a continuum of vegetation succession, acquisition requirements for willow riparian woodland and scrub and mixed riparian woodland and forest are considered together and can be counted against either type of impact.

3 Seasonal wetland acreage was quantified as the minimum polygon encompassing clusters of seasonal pools or drainages (i.e., wetland complexes). Impacts and land acquisition requirements will be tracked by the wetland delineation submitted in the Application Package described in Chapter 6, Section 6.8 and verified by the local jurisdiction, so estimates in this table overstate the expected impacts to and preservation of these land cover types. .

4 Pond creation to mitigate for impacts will be accomplished by creating ponds of approximately the same size as those lost. Pond creation to contribute to recovery will be accomplished by creating ponds with an approximate average size of a 0.5 acre.

Table 5-13. Acquisition, Restoration, and Creation Requirements for all Land-Cover Types (acres)

Land Cover Type	Total in Study Area	Estimated and Allowable Permanent Impact[1]	Estimated Impact (% of Total)	Min. Protection Requirements for Contribution to Recovery[2]	Min. Habitat Restoration or Creation Requirements to Contribute to Recovery[3]	Min. Protection, Restoration, and Creation Requirements	Required Protection if All Impacts Occur[4]	Required Restoration or Creation if All Impacts Occur[3]	Total Protection, Restoration, and Creation if All Impacts Occur
Land Cover Types with Acquisition, Restoration, or Creation Requirements									
California annual grassland	81,795	2,006	2.5%	13,300	-	13,300	13,300	-	13,300
Serpentine bunchgrass grassland	10,308	550	5.3%	4,000	-	4,000	4,000	-	4,000
Serpentine Rock Outcrop/ Barrens	260	22	8.5%	120	-	120	120	-	120
Serpentine Seep	34	0.5	1.5%	10	-	10	10	-	10
Rock Outcrop	87	0.5	0.6%	10	-	10	10	-	10
Northern Mixed Chaparral / Chamise Chaparral	23,763	86	0.4%	400	-	400	400	-	400
Mixed Serpentine Chaparral	3,712	131	3.5%	700	-	700	700	-	700
Northern Coastal Scrub / Diablan Sage Scrub	10,306	178	1.7%	1,400	-	1,400	1,400	-	1,400
Valley Oak Woodland	12,895	201	1.6%	1,700	-	1,700	1,700	-	1,700
Mixed Oak Woodland and Forest	84,488	1,441	1.7%	7,100	-	7,100	7,100	-	7,100
Blue Oak Woodland	11,160	131	1.2%	1,100	-	1,100	1,100	-	1,100
Coast Live Oak Forest and Woodland	31,652	840	2.7%	2,900	-	2,900	2,900	-	2,900
Foothill Pine - Oak Woodland	10,960	46	0.4%	80	-	80	80	-	80
Mixed Evergreen Forest	5,775	50	0.9%	20	-	20	20	-	20
Willow Riparian Forest and Scrub and Mixed Riparian Forest and Woodland	6,310	289	4.6%	250	50	300	578	339	917
Central California Sycamore Alluvial Woodland	373	7	1.9%	40	-	40	40	14	54
Redwood Forest	9,693	109	1.1%	10	-	10	10	-	10
Coastal and Valley Freshwater Marsh (Perennial Wetland)	381	25	6.6%	10	20	30	50	45	95
Seasonal Wetland	201	15	7.4%	5	-	5	30	30	60
Pond	1,110	52	4.7%	50	20	70	104	72	177
Subtotal	305,262	6,180	2.0%	33,205	90	33,295	33,652	501	34,153
Streams (miles)	2,392	9.4	0.4%	100.0	1.0	101.0	100.0	10.4	110.4

Table 5-13. Continued

Land Cover Types without Acquisition, Restoration, or Creation Requirements									
Coyote brush scrub	180	10	5.5%	-	-	-	-	-	-
Ponderosa Pine Woodland	419	0	0.0%	-	-	-	-	-	-
Knobcone Pine Woodland	711	8	1.1%	-	-	-	-	-	-
Reservoir	2,767	0	0.0%	-	-	-	-	-	-
Orchard	2,697	625	23.2%	-	-	-	-	-	-
Vineyard	1,393	37	2.6%	-	-	-	-	-	-
Agriculture developed / covered	1,935	0	0.0%	-	-	-	-	-	-
Grain, row-crop, hay and pasture,	33,648	7,356	21.9%	-	-	-	-	-	-
Urban-suburban	89,438	0	0.0%	-	-	-	-	-	-
Rural - residential	12,414	1,603	12.9%	-	-	-	-	-	-
Barren	211	32	15.2%	-	-	-	-	-	-
Landfill	364	0	0.0%	-	-	-	-	-	-
Golf courses / urban parks	8,673	2,095	24.2%	-	-	-	-	-	-
Ornamental woodland	95	30	31.3%	-	-	-	-	-	-
Subtotal	154,944	11,795	7.6%	-	-	-	-	-	-
TOTAL	**460,205**	**17,975**	**3.9%**	**33,205**	**90**	**33,295**	**33,652**	**501**	**34,153**

Notes:

[1] Source: Table 4-2.

[2] These acreage requirements are the minimum necessary to compensate for impacts of covered activities and contribute to the recovery of covered species, regardless of the actual level of impact. Sources: Tables 5-11 and 5-12. Actual acquisitions of these land cover types is likely to be greater than these minimum requirements because the Plan also includes requirements for connectivity, protection of plant occurrences, and others that will result in additional acquisitions and because parcels purchased to meet a specific requirement will include additional acres of non-target land cover types. Requirements for acquisition of Willow Riparian Forest and Scrub and Mixed Riparian Forest and Woodland are 250 acres of either type; for the purposes of this table the requirement is split in half (see Table 5-12).

[3] Habitat restoration and creation requirements apply only to riparian, wetlands, pond, and stream land cover types. See Table 5-12 for details.

[4] Compensatory protection applies only to riparian, pond, and wetland land cover types (see Table 5-12). Values are the maximum compensation estimated if all impacts of covered activities occur to these land cover types. The estimate for Willow Riparian Forest and Scrub and Mixed Riparian Forest and Woodland is a joint requirement and is split for this table. These values are inclusive of the acres in the proceeding Minimum Protection Requirements for Contribution to Recovery (see Section 5.3.1, subtitle *Acquisition and Restoration Requirements for Aquatic Land Cover Types* for rationale).

Table 5-14. Commitments by Time Period for Restoration and Creation Requirements that Contribute to Species Recovery

		Restoration/ Creation Commitments by Time Period (acres, except where noted)		
Land Cover Types	Restoration/ Creation Requirements to Contribute to Recovery[1]	Year 15	Year 30	Year 40[2]
Willow Riparian Forest and Scrub and Mixed Riparian Forest and Woodland	50	18.8	37.5	50
Coastal and Valley Freshwater Marsh	20	7.5	15.0	20
Pond	20	7.5	15.0	20
Total	**90**	**33.8**	**67.5**	**90**
Streams (miles)	1.0	0.3	0.7	1.0

Notes:

[1] Source: Table 5-13. For wetland and riparian land cover types, timing targets in this table apply to contributions to recovery; preservation and restoration required due to impacts is tied to the Stay-Ahead provision.

[2] All land acquisition must be completed by Year 45. All habitat restoration must be completed by Year 40.

Table 5-15. Minimum Distance from Urban Development[1] Required for Aquatic Land Cover Types to Count Toward Land Acquisition or Restoration/Creation Requirements

Land Cover Type	Minimum Distance from Dense Urban Development Required for Credit	Rationale and Sources
Coastal and valley freshwater marsh	750 feet	Perennial wetlands may support a variety of covered species including tricolored blackbird, California red-legged frog, western pond turtle, and California tiger salamander. Tricolored blackbirds may be sensitive to disturbance and predation from urban pets and aquatic amphibians rely on adjacent upland habitats for nesting and non-breeding season refugia, so a relatively large buffer is required. Though amphibians have been documented traveling great distances from aquatic breeding sites (Reese 1996 [Western pond turtle]; Trenham and Shafer 2005 [California tiger salamander] there is a gradual reduction of upland occurrence as distance from the aquatic feature increases. Trenham and Shafer (2005) captured 50% of California tiger salamander adults within 150 m (492 ft) and 90% within 490 m (1608 ft) from aquatic breeding habitat. A 750-foot buffer between aquatic habitat and urbanization could reasonably support more than 50% of individuals breeding in the wetland/pond if suitable upland habitat was available.
Seasonal wetland	100 feet if wetland is up-gradient from development; 250 feet if wetland is down-gradient of development	Habitat function may decline if seasonal wetlands are located within 100 feet of dense urban development. Hydrologic effects of development can be more severe if seasonal wetland is located down-gradient. Seasonal wetlands, as defined by the Plan, are unlikely to support covered species because their hydroperiod is often shorter than the breeding time required by covered aquatic species. As a result, buffer requirements are based more on ecosystem function rather than species needs.
Pond	750 feet from pond edge	This is the approximate distance below which available upland habitat for pond-breeding covered species begins to diminish substantially (Reese 1996 [Western pond turtle]; Trenham 2001[California tiger salamander]; Semlitsch and Bodie 2003 [amphibians]).
Stream[2]	150 feet from top of bank	This setback is recommended by many authors to maintain stream physical properties (e.g., sediment and nutrient reduction, moderation of stream temperature, channel complexity), salmonid habitat, plant diversity, and other functions.
Riparian woodland/scrub (any land cover type)	50 feet from vegetation dripline	The minimum setback required in Condition 11 (Chapter 6) from the riparian dripline is 50 feet. The land acquisition credit limit accounts for the loss of riparian habitat function within this buffer and the estimated loss of some value for riparian birds and amphibians beyond it.

Notes:

[1] Urban development is defined as the planning limit of urban growth. Development within County jurisdiction outside the planning limit of urban growth triggers these restrictions if that development is as dense as that found within the planning limit of urban growth.

[2] Applies to land acquisition requirement only. Stream restoration can be accomplished within urban areas at any distance from dense urban development for stream restoration credit under the Habitat Plan.

Table 5-16. Species Occurrences, Impacts, and Conservation Requirements for Covered Plants

	Current Known Occurrences[1,2]			Occurrences in Study Area During Plan Implementation[3]		Plant Occurrence Impacts and Conservation					Total Occurrences Protected in Reserve System	
Covered Species	Extant in California	Study Area	Type 1 Open Space[4]	Additional Occurrences Found (relative to baseline)	Total in Study Area	Total Maximum Impacted[5]	Mitigation Ratio[6]	Protected per Mitigation Ratio	Protected to Contribute to Recovery[7]	Total Protected in Reserve System[8]	Acquired[9]	Allowable Creation in lieu of New Occurrence Acquisition[10]
Tiburon Indian paintbrush	9	2	0	–	2	0	N/A	–	1	1	1	–
Coyote ceanothus	3	3	0	–	3	0[11]	N/A	–	5	5	3	2
Mt. Hamilton thistle	48	40	2	0	40	6	3:1	18	4	22	22	–
				6	46	7		21		25	25	–
				12	52	8		24		28	28	–
Santa Clara Valley dudleya	209	207	2	0	207	11	4:1	44	11	55	55	–
				6	213	12		48		59	59	–
				12	219	13		52		63	63	–
				18	225	14		56		67	67	–
Fragrant fritillary	59	8	0	0	8	1	3:1	3	1	4	4	–
				5	13	2		6		7	7	–
				10	18	3		9		10	10	–
Loma Prieta hoita	26	14	1	0	14	0	2:1	0	4	4	4	–
				3	17	1		2		6	6	–
				6	20	2		4		8	8	–
Smooth lessingia	39	39	3	0	39	6	2:1	12	12	24	12	12
				7	46	7		14		26	14	
				10	49	8		16		28	16	
				13	52	9		18		30	18	
Metcalf Canyon jewelflower	11	10	1	–	10	2	N/A	–	10	13	3	10
Most beautiful jewel-flower	86	39	3	0	39	6	2:1	12	5	17	17	–
				4	43	7		14		19	19	–
				8	47	8		16		21	21	–

Table 5-16. Continued

	Current Known Occurrences[1,2]			Occurrences in Study Area During Plan Implementation[3]		Plant Occurrence Impacts and Conservation					Total Occurrences Protected in Reserve System	
Covered Species	Extant in California	Study Area	Type 1 Open Space[4]	Additional Occurrences Found (relative to baseline)	Total in Study Area	Total Maximum Impacted[5]	Mitigation Ratio[6]	Protected per Mitigation Ratio	Protected to Contribute to Recovery[7]	Total Protected in Reserve System[8]	Acquired[9]	Allowable Creation in lieu of New Occurrence Acquisition[10]

Notes:

[1] See Chapter 3 for data sources.

[2] For the purposes of this Plan and the analyses, occurrences are equivalent to populations for all species except for Santa Clara Valley dudleya.

[3] More occurrences may be found during Plan implementation than were known during Plan preparation (baseline). These columns represent the minimum number of known occurrences that must be known in the study area before impacts described in the subsequent column can occur. The first line for each species accounts for occurrences known at the time of permit issuance. "Additional Occurrences Found" refers to the number of additional occurrence found during the permit term. "Total in Study Area" is the number of additional occurrence found during the permit term plus the number of occurrence known during Plan preparation.

[4] Occurrences that are only partially in open space are not included in totals.

[5] Occurrences are considered impacted if the occurrence is removed or a qualified biologist determines that occurrence viability will be reduced as a result of covered activities, as further described in Chapter 6, Condition 20. Impacts solely associated with implementation of the conservation strategy are not reflected in this column as those impacts will be minor and temporary in nature and will have a net benefit to the species. No new occurrence acquisition will allow additional impacts beyond what is listed in this table. Refer to Chapter 4 for full explanation of impacts by species.

[6] Mitigation ratios were only developed for species for which additional impacts could occur in the event that additional occurrences are found during the permit term. Ratios were calculated as the number of occurrences acquired if no additional occurrences were discovered during the permit term by the total maximum occurrences that could be impacted if no additional occurrences were discovered during the permit term. The mitigation ratio represents the number of occurrences that must be acquired prior to each impact, including the first impact. Species-specific requirements regarding timing of mitigation/conservation relative to impact are provided in Section 5.4 for the Tiburon Indian paintbrush, Coyote ceanothus, and Metcalf Canyon jewelflower.

[7] Recovery actions will occur regardless of impacts; however, acquisition activities performed for mitigation purposes can count toward recovery once the total mitigation obligation is achieved.

[8] With the exception of the Coyote ceanothus (see Section 5.4.11), all occurrences acquired or created in this Plan will be permanently protected within the Reserve System with a conservation easement and/or will be owned in fee by the Implementing Entity. The first row for each species in this column represents the minimum requirement of acquisition and creation regardless of the number of occurrences impacted (e.g., if no additional occurrences of Mt. Hamilton thistle are found during Plan implementation, the Implementing Entity will acquire 22 occurrences for the Reserve System even if less than six occurrences are impacted during the permit term).

[9] Acquisition of naturally-occurring occurrences could occur through fee title and/or conservation easement. Occurrences could be on land newly acquired under the Habitat Plan or on existing open space that is incorporated into the Reserve System. Occurrences must be acquired prior to impacts, with the exception of the Coyote ceanothus (see Section 5.4.11).

[10] For occurrence preservation, priority will always be given to acquisition, however, if acquisition is infeasible, creation is allowed as stipulated in Section 5.4. The decision to focus conservation effort on occurrence creation will be made jointly with the Wildlife Agencies. Creation will be completed by Year 40, acquisition will be completed by Year 45.

[11] Impacts are allowed to no more than 3,650 individuals or 5% of the population adjacent to Anderson Dam, whichever is smaller. This standard will be applied to the population as it existed during the 2009 surveys. It will not be applied to any new recruits that are a result of natural or artificial disturbance event such as fire.

Table 5-17. Commitments to Acquire and Enhance Modeled Habitat in the Reserve System for Covered Species with Models (acres)

Species and Habitat Type	Habitat in Study Area (acres)[1]	Modeled Habitat in Type 1 Open Space		Modeled Habitat in Type 1,2, and 3 Open Space		Commitment to Acquire Modeled Habitat for Reserve System (acres)	Maximum Modeled Habitat added to the Reserve System from Existing Open Space (acres)[2]	Total Protected in Reserve System and Type 1 Open Space		Total in Reserve System and Type 1, 2, and 3 Open Space	
		Area (acres)	Proportion (%)	Area (acres)	Proportion (%)			Amount (acres)	Proportion (%)	Amount (acres)	Proportion (%)
Bay Checkerspot Butterfly											
Primary Habitat	8,621	1,336	15%	2,921	34%	3,800	754	5,890	68%	6,721	78%
California Tiger Salamander											
Breeding Habitat	1,027	100	10%	403	39%	150	45	295	29%	553	54%
Non-breeding Habitat	323,721	45,667	14%	97,020	30%	30,000	11,700	87,367	27%	127,020	39%
Total	324,748	45,767	14%	97,423	30%	30,150	11,745	87,662	27%	127,573	39%
California Red-Legged Frog											
Primary Habitat	10,101	730	7%	3,230	32%	1,300	130	2,160	21%	4,530	45%
Secondary Habitat	331,672	45,523	14%	97,934	30%	30,000	11,800	87,323	26%	127,934	39%
Total	341,773	46,253	14%	101,164	30%	31,300	11,930	89,483	26%	132,464	39%
Foothill Yellow-Legged Frog (length in miles)											
Primary Habitat	244	37	15%	70	29%	30	7	74	30%	100	41%
Secondary Habitat	447	82	18%	152	34%	50	17	149	33%	202	45%
Total	690	119	17%	222	32%	80	24	222	32%	302	44%
Western Pond Turtle											
Primary Habitat	82,895	13,900	17%	28,568	34%	7,000	2,800	23,700	29%	35,568	43%
Secondary Habitat	232,021	31,067	13%	69,491	30%	20,000	9,100	60,167	26%	89,491	39%
Total	314,916	44,967	14%	98,060	31%	27,000	11,900	83,867	27%	125,060	40%
Western Burrowing Owl											
Overwintering Habitat	132,770	12,584	9%	28,517	21%	17,000	4,310	33,894	26%	45,517	34%
Occupied and Potential Nesting Habitat[3]	65,099	1,003	2%	9,284	14%	5,300	0	6,303	10%	14,584	22%
Total	197,869	13,586	7%	37,802	19%	22,300	4,310	40,196	20%	60,102	30%
Tricolored Blackbird											
Primary Habitat	7,933	295	4%	2,546	32%	1,000	40	1,335	17%	3,546	45%
Secondary Habitat	132,358	10,742	8%	26,888	20%	18,000	3,800	32,542	25%	44,888	34%
Total	140,291	11,037	8%	29,435	21%	19,000	3,840	33,877	24%	48,435	35%
Least Bell's Vireo											
Primary Habitat	3,097	65	2%	330	11%	460	2	527	17%	790	26%
San Joaquin Kit Fox											

Table 5-17. Continued

Species and Habitat Type	Habitat in Study Area (acres)[1]	Modeled Habitat in Type 1 Open Space		Modeled Habitat in Type 1,2, and 3 Open Space		Commitment to Acquire Modeled Habitat for Reserve System (acres)	Maximum Modeled Habitat added to the Reserve System from Existing Open Space (acres)[2]	Total Protected in Reserve System and Type 1 Open Space		Total in Reserve System and Type 1, 2, and 3 Open Space	
		Area (acres)	Proportion (%)	Area (acres)	Proportion (%)			Amount (acres)	Proportion (%)	Amount (acres)	Proportion (%)
Secondary Habitat	38,543	5,067	13%	6,012	16%	4,000	0	9,067	24%	10,012	26%
Secondary Habitat (Low Use)	2,349		0%	303	13%	100	0	100	4%	403	17%
Total	40,892	5,067	12%	6,315	15%	4,100	0	9,167	22%	10,415	25%
Mt. Hamilton Thistle											
Primary Habitat	487	55	11%	204	42%	150	60	265	54%	354	73%
Fragrant Fritillary											
Primary Habitat	8,820	1,025	12%	3,074	35%	3,000	1,000	5,025	57%	6,074	69%
Secondary Habitat	156,635	15,346	10%	39,243	25%	20,000	3,000	38,346	24%	59,243	38%
Total	165,455	16,371	10%	42,317	26%	23,000	4,000	43,371	26%	65,317	39%
Loma Prieta Hoita											
Primary Habitat	104,126	15,133	15%	34,426	33%	9,000	3,500	27,633	27%	43,426	42%
Secondary Habitat	17,745	2,143	12%	4,241	24%	1,000	600	3,743	21%	5,241	30%
Total	121,871	17,276	14%	38,667	32%	10,000	4,100	31,376	26%	48,667	40%
Smooth Lessingia											
Primary Habitat	10,491	1,268	12%	3,659	35%	4,000	1,100	6,368	61%	7,659	73%
Metcalf Canyon Jewelflower											
Primary Habitat	8,105	984	12%	2,843	35%	3,200	1,000	5,184	64%	6,043	75%
Most Beautiful Jewelflower											
Primary Habitat	14,277	1,490	10%	5,030	35%	4,000	1,700	7,190	50%	9,030	63%
Secondary Habitat	85	10	12%	12	14%	0	0	11	13%	12	14%
Total	14,362	1,500	10%	5,042	35%	4,000	1,700	7,201	50%	9,042	63%

[1]All area measurements are in acres unless otherwise noted.

[2] County Park lands added to Reserve System and converted from Type 2 or 3 Open Space to Type 1 (see Table 5-5) within the Reserve System would be enhanced, where appropriate. A maximum of 13,291 acres of existing open space could be credited toward the Reserve System size under the Plan. Additional acres of existing open space could be incorporated into the Reserve System; however, they would not receive credit toward the Reserve System size. Alternatively, the Implementing Entity may acquire new lands for the Reserve System in place of adding this acreage from existing open space, as long as the total Reserve System size requirements are met.

[3] Western burrowing owl modeled occupied nesting and potential nesting modeled habitat is quantified inside the study area only. The Implementing Entity will manage a minimum of 5,300 acres of western burrowing owl nesting (occupied and potential) habitat throughout the permit area by the end of the permit term. Of this acreage, a minimum of 600 acres of occupied nesting habitat must be protected in fee title or conservation easement as part of the Reserve System. For the remaining 4,700 acres, land acquisition (fee title or easement) or management agreements may be used and the land may not be part of the Reserve System . However, lands not acquired will be under permanent management agreements by year 45. Additional detail is provided in Chapter 5 and Appendix M.

Table 5-18. Land Acquisition and Enhancement Requirements for Selected Conservation Analysis Zones (acres)

Conservation Analysis Zone[1]	Natural Land Cover Types in Zone(s) (acres)	Natural Land Cover Acquisition Requirement in Zone(s) (acres)	Proportion (%)
Alameda 1	1,338	--	--
Coyote 7	4,567	--	--
Subtotal[2]	5,905	2,300	39%
Coyote 4	9,146	4,200	46%
Subtotal	9,146	4,200	46%
Uvas 1	10,891	1,000	9%
Uvas 2	8,573	800	9%
Uvas 3	4,761	--	--
Uvas 4	4,357	--	--
Uvas 5	8,630	4,600	53%
Uvas 6	831	200	24%
Subtotal	38,043	6,600	17%
Pacheco 1	9,093	--	--
Pacheco 2	7,535	--	--
Pacheco 3	5,849	--	--
Pacheco 4	5,477	--	--
Pacheco 5	12,959	--	--
Pacheco 6	8,278	--	--
Subtotal[2]	49,190	2,400	5%
Coyote 2	4,954	900	18%
Pacheco 7	5,037	800	16%
Pacheco 8	11,706	3,800	32%
Subtotal	21,697	5,500	25%
Total[3]	**123,981**	**21,000**	**17%**

Notes:

[1] Conservation Analysis Zones with separate land acquisition requirements were selected based on the need to be more geographically specific to achieve conservation goals and objectives.

[2] Land acquisition can be achieved in any applicable conservation analysis zone to meet the requirements in the subtotal.

[3] Total land acquisition requirement for these conservation analysis zones overlap with land acquisition requirements for land cover types in Tables 5-11 and Table 5-13. Land acquisition requirements by conservation analysis zone include both terrestrial and wetland land cover types.

Table 5-19. Land Acquisition and Enhancement Requirements for Serpentine Grassland in the Study Area

Conservation Analysis Zone[1]	Serpentine Grassland in Zone(s) (acres)	Serpentine Grassland Acquisition Requirement in Zone(s) (acres)	Proportion (%)
Guadalupe 1 and 3	980	500	51%
Guadalupe 2	11	-	0%
Coyote 3	21	-	0%
Coyote 4	131	100	76%
Coyote 5	2,655	1,900	72%
Coyote 6	1,735	900	52%
Coyote 7	22	-	0%
Coyote 9	66	-	0%
Coyote 10	153	-	0%
Llagas 2	299	200	67%
Llagas 3	583	100	17%
Llagas 4	32	-	0%
Llagas 5	16	-	0%
Uvas 1	147	-	0%
Uvas 2	42	-	0%
Uvas 3	38	-	0%
Uvas 4	10	-	0%
Uvas 5	175	-	0%
Uvas 6	8	-	0%
Pescadero 1	7	-	0%
Pacheco 5	50	-	0%
Pacheco 6	73	-	0%
Any Conservation Analysis Zone		300	
Total	**7,254**	**4,000**	**55%**

Notes:

[1] Only those conservation analysis zones with serpentine grassland are shown.

Table 5-20. Management Consideration for Significant Invasive Plants in the Plan Area

Species	Management Considerations
Non-native Annual Grasses (multiple species)	The grasslands of the region are overwhelmingly dominated by very aggressive weedy grasses and forbs that evolved under extreme grazing pressure in the Mediterranean region of Southern Europe, North Africa, and the Middle East before invading and replacing the native California grasslands. The annual-dominated grasslands that we have today are quite different in significant ways from the native grasslands of the past—different species, different animal herbivory and traffic, and different management by people. Without management (mostly with livestock grazing), these aggressive plants grow tall and dense (even in serpentine), choking out the habitat structure that allowed the currently endangered plants and animals to survive through the last 250 or more years. Grazing still controls the growth of these plants in their native grasslands around the Mediterranean Sea, and in California has facilitated the persistence of a host of endangered species in our grasslands. **Grazing Management.** The existing science of grasslands and their management tells us that some kind of grazing is far better than none, for multiple conservation purposes, including maintenance of habitat for grassland-dependent special-status species. Grazing termination or exclusion has lead to local extirpations of endangered species, particularly during years of above-normal precipitation (e.g., Bay checkerspot butterfly). Research and experience has shown that grazing can be prescribed more precisely to create and maintain the desired habitat structure for special-status species, fire fuel patterns, and reduction of pest plants, while minimizing impacts. Livestock's role in grassland conservation and grazing management, as well as the fire, mechanical, and herbicide treatment options are described in text.
Barbed goatgrass (*Aegilops triuncialis*)	**Grazing Management (risks of spread/timing/intensity).** Small infestations can be spread quickly by attachment of the barbed seeds to livestock and wildlife, and by distribution of livestock replacement hay. Heavy grazing during the growing period, followed by late-spring rest has increased the density of this pest. Heavy grazing during the early growing season can be effective in limiting seed production. **Fire.** Thorough late-spring burning of infested patches, where there is abundant herbaceous fuels and before seedheads have emerged, has been effective. Multiple burns are required because of persistence of a viable seedbank. **Mechanical.** Mowing has been less effective than grazing because prostrate plants escape injury. Mowing during the early growing season can be effective in limiting seed production. **Herbicides.** Glyphosate can be effective if the infestations are small and found early. This herbicide can be effective if used in the winter or spring, but repeated applications are likely to be necessary to deplete the seedbank.
Black mustard (*Brassica nigra*)	**Grazing Management (Timing/Intensity).** Disturbance, including excessive grazing, promotes the dominance and spread of black mustard. The fast growing, fibrous stems and branches of black mustard are generally not preferable to livestock. Black mustard favors nutrient-rich soils that are especially prevalent in areas used by cattle. Once dominance by black mustard is established, allelopathic chemicals leaching from dead stalks and tissues further prevents the establishment of other plants. **Fire.** Dense black mustard stands may increase the fire frequency as plants are extremely flammable upon desiccation. There is no evidence in the available literature that prescribed burning is an effective technique to control black mustard infestations. The increased nitrification of soil and lack of viable competitors may increase the level of infestation. **Mechanical.** Mowing and hand pulling is very effective for controlling relatively small populations of black mustard. Mowing should be timed for early spring, prior to the production of viable seeds. **Herbicides.** 2-4-D and glyphosphate are both effective herbicides for control of black mustard. These are best applied to rosettes immediately after mowing.

Species	Management Considerations
Italian thistle (*Carduus pycnocephalus*)	**Grazing Management (Timing/Intensity).** Although cattle grazing has demonstrated limited success in controlling Italian thistle, properly timed grazing will minimize the spread of seed and slow the rate of infestation. Light to moderate intensity early to mid-spring grazing prior to the production of flowering heads is preferable and will minimize soil disturbance and nitrification of soil, which favors Italian thistle establishment and spread. **Fire.** Very little data supports the use of fire as an effective mechanism for Italian thistle control. Many ecologists have observed dramatic increases in the size of Italian thistle infestations following fire. This is likely due to the increased nutrients released into the soils and lack of competition from other annual plants. However, similar to YST, burning over 2 or more consecutive years is likely to reduce the viable seedbank and decrease the size and density of Italian thistle colonies. This strategy is best used as part of an integrated pest management program. **Mechanical.** For relatively small infestations of Italian thistle, mowing is the preferred method for control. This technique requires mowing before seed production over several consecutive years (or even within years). Slashing is even more effective because more of the above ground plant material is removed. Italian thistle has been shown to readily flower in plants that are cut at or above 8 cm above the ground. Further, if plants are cut too close to flowering, they can still produce viable seed after they have been mowed. Hand hoeing is the most effective technique for small patches, especially if roots are severed 10 cm below the ground surface because plants will not resprout in the same growing season. **Herbicides.** Herbicides are most effective in combination with other weed management techniques. 2-4-D has shown some success and is best applied directly to the roots when thistles are less than 0.25m.
Yellow star thistle (*Centaurea solstitialis*)	**Grazing Management. (Timing/Intensity).** Cattle grazing must occur prior to blooming period of spiny flower heads. High intensity early spring grazing followed by mowing/herbicide application is an effective method for control although full eradication is highly improbable. Note: Goats are preferable to cattle because they will browse on spiny flower heads later in the year. Yellow star thistle is highly toxic and may be fatal to horses. **Fire.** Prescribed burning has proven effective only after repeated burns over 2 or more consecutive years. Otherwise, fire is counterproductive and will increase germination and spread of YST due to increased light penetration and soil warming resulting from the removal of thatch and other competing plant species. Prescribed burning in a single year may be effective as part of an integrated pest management strategy including mowing and herbicides. **Mechanical.** Although labor intensive and time consuming, mowing is an effective strategy for controlling yellow star thistle after plants have bolted but prior to the production of viable seeds. This technique is most effective for small, isolated populations. **Herbicides.** Clopyralid is the most effective herbicide for full season control of YST registered for use in California. Unlike most post-emergence herbicides, it provides both foliar and soil activity. The best timing for application is when YST is in the early rosette stage. Glyphosphate (Roundup) is useful for control after plants have bolted. Herbicides are best utilized as part of an integrated pest management program.
Bull thistle (*Cirsium vulgare*)	**Grazing Management (Timing/Intensity).** Cattle will not consume bull thistle due to long, stiff spines at the end of the leaves and subtending the flowers. However, bull thistle tends to colonize in disturbed overgrazed areas including wallows near water troughs. **Fire.** Biennial forbs, including most thistles, require burning over 2 or more consecutive years for effective control. A single fire will likely increase the level of bull thistle infestation. **Mechanical.** Repeated mowing will control infestations of bull thistle, but mowing must be timed before the production of flowers

Species	Management Considerations
	and viable seeds. **Chemical.** 2-4-D, clopyralid, picloram, and dicamba are effective herbicides for controlling bull thistle. Herbicide application is most effective when applied to rosettes prior to the production of flowers and viable seeds.
Common teasel (*Dipsacus fullonum*)	**Grazing Management (Exclusion).** In general, spiny flower-heads are natural deterrent to cattle grazing. Dense infestations are generally impenetrable to livestock. There is evidence that cattle will not consume teasel prior to flower production due to the bitter taste and spiny leaves. However, because teasel is spread by seed, cattle may incidentally translocate seeds and spread teasel to other sites. Disturbance and denuded vegetation from heavy grazing is also likely to facilitate teasel establishment due to increased nutrients (nitrification) and lack of competition from other plants. **Fire.** Late spring prescribed burns may be somewhat effective for teasel control. However, because fire will not carry well through dense stands of mature plants, fire alone will not eradicate teasel. Prescribed burning may make it easier to locate rosettes for mechanical or chemical control. **Mechanical.** Mowing prior to the production of mature flowers is effective for control of teasel, but will not eradicate common teasel. Hand pulling or mattocking is preferable due to full removal of perennial root systems. **Chemical.** 2-4-D applied in the spring to rosettes prior to mature flower production is effective for teasel eradication. This strategy is best used in combination with mowing as part of an integrated pest management program.
Blue gum eucalyptus (*Eucalyptus globulus*)	**Grazing Management. (None).** Eucalyptus displaces native plant communities/wildlife habitat due to rapid establishment and growth. Allelopathic properties in the leaves and stems prevent recruitment of all but the hardiest understory vegetation. Eucalyptus will rapidly invade grasslands, reducing the available forage for cattle. Furthermore, aromatic and woody seedlings/saplings are unlikely to be ingested by cattle. **Fire.** No data exists to support the use of prescribed fire to control eucalyptus. However, there is some speculation that prescribed burning prior to cutting trees may assist with herbicide application. In general, eucalyptus infestations are expected to increase the wildfire frequency due to fast growing and highly flammable properties of this species. **Mechanical.** Cutting trees and leaving stumps flat and low to the ground is the common method for control followed by stump grinding or direct herbicide application. Hand pulling of seedlings and saplings up to one inch is diameter is also an effective means of control. **Chemical.** Various herbicides are typically applied to cut stumps. The most commonly used herbicide is 25–50% dilute glyphosphate applied directly to the stump within several minutes of cutting. Because eucalyptus will re-sprout from cut stumps, new growth should be monitored and controlled for up to three years. It has been postulated the best time to remove regrowth is when shoots are 6-8 feet high and are still a major net energy investment for the tree.
Fennel (*Foeniculum vulgare*)	**Grazing Management (None).** Grazing management will not control existing fennel infestations in SCTP. Mature fennel is not palatable to livestock and most infestations are located outside of selected grazing management units. However, fennel is not typically found in grazed pastures. Moderate intensity grazing should prevent the establishment of new fennel infestations. **Fire.** Prescribed burning is not a feasible strategy for fennel control in STCP due to proximity to roads and private residences. **Mechanical.** While mowing prior to seed production may prevent further spread of fennel, eradication requires cultivation of plants including full removal of the roots. Although labor intensive, mattocking or hand digging are the preferred strategies for eradication. **Chemical.** Application of 2-4-D while plants are growing but prior to flower production has proven effective. Plants must be wetted

Species	Management Considerations
	prior to application, particularly the crowns. However, because fennel is often located on embankments adjacent to waterways or impermeable road surfaces, herbicide application may not be feasible.
Milk thistle (*Silybum marianum*)	**Grazing Management (Intensity).** Accumulated nitrates in milk thistle leaves are toxic to cattle. Thorny spines on the leaf margins and flower heads will cause selective avoidance by cattle as well. Residual dry matter (litter) in the late summer and fall is a highly important inhibitive factor in the germination of milk thistle seed. Thus, the level of grazing in areas supporting this plant should be carefully managed for appropriate levels of RDM. **Fire.** No data exists to support the use of prescribed fire to control milk thistle infestations. Some observers have noticed a decrease in milk thistle following accidental burns, but this has not been corroborated experimentally. It is generally believed that nutrient loading from fire and lack of competitors will increase milk thistle germination. Prescribed burning may be useful if repeated over 2+ consecutive years. **Mechanical.** Mowing alone is not an effective method of control for milk thistle. Plants are often able to re-sprout and grow back in the same year, or produce viable flower heads below the level of the mower. Tilling or digging prior to flower productions is far more effective in that it removes the entire plant. Plants removed in this manner should be bagged and disposed of offsite because any flowers will still go to seed even after they have been uprooted. Tilled areas should be re-vegetated using a non-invasive, preferably native seed mix to avoid further establishment of milk thistle and other invasive species. **Herbicides.** Spot spray application of 2-4-D, dicamba or piclroam during the seedling to rosette phases of milk thistle development has demonstrated effective control. A recent experiment using the herbicides picloram and methabenzthiazuron in combination with phenoxyacetic acid compound was 100% effective in eradicating milk thistle.

Sources:

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DiTomaso, J.M. and E.A. Healy. 2007. Weeds of California and Other Western States. Vols. 1 and 2. University of California Agriculture and Natural Resources, Oakland, CA.

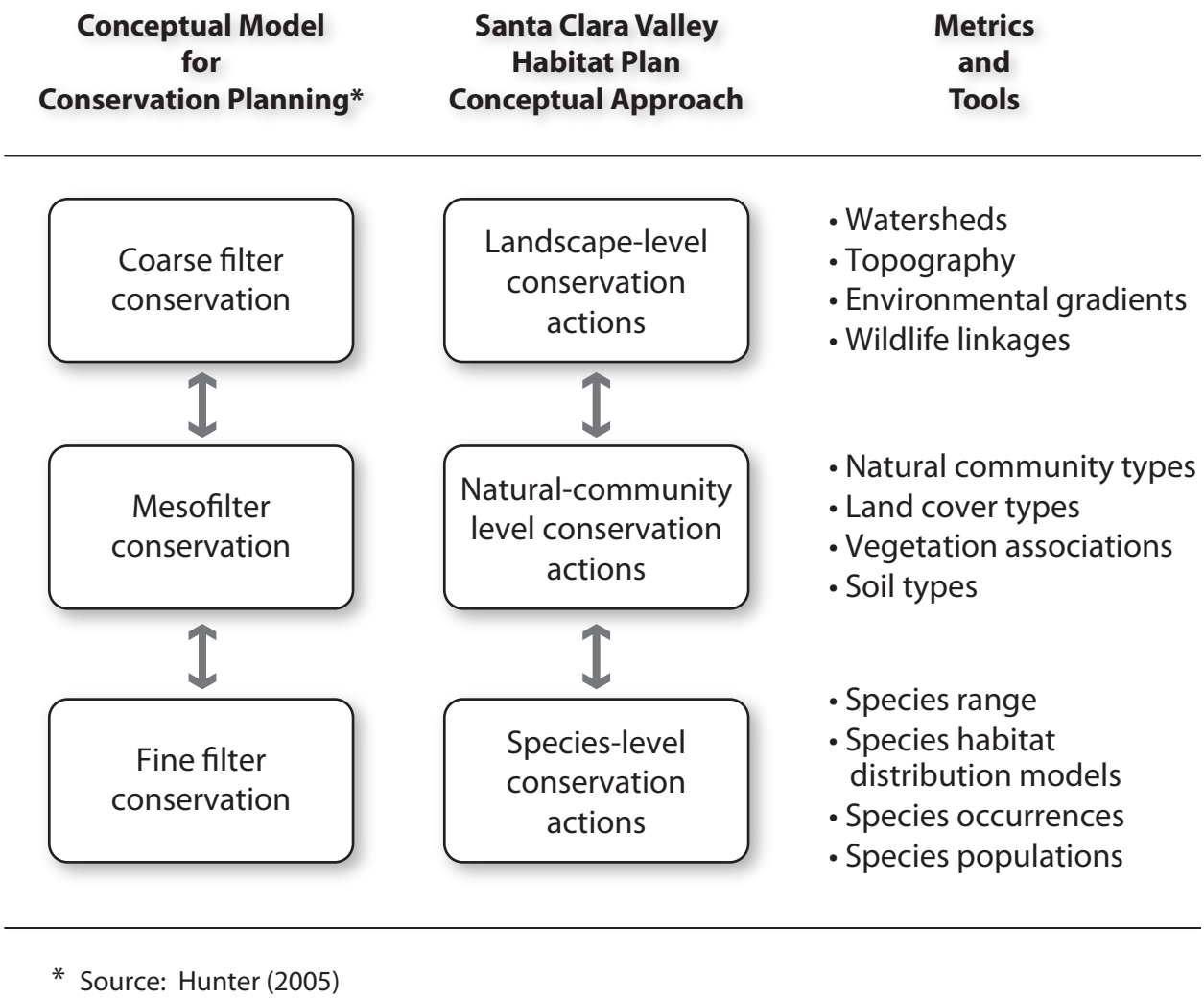
Lawrence D. Ford Rangeland Management and Conservation Science and EcoSystems West Consulting Group. 2011. Grazing Management Plan, Santa Teresa County Park, San Jose, California. Prepared for Santa Clara County Department of Parks and Recreation.

Table 5-21. Protected Critical Habitat Units

Critical Habitat Unit[1]	Total Critical Habitat in Study Area	Critical Habitat in Open Space Type 1	Percent in Open Space Type 1	Critical Habitat in Open Space Types 2–4	Percent in Open Space Types 2–4	Estimated Critical Habitat in Reserve System[2]	Percent in Reserve System
Bay Checkerspot Butterfly							
5-Metcalf	4,503	780	17%	41	1%	2,580	57%
6-Tulare Hill	348	158	45%	0	0%	169	49%
7-Santa Teresa Hills	3,278		0%	1,699	52%	2,135	65%
8-Calero Reservoir	1,543	2	0%	913	59%	1,336	87%
9a-Kalana	170		0%	0	0%	103	61%
9b-Kalana	56		0%	0	0%	–	0%
10-Hale	507	28	5%	–	0%	434	86%
11-Bear Ranch	283		0%	283	100%	274	97%
12-San Martin	467	241	52%	16	3%	–	0%
13-Kirby	5,446	834	15%	1,244	23%	2,596	48%
Total	**16,601**	**2,042**	**12%**	**4,197**	**25%**	**9,627**	**58%**
California Tiger Salamander							
East Bay-5	1,393	674	48%	169	12%	549	39%
East Bay-6	3,916		0%	3,757	96%	2,519	64%
East Bay-7	8,595	5,767	67%	–	0%	1,757	20%
East Bay-8	2,536	2	0%	2,357	93%	1,701	67%
East Bay-9	2,935		0%	1,930	66%	190	6%
East Bay-10A	194	0	0%	–	0%	–	0%
East Bay-10B	698	0	0%	–	0%	570	82%
East Bay-11	2,223		0%	1,837	83%	0	0%
East Bay-12	5,607		0%	–	0%	1,436	26%
Total	**28,096**	**6,443**	**23%**	**10,049**	**33%**	**8,722**	**31%**
California Red-Legged Frog							
ALA-2	1,465		0%	73	5%	819	56%
STC-1	52,283	23,805	46%	12,716	24%	13,573	26%
STC-2	97,214	12,897	13%	9,000	9%	7,344	8%
Total	**150,962**	**36,703**	**24%**	**21,789**	**14%**	**21,736**	**14%**

[1] Covered species critical habitat within the study area is depicted in **Figure 4-4** (Bay checkerspot butterfly), **Figure 4-5** (California tiger salamander), and **Figure 4-6** (California red-legged frog).

[2] Assumes all land within critical habitat supports primary constituent elements. Includes existing parklands that will be integrated into the Reserve System.



* Source: Hunter (2005)

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Figure 5-1
Conceptual Model and Conceptual Approach to the Conservation Strategy for the Santa Clara Valley Habitat Plan

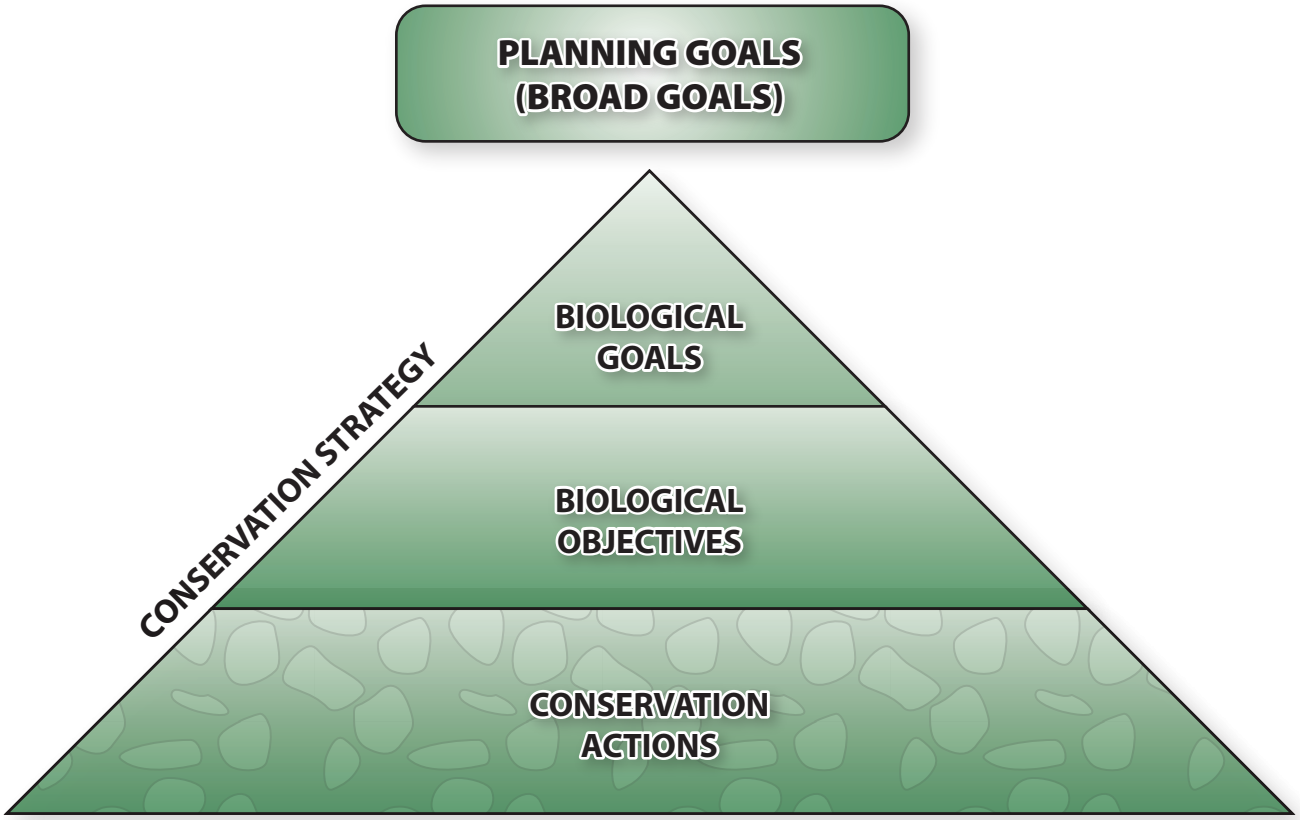

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Figure 5-2
Structure of the Biological Goals and Objectives

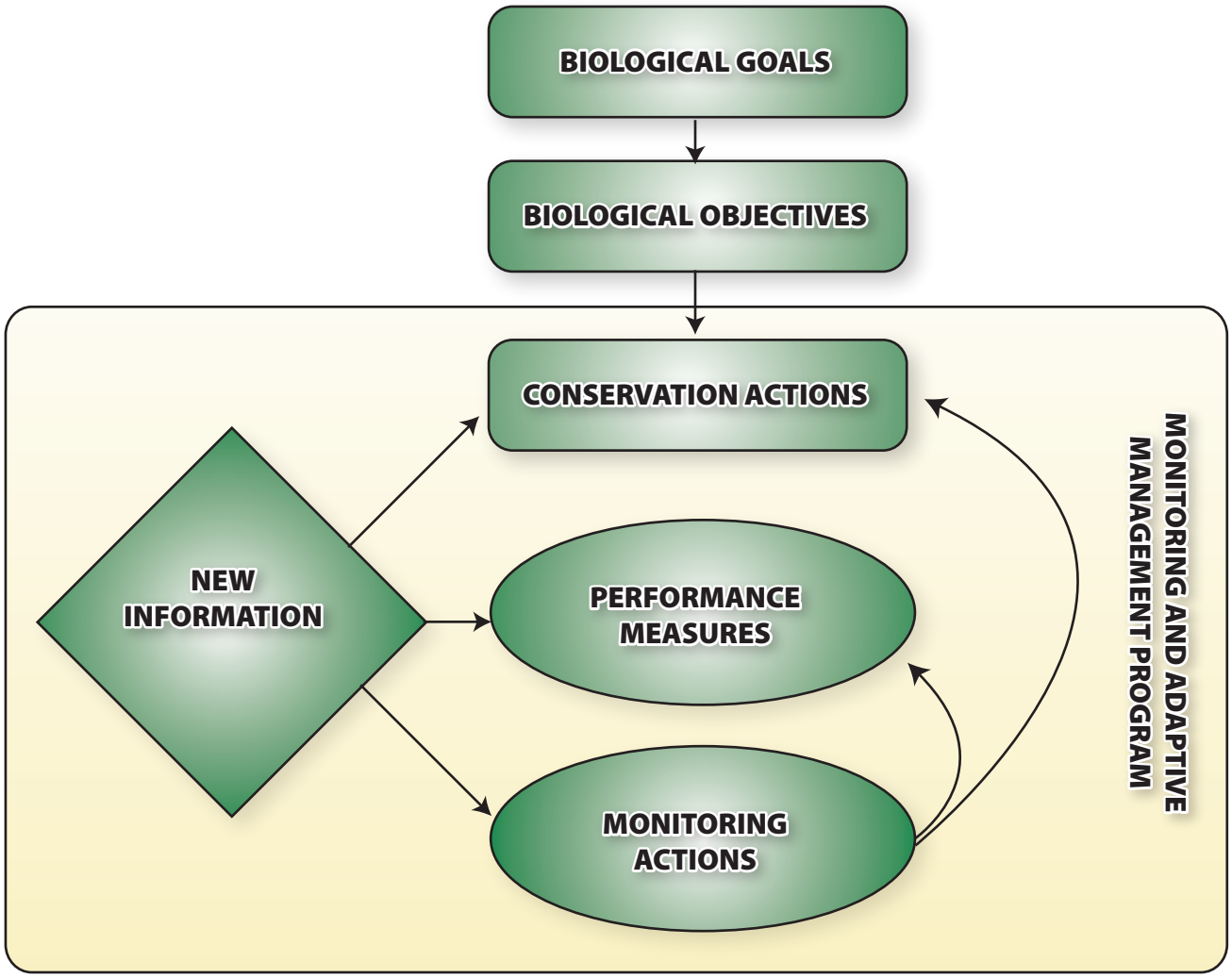

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Figure 5-3
Relationship of Biological Goals and Objectives to Adaptive Management and Monitoring

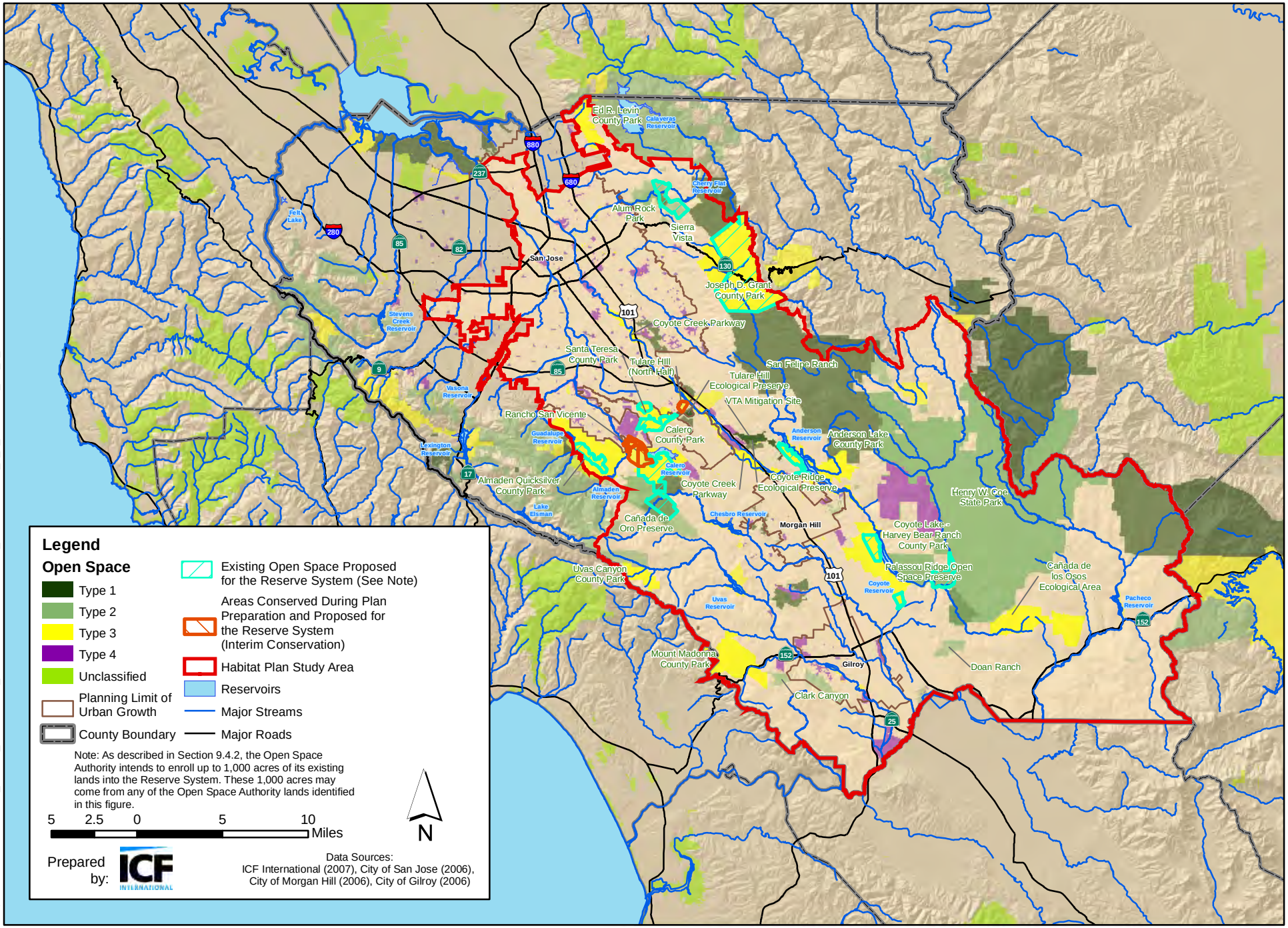

Figure 5-4
Existing Open Space and Interim Conservation Proposed for the Reserve System

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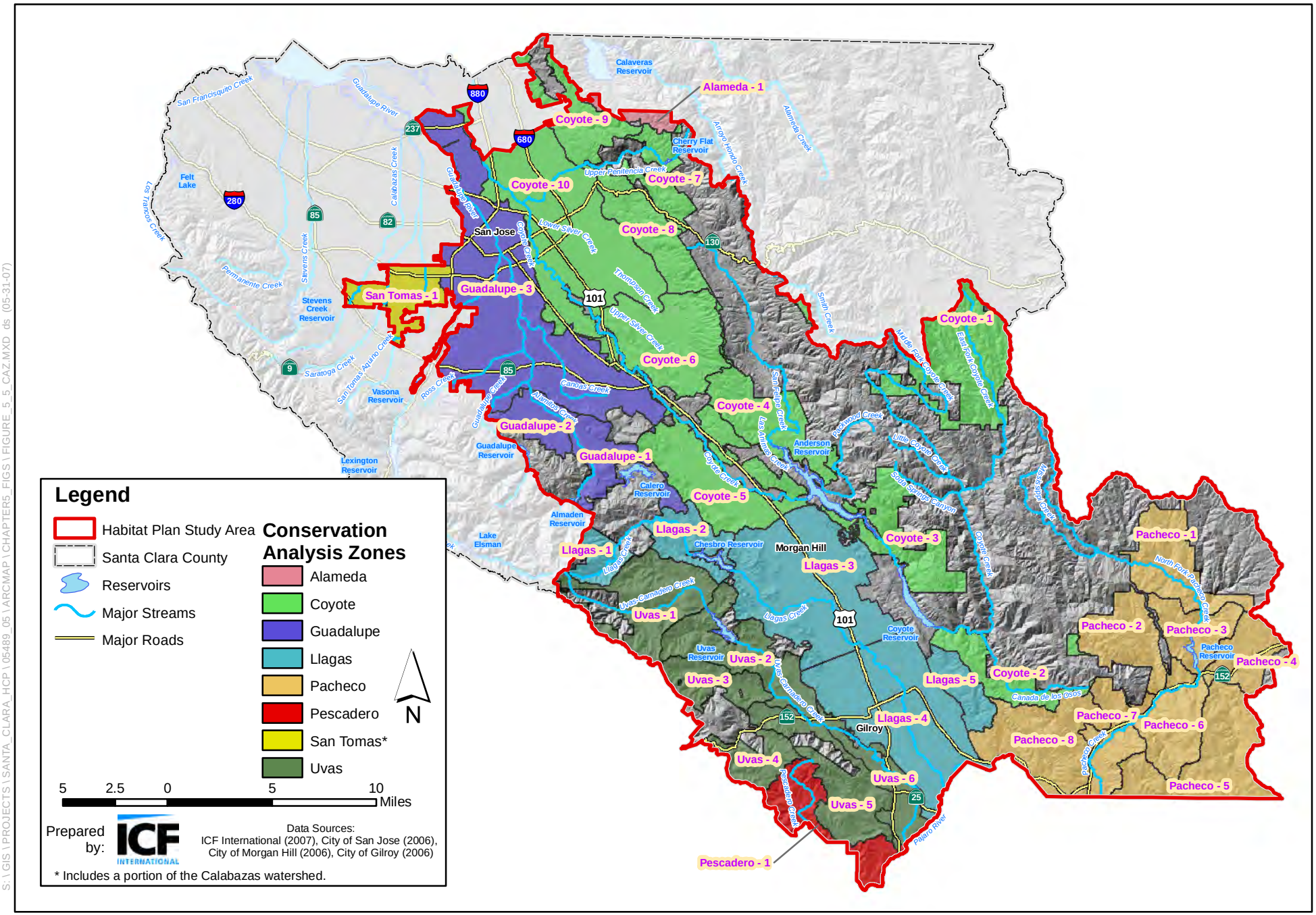

Figure 5-5
Conservation Analysis Zones

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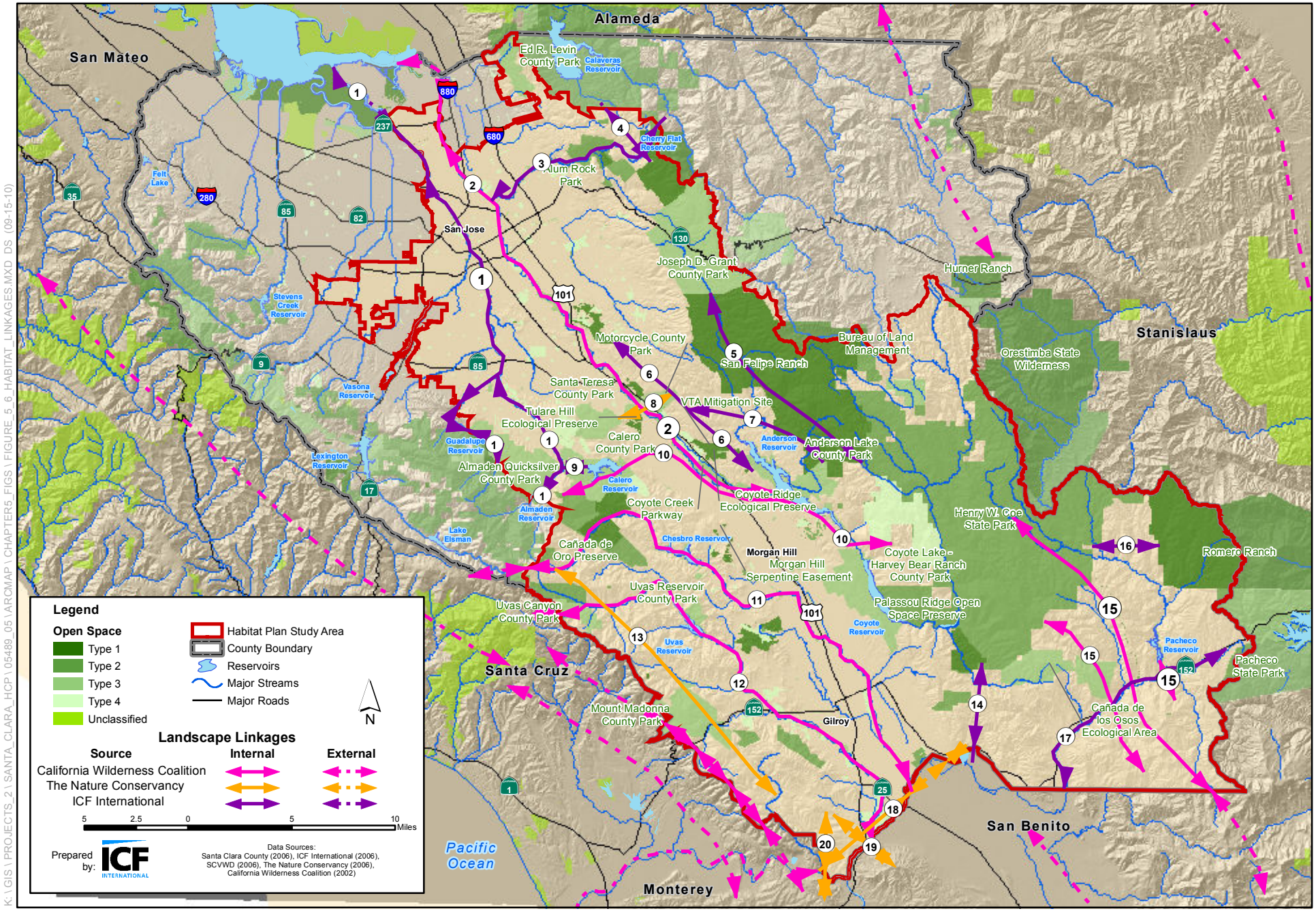

Figure 5-6
Potential Landscape Linkages in and Near the Study Area

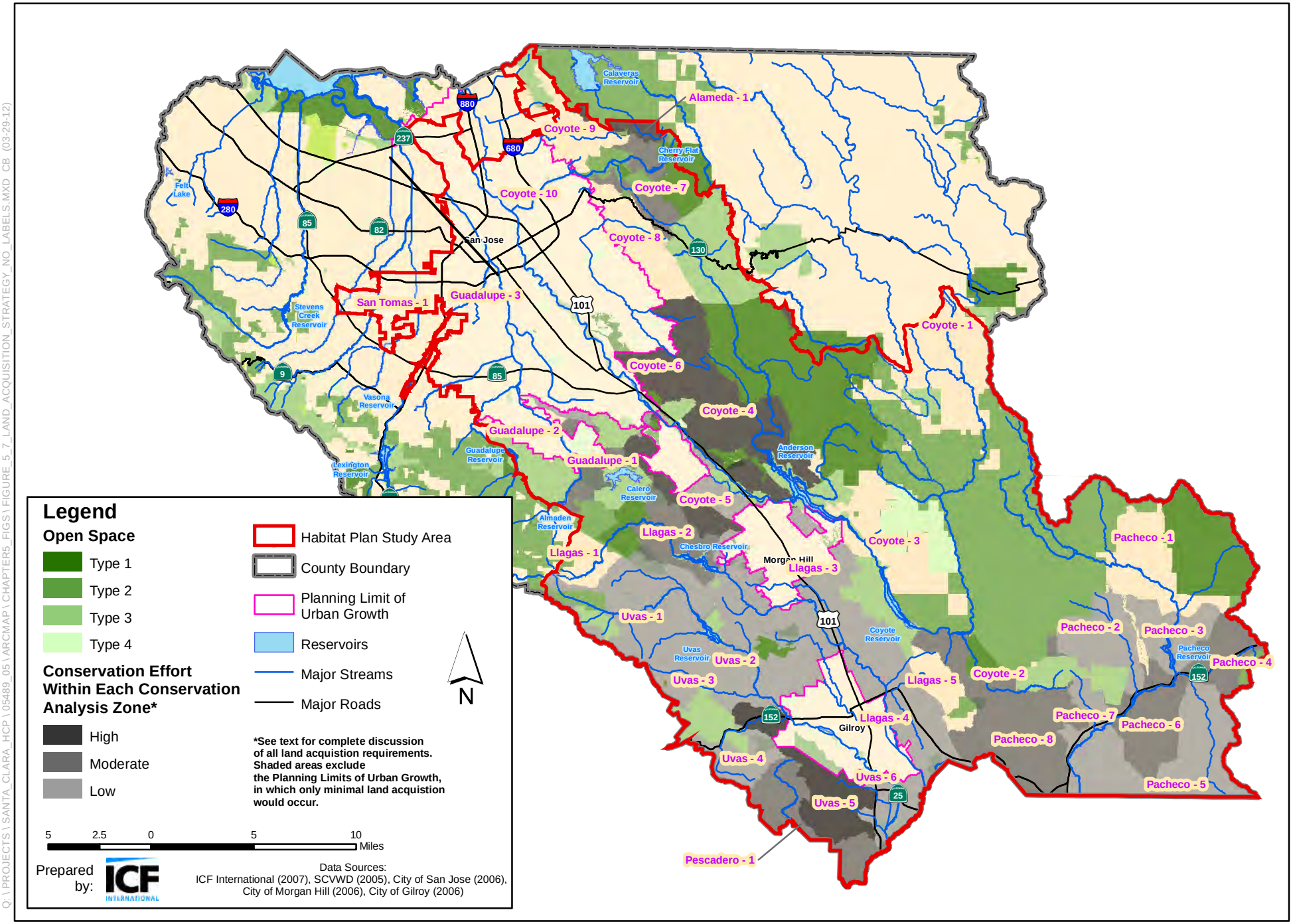

Figure 5-7
Land Acquisition Strategy

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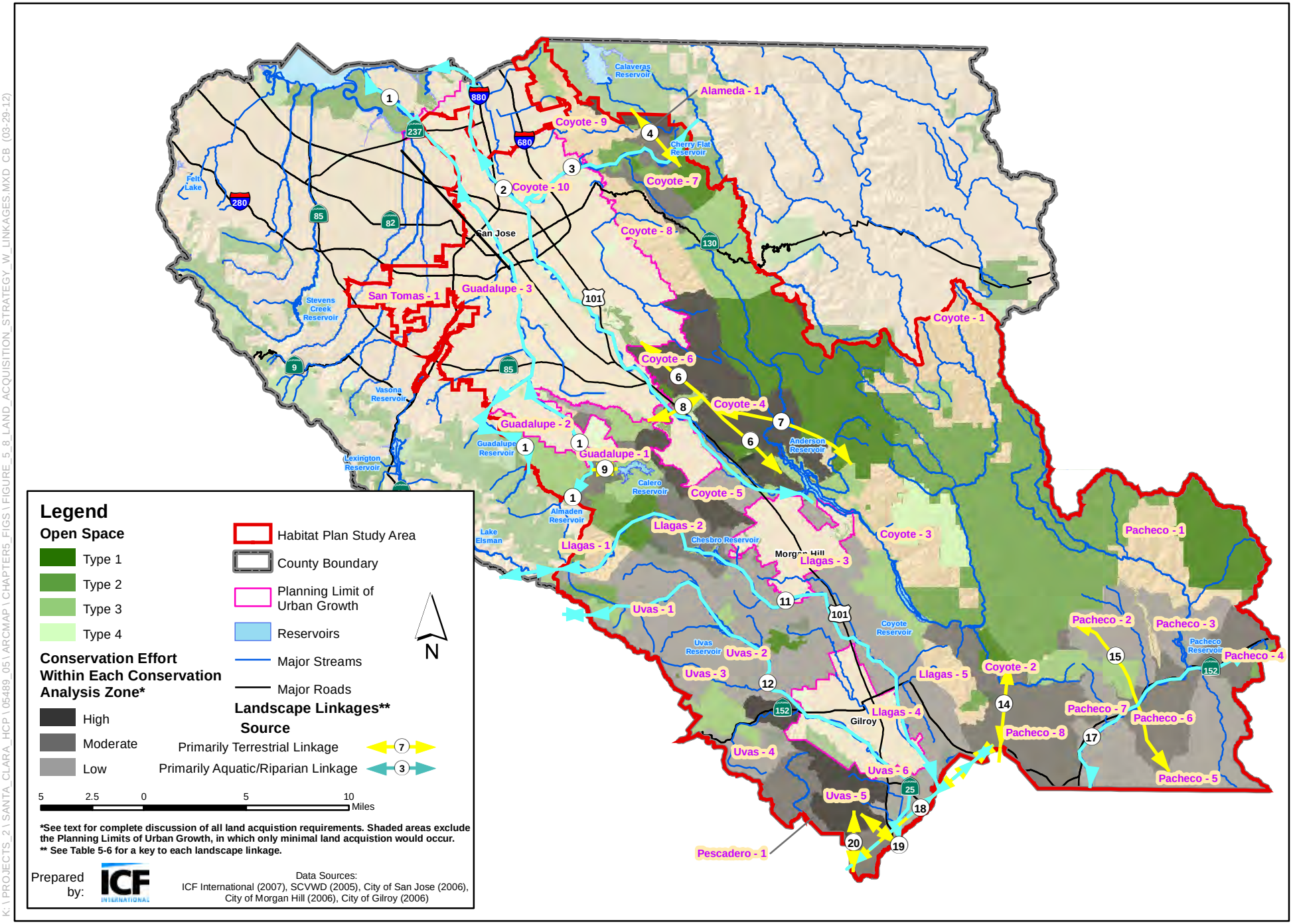

Figure 5-8
Land Acquisition Strategy with Applicable Landscape Linkages

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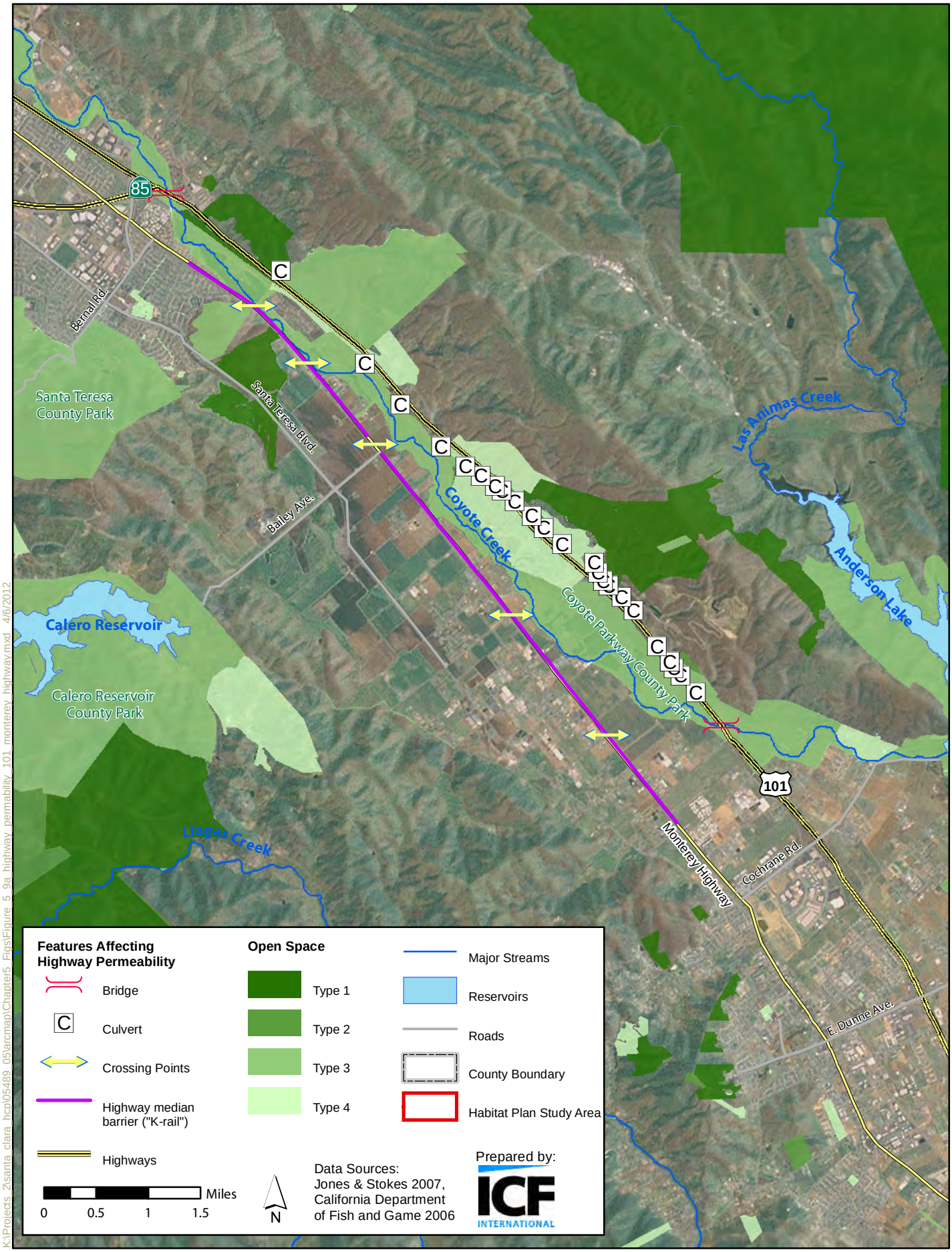

Figure 5-9a
Permeability along U.S. 101

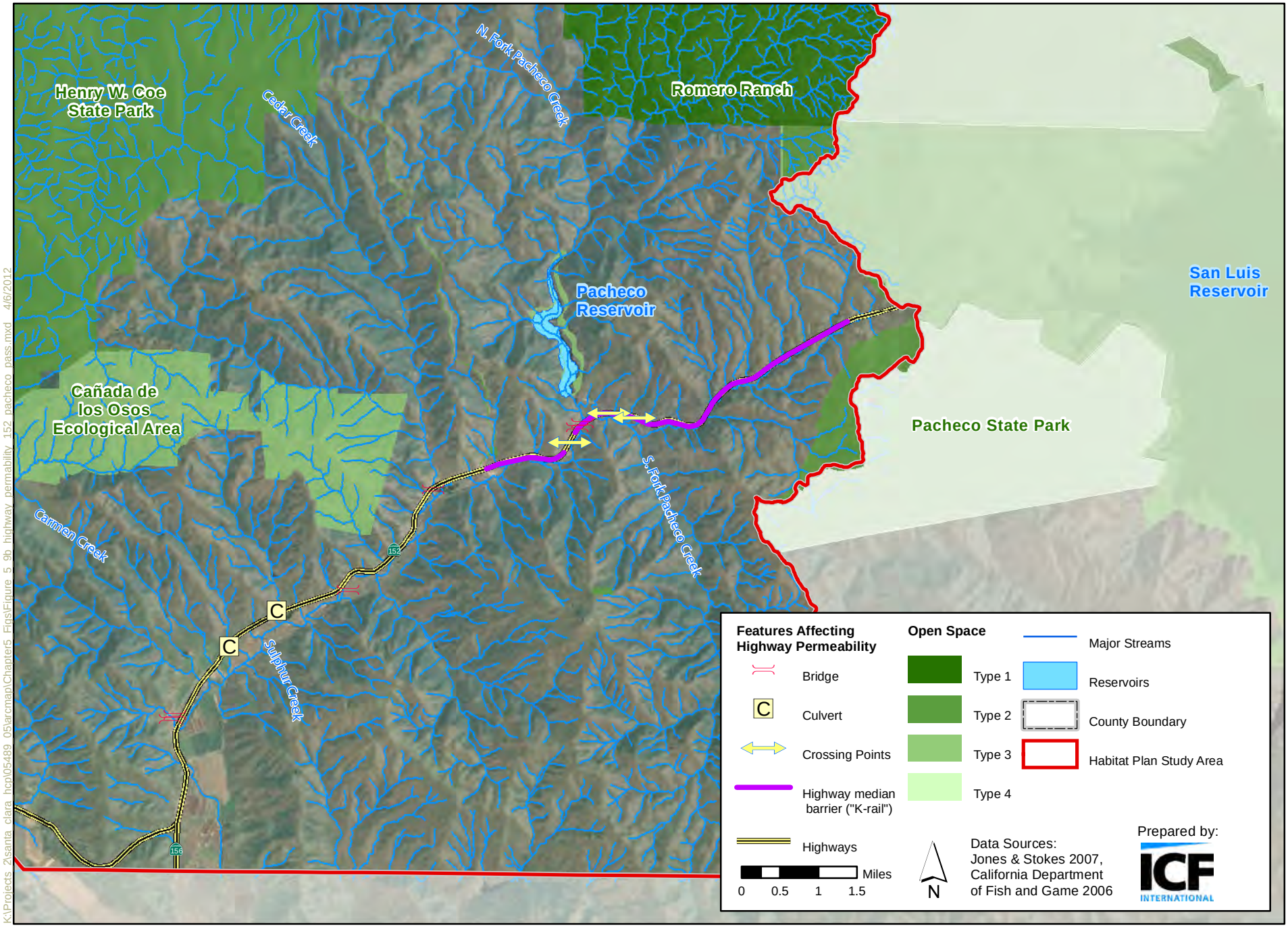

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Figure 5-9b
Permeability along Highway 152

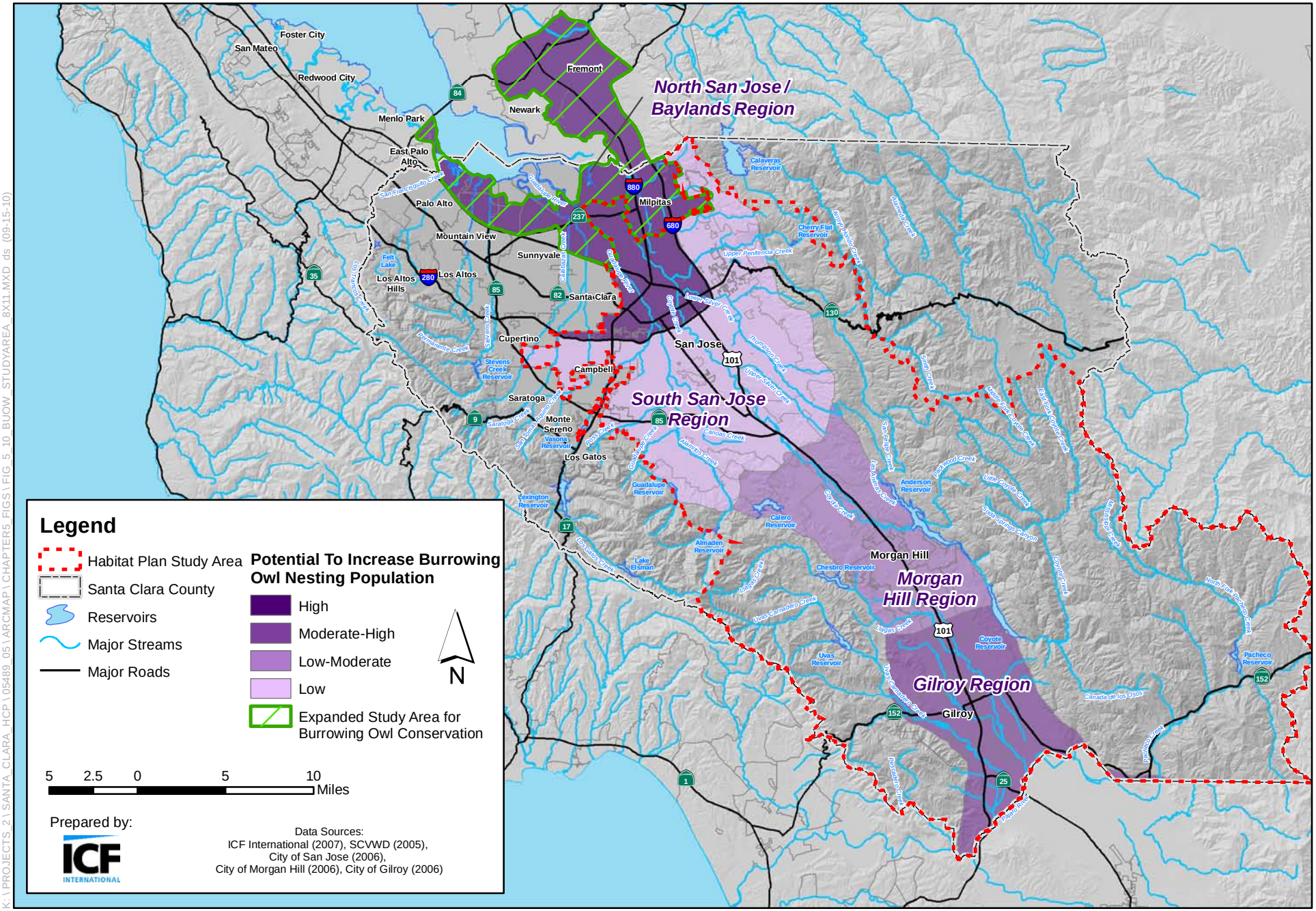

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Figure 5-10
Expanded Study Area for Burrowing Owl Conservation

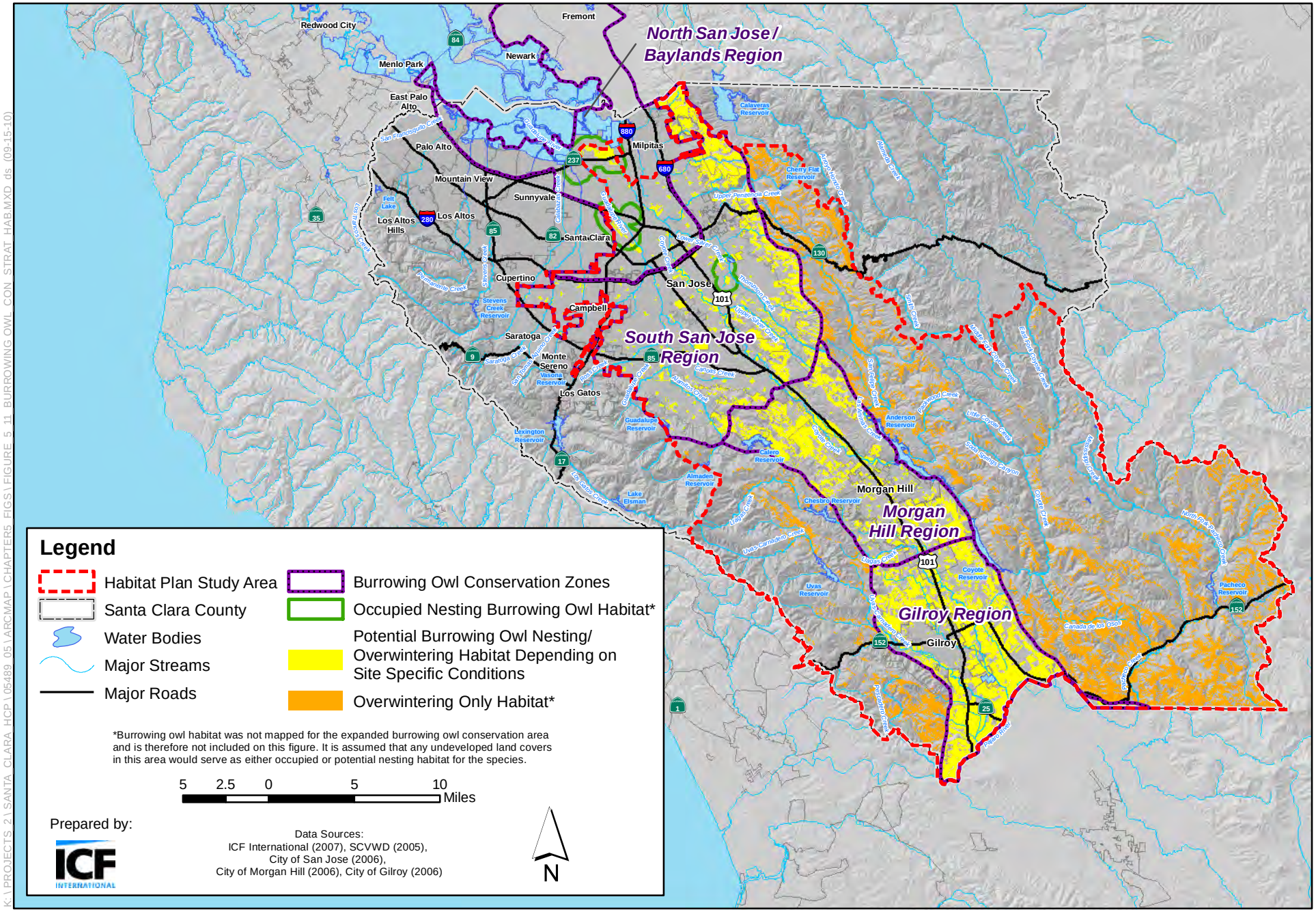

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Figure 5-11
Burrowing Owl Conservation Strategy - Habitat Types

Chapter 6

Conditions on Covered Activities and Application Process

6.1 Introduction

As required by ESA (Section 10[a][2][A][ii]) and Fish and Game Code Sections 2820 (a)(6) and 2820(f), this Plan includes measures to avoid and minimize take of covered species. These measures to avoid and minimize impacts are described as *conditions on covered activities* and are designed to achieve the objectives listed below.

- Provide avoidance of covered species during implementation of covered activities throughout the study area.
- Prevent take of individuals from covered activities as prohibited by law (e.g., take of fully protected species).
- Minimize adverse effects on natural communities and covered species where conservation actions will take place.
- Avoid and minimize impacts on jurisdictional wetlands and waters throughout the study area.

In the context of effects on covered species, one of the greatest benefits of an HCP/NCCP is that mitigation for individual projects can be implemented systematically on a regional scale. This enables a more comprehensive approach to conservation that concentrates protection where it has the greatest value. The Plan also restricts covered activities in high-value land cover types (e.g., wetlands, serpentine grassland) and for some species (e.g., covered plants and selected covered wildlife species). By protecting high-quality areas in the Reserve System and restricting covered activities in areas of higher biological value, regional avoidance and minimization goals are supported.

This chapter describes conditions on covered activities that help meet regional avoidance and minimization goals. Regional avoidance and minimization reduces the need for individual projects to avoid and minimize impacts at the project scale and allows streamlining of regulatory requirements. This Plan assumes that take will result from individual covered activities and that this take will be mitigated through the conservation strategy (Chapter 5). Most activities covered under this Plan are required to provide limited documentation of field conditions to verify these assumptions (see Section 6.2 *Exemptions from Conditions*).

Avoidance and minimization measures are regulated by federal, state, and local programs. The conditions on covered activities (avoidance and minimization measures), described in this chapter do not supersede requirements by other agencies and are not intended to provide a basis for non-compliance with other applicable design guidelines required by other federal, state, and local agencies.

This chapter also describes the application process for individual projects to request coverage under this Plan. The application process is described in detail at the end of this chapter in Sections 6.7 *Receiving Take Authorization under the Plan* and 6.8 *Habitat Plan Application Package*. The conditions on covered activities and application process are included in this chapter together so that project proponents have one location in this document in which all requirements are described.

The NCCP Act requires that the Permittees get concurrence from the Wildlife Agencies before adopting, amending, or approving any plan or project that is inconsistent with the objectives and requirements of this Plan[1]. The conditions described in this chapter are designed to ensure this consistency and provide standard and predictable requirements for project applicants. However, Permittees may need to adopt or impose additional conditions beyond those described in this chapter for unanticipated projects or effects in order to ensure consistency with the Habitat Plan and compliance with the NCCP Act. The Permittees will evaluate all projects respective to their authorities to ensure that all applicable conditions described in this chapter have been incorporated into the project prior to extending take coverage under the Plan. Chapter 8 describes applicant responsibilities in the application process.

In addition to the conditions described in this chapter to avoid and minimize impacts, covered activities may also require payment of mitigation fees (see Chapter 9), provision of land in lieu of mitigation fees (see Chapter 8), or habitat restoration or creation in lieu of wetland fees.

6.2 Exemptions from Conditions

Many projects within the study area do not disturb the ground or have little or no measurable impact on the covered species or natural communities. Because the probability of take is so low, the need to enforce conditions on the projects and activities specified below would not provide a net benefit for species. Therefore, these covered activities are not subject to the conditions described in this chapter. Quantifiable impacts associated with activities exempt from conditions of the Habitat Plan will be reported in the Application Package (see Section 6.8, below) (impacts that cannot be quantified will not be tracked). Although these covered activities are exempted from the conditions, all of them receive take coverage (**Table 6-1**).

[1] Fish and Game Code Section 2820(b)(3).

Exemptions based on land cover types are based on the mapping for this Plan at the time of permit issuance and the nature of covered activities previously permitted on the site.

Many of the covered activities exempt from the conditions in this chapter may also be exempt from the Habitat Plan fees, as described in Chapter 9, Section 9.4.1 *Habitat Plan Fees*. The association between covered activities exempt from conditions on covered activities and Habitat Plan fees are shown in **Table 6-1**.

The following activities and projects are exempt from all of the conditions in this chapter and are not tracked as impacts by the Implementing Entity (as described above)[2].

- Projects that do not result in ground disturbance do not result in release of potential water quality contaminants, or do not create new wildlife barriers.
- Private-sector, routine-maintenance activities that require a development, grading, or building permit, and that occur inside the urban service area (private-sector activities that do not require a development, grading, or building permit are not covered by the Plan or its conditions or fees).
- Private-sector, routine-maintenance activities that require a development, grading, or building permit; that occur outside of the urban service area; and that occur within 50 feet of all existing structures at the time of Plan commencement or within 50 feet of structures that were permitted for incidental take under the Habitat Plan.
- Any covered activity described in Chapter 2 that occurs in urban-suburban, landfill, reservoir[3], or agriculture developed[4] land cover types as verified in the field, unless the activity may affect a mapped or unmapped stream, riparian, serpentine, pond, or wetland land cover types, or the activity is located in a stream setback (see Condition 11 for a discussion of stream setbacks).
- Routine infrastructure maintenance by public agencies within the planning limit of urban growth that do not affect stream, riparian, serpentine, ponds, or wetland land cover types.
- Routine infrastructure maintenance by public agencies that occurs in urban-suburban, landfill, reservoir, or agriculture developed land cover types that do not affect stream, riparian, serpentine, pond, or wetland land cover types. Examples of such activities include filling pot-holes and resurfacing existing roads without expansion of the paved area.

[2] Project proponents are still required to comply with survey and avoidance requirements for applicable local, state, and federal laws not addressed by the Habitat Plan (e.g., local tree ordinances, state fully protected species, the federal Migratory Bird Treaty Act).
[3] "Reservoir" does not include the dam face. Exemptions described in this chapter do not apply to projects impacting the face of covered dams.
[4] The land cover type "agriculture developed" (also known as agriculture developed/covered ag) is defined in Chapter 3 as intensive agricultural operations such as nurseries and greenhouses.

The following activities[5] are also exempt from all conditions in this chapter but will be tracked by the Implementing Entity as impacts when they occur on natural land cover types.

- Additions to existing structures or new structures that are within 50 feet of an existing structure (e.g., a new garage) that result in less than less than 5,000 square feet of impervious surface so long as no stream, riparian, wetlands, ponds, or serpentine land cover type are affected. Additions are cumulative and must be calculated based on the footprint of the structure at time of Plan implementation to determine whether this threshold has been crossed.
- A covered activity on a parcel of less than 0.5 acre or less as long as no serpentine, stream, riparian, pond, or wetland land cover type is within the parcel.

A project proponent of a covered activity in the Plan will not be required to comply with the conditions in this chapter or pay any Habitat Plan fees if the proponent of the activity provides written confirmation to the Implementing Entity that the CDFG and USFWS have determined that the activity is not subject to CESA and ESA, respectively; or has already received the necessary take authorizations under CESA and ESA; or has otherwise complied with CESA and ESA. An activity will be deemed to be in compliance with CESA and ESA by the Implementing Entity and thus be exempt from the conditions in this chapter and otherwise comply with the Habitat Plan if the proponent provides the following:

1. Letters from both USFWS and CDFG that specifically refers to the activity and states that the activity is not likely to result in take of any federally or state listed species and will not preclude successful implementation of the conservation strategy for all covered species, or
2. A copy of an incidental take permit issued by CDFG for the activity, and copies of incidental take statements or incidental take permits issued by USFWS that authorize the incidental take associated with the proposed activity.

Additional covered activities are exempt from species surveys, as described in Section 6.8.5 *Item 5: Results of Applicable Species Surveys and Monitoring*, below.

Activities or projects listed in Chapter 2, Section 2.4 *Projects and Activities Not Covered by this Plan*, are specifically excluded from coverage under this Plan and therefore cannot receive take authorization, are not subject to the conditions in this chapter, and do not pay Habitat Plan fees (see Section 2.4 for additional information on these excluded activities and projects). These projects are listed below.

[5] Although private development that does not meet the criteria described in Section 2.3.2 *Urban Development* subheading *Private Development Coverage Area* and additions of less than 5,000 square feet of new impervious surface (regardless of parcel size) are not subject to the Plan, project proponents may choose to opt into the Plan. If project proponents seek to have these activities covered, the bulleted exemptions apply.

- Private sector activities that do not obtain a development, grading, building, or other construction permit involving land disturbance for the purposes of making land improvements, such as the construction of buildings, roads, and driveways ("building permits" referenced herein do not include plumbing, electrical, or mechanical permits). Activities that do not obtain these development permits are not covered by the Plan.
- SCVWD Stream Maintenance Program activities.
- City of Gilroy expansion beyond the Plan's planning limit of urban growth.
- Bay Area to Central Valley high-speed train.
- New highway between I-5 and U.S. 101.
- Routine and ongoing agricultural activities or expansion of cultivated agriculture into natural land cover types, including vineyard development, that does not seek discretionary approval or permitting by the local jurisdiction.
- Timber harvest operations.
- Quarries and other mining other than expansion of Freeman Quarry (except as otherwise noted).
- New and expanded landfills other than Kirby Canyon, Pacheco Pass Landfill expansions, and landfills occurring inside the planning limit of urban growth of the three cities.
- Mercury removal/remediation (unless described in Chapter 2 as a covered activity).
- Corps led projects.
- Pacheco dam reconstruction and reservoir enlargement.
- Pesticide/ herbicide application for the federal permit.
- Installation and operation of groundwater wells (except as otherwise noted).
- Increased development due to incorporation of San Martin.
- Dam removal and/or construction of new dams.
- Wind farm development.
- Water importation from outside the SCVWD service area.
- Emergency activities.

6.3 Conditions on All Covered Activities

The conditions below are categorized and described in several ways: by activity type, by natural community, and by species. Collectively they provide for regional and site-specific avoidance and minimization of impacts on covered species and sensitive land cover types. It is the responsibility of project

proponents to design and implement their projects in compliance with these conditions. For private projects, the applicable local jurisdictions will review project compliance with the conditions in this chapter. The Local Partners will determine best adherence to conditions where discretion exists. If a project applicant proposes to use a less preferable design option (e.g., a culvert instead of a free-span bridge), the project applicant must demonstrate why a preferred option is infeasible. For private applicants, local jurisdictions will determine if this rationale is sufficient under these circumstances.

Conditions on covered activities, including avoidance and minimization measures identified for certain covered activities and species-specific measures, may be revised over the course of the permit term based on results of implementation through the adaptive management process. Proposed revisions will be reviewed by the Wildlife Agencies upon submission of each annual report to ensure the successful implementation of the conservation strategy. Agencies will review and respond within 30 days. Revisions to conditions will be approved by the Wildlife Agencies prior to the Permittees adopting revised conditions. Allowing such revisions will ensure that out-of-date or unsuccessful management techniques do not persist and that best available science can be incorporated into the conditions as appropriate for the Plan.

Compliance with the Habitat Plan does not preclude compliance with all other applicable state and federal laws. It is the project proponent's responsibility to ensure compliance with all applicable laws and regulations.

All projects that discharge dredged or fill material into waters of the United States, including federal jurisdictional wetlands, are required to obtain applicable permits (e.g., Clean Water Act Section 404 and Section 401) from the Corps and the Regional Board. Projects that place fill, alter the bed bank or channel, or divert the flow of streams, alter portions of streams above the ordinary high water mark, alter streams that lack a nexus to navigable waters, wetlands, or lakes under the jurisdiction of the state only are required to obtain a waste discharge requirement from the Regional Board and enter into a streambed alteration agreement with CDFG[6]. Any project that requires a permit from the Corps, Regional Board, or CDFG for impacts on streams and other aquatic areas may be subject to avoidance and minimization requirements. Those requirements may differ from the avoidance and minimization requirements in this Plan.

Condition 1, described below, pertains to all covered activities. Other conditions specifically pertain to certain types of activities, certain species, or certain natural communities and are enumerated in subsequent sections.

[6] Activities covered by this Plan that need a streambed alteration agreement are expected to fully meet the standards of the streambed alteration agreement through compliance with this Plan for species covered by the Plan.

Condition 1. Avoid Direct Impacts on Legally Protected Plant and Wildlife Species

Contra Costa Goldfields

Contra Costa goldfields is a federally endangered and CNPS 1B plant species whose extreme rarity precludes coverage under the Habitat Plan. Because the Habitat Plan does not cover the species, compliance is required on an individual basis.

The likelihood of discovery of new occurrences is very low. If a new occurrence of this species is found, its avoidance would be of the highest importance to the species' viability. If an applicant encounters Contra Costa goldfields on their site, they will contact the USFWS for written concurrence of avoidance to ensure that the project does not jeopardize the continued existence of the species.

Wildlife Species Protected Under Other Laws

Several wildlife species that occur in the study area are listed as fully protected, as defined under Sections 3511 and 4700 of the California Fish and Game Code. As described in Chapter 1, CDFG cannot issue permits for take[7] of these species. Fully protected species that are known or likely to occur in the study area are listed below.

- Golden eagle.
- Bald eagle.
- American peregrine falcon.
- Southern bald eagle.
- White-tailed kite.
- California condor.
- Ring-tailed cat (= ringtail).

Three of the fully protected raptor species—white-tailed kite, peregrine falcon, and golden eagle—forage widely throughout the study area but nest in discrete locations. Bald eagles are rare winter migrants to Santa Clara County but have been known to breed in the San Francisco Bay Area. A California condor population has been established in San Benito County (Pinnacles National Monument) and birds forage occasionally in Santa Clara County. Additionally, ringtails may be found in some riparian woodlands in the study area.

Further, all migratory bird species and their nests are protected under the Migratory Bird Treaty Act (MBTA). All birds listed above and those covered by

[7] Take is defined more narrowly in the California Fish and Game Code than in the ESA; see Chapter 1, *Introduction*, for details.

the Plan (western burrowing owl, least Bell's vireo, and tricolored blackbird) are considered migratory birds and subject to the prohibitions of the MBTA. Actions conducted under the Plan must comply with the provisions of the MBTA and avoid killing or possessing covered migratory birds, their young, nests, feathers, or eggs. As described in Chapter 1, the ESA incidental take permit, once issued by USFWS, will automatically function as an MBTA Special Purpose Permit, as specified under 50 CFR Sec. 21.27, for least Bell's vireo (the only migratory bird listed as threatened or endangered under the ESA) for a 3-year term subject to renewal by the Permittees (see Appendix 5 in U.S. Fish and Wildlife Service and National Marine Fisheries Service 1996). Should any other of the covered migratory birds become listed under the ESA during the permit term, the ESA permit would also constitute a Special Purpose Permit under the MBTA for that species for a 3-year term subject to renewal by the Permittees.

Golden eagle and bald eagle are also protected under the Bald and Golden Eagle Protection Act. Take of golden eagle or bald eagle includes "impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment" (72 FR 31133).

6.4 Conditions on Specific Covered Activities

Conditions 2–10 pertain to seven specific categories of covered activities: urban development, in-stream capital projects, in-stream operations and maintenance, rural capital projects, rural operations and maintenance, rural residential development, and Plan implementation.

6.4.1 Urban Development

Urban development is defined as development occurring inside the urban service area of the three Local Partner cities. Although urban development is assumed in the impact analysis to occur throughout the planning limit of urban growth of each city over the 50-year Habitat Plan permit term, the density of development is not assumed to be urban unless the area is also inside of the urban service area.

There are two conditions on new urban development required by the Plan. Conditions on urban development are limited because of the generally low biological value of resources within urban areas[8]. The two general exceptions are the urban fringe and stream resources. Condition 2 below addresses the edge of new urban development in relationship to the Reserve System; in-stream activities are addressed in subsequent conditions.

[8] See Chapter 3 for the rationale for this assumption and Chapter 5 for identification of selected sites in urban areas with high-value resources.

Condition 2. Incorporate Urban-Reserve System Interface Design Requirements

For the purposes of this Plan, the urban-Reserve System interface is defined as the zone between existing and future urban development and the Reserve System. Because the study area includes three cities, development is anticipated adjacent to the Reserve System in some locations. Because of the influence of urban land uses it is anticipated that some areas generally unsuitable for covered species will border some of the Reserves. Urban buildout adjacent to reserves has the potential to directly or indirectly adversely affect covered species and natural communities within the Reserve System. Sources of such adverse effects may include vandalism, dumping of trash, trampling, unauthorized mountain bike or off-road vehicle use; runoff from adjacent streets and landscaped areas containing lawn fertilizer, pesticides, and vehicle waste (petroleum byproducts); introduction of invasive nonnative species (e.g., pampas grass, French broom, Argentine ants, giant reed); lights and noise from nearby development; unregulated movement of domestic animals; and the potential for covered species to enter developed or urban areas.

Beyond minimizing such direct and immediate impacts, the design of the urban-Reserve System interface will consider indirect and long-term effects, such as runoff from developed areas[9] that can transport harmful substances (e.g., pesticides, automotive fluids, sediment) into reserves; establishment of invasive nonnative species that can disperse from nearby landscaped areas; and structural and biological damage (e.g., soil compaction, creation of unauthorized trails, disturbance of sensitive species) that can result from unmanaged human access and use.

The interface design will address the following key questions, which are based on those proposed by Kelly and Rotenberry (1993) for urban reserves in California.

- What external forces or processes may have a negative impact on covered species and habitats at or near the reserve boundary?
- To what extent are those external forces likely to penetrate the boundary and result directly or indirectly in negative impacts on covered species and habitats? (How permeable is the boundary?)
- Which covered species are likely to exit the reserve and expose themselves to increased risk of injury or death?
- What structures can be built or programs implemented to prevent or mitigate these impacts? For example, how can boundary permeability be altered?

With these questions in mind, site-specific interface design requirements were developed to reduce negative impacts of development on covered species and to

[9] In general, development in the permit area will occur downslope from Habitat Plan reserves, so runoff should flow away from reserves. However, because construction grading often alters local drainage patterns, some runoff could flow into reserves if precautions are not taken.

help reduce conflicts if wildlife moves outside the Reserve System. The following sections (*Design Requirements*) describe requirements and opportunities for reducing impacts on covered species and natural communities on Reserve System lands adjacent to urbanized areas.

Design Requirements

New urban development that occurs adjacent to reserves or areas with moderate or high priorities for land acquisition (see Chapter 5, Section5.3.1 *Land Acquisition and Restoration Activities*) will incorporate design requirements at the urban-Reserve System interface to minimize the indirect impacts of development adjacent to existing reserves. The relevant jurisdiction (city or County) will determine which development projects are subject to this condition, as well as which components may be required for a particular development. The Implementing Entity will provide technical assistance when needed. Design requirements to be incorporated in new development at the urban-Reserve System interface, include those listed below.

- Locate the proposed development as far from the reserve boundary as possible consistent with other onsite conditions and constraints.
- Where new development occurs, roads will be placed on the interior of the development (i.e., away from the reserve boundary) to reduce the incidence of domestic pets entering the reserves and to isolate this hazard for wildlife that might enter urban areas from the reserves.
- Fences adjacent to yards or home sites will be designed to minimize the risk of pets escaping private yards and entering reserves (e.g., fences will be as tall as permitted by city and county codes, with no spaces between slats).
- Fences shared with reserve boundaries will not contain any gates between the private property and reserve to prevent entrance and trampling of sensitive species or illegal dumping (legal access to reserves will be provided at recreation staging areas).
- No private gates into the Reserve System will be allowed unless required by a pre-existing access easement and identified as an exception by the Implementing Entity.
- Public roads adjacent to reserves (e.g., a road that is aligned parallel to a reserve boundary) will be fenced to reduce unauthorized public access. Locked gates will be inspected regularly to identify any unauthorized locks.
- Development will be designed to minimize the length of the shared boundary between urban areas and the reserves (i.e., minimize the urban edge).
- Outdoor lighting will be of low intensity and will utilize full cutoff fixtures to reduce light pollution of the surrounding natural areas.
- Use of high-intensity lighting (e.g., recreation facilities, commercial parking lots) near reserves will be avoided or, if necessary, placed as low to the

ground as possible and directed away from the reserves to minimize long-distance glare.

- Public facilities such as ballparks and fields that require high-intensity night lighting (i.e., floodlights) will be sited at least 0.5 mile from the reserve boundary to minimize light pollution. Facilities may be sited closer to the Reserve System if the Implementing Entity determines that the lighting system will not be intrusive to wildlife within the Reserve System (e.g., hills block the lighting).
- For any landscaping, non-invasive plants will be required and use of native plants is highly encouraged, consistent with County landscaping guidelines (County of Santa Clara 2009).
- Natural or artificial barriers or other access restrictions may be installed around development to protect sensitive land cover types and covered species in the reserves. Barriers will be designed so they are appropriate for site conditions and resources protected. Some barriers should keep undesirable pets outside of the Reserve, other barriers should keep covered species inside the Reserve, while others should do both. Before installation of a barrier, consider if the area is used by covered species for movement, if the barrier would prevent movement critical for species life cycle, or if the barrier would encourage species to use other less favorable crossings.

Any design requirements incorporated into projects at the urban-Reserve System interface will be located within the development (i.e., not on the Reserve System) with the exception of the fuel buffer described in Condition 10 below. These features will be maintained by the property owners. The Implementing Entity will monitor compliance with these conditions along the reserve boundary concurrent with other monitoring activities described in Chapter 7. Violations will be reported to the applicable local jurisdiction for enforcement.

Although they are not under obligation or requirement, existing developments located adjacent to reserves or lands identified as land acquisition targets for Plan reserves are encouraged to adopt and implement as many of these design requirements as practicable. Local jurisdictions are encouraged to notify and involve the Implementing Entity during the design review process for large projects planned adjacent to the Reserve System.

In addition to the requirements identified above, several other requirements and avoidance and minimization measures are applicable to development near reserves. Project proponents will comply with the following conditions as appropriate.

- Condition 3. *Maintain Hydrologic Conditions*.
- Condition 7. *Rural Development Design and Construction Requirements*.
- Condition 10. *Fuel Buffer*.

Condition 3. Maintain Hydrologic Conditions and Protect Water Quality

This condition applies to all projects. The implementation of these projects could result in impacts on watershed health through changes in hydrology and water quality.

Currently, all Permittees have stormwater management plans that regulate new development and redevelopment as part of compliance with regulations under National Pollutant Discharge Elimination System (NPDES) permit requirements. An amendment to the Clean Water Act, the NPDES Program is a compliance permit regulating any point source pollution that is discharged into waters of the United States. The San Francisco Bay Regional Board administers the NPDES program in for the Coyote and Guadalupe watersheds. The Central Coast Regional Board administers the NPDES program for the Pajaro Watershed which includes Uvas, Llagas, and Pacheco subbasins. The purpose of this condition is to identify a consistent approach for applying the most important water quality conditions of each Regional Board across the study area (North and South County).

Site Design and Avoidance and Minimization Measures

Through development of stormwater management plans and complementary guidance manuals (Santa Clara Valley Urban Runoff Pollution Prevention Program 2006; City of Gilroy 2004; City of Morgan Hill 2004, 2008; Santa Clara Valley Water Resources Protection Collaborative 2006; Santa Clara Valley Water District 2008), the Permittees have identified a set of programmatic avoidance and minimization measures, performance standards, and control measures to minimize increases of peak discharge of stormwater and to reduce runoff of pollutants to protect water quality including during project construction. These avoidance and minimization measures originated, in part, from the measures that area typically required by the Regional Boards and CDFG for projects that have the potential to affect aquatic resources. Many of these avoidance and minimization measures also support the biological goals and objectives of this Habitat Plan. Implementation of these avoidance and minimization measures will reduce the potential for adverse impacts on covered species. **Table 6-2** lists avoidance and minimization measures for all water-related covered activities described in Condition 3, 4, and 5 of this Plan. Each local jurisdiction, or the Implementing Entity in the case of projects conducted by the Permittees, will verify that all appropriate measures in **Table 6-2** are implemented to minimize effects to covered species and their aquatic habitat (see Section 6.8.6). **Table 6-2** lists the source control measures and avoidance and minimization measures from the Permittees' existing stormwater management plans and complementary manuals that are most effective in protecting covered aquatic species and aquatic species habitat.

The requirements listed in **Table 6-2** include general, project design, construction, and post-construction avoidance and minimization measures. Project design measures are site design planning approaches that protect water quality by preventing and reducing the adverse impacts of stormwater pollutants and increases in peak runoff rate and volume. They include hydrologic source control measures that focus on the protection of natural resources and the reduction of impervious surfaces. Construction site conditions include source and treatment control measure to prevent pollutants from leaving the construction site and minimizing site erosion and local stream sedimentation during construction. Post-construction conditions include measures for municipal operations, stormwater treatment, and flow control.

In addition to the avoidance and minimization measures identified above, several other avoidance and minimization measures are identified in other conditions that will help reduce potential impacts to water quality in the study area. Project proponents will comply with the following conditions as appropriate.

- Condition 2. *Incorporate Urban Reserve System Interface Design Requirements*.
- Condition 4. *Stream Avoidance and Minimization for In-Stream Projects*.
- Condition 5. *Avoidance and Minimization Measures for In-Stream Operations and Maintenance*.
- Condition 7. *Rural Development Design and Construction Requirements*.
- Condition 8. *Implement Avoidance and Minimization Measures for Rural Road Operations and Maintenance*.
- Condition 11. *Stream and Riparian Setbacks*.
- Condition 12. *Wetland and Pond Avoidance and Minimization*.

6.4.2 In-Stream Projects

In-stream projects—such as flood protection projects, construction of new bridges and repair or rehabilitation of existing bridges or culverts, and water supply capital projects—have the capacity to affect wildlife, aquatic species, and habitats by introducing sediment discharge, disturbing earth and riparian vegetation, and altering hydrologic and hydraulic characteristics of water bodies. Condition 4 is designed to address such impacts.

Several of the in-stream covered activities described in Chapter 2 are also covered activities under the SCVWD proposed Three Creeks HCP. The conditions described below for in-stream projects, as well as for stream and riparian habitat and associated covered species (e.g., Condition 16), are consistent with the Three Creeks HCP.

Condition 4. Avoidance and Minimization for In-Stream Projects

The primary purpose of this condition is to identify design requirements and construction practices for in-stream projects to minimize impacts on riparian and aquatic habitat. The term *in-stream* is defined for the purposes of this Plan as the stream bed and bank and the adjacent riparian corridor. The adjacent riparian corridor encompasses all mapped riparian land cover (i.e., riparian forest and scrub natural community) immediately adjacent to a stream (see **Figure 3-10** for mapped land cover types). All in-stream projects must be designed to minimize adverse impacts on stream morphology, aquatic and riparian habitat, and flow conditions. Projects that may also affect wetlands or pond areas are addressed in Condition 12, *Wetland and Pond Avoidance and Minimization*.

All in-stream projects, including projects occurring in dewatered reservoirs, will adopt design requirement and construction avoidance and minimization measures to minimize impacts on covered species, natural communities, and wildlife movement. SCVWD and other Local Partners, such as County Parks, have developed avoidance and minimization measures for projects occurring in streams. The Fishery Network of Central California Coastal Counties (called "FishNet 4C" for the original four counties involved) developed the *County Road Maintenance Guidelines for Protecting Aquatic Habitat and Salmon Fisheries* (Fishery Network of Central California Coastal Counties 2004). This manual, while focused on road maintenance activities, provides avoidance and minimization measures that are applicable to all types of in-stream construction activities. **Table 6-2** summarizes these collected avoidance and minimization measures that are required conditions of in-stream covered activities. Avoidance and minimization measures in this table are applicable to the covered activities addressed in this condition as well as in Condition 3, *Maintain Hydrologic Conditions and Protect Water Quality* and Condition 5, *Avoidance and Minimization Measures for In-Stream Operations and Maintenance*. The avoidance and minimization measures address construction staging, dewatering, sediment management, vegetation management, bank protection, drainage, trail construction, and ground disturbance.

All avoidance and minimization measures listed in **Table 6-2** are required unless the avoidance and minimization measure is not appropriate for the activity or field data collected at the site or in comparable areas demonstrate that the avoidance and minimization measure would not benefit wildlife or reduce impacts on natural communities. The Implementing Entity will update the avoidance and minimization measures in **Table 6-2** over time so that they are more appropriate for implementing a specific covered activity or more beneficial for the covered species. Therefore, the Implementing Entity will update this list of avoidance and minimization measures over the permit term as appropriate to reflect new science and avoidance and minimization measure monitoring results. Proposed revisions will be reviewed by the Wildlife Agencies upon submission of each annual report to ensure the successful implementation of the conservation strategy. **Table 6-2** also includes additional avoidance and minimization measures drawn from those currently used by the Local Partners that strive to

reflect current and forthcoming regulations and guidelines for in-stream project design (e.g., the State Water Board's *Wetland and Riparian Area Protection Policy*, described below).

Types of Projects Subject to Condition

The in-stream projects listed below are subject to the design requirements or construction practices because they are expected to result in impacts on creeks or streams.

- Installation or rehabilitation of flood protection projects and levee reconstruction.
- Bank stabilization projects.
- Geomorphic rehabilitation.
- Gravel enhancement.
- Bridge construction and replacement including vehicular, train, and pedestrian bridges throughout the study area.
- Development of trails in or through the in-stream area (stream bed, banks, and adjacent riparian land cover).
- Culvert installation or replacement.
- Dam repair and seismic retrofit, including dewatering events and development of borrow sites.
- Restoration projects throughout the study area, including creek realignment and erosion management.
- Operation, maintenance and replacement of existing water supply structures such as stream gauges, percolation ponds, and diversions.
- Any other activity that requires construction work within the in-stream area (stream bed, banks, and adjacent riparian land cover).

Design Requirements

Some impacts on stream and riparian land cover types are expected under the Plan (see **Tables 4-2 and 4-3**). All covered activities subject to this condition will implement the measures listed in **Table 6-2** associated with this condition to avoid or minimize impacts of covered activities on streams and riparian woodland/scrub.

- Applicants must also comply with Condition 7 *Rural Development Design and Construction Requirements* where applicable.
- Applicants for projects with streams on site must follow the setback requirements in Condition 11, *Stream and Riparian Setbacks*.

- Applicants for projects with wetlands or ponds on site must comply with Condition 12, *Wetland and Pond Avoidance and Minimization*.
- Applicants for transportation improvements that include stream crossings must comply with Condition 6, *Design Requirements for Covered Transportation Projects*.

Design Criteria for SCVWD Flood Protection Projects

Flood protection projects shall be designed with an objective to protect or enhance natural channel and habitat functions. Designs will be developed and selected to maintain or improve bank stability, minimize bed degradation or aggradation, protect or improve streambed substrate conditions, protect or increase habitat diversity and complexity, and minimize required maintenance. All covered flood control projects will incorporate the following design elements:

1. Flood protection projects will incorporate support for natural stream functions and allow for natural stream processes to occur consistent with the flood protection goals of the project. Approaches for flood protection will generally include excavation of flood benches based on natural geomorphic conditions, off-stream detention, set-back levees or floodwalls, biotechnical bank stabilization methods, and grade control.
2. Project design alternatives will consider habitat connectivity between the stream and the adjacent floodplain as an objective.
3. Project design alternatives will incorporate native riparian vegetation and in-stream habitat enhancement features, where feasible. Potential enhancement features will be evaluated during the project design review process described below.
4. Bypasses that convey all or a portion of flood flows into channels, tunnels, culverts, or other areas that are isolated from the natural stream will be used only when other options have been evaluated and found infeasible to meet flood protection goals. If used, bypasses will be designed considering local geomorphic and flood characteristics and will minimize impacts to in-stream habitat.

Review Process for Covered Flood Control and Levee Reconstruction Projects

1. Flood control and levee reconstruction projects shall be reviewed by the Wildlife Agencies as described in Chapter 8, Section 8.7.3 *Wildlife Agency Responsibilities*.
2. During the 60% project design stage(s), review and input from the Wildlife Agencies shall be solicited.
3. The Wildlife Agencies providing review will return comments within a mutually agreeable timeline to maintain project schedule. As described in Chapter 8, Section 8.7.3 *Wildlife Agency Responsibilities*, the Wildlife Agencies must review and approve flood control projects to ensure that they are consistent with Habitat Plan requirements.

Requirements for SCVWD Dewatering Events

The following conditions apply to the dewatering events conducted at SCVWD covered reservoirs. Dewatering events *are necessary* for seismic safety retrofit and major maintenance (see Chapter 2 for a description of these covered activities). Due to the unique characteristics at each dam site, a reservoir-specific dewatering plan will be submitted to the Wildlife Agencies for review and approval prior to the first dewatering event for each reservoir (see Chapter 8, Section 8.7.3 *Wildlife Agency Responsibilities* for details of this process). Dewatering plans will be reviewed and, if appropriate, updated prior to subsequent dewatering events during the permit term. Dewatering plans will address various issues as requested by the Wildlife Agencies during the covered activity review process or as required by the environmental compliance process and will include the following.

- Timing for the initiation and duration of the dewatering event, including the draining and refilling stages of the dewatering event.
- Average, minimum, and maximum flows expected during draining and refilling (flows will be within the limits described in **Table 2-4**) including the duration of periods in which the maximum reservoir release may be made.
- A schedule for re-operation according to applicable rules curves.
- The ability of SCVWD to bypass water or provide other supplemental sources downstream.
- Documentation of in-channel dryback conditions from the previous 3 years, if feasible, and an evaluation of potential increases in the length and duration of dryback related to the dewatering event.
- A qualitative assessment of total flows that could occur downstream of the dam when taking into account stream inflows other than reservoir releases (e.g., stormwater, urban runoff) based on monitoring done during the previous years to assess the level of potential dryback.
- A description of baseline monitoring conducted for California red-legged frog, foothill yellow-legged frog, and western pond turtle in channels to be affected by the drawdown to establish presence of covered species in the channel.
- A description of anticipated effects of the dewatering event on covered species.

In addition, minimization measures included in a dewatering plan could include, but are not limited to, the following.

- Releases will not result in the overtopping of the channel between May and July when western pond turtles are nesting.
- SCVWD will bypass reservoir inflow around the dam and/or provide other supplemental flows downstream of the reservoir.
- SCVWD will consider installing outlets that provide better control over release volumes (beneficial for subsequent dewaterings).

- SCVWD will ramp increases and decreases in flows during dewatering to avoid washing covered species downstream or drying back the channel faster than covered species can adapt and move to new locations.
- Surveys for covered species as required by this chapter prior to re-filling of the reservoir or other construction activities if the reservoir basin has been undisturbed for a period of time. Surveys may be limited to areas that were not disturbed during construction or that were not inundated before construction but may be after construction.
- As reservoir levels decline, the gravel trap at the upstream end of the reservoir, if present, will be isolated and lined to contain inflow to provide for a relocation site for rescued native fish, amphibians, and/or western pond turtle.
- The lined gravel traps will be designed to allow bypass of inflow through or around the reservoir.

6.4.3 In-Stream Operations and Maintenance

In-stream[10] operations and maintenance activities covered under this Plan—such as sediment removal, bank stabilization, vegetation management, and debris blockage removal to maintain flows—have the potential to affect covered species by introducing sediment and other pollutants into downstream waterways or by disturbing riparian land cover associated with streams. Condition 5 specifies avoidance and minimization measures for covered operations and maintenance activities within and immediately adjacent to the stream channel. Note that SCVWD's Stream Maintenance Program is not a covered activity under this Plan and therefore not subject to the conditions of this chapter of the Plan.

Condition 5. Avoidance and Minimization Measures for In-Stream Operations and Maintenance

The purpose of this condition is to identify avoidance and minimization measures to be applied when conducting in-stream operations and maintenance activities. The measures will help reduce impacts on stream and riparian land cover types and covered species.

Types of Projects Subject to Condition

The following in-stream operations and maintenance activities are subject to the measures or construction practices described below because they are expected to result in impacts on creeks or streams.

[10] *In-stream* is defined for the purposes of the Plan as, "the stream bed and bank and the adjacent riparian corridor."

- Facility maintenance such as trail, bridge, road, and culvert repair and/or replacement in in-stream areas.
- Natural resource protection such as small bank stabilization projects and removal of debris deposited during flooding.
- Operations and maintenance of flood protection facilities (e.g., dams, armored creeks, detention ponds, streams). Activities may include vegetation management, minor sediment removal, or bank stabilization.
- Operations and maintenance of water supply facilities (e.g., flashboard dams, inflatable dams, stream gages, pipelines, and diversions).
- Non-routine stream maintenance activities conducted by SCVWD (i.e., those activities not covered by SCVWD's Stream Maintenance Program) including extensive removal of vegetation in the Lower Llagas flood control channel.
- Removal of debris blockages except in emergency situations.
- Mitigation and/or monitoring in creeks or adjacent riparian corridors.
- Vegetation management for exotic species removal, such as removal of giant reed, and native vegetation plantings.
- Reservoir dewatering events.
- Reservoir filling.

Avoidance and minimization measures listed in **Table 6-2** will apply to all streams in the project areas as well as to open canals, because these canals may provide habitat for covered species.

Stream Operation and Maintenance Activities

Several of SCVWD's Stream Maintenance Program avoidance and minimization measures were adapted for inclusion in **Table 6-2** and will be adopted for this Plan. Additional avoidance and minimization measures are identified below to ensure adequate avoidance and minimization of species covered under this Plan during implementation of stream operations and maintenance covered activities. These avoidance and minimization measures were informed by sources that include the Santa Clara Valley Resources Protection Collaborative *Guidelines and Standards* (Santa Clara Valley Water Resources Protection Collaborative 2006) and the SCVWD *Best Management Practices Handbook* (Santa Clara Valley Water District 2008). Throughout the permit term, avoidance and minimization measures listed in **Table 6-2** will be updated through the adaptive management process to reflect current best practices.

Dam Maintenance Program

All applicable measures in **Table 6-2** will apply to implementation of activities associated with the Dam Maintenance Program (see Chapter 2). In addition,

activities requiring reservoir dewatering will comply with the requirements for dewatering reservoirs described above under Condition 4 *Stream Avoidance and Minimization for In-Stream Projects* and in Chapter 2.

Pipeline Maintenance Program

While SCVWD's Pipeline Maintenance Program is described in Chapter 2 under Section 2.3.6 *Rural Operations and Maintenance*, some activities have the potential to affect aquatic resources, particularly at blow-off sites. The following avoidance and minimization measures are from SCVWD's Pipeline Maintenance Program Final Program EIR (MHA Environmental Consulting 2007) and will be applied to Pipeline Maintenance Program covered activities in addition to other applicable avoidance measures described in this chapter.

- The discharge location and receiving water will be observed for signs of erosion by a trained individual. If erosion is evident, flow rates will be reduced. If erosion continues to occur, discharges will be terminated until appropriate erosion control measures are installed. Monitoring will be conducted just prior to the start of the discharge and regularly (i.e., every hour, every four hours, every eight hours) during the discharge. Monitoring frequency will depend on the nature of the discharge and the erosion in the area.
- An environmental monitor will walk along each discharge drainage to the termination of the drainage or 500 feet downstream to inspect for erosion after a draining is complete. If erosion is detected, reclamation measures will be taken to correct the erosion. Correction measures shall include recontouring the land to its previous state and revegetating with the appropriate native grass species in the area, if necessary.
- Discharge rates will be ramped up slowly such that the increase in flow rate in the receiving water is gradual and scouring of the channel bed and banks does not occur.
- Flows will be diverted around sensitive, actively eroding, or extremely steep areas to prevent erosion. Flow diversion methods might include use of flexible piping and/or placement of sandbags to alter flow direction, or equivalent measures. The new flow path and discharge point will be monitored for signs of erosion.
- Pipeline discharge for maintenance work would preferentially be performed during winter months, when storm events are more common and when water is naturally highest. Discharge flows are then a minimal portion of overall stream or river flow. If draining must occur during summer or fall, a slow release is mandatory to ensure receiving waters do not experience a substantial temperature change (greater than 2 degrees Fahrenheit).

6.4.4 Rural Projects

Rural projects include transportation projects, the South County Airport expansion, the Kirby Landfill expansion, construction of large new recreation facilities (e.g., golf course, sports fields, and extensive picnic areas), capital water supply projects, and private rural residential and commercial development. These rural projects have the potential to affect covered species by removing substantial areas of habitat, disrupting hydrologic patterns, contributing to habitat fragmentation, discharging sediment into water bodies, and resulting in direct mortality of covered species. Conditions 6 and 7 are designed to reduce the severity of such impacts for rural projects.

Condition 6. Design and Construction Requirements for Covered Transportation Projects

This condition identifies design requirements to minimize the impacts of transportation projects on wildlife movement, occurrences of certain covered species, and important habitat for covered species. All road and rail transportation projects (including the BART extension), or portions thereof, outside streams and within the planning limit of urban growth are exempt from this condition. Road projects in these areas are either within participating cities (i.e., urban areas) or within adjacent County jurisdiction, both of which support relatively dense suburban development. Road projects in these areas are not expected to significantly affect wildlife linkages, occurrences of covered species, or habitat for covered species. All covered transportation projects that cross streams or creeks, including bridges, are subject to Condition 4 above.

Four new road extensions/connections/realignments are proposed outside the planning limit of urban growth during the permit term of this Plan. However, many road improvements, including road widenings, are covered by the Plan (see **Table 2-6**). One new mass transit project is covered by the Plan: the double tracking of the Caltrain line from San José to Gilroy along the existing corridor.

Exempt Transportation Projects

The following projects are not subject to the design requirements or construction practices specified in this condition because they are not expected to result in new ground disturbance and are not expected to create new wildlife movement barriers or augment existing barriers.

- Installing traffic signals, signs, pavement markings, flashing beacons, or other safety warnings.
- Painting new lane striping.
- Installing “rumble” strips, channelizers, or other safety markers.
- Installing guardrails or similar structures that are permeable to wildlife.

- Installing ramp metering.
- Regrading existing shoulders (this activity is considered maintenance; see Condition 8).
- Implementing other road safety improvements on less than 1,000 feet of roadway.

All transportation projects that cross creeks are subject to Condition 4 above.

The following projects are also exempt from this condition, due to their small footprint, if the project does not include installation of median barriers or other impermeable safety barriers, and if no mapped or unmapped stream, riparian, serpentine, pond, or wetland land cover types are present, and if the activity is not located in a stream setback. Project lengths must be calculated based on the all new adjacent projects constructed since the time of Plan implementation to determine whether the below thresholds have been crossed.

- Widening roads to add lanes where the project is less than or equal to 1,000 feet in length.
- Realigning roads for safety or operational purposes where the project is less than or equal to 1,000 feet in length.
- Constructing new turn lanes less than or equal to 1,000 feet in length.
- Constructing a new road shoulder less than or equal to 1,000 feet in length.

Outside the planning limit of urban growth transportation projects will adopt design requirements and construction practices to minimize impacts on covered species, natural communities, and wildlife movement (see below). Depending on the type of project, these design requirements and construction practices would be *required* or *possible* (**Table 6-3**).

- **Required** (R). Design element or construction practice is required.
- **Possible** (P). Design element or construction practice is required unless field data collected at the site or in comparable areas demonstrate that the element or practice would not benefit wildlife, and CDFG and USFWS concur with the findings.

Types of Projects Subject to Condition

The following projects are subject to the design requirements or construction practices because they are expected to result in new ground disturbance, or they may create new wildlife movement barriers or augment existing barriers. Each project category is subject to a specific combination of requirements listed below and in **Table 6-3**.

Highway Projects

Highway projects are those VTA projects identified in **Table 2-6** as highway projects that call for the expansion of existing highways within the study area.

Mass Transit Projects

The single mass transit project identified for coverage in this Plan is the VTA project identified in **Table 2-6** as *Caltrain South County* which calls for the double tracking of the existing Caltrain corridor.

Roadway Projects and Interchange Upgrades

Major roadway projects and interchange upgrade projects (major roadway projects) are those projects identified in **Table 2-6**. All non-exempt Santa Clara County roadway projects and VTA interchange upgrades identified in **Table 2-6** are subject to the conditions identified **Table 6-3**.

Road Safety and Operational Improvements

These projects include the road projects described in Section 2.3.5 *Rural Capital Projects* that are not listed in **Table 2-6**. Road safety and operational improvements are expected to involve ground-disturbing activities but are not expected to impede or substantially worsen wildlife linkage. However, there may be opportunities for some projects to improve wildlife linkages. These projects are subject to construction and post-construction practices but not to project design requirements (**Table 6-3**).

Dirt Road Construction

Dirt roads may be constructed by the Permittees or private landowners to access their property. These projects are subject to construction and post-construction practices but not to project design requirements (**Table 6-3**).

Pre-Design Data Collection for Wildlife Movement

For transportation projects with the greatest potential to affect wildlife movement (see **Table 6-3** and lists above), it will be important to incorporate requirements that minimize the projects' adverse impacts on wildlife movement. In some cases, transportation projects may present opportunities to upgrade existing structures to improve wildlife movement. For these upgrades to be most effective, they will be supported by data describing movement of wildlife at or near the project site and the likelihood of vehicle collisions based on traffic patterns.

To facilitate better project design and to avoid delays in project construction due to the data collection process, the Implementing Entity will establish a long-term data collection program on wildlife movement in the study area. The primary goal of this program will be to determine the movement patterns of key covered species and other native wildlife throughout the study area. Data collection stations will be established at points along covered transportation projects that are most likely to affect wildlife movement. Wildlife movement will be studied at key sites to determine which species move through the area, when they move and, most importantly, which landscape features are most often used. Techniques used for data collection will vary by site and target species but may include remote cameras, wildlife track pads, and roadkill observations. This program is described in greater detail in Chapter 5. It is expected that several

years (or decades) of data will be available to inform project design by the time that many of these projects reach the design stage. (This monitoring program is in addition to the wildlife corridor feasibility study discussed in Chapter 5.)

Data collection will be required on wildlife movement along the applicable project corridor for at least 1 year prior to project design. These data will be used to select the design requirements most appropriate for the species and conditions particular to the site (see below). If the Implementing Entity has not collected data in the project vicinity and the project timeline does not permit new data collection, then the applicant must apply all the design guidelines on the basis of the best available information for the region and appropriate to the conditions at the project site.

Transportation project applicants will coordinate with the Implementing Entity and Wildlife Agencies on applicable projects as indicated in **Table 6-3** during the conceptual design phase to ensure that as the project moves from conceptual to final design, the project meets the terms of this Plan.

When multiple road expansions are planned for a roadway during the permit term, wildlife crossing needs will be considered for each roadway as a whole, not by road segment. Further, design requirements will be considered for each wildlife species likely to cross the facility (Barnum 2003). These data will inform the design of wildlife movement structures suitable for the site and the species that use the area. In addition, after each project component is installed, wildlife activity along the road will be monitored to assess how wildlife responded to the project, if behavior has changed, and if additional design considerations will be utilized as future projects are implemented along the roadway.

Transportation Project Design Requirements

To reduce the impacts of construction activities on natural communities and native species within the study area, the design requirements listed below will be implemented for applicable transportation projects (**Table 6-3**). Design requirements are based on the latest techniques for minimizing impacts of transportation projects (Forman et al. 2002; Irwin et al. 2003; Finch 2004; Hilty et al. 2006). Some design requirements may be updated by the Implementing Entity if the best available science indicates that such updates would be more effective at facilitating safe wildlife movement across transportation corridors. Because the effectiveness of road crossings designed for wildlife is an active area of research, frequent advances in design are expected throughout the permit term.

- **Enhance existing undercrossings.** When road expansion projects span an undercrossing, such as a culvert, existing undercrossing structures will be enhanced within safety or engineering limitations to allow for fish and wildlife movement. Existing culverts or other potential crossing points will be enhanced if results of data collection indicate that the existing structure is inadequate. The design requirements of replacement structures will be

determined by the species that have been documented using or attempting to use the site. Wildlife crossings that can serve multiple species will be used whenever possible.

- **Crossing enhancements.** Crossing enhancements must incorporate design requirements identified for culverts in Condition 4, *Stream Avoidance and Minimization for In-Stream Projects*.
- **Minimum sizing of culverts.** Culverts must be the minimum length, height, and width necessary to provide safe passage under the road for the target species present at the site (based on data collected as described above). Culvert designs will be based on the best available data at the time. Current recommendations are that culverts designed for medium-size mammals (e.g., San Joaquin kit fox, coyote, raccoon) be 5–8 feet in diameter (although culverts larger than 8 feet in diameter may be needed for longer crossings). Culverts designed for small mammals or amphibians are recommended at 18–48 inches in diameter. Culverts will provide a natural substrate on which wildlife can travel (e.g., open bottom box culvert) when such designs are compatible with the hydrologic needs of the culvert.
- **Install grating to allow ambient light to penetrate undercrossing.** Culverts will include grating on the inactive part of the roadbed (e.g., road shoulders or median) to allow filtration of ambient light and moisture but minimize noise intrusion. Artificial lighting inside tunnels or culverts will not be used; these devices have not been shown to be effective and may deter nocturnal wildlife. Such devices may also be vandalized.
- **Fencing design.** Fencing will be required in areas where high mortality rates of species attempting to cross the road occur. Fencing will be used along the perimeter of the roadway to direct animals to undercrossings and minimize their access to the road. Fencing designs will be tailored to the species expected to use the undercrossing and will be based on the best available data on species use and best fencing designs available at the time. For example, fencing for amphibians will be high enough to prevent amphibian crossing but low enough to allow movement of other species (e.g., deer, badgers, etc.). Fencing will extend out from the undercrossing along the road to an appropriate distance that will serve as a barrier to wildlife attempting to cross the road. The distance that fencing extends from the undercrossing will be determined on a case-by-case basis and will consider locations of known collisions in the area. Right-of-way fencing could be designed to serve this purpose. Fencing must be attached to the undercrossing to prevent wildlife from passing through a gap between the undercrossing and the beginning of the fence.

  Fencing must be monitored regularly by the facility owner and repairs made promptly to ensure effectiveness. Vegetation must be managed along small mammal and amphibian fencing to reduce the opportunity for these species to climb the fence. Fencing designed for small mammal or amphibian exclusion must be installed at least 8 inches into the soil to prevent small mammals from tunneling under the fence.

Where low-traffic side roads (e.g., ranch roads) cross the wildlife fences along the main roadway, gates will be used whenever possible to avoid creating a gap in the fence that wildlife could move through. The gate will be designed to minimize the gap between the gate and the roadbed. If gates are not feasible, an in-roadway barrier (e.g., wildlife grates) or device that channels species away must be installed to deter wildlife from moving around fences and into the road.

- **Passage placement.** New passages will only be placed or located in areas that connect two viable habitats so that wildlife is not directed into urbanized areas.
- **Road or rail barrier designs.** When compatible with vehicle and train safety, road and rail median barriers or shoulder barriers will allow wildlife to cross under or over the barrier in the event they become trapped in the right-of-way. For example, one-way gates could be used to allow movement out of the hazardous zone but not into it.

Construction Practices

The following construction practices apply to categories of transportation projects listed in **Table 6-3**.

Avoidance and Minimization Measures for Transportation Projects

- Minimize ground disturbance to the smallest area feasible.
- For construction of new dirt roads, prevent rills (a narrow groove or crack in the road resulting from erosion by overland flow) by breaking large or long bare areas up into smaller patches that can be effectively drained before rills can develop (Fishery Network of Central California Coastal Counties 2004).
- For construction of new dirt roads, disconnect and disperse runoff flow paths, including roadside ditches, which might otherwise deliver fine sediment to stream channels (Fishery Network of Central California Coastal Counties 2004).
- For construction of new dirt roads, prevent gullies by dispersing runoff from road surfaces, ditches and construction sites, by correctly designing, installing and maintaining drainage structures (e.g., road shape, rolling dips, out-sloped roads, culverts, etc.) and by keeping streams in their natural channels. No single point of discharge from a road or other disturbed area should carry sufficient flow to create gullies. If gullies continue to develop, additional drainage structures are needed to further disperse the runoff (Fishery Network of Central California Coastal Counties 2004).
- When constructing or reconstructing a ditch, utilize designs for outlet locations that avoid directly dumping ditch water into surface waters, when practical. If not practical, implement sediment management avoidance and minimization measures to trap sediment before it reaches a stream. Avoidance and minimization measures described in Condition 3 and

Condition 4 will be applied as appropriate (Fishery Network of Central California Coastal Counties 2004).

- When designing or redesigning roads, look for opportunities to restore natural drainage patterns. Install culverts or rolling dips to retain water in its drainage of origin, which will decrease the potential for erosion downstream. On problem roads, look for opportunities to reconstruct the road segment to improve and maintain natural drainage patterns; for example, add rolling dips, emergency water bars and additional cross drains (Fishery Network of Central California Coastal Counties 2004).
- When constructing dirt roads, install road surface and ditch drainage structures frequently enough so that gullies do not form at drainage points and so that the road and drainage system are generally dry (Fishery Network of Central California Coastal Counties 2004).
- Equipment storage, fueling, and staging areas will be sited on disturbed areas or on non-sensitive nonnative grassland land cover types, when these sites are available, to minimize risk of direct discharge into riparian areas or other sensitive land cover types. When such sites are not available, staging will occur on the road used to access the site.
- All species survey requirements of this Plan will be followed within the construction zone (i.e., the limit of project construction plus equipment staging areas and access roads) and the entire road right-of-way. Expanding the survey area beyond the project footprint will help identify covered species and their habitats so that impacts on covered species that occur adjacent to the construction zone can be minimized.
- No erodible materials will be deposited into watercourses. Brush, loose soils, or other debris material will not be stockpiled within stream channels or on adjacent banks.
- Silt fencing or other sediment trapping methods will be installed below the grade of new road construction or road widening activities to minimize the transport of sediment off site.
- Temporary barriers will be constructed to keep wildlife out of construction sites, as appropriate.
- Onsite monitoring will be conducted by a qualified biologist throughout the construction period to ensure that disturbance limits, avoidance and minimization measures, and Plan restrictions are being implemented properly.
- Use existing roads for access and disturbed area for staging as site constraints allow. Off-road travel will avoid sensitive communities such as wetlands and known occurrences of covered plants.
- Active construction areas will be watered regularly to minimize the impact of dust on adjacent vegetation and wildlife habitats, if warranted.
- Portions of the project that occur in streams (e.g., bridge or culvert construction) will comply with Condition 4.

Post-construction Practices

Following construction, the areas beyond road shoulders and inside the right-of-way will be returned to a pre-project or ecologically improved condition. These actions will likely be applied differently to each road project and will decrease the potential for the spread of nonnative species.

- Invasive plants within the project area and any construction staging areas will be removed to prevent the spread of these species into nearby or adjacent reserves.
- All disturbed soils will be revegetated with native plants and/or grasses or sterile nonnative species suitable for the altered soil conditions upon completion of construction. Local watershed native plants will be used if available. If sterile nonnative species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive nonnatives. All disturbed areas that have been compacted shall be de-compacted prior to planting or seeding.
- Vegetation and debris will be managed in and near culverts and under and near bridges to ensure that entryways remain open and visible to wildlife and that the passage through the culvert or under the bridge remains clear.

All structures constructed for wildlife movement (tunnels, culverts, underpasses, fences) will be monitored at regular intervals by the Local Partner facility owner and repairs made promptly to ensure that the structure is in proper condition. For facilities owned by entities not participating in the Habitat Plan (e.g., California Department of Transportation [Caltrans]), the Implementing Entity will secure access and data collection agreements with these entities to allow the Implementing Entity to conduct this monitoring.

Condition 7. Rural Development Design and Construction Requirements

For this Plan, rural development is defined as any new development that occurs outside of the urban service area at the time the development is permitted under the Plan, or those areas within the urban service area that are only covered for development consistent with rural land uses. The rural development covered activities listed below are subject to this condition and to the applicable permitting process of the local jurisdiction.

- Residential development (e.g., single family homes, subdivisions) consistent with the County General Plan (County of Santa Clara 1994). Ancillary improvements may include privately owned bridges, driveways, access roads, vineyards or orchards, and other accessory structures associated with rural dwelling units.
- Non-residential development consistent with the County General Plan (County of Santa Clara 1994). This includes new commercial facilities

(institutional, industrial) agricultural facilities (mushroom farms, commercial stables, and equestrian event facilities) or similar uses that obtain building, grading and/or other development permits, consistent with local general plans, such.

- Vineyard, orchard, or other farming activity that obtains a building, grading, or development permit from the County or City.
- Residential or non-residential development on the non-urban hillsides of eastern San José (outside the planning limit of urban growth) and in the Coyote Valley Urban Reserve and South Almaden Valley Urban Reserve consistent with the San José General Plan.
- Residential or non-residential development in the Morgan Hill Southeast Quadrant consistent with the Morgan Hill General Plan.
- Residential or non-residential development in the Hecker Pass Specific Plan area consistent with the Gilroy General Plan.
- Projects, including capital projects, implemented by Permittees outside the urban service area.

As described in Chapter 4, rural development in hillside and natural areas that will remain rural has a greater potential for direct and indirect impacts on sensitive habitat and more covered species than urban development in already developed areas for a number of reasons. First, rural development tends to occur on larger parcels or in less constrained sites, affecting larger areas. Second, the existing landscape in hillside and natural areas is generally less disturbed prior to project construction on rural development sites than on urban sites. Third, rural development tends to occur near or in areas with native vegetation and higher biological values, including areas near or adjacent to the Reserve System. Rural development in natural areas tends to increase habitat fragmentation, which degrades or disrupts landscape connectivity. New driveways and roads associated with rural development may create new hazards or barriers to species dispersal. Indirect impacts also occur at both the development site and the landscape level, as rural development can introduce new sources of noise, light and glare, air pollution, and vehicle traffic in more remote areas. Despite the potential for these adverse effects on natural communities and covered species, rural development projects often have greater flexibility to modify designs to reduce or minimize impacts on covered species and natural communities than projects in urban areas.

As described in Chapter 4, existing land use restrictions and requirements also substantially limit the footprint and extent of rural development. For example, almost all of the areas intended to be incorporated into the Reserve System (see Chapter 5) are large land holdings designated as Hillside or Ranchland land uses under the County General Plan. In these areas, the maximum development density allowed is one residence per 20 to 160 acres, based on the average slope of a parcel. Subdivision of sites designated Hillside or Ranchland seldom occurs and this pattern is not expected to change during the permit term due to the physical challenges of development in most of the study area. Under County policies, most subdivision proposals for Hillside parcels are required to cluster

future development and preserve a minimum of 90% of the site as open space. If suitable, these large set-asides could be incorporated into the Reserve System. County policies and regulations also require that grading be minimized in Hillside and Ranchland areas through the site design process, which emphasizes compact development. These land-use restrictions help to minimize the effects of rural development on covered species and natural communities.

The primary goal of this condition is to minimize the potential direct and indirect impacts of rural development in areas that will remain primarily rural on covered species and natural communities most likely to be affected by rural development (see Chapter 4, including **Table 4-1**, for an accounting of which species could be affected by rural development). Additional goals of this condition are listed below.

- Minimize habitat fragmentation and degradation of landscape linkages (e.g., wildlife corridors), including maintaining connectivity between aquatic, riparian, and upland habitats.
- Minimize loss of sensitive land cover types and natural communities including but not limited to riparian woodlands, seasonal wetlands, freshwater marsh, ponds, serpentine grassland, valley oak woodland, knobcone pine woodland, and ponderosa pine woodland.
- Reduce the extent of new roads in remote rural areas in order to reduce negative impacts on species.
- Minimize degradation of streams and maintain the hydrograph to the baseline (defined as the existing conditions at the time of Plan approval), or adjust the hydrograph toward predevelopment conditions[11].
- Minimize construction-related impacts, including noise; air emissions; erosion and sedimentation; disturbance of native vegetation; and introduction of nonnative, invasive species.
- When designing or retrofitting County facilities, evaluate whether the project can be designed to reduce impervious surfaces to less than pre-project conditions.

This condition integrates existing County requirements with additional avoidance and minimization measures that are intended to reinforce current regulations and support the goals of this condition. The design requirements and conditions for all rural development covered by the Plan are listed below and will be applied as applicable.

Design and Construction Requirements

Projects subject to this condition are required to follow the following measures.

[11] The hydrograph will be monitored using existing stream gages within the study area, new gages proposed under the plan, and could be monitored at large developments occurring during the Permit Term, as deemed appropriate by the Implementing Entity.

- Plans presented to local jurisdiction planning staff by private applicants for discretionary approval or a building permit process must identify the proposed impact area and general location of site design features (e.g., residence, access road, leach field, wells, vineyards, accessory structures, etc.). The site plan will show all improvements that will result in permanent land cover impacts (e.g., home, driveway, barn, pool, patio, landscaping, and utilities, etc.), including a 50-foot buffer around all proposed site improvements. The project area plus the 50-foot buffer is called the *development area*. This site plan will also show all site improvements that will result in temporary land cover impacts during construction but that will be returned to the pre-project land cover type within 1 year of completing construction (e.g., leach fields, well pipelines that do not result in permanent habitat disturbance), including a 10-foot buffer around the proposed footprint of the site improvements. Plans do not need to show buffer areas (50 feet for permanent improvements and 10 feet for temporary improvements) that cross property boundaries (e.g., a house 30 feet from a property line only needs to show the buffer area up to the property line). **Figure 6-1** provides an example map of the information required on the site plan. (**Figure 6-1** also defines the development area for the purposes of determining survey areas [see Section 6.8.5 *Item 5: Results of Applicable Species Surveys and Monitoring*] and calculating development fees [see Chapter 9, Section 9.4.1 *Habitat Plan Fees*]).
- Minimize ground disturbance to the smallest area feasible.
- Build close to, and utilize to the extent practicable, existing infrastructure (e.g., existing driveways, utility lines).
- Use existing roads for access and disturbed areas for staging as site constraints allow. Off-road travel will avoid sensitive communities such as wetlands and known occurrences of covered plants.
- Adhere to Condition 10, *Fuel Buffer*.

Site Hydrology

- Develop only the minimum number of stream crossings necessary to access the property.
- At project sites that are adjacent to any drainage, natural or manmade, exposed soils must be stabilized or otherwise contained on site to prevent excessive sediment from entering a waterway.
- Use of impermeable surfaces surrounding structures must be minimized to the greatest extent possible through the use of alternative design treatments, such as low impact development methods, including but not limited to, permeable pavers, green roofs, and rainwater catchments so that natural infiltration is facilitated and runoff is reduced.
- Consistent with State and Regional Water Quality Control Board regulations, runoff from impermeable surfaces must be directed to natural or landscaped areas, or to designed swales or detention/retention basins to encourage

natural filtration and infiltration. Diversion to a cistern or other onsite stormwater management technique is also allowed and encouraged.

- Avoid and minimize impacts associated with altering natural drainages and contours on the project site. If the site is graded, blend grading into the existing landform as much as possible.
- Leach fields must be sited away from creeks in accordance with the County septic ordinances, as well as at least 100 feet from the reserve boundary. Leach field installation may result in localized soil moisture content and groundwater levels that may have adverse effects on sensitive plants or plant communities in the Reserve System. Leach fields may be sited within the 100-foot setback if site-specific conditions (i.e., topography) adequately minimize effects, or adequate space is not available to site the field elsewhere (i.e., the parcel is too small).
- Adhere to Condition 3, *Maintain Hydrologic Conditions and Protect Water Quality*.
- Adhere to Condition 4, *Stream Avoidance and Minimization for In-Stream Projects*.
- Adhere to Condition 5, *Avoidance and Minimization Measures for In-Stream Operations and Maintenance*.
- Adhere to Condition 11, *Stream and Riparian Setbacks*.

Vineyards

The following conditions apply to new vineyards that are covered by the Habitat Plan (i.e., those requiring a permit from the County or other local jurisdiction) and are encouraged for new and existing vineyards that do not require a development permit.

- During construction, use cover crops, straw mulch, straw wattles/fiber rolls, coconut husks, or other equivalent erosion control mechanism to prevent sediment from being blown or washed from the project site.
- All disturbed areas will be protected during the rainy season (October 15–April 15). Permanent or temporary measures to prevent erosion must be utilized during vineyard planting. Permanent measures must be utilized once planting is completed. Erosion control measures must be in place by October 15.
- Plant vine rows along existing contours to slow runoff and reduce erosion on hillsides (California Sustainable Wine Growing Alliance 2002a).
- A stormwater management system designed for an average storm recurrence interval of not less than 25 years will be installed on the vineyard site. The system will allow excess stormwater runoff to be carried through the vineyard site with minimum erosion and consistent with the overall drainage patterns present in the area. This requirement may be met by either temporary or permanent measures while vineyard planting work is being

carried out, but shall be met by permanent measures by the time vineyard planting work is completed.

- A sediment control system designed to minimize the discharge of sediment from the vineyard site will be installed on the vineyard site. This requirement may be met by either temporary or permanent measures while vineyard planting work is being carried out, but will be met by permanent measures by the time vineyard planting work is completed.
- If open conduits are used as part of the stormwater management system, plant conduits with grasses and other vegetation to filter sediment, pesticides, and fertilizers from runoff and to reduce the potential that the stormwater conduit itself will erode.
- As part of the stormwater and sediment management systems, install vegetated swales, detention basins, extended vegetated buffer, or other similar feature on the downslope edge of the planted area to capture and treat runoff before it enters local streams. This will minimize the amount of sediment, fertilizers, and pesticides that enter local streams.
- Heavy equipment will not be utilized on dirt access roads immediately after rain to prevent roads from turning to mud and sediment from running off the roads (California Sustainable Wine Growing Alliance 2002a).
- Use of natural pest management approaches in place of pesticides is highly encouraged.
- Maintain a buffer of natural vegetation, including grasses, shrubs, or mature trees, around the perimeter of the vineyard to reduce topsoil erosion and provide habitat for birds that will prey on rodents (California Sustainable Wine Growing Alliance 2006).

Private Rural Roads

- Minimize to the maximum extent possible the amount of ground disturbance when constructing roads.
- Ground-disturbing activities associated with road construction should be timed to occur during dry weather months to reduce the possibility of landslides or other sediment being transported to local streams during wet weather.
- If construction extends into wet weather, the road bed will be surfaced with appropriate surfacing material to prevent erosion of the exposed roadbed (Pacific Watershed Associates 1994).
- Avoid, to the extent possible, constructing roads on steep slopes (over 25%) or on unstable slopes.
- If construction on steep slopes is required, construction will be timed for dry weather months to reduce the potential for landslides.
- Adhere to the avoidance and minimization measures for dirt road construction in Condition 6 under *Avoidance and Minimization Measures for Transportation Projects* (see first three bullets under heading).

Other Requirements

- Maintain as much natural vegetation as possible, consistent with fuel management standards, on the project site.
- Maintain County-mandated fuel buffer (variable width by slope conditions).
- On sites adjacent to reserves, locate the proposed development as far from the reserve boundary as possible consistent with other onsite conditions and constraints and adhere to Condition 2, *Incorporate Urban-Wildland Interface Design Elements*.
- All temporarily disturbed soils will be revegetated with native plants and/or grasses or sterile nonnative species suitable for the altered soil conditions upon completion of construction. Local watershed native plants will be used if available. If sterile nonnative species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive nonnatives. All disturbed areas that have been compacted shall be de-compacted prior to planting or seeding.
- All temporarily disturbed areas, such as staging areas, will be returned to pre-project or ecologically improved conditions within 1 year of completing construction or the impact will be considered permanent.
- No plants identified by the California Invasive Plant Council as invasive[12] will be planted on the project site. Planting with watershed local native and/or drought-resistant plants is highly encouraged. This reduces the need for watering as well as the need for fertilizers and pesticides.
- Outdoor lighting will be of low intensity and will utilize full cutoff fixtures to reduce light pollution of the surrounding natural areas.

Project proponents must continue to adhere to all applicable local planning ordinances including: noise ordinances, zoning ordinances, fuel management guidelines for fire buffers, NPDES permit requirements, Water Collaborative guidelines and standards, Santa Clara County grading ordinance, and drainage manual.

6.4.5 Rural Operations and Maintenance

Rural operations and maintenance activities—such as operations and maintenance of utility lines and facilities, road maintenance, vegetation management, and mitigation monitoring—have the potential to affect covered species by disturbing nesting covered bird species, leading to sediment discharge, and spreading of nonnative invasive species. Condition 8 would reduce the severity of such impacts.

[12] See <www.cal-ipc.org/ip/inventory> for the latest list of invasive species.

Condition 8. Implement Avoidance and Minimization Measures for Rural Road Maintenance

Road maintenance activities have the potential to directly affect covered species through management activities such as mowing, and may indirectly affect covered species by introducing sediment and other pollutants into downstream waterways and by spreading invasive weeds. Effects on covered species may be greatest on unpaved roads due to their erosion potential. The County maintains an extensive network of paved and unpaved roads. All roads maintained by the County Roads and Airports Department in the study area are paved, except for a portion of one road[13]. County Parks maintains an extensive network of unpaved maintenance and emergency access roads within their parks that often serve primarily as recreational trails. SCVWD maintains a small network of paved and unpaved roads, mostly on levees and along pipelines. Gilroy and Morgan Hill do not maintain any dirt roads outside of the planning limit of urban growth.

To avoid and minimize these impacts, avoidance and minimization measures were developed to address potential impacts associated with road operation and maintenance activities. The avoidance and minimization measures in this condition are based largely on the guidelines in *County Road Maintenance Guidelines for Protecting Aquatic Habitat and Salmon Fisheries* (Fishery Network of Central California Coastal Counties 2004). This manual, also called FishNet 4C, was developed by six central California counties (Mendocino, Sonoma, Marin, San Mateo, Santa Cruz and Monterey counties) and included input from cities, local Resource Conservation Districts, and water agencies. This manual identifies best management practices to protect water quality and aquatic habitat when implementing routine and emergency road maintenance activities. These guidelines incorporate avoidance and minimization measures from other road maintenance programs (e.g., the Oregon State Department of Transportation's *Road Maintenance Manual*, and the Northern Five Counties Salmon Conservation Group's *A Water Quality and Stream Habitat Protection Manual for County Road Maintenance in Northwestern California Watersheds*) (Fishery Network of Central California Coastal Counties 2004). Avoidance and minimization measures identified in the FishNet 4C guidelines are included in **Table 6-4** as part of this condition. In addition to the avoidance and minimization measures in **Table 6-4**, project proponents will comply with the avoidance and minimization measures listed below. Avoidance and minimization measures identified in this condition will be used for all covered road operation and maintenance activities.

- Projects occurring in streams or riparian setback zone will also comply with Condition 4 and Condition 5 as appropriate.
- Minimize ground disturbance to the smallest area feasible.
- Within the riparian setback zone (see Condition 11), silt fencing or other sediment control device will be installed downslope from maintenance

[13] The one unpaved road maintained by County Roads and Airports in the study area is 1.75 miles of Mount Madonna Road between Redwood Retreat Road and Summit Road (the county line).

activities that disturb soil (e.g., blading of fire or access roads within Parks or the Reserve System) to minimize the transport of sediment off site.

- In the course of rural road maintenance, no erodible materials will be deposited into watercourses. Brush, loose soils, or other debris material will not be stockpiled within stream channels or on adjacent banks where it could be washed into the channel.
- Alternatives such as mechanical control will be considered to substantially lessen any significant impact on the environment before using pesticides. Integrated pest management avoidance and minimization measures will be used for all vegetation control. Limitations may occur due to fire management requirements and local integrated pest management ordinances.
- The effects of herbicide and pesticide application will not be covered under the federal permits for this Plan. Herbicides and pesticides will be used only when necessary and will be applied in strict compliance with label requirements and state, federal, and local regulations. Herbicides and pesticides will only be applied when weather conditions will minimize drift and impacts on non-target sites.
- Maintenance activities on rural roads adjacent to natural land cover types will be seasonally timed, when safety permits and regulatory restrictions allow, to avoid or minimize adverse effects on active nests of resident and migratory birds, including covered bird species (western burrowing owl, least Bell's vireo, and tricolored blackbird). This measure is particularly relevant for right-of-way mowing[14], brush clearing, prevention of disease spread (i.e., sudden oak disease), and tree trimming. Project proponents will coordinate with the Implementing Entity to develop work schedules that optimize logistic, safety, and financial needs while minimizing potential impacts on nesting birds.
- Mowing equipment will be thoroughly cleaned before use in rural areas so they are free of noxious weeds (e.g., yellow star-thistle) and do not introduce such weeds to new areas.
- Maintenance or repair of road medians or shoulder barriers in areas that support natural land cover types (e.g., annual grassland, oak savanna, oak woodland) will not reduce the ability of wildlife of all types to move through or over them, within safety limits. Replacement or repair of road medians will be designed or installed to allow wildlife to move past these structures. Exceptions may be made by the Permittee if significant safety concerns or financial constraints arise.
- All disturbed soils will be revegetated with native plants and/or grasses or sterile nonnative species suitable for the altered soil conditions upon completion of construction. Local watershed native plants will be used if available. If sterile nonnative species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-

[14] For example, County Parks has a Memorandum of Understanding with the California Department of Forestry and Fire Protection (Cal-Fire) that limits mowing to November to April to minimize fire hazards. There may be other public safety restrictions that limit the ability to achieve this guideline.

term erosion control and slow colonization by invasive nonnatives. All disturbed areas that have been compacted shall be de-compacted prior to planting or seeding.

- Ground-disturbing road maintenance activities, such as regrading, will be timed so that the moisture content of the soil will support recompaction of the soil and reduce the need for an imported water source to achieve soil compaction. Similarly, activities will be timed so that use of heavy equipment will not result in the creation of mud puddles and ruts.
- Regularly scheduled visual inspections of all roads will be conducted to identify sites where erosion is contributing sediment to local streams. Appropriate actions will be taken within the road right-of-way to manage the erosion.
- Flow lines (e.g., culverts and ditches) will be cleared annually to maintain flow lines free of debris.
- Use existing roads for access and disturbed area for staging as site constraints allow. Off-road travel will avoid sensitive communities such as wetlands and known occurrences of covered plants.
- All new public roads that are accessible to general public vehicular use will be paved (this does not include fire roads that may also serve recreational needs).

6.4.6 Reserve System Implementation

Reserve System implementation—which includes activities associated with recreation, construction, infrastructure design, and maintenance of the reserves—could result in localized effects on covered species and their habitats. All relevant conditions will be applied to construction and maintenance activities within the Reserve System.

Condition 9. Prepare and Implement a Recreation Plan

Public access, consistent with the Habitat Plan conservation strategy, will be provided on all reserves owned in fee title by a public agency. Public access to privately owned land under conservation easement will only be permitted with the landowner's consent. See Chapter 10 *Assurances* for more details.

All public access to reserves will be managed according to a recreation plan that will be developed by the landowner (e.g., County Parks, Open Space Authority) and/or the Implementing Entity consistent with the requirements of this condition. Recreation plans will be reviewed by the Implementing Entity for consistency with this condition and integrated into the applicable reserve unit management plan which will be reviewed and approved by the Permittees and the Wildlife Agencies. Wildlife Agency approval of reserve unit management plans

will follow the timelines established in Chapter 5, Section 5.2.5 *Land Management* subheading *Land Management on Reserves*.

The recreation plan will address lands that are acquired for or incorporated into a reserve unit where the Implementing Entity and the land owner determine that recreational and educational uses are compatible with the conservation strategy of this Plan. Each recreation plan will apply to the portion of the reserve unit for which the recreation plan was developed, including existing open space that is incorporated into the unit (existing open space selected for the Reserve System was chosen, in part, for its recreational uses that are compatible with the biological goals and objectives of the Plan).

At a minimum, each recreation plan will contain the requirements listed below.

- Identification of sites within reserves where recreational use is compatible with the goals and objectives of the Plan.
- Identification of acceptable forms of recreation if different from those forms identified in this condition.
- Identification of sites within reserves that contain sensitive land cover types or suitable or occupied habitat for covered species.
- Maps of existing and proposed recreational trails, staging areas, and facilities and of habitat types affected.
- Site-specific methods of recreational use controls.
- Trail and use monitoring methods, schedules, and responsibilities.
- Trail operation and maintenance guidelines and responsibilities. This includes control of active off-trail recreational activities determined inappropriate by Implementing Entity and Wildlife Agencies.
- A framework for enforcement of recreational restrictions and permitting process for restricted recreational uses.
- An evaluation determining if the impact of planned recreational use is within the limits established in the Plan and EIS/EIR, and if planned recreation is compatible with the biological goals and objectives of the Plan.
- 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 or sensitive species).

Land acquired for reserves will be closed to all recreational uses until a recreation plan is developed and approved as part of a reserve unit management plan. Existing recreational uses on land incorporated into the Reserve System from existing open space (e.g., County Parks) will continue until the reserve unit management plan and associated recreation plan is completed. Existing open space selected for the Reserve System was chosen, in part, because of its compatible recreation uses with the conservation strategy (see **Table 5-5** and **Figure 5-4**). Until the reserve unit management plan is completed, no additional

recreational uses beyond what is currently allowed will occur on that existing open space incorporated into the Reserve System.

Recreational uses in the Reserve System will be designed to minimize impacts on biological resources and must adhere to the requirements and guidelines listed below.

- Recreation will only be allowed where it is compatible with the biological goals and objectives of the Plan and has less-than-significant impacts on biological resources after implementation of necessary mitigation measures, as described in the EIR/EIS.
- Recreational use and impacts will be monitored by the landowner and the Implementing Entity to ensure that uses do not substantially and adversely affect covered species. If any use is found to be substantially adversely affecting covered species, that use will be discontinued until adjustments in the use can be made to reduce or eliminate impacts (see Chapter 7 for details on monitoring). The Implementing Entity will make decisions about discontinuing or modifying recreational uses in close consultation with the landowner or other applicable reserve management agency or organization, and through a public process.
- Recreational uses allowed in reserves include pedestrian use (walking, hiking, running), dogs on leash, backpacking, nonmotorized bicycle riding on designated trails, horseback riding, wildlife observation and photography, and environmental education and interpretation on designated trails at appropriate sites. Other uses may be allowed by the Implementing Entity as long as they are compatible with the biological goals and objectives of the Plan and users obtain appropriate permissions for conducting activities if needed (e.g., County Parks requires a permit for professional photography).
- Allowable recreational uses will be controlled and restricted by area and time to minimize impacts on natural communities and covered species and to ensure that the biological goals and objectives of the Plan are met. For example, trails will be closed during and immediately following heavy rains and annually winterized to minimize erosion and sedimentation. Additional types of recreational uses (e.g., horse carts on trails) may be allowed if the Implementing Entity determines that they are consistent with the biological goals and objectives of the Plan, CDFG and USFWS concur, and users obtain appropriate permissions for conducting activities if needed (e.g., County Parks requires a permit for use of horse carts).
- Activities will be allowed in keeping with the ecological needs of the given habitat. Any off trail activities and other active recreation not listed above (e.g., outdoor sports, geocaching) unless otherwise authorized by the Implementing Entity are prohibited. Recreational uses will be allowed only during daylight hours and designated times of the year (i.e., limited seasonal closures to protect sensitive covered species; see below for specific examples) unless authorized through a use permit (i.e., backpacking). Exceptions may be made for educational groups and events that are guided by an Implementing Entity staff person or docent approved by the Implementing Entity.

- New staging areas will be developed to the extent possible in areas within reserves that are already disturbed and not suitable for habitat restoration, and that do not contribute to the conservation biological objectives for covered species habitats and/or natural communities. Sites at the edges of reserves will be chosen over sites on the interior of reserves.
- No motorized vehicles or boats will be allowed in reserves, except for use by the reserve manager staff or with the prior approval of the reserve manager (e.g., contractors implementing Plan conservation actions such as habitat restoration and monitoring, grazing tenants, fire-suppression personnel, and maintenance contractors). For reserves under conservation easements, vehicle use will be allowed as part of the regular use of the land (e.g., agricultural operations, permanent residents, utilities, police and fire departments, other easement holders), as specified in the easement.
- When compatible with Plan biological goals and objectives, dogs may be allowed in daylight hours in designated reserves or in designated areas of reserves, but only on leash. Leash law restrictions will be strictly enforced by reserve managers and staff because of the potential impact of dogs on covered species such as San Joaquin kit fox, western burrowing owl, California red-legged frog, and California tiger salamander. Leash enforcement may include citations and fines. Dogs used for herding purposes by grazing lessees must be under verbal control and have proof of vaccination.
- Recreational hunting or fishing within reserves will be prohibited except in limited circumstances. Landowners who have hunted large game (e.g., deer, elk, turkey, or pigs) on their property that becomes part of the Reserve System through a conservation easement will be allowed to continue this use as long as it is consistent with the biological goals and objectives of the Plan. Similarly, hunting for management purposes (e.g., feral pigs) is encouraged where it will contribute to achieving the goals and objectives of the Plan. The Implementing Entity will develop management hunting protocols on new reserve lands in coordination with other agencies who utilize hunting for management purposes (e.g., CDFG). Fishing is currently allowed in some County parks that will be added to the Reserve System. To be consistent with this condition, lakes or ponds in which fishing will continue will not be included in the Reserve System.
- Picnic areas shall be operated during daylight hours only. No irrigated turf or landscaping shall be allowed in picnic areas. To the extent feasible, picnic areas will be located on the perimeter of preserve areas and will be sited in already disturbed areas. No private vehicles shall be allowed in picnic areas, unless the picnic area is at a staging area and except for limited special events approved by the Implementing Entity. Maintenance and emergency vehicles shall be permitted access to picnic areas.
- Backpack camps shall be limited to use by no more than 25 people at each site. With the exception of Americans with Disabilities Act (ADA) service animals, dogs shall only be allowed in backpack camps on-leash. In coordination with the reserve manager, the Implementing Entity will monitor

use and maintenance of backpack camps and may implement a reservation and permitting process for use of backpack camps.

- Public collecting of native species will be prohibited within reserves.
- Introduction of domestic or feral animals, including cats, ducks, fish, reptiles, and any exotic non-naturalized species, is prohibited within the reserves to prevent interference with and mortality of native species, except by the reserve manager for management purposes (e.g., livestock for grazing or dogs for livestock control or protection).
- Trails will be established on existing roads or trails wherever possible to minimize the need for new ground-disturbing activities and to reduce new and ongoing maintenance costs. However, this will be balanced with the need to reroute some poorly designed existing ranch roads that are difficult and expensive to maintain. In some cases, rerouting access roads may have net benefits on biological resources.
- New trails will be designed and operated to be compatible with natural resources protection. New trails will be sited to minimize impacts on sensitive species (including covered species) and natural communities as well as disturbance to adjacent landowners and land uses. Wetlands will be avoided except for educational trails, and trails through woodland or riparian habitat will avoid tree removal or substantial pruning to the extent possible. If tree removal is required, unhealthy, exotic tree species, or trees unlikely to reach maturity due to site conditions (e.g., being shaded out by larger trees) will be targeted for removal.
- Trails built across streams or through riparian corridors will be sited and designed with the smallest footprint necessary to cross the in-stream area. Stream crossings will be perpendicular to the channel and be designed to avoid any potential for future erosion. Trails that follow a stream course will be sited outside the riparian corridor to the maximum extent feasible.
- Trails will not be paved, except as required by law, and will be sited and designed so that they do not contribute to erosion and bank failure. To provide trail access for a range of user capabilities and needs (including persons with physical limitations) in a manner consistent with state and federal regulations, the landowner would site and design new, paved trails in areas within reserves that are already disturbed and do not have the potential to affect sensitive habitat. As common practice, these types of whole-access trails would be sited near staging areas.
- Recreational uses will be controlled using a variety of techniques including fences, gates, clearly signed trails, educational kiosks, trail maps and brochures, interpretive programs, and patrol by land management staff.
- Construction of recreational facilities within reserves will be limited to those structures necessary to directly support the authorized recreational use of the reserve. Existing facilities will be used where possible. Facilities that support recreation and that may be compatible with the reserve include parking lots (e.g., small gravel or paved lots), trails (unpaved or paved as required by law), educational and informational kiosks, up to one visitor

center located in a disturbed or non-sensitive area, and restroom facilities located and designed to have minimal impacts on habitat. Playgrounds, irrigated turf, off-highway vehicle trails, and other facilities that are incompatible with the goals and objectives of this Plan will not be constructed.

- Signs and informational kiosks will be installed to inform recreational users of the sensitivity of the resources in the reserve, the need to stay on designated trails, and the danger to biological resources of introducing wildlife or plants into the reserve.
- New trails will be prohibited within 100 feet of wetlands and streams that provide suitable habitat for covered amphibians and aquatic reptiles or tricolored blackbird, unless topography or other landscape characteristics shield these trails from the covered species habitat or a lack of effect of the trail on the species can be otherwise demonstrated.
- New trails will be prohibited within 250 feet of active western burrowing owl nests. If an owl pair nests within 250 feet of an active trail, Implementing Entity staff will consult with the Wildlife Agencies to determine the appropriate action to take. Actions may include prohibiting trail use until young have fledged and are no longer dependant on the nest.
- When compatible with Plan biological goals and objectives, recreation plans for reserves adjacent to existing public lands will try to ensure consistency in recreational uses across open space boundaries to minimize confusion in the public. Reserves adjacent to non-Plan public lands with different recreational uses will provide clear signage to explain these differences to users that cross boundary lines. The Implementing Entity will be responsible for securing and signing reserve boundaries.

Rare exceptions to the guidelines listed above will be considered and approved by the Implementing Entity and the Wildlife Agencies on a case-by-case basis. Exceptions will be approved only if they are consistent with the biological goals and objectives of the Plan. Any exceptions will be clearly identified in the recreation plan.

Condition 10. Fuel Buffer

In accordance with state law[15], all applicable covered activities will remove all brush, flammable vegetation, or combustible growth within at least 30 feet and up to 100 feet of occupied dwellings or structures. The amount of fuel modification necessary shall take into account the flammability of the structure as affected by building material, building standards, location, slope, and type of vegetation. Fuels will be maintained in a condition so that a wildfire burning under average weather conditions would be unlikely to ignite the structure. The intensity of fuels management may vary within the 100-foot buffer of the structure, the most intense being within the first 30 feet around the structure.

[15] California Government Code Section 51182 and Public Resources Code 4291.

Consistent with fuels management objectives, steps will be taken to minimize erosion consistent with Condition 7.

Applicable covered activities include construction of new structures in the Diablo Range or Santa Cruz Mountains, or new structures built in grassland, chaparral, oak woodland, or conifer woodland land cover types. This condition also applies to structures built in areas designated by the County as a very high fire hazard severity zone pursuant to Section 51179 of the California Government Code.

If the property line is less than 30 feet from the occupied structure, then the brush and vegetation will be cleared up to the property line in order to maintain compliance with Public Resources Code 4291. Additional brush and vegetation clearing may be required by local or other state laws. To ensure that erosion is minimized, grass and other vegetation within 30 feet of structures will be maintained within this fuel buffer to a height of 18 inches or less. The cost of establishing and maintaining this fuel buffer will be borne by the project proponent. This condition does not apply to single trees or other vegetation that is well-pruned and maintained so as to effectively manage fuels and not form a means of rapidly transmitting fire from other nearby vegetation to a dwelling or structure.

The vast majority of properties adjacent to the Reserve System are expected to be able to create sufficient defensible space within their property to meet this condition. If an additional buffer is deemed necessary by the responsible fire agency, then the private landowner may seek an encroachment permit from the Implementing Entity to meet fire code. In these limited instances, the Implementing Entity may decide to allow a fuel buffer on the reserve side of a property boundary to provide additional protection against wildland fire. The Implementing Entity or land manager would define the allowable activities in encroachment permit to ensure compliance with HCP goals. If this is applied, the fuel management buffer within the reserve will not be credited to the land acquisition requirements in Chapter 5 because this area will be maintained in a disturbed state.

In areas within the Reserve System where management of fuel loads is necessary, the Implementing Entity will trim, mow, conduct prescribed burns, utilize grazing, or otherwise clear vegetation to minimize fuel loads and fire hazards. Various land uses are allowable within the fuel management buffer as long as they reduce fire hazards. Uses such as trails, fire-resistant landscaping, and livestock grazing are compatible with the fuel buffer. Allowable uses must comply with the urban-Reserve System interface guidelines described above.

Creating and maintaining the fuel management buffer within the Reserve System may have impacts on covered species. For example, plants such as Santa Clara Valley dudleya and smooth lessingia may occur in grasslands within fuel buffers. Any impacts on covered plants from fuel buffer management will be counted by the Implementing Entity as an adverse effect that must be offset by conservation of covered plants in the Reserve System (see Chapter 5). In some cases,

maintenance of the fuel buffer may improve habitat for covered plants by reducing cover of nonnative plants.

6.5 Conditions to Minimize Impacts on Natural Communities

Conditions 11–14, described below, are designed to minimize impacts on natural communities identified as representing important ecosystems in the Plan area.

Condition 11. Stream and Riparian Setbacks

This condition applies to all covered activities that may impact streams. This includes all development inside the urban service area where a stream or the stream setback overlaps any portion of the parcel on which a covered activity is being implemented. Outside the urban service area, this includes all covered activities where a stream or stream setback overlaps any portion of the development area or project footprint. Exemptions and exceptions may apply as described below in this condition.

Background

The management of stream corridors and associated riparian habitat through the implementation of setbacks has become an increasingly important tool for conserving aquatic and semi-aquatic populations and riparian vegetation and improving water quality. There is strong evidence that riparian buffers of sufficient width protect and improve water quality by intercepting non-point source pollutants in surface and shallow subsurface water flow (e.g., Lowrance et al. 1984; Castelle et al. 1994).

Healthy riparian buffers are also widely recognized for their ability to perform a variety of physical and biological functions other than improving water quality. These functions include stabilizing stream channels; controlling erosion by regulating sediment storage, transport, and distribution; providing organic matter (e.g., leaves and large woody debris) that is critical for aquatic organisms; storing nutrients for the surrounding watershed; reducing water temperature through shading; minimizing flood peaks; and serving as key recharge points for renewing groundwater supplies (DeBano and Schmidt 1989; O'Laughlin and Belt 1995). Riparian buffers also provide habitat for a large variety of plant and animal species. Riparian buffers have been proposed, and in some cases proven, to be landscape components that promote wildlife movement, enhance gene flow, increase connectivity of isolated habitat patches, and provide breeding and foraging habitats for animals (Hilty et al. 2006; Rosenberg et al. 1997).

Within the study area, streams provide important breeding, foraging, and movement habitat for California red-legged frog, foothill yellow-legged frog, and western pond turtle. Riparian woodland, which is found next to many of the study area's streams, provides breeding sites for tricolored blackbird and least Bell's vireo. Riparian woodland habitat also protects water quality by filtering inflow, thus reducing pollutant input and sediment load. Finally, stream and riparian areas provide key linkages connecting conservation areas targeted under the Habitat Plan (see **Table 5-9** and **Figure 5-6**).

Because of the importance of streams and associated riparian woodland for the benefit of covered species and as sensitive land cover types addressed by this Plan, this condition was developed to be as protective as feasible within the land-use constraints of the local jurisdictions and financial constraints of the Habitat Plan. The following principles were developed to guide the stream and riparian setback condition for this Plan.

- Stream habitat and functions are very difficult to replace once lost; in some cases they cannot be replaced.
- Stream setbacks will be required for all covered activities occurring near streams and riparian areas to minimize effects on covered species as required under the ESA and NCCPA. Additional protections adjacent to streams may also be required for urban redevelopment projects.
- Each of the cities participating in the Habitat Plan, as well as the County, has either setback regulations (Morgan Hill) or policies (San José, Gilroy, County of Santa Clara) currently in place. However, these regulations and policies are not consistent among the jurisdictions. A condition is needed that will make regulatory guidance consistent for all covered activities across all jurisdictions. All covered activities must adhere to both the applicable existing local regulations and the requirements of the Plan.
- The main goal of the stream setback requirement is to minimize further degradation of stream and riparian communities from implementation of covered activities and to maintain basic biological and physical functions of stream and riparian systems.
- The purpose of the stream setback requirement within the urban service area is to, at a minimum, protect stream and riparian communities that provide habitat for covered species because these habitats are unique and cannot be conserved elsewhere within the study area.

Protection of streams and adjacent riparian vegetation under this condition would conserve habitat for California red-legged frog, foothill yellow-legged frog, western pond turtle, and least Bell's vireo. All of these species use stream and riparian habitats as either primary or secondary habitat, as described in Chapter 3, *Physical and Biological Resources.*

An analysis was performed to determine the overall value of the setback for protecting covered species' habitat. Modeled habitat protected by the setback was quantified and compared to the level of protection provided by the Reserve System alone. In GIS the habitat models for four covered species (California

red-legged frog, foothill yellow-legged frog, western pond turtle, and least Bell's vireo) were overlaid with the expected locations and widths of riparian setbacks outside of the planning limit of urban growth (setback avoidance is not required inside the urban service area and so those areas were not included in this analysis) for all covered activities except rural residential development (exact location of rural residential development is not known at this time and thus could not be included in the analysis). Assuming all of these covered activities occur, an additional 2,855 acres (28%) of modeled breeding (primary) habitat for California red-legged frog and an additional 348 miles (50%) of modeled habitat (primary and secondary) for foothill yellow-legged frog would be avoided. Also, implementation of the stream setback would avoid an additional 837 acres (55%) of modeled habitat for least Bell's vireo. Setback benefits to these species and western pond turtle are summarized in **Table 6-5**. Stream habitat for covered species will likely overlap (i.e., miles and acres referenced in the table and above are not additive).

Definitions

The following terms are defined for this condition. These definitions are also found in the glossary (**Appendix A**).

Riparian habitat or riparian vegetation: Riparian vegetation is associated with river, stream, or lake banks and floodplains. Riparian vegetation is also defined by USFWS (2009) as plant communities contiguous to and affected by surface and subsurface hydrologic features of perennial or intermittent lotic and lentic water bodies (i.e., rivers, streams, lakes, or other watercourses). Riparian areas have one or both of the following characteristics: 1) distinctively different vegetation than adjacent areas, 2) species similar to adjacent areas but exhibiting more vigorous or robust growth forms due to the greater availability of surface and subsurface water.

Stream: A watercourse that flows at least periodically or intermittently through a bed or channel having banks. This may include watercourses having a surface or subsurface flow that supports or has supported riparian vegetation, fish or other aquatic life. In the context of the Habitat Plan, a watercourse must meet SCVWD "*Criteria to Verify or Identify a Watercourse as a Stream*" discussed below under *Framework* (Santa Clara Valley Water Resources Protection Collaborative 2006) to qualify as a stream.

Reach: A section of a stream. Reaches are defined based on a specific need (e.g., monitoring) and do not necessarily reflect a standard set of characteristics.

Perennial stream: A stream with year-round surface flow that is supplied by both rainfall runoff and groundwater, as well as by substantial dry-season inputs (e.g., runoff).

Intermittent stream: A stream that is supplied by both rainfall runoff and groundwater. Intermittent streams tend to be seasonal, with flow during the rainy season and into the late spring or early summer.

Ephemeral stream: A stream that flows only in response to rain events and receives no groundwater input. As defined in the Habitat Plan, ephemeral streams will not include irrigation ditches, underground streams, or drainages and swales that have neither defined bed and bank nor evidence of scour or sediment transport. All other ephemeral drainages that qualify as streams will be considered under the Habitat Plan.

Framework

This condition will apply to all covered activities, including those within the Reserve System. This condition also has exemptions and exceptions as described in subsequent sections below.

The width of the setback is driven by the following criteria:

- stream community,
- slope, and
- location of the covered activity in relation to the urban service area of each local jurisdiction.

Each of these criteria is described below.

Stream Community

Stream communities are grouped into two simplified categories for the purposes of this condition. These categories are based on broad definitions of the biological characteristics of those communities and correspond to the level of habitat quality for covered species and sensitive riparian communities within the study area. Categories for the stream setback requirement are provided below.

- **Category 1**. This stream type has sufficient flow to support covered species and riparian habitat. These streams include perennial streams and some intermittent streams. These streams are typically larger than ephemeral drainages and support movement of covered species along the length of the stream. The ability of these streams to also support healthy riparian habitats bolsters the ecological value of the stream. This category also includes all in-channel ponds downstream of reservoirs. These streams are shown in **Figure 6-2**[16]**.**
- **Category 2**. This stream type may not have sufficient flow to support covered species and riparian habitat. These streams include all ephemeral streams and some intermittent stream reaches. These reaches provide minimum support of water-quality functions and primary breeding habitat for

[16] **Figure 6-2** may be periodically updated by the Implementing Entity in consultation with the Wildlife Agencies as new data becomes available.

covered species. Category 2 streams are not specifically mapped as part of the Habitat Plan. They include both identified streams (named creeks and USGS blueline creeks) that are not classified as Category 1 streams (as shown in **Figure 6-2**) and other unmapped streams that meet the "Criteria to Verify or Identify a Watercourse as a Stream" as defined below.

Categories are applied to reaches of streams as opposed to entire streams. This is because almost all streams begin in the uppermost portions of their watersheds as ephemeral streams and gradually become intermittent or perennial and they move downslope and accumulate flows from the watershed and, sometimes, the groundwater basin. As such, a single stream may contain both Category 1 and Category 2 reaches.

The mapped stream network for the Habitat Plan does not differentiate between perennial, intermittent, and ephemeral drainages. However, SCVWD developed a map of all fish-bearing streams in the study area. While fish are not covered by this Plan, presence of fish is a good indicator of the stream type. For example, ephemeral streams do not generally support fish. As such, the stream categories are identified using fish-bearing or non-fish bearing streams as a proxy for Category 1 and Category 2 streams, respectively. Reaches for which fish data are unknown are assumed not to support fish and are included in Category 2. Category 2 reaches cannot occur downstream of a Category 1 reach.

Criteria to Verify or Identify a Watercourse as a Stream

While all Category 1 streams are mapped by the Plan, not all Category 2 streams are mapped. If a watercourse is not mapped by the Plan, but does meet the following criteria, it will be classified as a Category 2 stream. The following is based on the *Santa Clara Valley Water Resources Protection Collaborative* (2006).

A watercourse which does not appear to fit into one of the two described stream categories may be considered a stream if the director of the planning department of the local jurisdiction determines that the watercourse complies with all of the following three criteria:

1. the watercourse is hydrologically connected to a waterway above and below the site or is connected to a spring, headwaters, lake, and/or bay based on satisfying at least one of the conditions identified in paragraph (A) below; and
2. the watercourse is within a defined channel which includes a bed, bank, and exhibits features that indicate actual or potential sediment movement based on satisfying at least one of the conditions identified in paragraph (B) below; and
3. the watercourse occupies a specific topographic position based on satisfying at least one of the conditions identified in paragraph (C) below.

In determining whether the subject watercourse possesses these three features, the following criteria will be examined by the Local Partner with jurisdiction over the covered activity. If necessary, this determination may require the

technical expertise and recommendations of a qualified biologist, hydrologist, or other qualified professional. In addition, the Local Partner with jurisdiction over the covered activity may require the project proponent to provide additional information as deemed necessary to determine if the watercourse satisfies the three criteria listed below.

This process will not be used to determine if a CDFG Streambed Alteration Agreement will be required pursuant to Section 1600 et seq. of the California Fish and Game Code or to determine if a Corps Section 404 Clean Water Act permit will be required.

A. Hydrologic Connectivity—Criterion #1 above will be considered met if any of the following conditions are present:

1. Stream headwaters, springs, in-channel culverts, underground seepage, or groundwater flow are present and capable of providing hydrologic connectivity to recognized watercourses. Sections of stream placed underground by manmade infrastructure (e.g., culverts) are not considered streams for the purpose of this condition except as noted in paragraph B item 4 below.
2. Streams may become connected across or over manmade improvements such as roads (e.g., a temporary connection during a storm event). Except for stream channel improvements, water flowing across or over such improvements within the public right-of-way is not considered a stream. Sections above and/or below this connectivity are streams if they meet the other required features.
3. Springs are present and are considered part of a stream if located above (uphill from) stream initiation.

B. Channel Form—Criterion #2 above will be considered met if any of the following conditions are present:

1. The watercourse has a stream channel, beginning at the point of bed and bank initiation, which may be natural, altered, or engineered.
2. The stream channel must have enough flow under present-day conditions to maintain channel form and to move sediment. A non-engineered stream channel bed and bank are created and maintained by erosion and sedimentation, thus the presence of a channel with bed and bank is itself evidence of sufficient flow. Flow volume or timing is not criteria for stream determination.
3. The stream channel has evidence of scour, sedimentation, sediment sorting, undercut banks and/or other erosion, deposition, or transport features —all of which support sediment movement.

   Engineered or altered channels exist and are partially or wholly made of earth, concrete, rip rap, or other materials. The hardened nature of these channels bed and banks, and a lack of available sediment along the channel reach, may prevent signs of sediment movement or scour. Such channels need not have explicit evidence of sediment transport.

4. A currently underground stream was filled without appropriate permits from all applicable regulatory agencies (federal, state, and local) or is underground due to a landslide.

C. Topographic Position—Criterion #3 above will be considered met if any of the following conditions are present:

1. The watercourse is either a 'U' or 'V' shaped channel typically located at the low point of a macro-topographic feature.
2. The watercourse consists of bowl, 'U', or 'V' shaped topography with high points draining to valley or ravine as part of a large drainage network leading to large streams, lakes and/or a bay.
3. The watercourse located on flatland consists of shallow bowl or 'U' shaped topography. Generally these streams flow from the hills toward a bay following the slope of the land.

Stream topography can be indicated on a topography map by a 'U' or 'V' shape pointed in the uphill direction.

Slope

Slope is an important determinant of soil stability and therefore erosion and sedimentation rates into streams. Steeper slopes erode faster and are more susceptible to disturbance by the covered activities. To account for these factors, stream setback requirements are greater on steeper slopes. The slope categories developed for the Habitat Plan were based on slope-stability categories in local codes and guidelines. Two slope categories were created. Slope categories are as follows.

- **0%–30% Slopes**. Generally stable slopes. This category does not require additional setbacks beyond those identified above.
- **>30% Slopes**. Increasingly unstable slopes. This category requires increase protection and greater stream setbacks.

If the development area as described in Condition 7 is located within 200 feet of a Category 1 stream, the project proponent will include site topography on the development area map (see Section 6.8.2 *Item 2: Project Description and Map*) in 5-foot intervals in elevation. The project proponent will also calculate the average slope of the development area to determine how this criterion is applied. Slope is defined as the average natural slope of the land within the proposed development area based on an engineered site plan. The average slope is determined by the formula:

$$S = (I*L/ A)*100, \text{ where}$$

S is the average slope of the area in percent; *I* is the contour interval in feet; *L* is the combined length of contour lines in feet; and A is the area of the development area. Average site slope will be calculated by a registered civil engineer or licensed land surveyor. **Figure 6-3a** illustrates an example setback based on slope.

Urban Service Area

Different setback distances will be applied depending on whether the covered activity occurs within the urban service area[17] (as adopted and mapped by LAFCO and defined by each city's General Plan at the time of adoption of the Habitat Plan) or outside the urban service area. Within the urban service area of San José, Morgan Hill, and Gilroy, there is typically extensive existing urban development. Due to past land-use policies, this development may have limited or no setbacks from streams. As such, these areas tend to be developed or highly altered from a natural state and the overall habitat value for covered species is less than in the rural areas. The stream setback requirement for covered activities within the urban service area is therefore modest and consistent with existing land uses. This setback also recognizes the limited potential for new development within the urban service area to provide stream protections.

Outside of the urban service area, stream setbacks are greater to maximize protection of existing stream functions and values and to provide additional opportunities for stream and riparian protection and restoration (see Chapter 5). Stream setbacks outside the urban service area take into account the opportunity to establish protective setbacks and to pro-actively prevent degradation seen within the urban service area from past development. The difference between setbacks inside and outside of the urban service area reflects the fact that lands within the urban service area provide a minimum amount of habitat in support of basic ecological functions including connectivity for covered species, while stream and riparian habitat outside of the urban service area will be instrumental in successful implementation of the conservation strategy.

Required Setbacks

Stream setback requirements have been developed on the basis of an extensive literature review of applicable research from both local and national sources (**Table 6-6**) and in consultation with the Wildlife Agencies. Scientific studies to determine minimum setbacks typically recommend relatively modest setbacks (an average of 58 feet) to protect water quality (e.g., sediment and nutrient loading). Recommended setbacks to enhance stream ecology were greater and ranged from 85 to 220 feet with an average of 132 feet. Setbacks intended to provide protection for plants and wildlife were the greatest and ranged from 30 to 1,600 feet, with an average range of 335 to 410 feet (**Table 6-6**).

Working from scientifically rigorous definitions of appropriate setbacks, further refinement of setbacks was coordinated with the Local Partners to determine setback widths that, while consistent with the literature, limited the number of situations in which the setback would create undue hardship upon property owners or be infeasible to implement on a consistent basis (the setback would

[17] The urban service area was used instead of the planning limit of urban growth because the urban service area represents the current boundary of urban development, not the future boundary after implementation of all covered activities. The Local Partners felt strongly that stricter riparian setbacks should be applied outside the urban service area to maximize protection of stream and riparian areas prior to urbanization of these areas.

create a large number of property exemptions). As such, the setbacks identified for this Plan (35 to 250 feet) balance the need to protect ecological functions with surrounding land uses and private property constraints.

A stream setback, measured from top of the stream bank, will be applied to all covered activities as shown in **Table 6-7**. To facilitate implementation of this condition, required setbacks are described below based on project location. **Figures 6-3a through 6-3d** illustrate different applications of the setback.

Inside the Urban Service Area

Inside the urban service area at the time of Plan adoption, the setback for Category 1 streams is 100 feet (**Figure 6-3b**). The setback is increased by 50 feet for parcels with slopes greater than 30% to compensate for increased slope instability and higher anticipated rates of erosion. In addition, if the site supports riparian vegetation the setback is equal to either the riparian edge plus a 35 foot buffer or the setback as defined above, whichever is greater.

The setback for all Category 2 streams is 35 feet regardless of location or slope (see **Figure 6-3c**). In addition, if the site supports riparian vegetation, the setback is extended to include the riparian edge plus a 35-foot buffer. The 35-foot buffer is based on a minimum setback distance of 33 feet suggested for sediment and nutrient reduction (Corley et al. 1999). Ephemeral streams, while constituting the majority of streams affected by this condition, are not commonly mapped due to inherent difficulties in mapping ephemeral tributaries in the study area. Unmapped ephemeral streams will only be subject to the required setback if the criteria for defining a watercourse discussed under *Framework* are met for hydrologic connectivity, channel form, and topographic position (Santa Clara Valley Water Resources Protection Collaborative 2006). The applicable local jurisdiction is responsible for making determinations of whether a watercourse qualifies as a Category 2 stream and for implementing setbacks. Each local jurisdiction may also choose to extend the setback beyond 35 feet in cases where site-specific slope and geological characteristics warrant increased protection.

If the project proponent complies with the stream setback when implementing covered activities (i.e., the project avoids the setback), the area of the setback will be excluded from the development fee calculation for the project. The project will be tracked as the parcel or development area excluding the avoided setback so that local jurisdictions are able to identify new impacts in future project applications.

Outside the Urban Service Area

Outside of the urban service area, setback requirements are greater. For Category 1 streams the setback distance is 150 feet (see **Figure 6-3d**). The setback is increased by 50 feet for slopes greater than 30% to compensate for increased slope instability and higher anticipated rates of erosion (**Figure 6-3a**). In addition, if the site supports riparian vegetation, the setback is either the riparian edge plus a 35-foot buffer or the setback described above, whichever is greater.

As described above for required setbacks "*Inside the Urban Service Area*," the setback for all Category 2 streams is 35 feet regardless of location or slope (**Figure 6-3c**). If the site supports riparian vegetation, the setback will extend from the riparian edge plus a 35-foot buffer.

Unless a covered activity meets the "Exemption" criteria or is granted a stream setback exception, as described below, implementation of covered activities is prohibited within the stream setback.

Project proponents of projects located outside the urban service area must ensure that the development area does not encroach into the stream setback unless an exemption or an exception is applied. Projects or portions of projects that qualify for an exemption or exception are described below.

If a project proponent chooses to offer a conservation easement onstream setback areas, and the Implementing Entity and Wildlife Agencies approve, the contribution of the area placed under conservation easement may offset development fees as described below under *Fees and Conservation Easements*, and the land will become part of the Reserve System and contribute to the Plan's requirements for riparian preservation (**Table 5-13**).

Exemptions

The exemptions below apply regardless of location. If a covered activity qualifies for an exemption, a stream setback is not applied and the project proponent is not required to comply with this condition. However, other conditions may still apply and the project is still required to pay all applicable fees (e.g., land cover fee, wetland fee) as described in Chapter 9. Exemptions from the stream setback include the following.

1. Any activity that is not a covered activity and not subject to the Habitat Plan or its conditions.
2. Activities listed as exempt in Section 6.2.
3. Development on parcels less than 0.5 acre.
4. Covered activities that require work within or adjacent to streams such as bridges, levee maintenance and repair, flood-protection projects, stream maintenance, outfall installation and maintenance, flood-protection capital projects, dam-related capital projects.
5. Recreational trails (see Condition 4 and 9 for details on trail siting).
6. Replacement of utilities that result in no new permanent disturbance to the riparian corridor during construction and operation and generate only temporary loss of habitat. (This exemption does not apply for utility projects that result in new permanent riparian impacts.)
7. Stream crossings essential to provide a means of access to parcel or facility.

Exceptions

Stream setback policies that apply to a large number of parcels with varying characteristics require a clear and practical set of exceptions. The term exception means an allowance for reductions in mandated setback distances necessary to allow reasonable use and development of a property based on the variety of constraints and factors that may affect the property. In situations where exceptions are granted, portions of this stream setback condition may still apply. Exceptions will be used in a minority of cases with special circumstances that limit or restrict the ability of a landowner to fully apply the stream setback. For example, geologic and seismic hazards, unusual lot size or configurations, unusual slope, or grading and access issues may present site constraints that require exceptions to the stream setback condition in order to allow reasonable development of a site consistent with local land use regulations.

For all proposed exceptions to the stream setbacks (inside or outside the urban service area), exceptions will be considered based on the following factors:

1. The existence of legal uses within the setback.
2. The extent to which meeting the required setback would result in a demonstrable hardship (i.e., denies an owner any economically viable use of his land or adversely affects recognized real property interests) for the applicant.
3. The extent to which meeting the required setback would require deviation from, exceptions to, or variances from other established policies, ordinances or standards regarding grading, access, water supply, wastewater treatment, disposal systems, geologic hazards, zoning, or other established code standards.
4. The stream setback exception does not preclude achieving the biological goals and objectives of the Habitat Plan or conflict with other applicable requirements of the Habitat Plan and local policies.

Regardless of project location, stream setback exceptions may not reduce a Category 1 stream setback to less than a distance of 50 feet for new development or 35 feet for existing or previously developed sites with legal buildings and uses (**Figure 6-3b**). All applicable fees must be paid for areas granted an exception.

Exceptions may be requested through the standard application process described in Section 6.8, or through a separate request process. Applicants must apply for a stream-setback exception through their local jurisdiction. All private applications for stream-setback exceptions must be reviewed and approved by the local jurisdiction. For projects implemented by a local jurisdiction, exception requests must be made to the Implementing Entity. The findings required to approve the stream setback exception must be supported by factual information and judgments in the record.

As part of the review process, the local jurisdiction or the Implementing Entity must consider the implications of a reduced setback on the riparian system and

covered species, progress toward the biological goals and objective of the Plan, and potential effects on adjacent properties. The local jurisdiction or the Implementing Entity must make written findings that document these considerations and the rationale for the stream-setback exception (see below for specific required findings). The local jurisdiction or the Implementing Entity may require technical reports from qualified professionals or consultants to support the application or request. For example, for any significant proposed reduction, a report by a qualified biologist, stream hydrologist, registered engineer, or other professional may be required as a basis for making necessary findings. Please see Section 6.8.5 for definition of a "qualified biologist."

If the stream setback exception is granted at an administrative level (Zoning Administrator) or by a designated decision-making authority (Planning Commission), local agencies must include provisions that allow appeal of this decision to the elected legislative body of the applicable agency. Applicable fees may be imposed by the legislative body for processing such appeals, as well as for the original exception requests.

Prior to granting the exception, the local jurisdiction will provide the exception request and proposed decision to both the Implementing Entity and the Wildlife Agencies for review and comment. The Implementing Entity and Wildlife Agencies will have 30 days to review the request and provide a written response. A local agency cannot take an action until after that 30 day-period. The Implementing Entity will compile a list of all exceptions granted each calendar year for inclusion in the annual report to the Wildlife Agencies.

Fees and Conservation Easements

If the stream setback is precluded from future development by a permanent conservation easement offered voluntarily by the landowner, and the easement is acceptable to the Implementing Entity and Wildlife Agencies and consistent with the Plan Reserve System (as described in Chapter 8, Section 8.6.3), a portion of the land cover fee for the covered activity (i.e., the fee for impacts to land cover types outside of the setback) may be waived by the Implementing Entity. If the value of the easement, in terms of area and resource value, exceeds the fee, credit cannot be "banked" for other projects (i.e., the Implementing Entity will not compensate for excess credit). Partial fee waivers for setbacks will be determined on a case-by-case basis by the Implementing Entity according to the criteria in Chapter 9, Section 9.4.1, subheading *Land Provided in Lieu of Development Fee*.

Each local jurisdiction may also consider imposing a conservation easement as a requirement for development approval when there is a direct nexus between the effects or impacts of a project and the need for an easement. The Implementing Entity will provide technical assistance to the local jurisdiction to determine whether a conservation easement is warranted. An easement must also demonstrate rough proportionality with the impact of the project.

Condition 12. Wetland and Pond Avoidance and Minimization

The purpose of this condition is to minimize direct and indirect impacts to wetlands and ponds and in some cases, avoid direct and indirect impacts to high quality wetlands and ponds. Direct impacts are those that directly affect a wetland or a pond within its mapped boundary (see Section 6.8.4 *Item 4: Map of Wetlands and Waters* for a description of mapping direct impacts to wetlands). Project proponents are required to pay a wetland fee for impacts to wetlands and ponds to cover the cost of restoration or creation of aquatic land cover types required by this Plan (see Chapter 9 for details on this wetland fee). Covered activities can avoid paying the wetland fee if they avoid impacts to the wetland.

All project proponents will implement the following actions to avoid and minimize impacts of covered activities on wetlands and ponds.

Planning Actions

- Projects must be designed to avoid and minimize impacts to wetlands to the maximum extent practicable.
- Applicants with streams on site must follow the stream setback requirements in Condition 11.
- Applicants for coverage under the Plan must follow the requirements and guidelines in Condition 3 to minimize the effects of development on downstream hydrology, streams, and wetlands.

Design

- Locate septic facilities, if used, at least 100 feet from the edge of a wetland or pond if space allows.
- If the runoff from the development will flow within 100 feet of a wetland or pond, install vegetated stormwater filtration features, such as rain gardens, grass swales, tree box filters, or infiltration basins, to capture and treat flows.
- Plant native vegetation (shrubs and small trees) between the wetland or pond and the development such that the line of sight between the wetland or pond and the development is shielded.
- If during the environmental review process it is shown that a project has adverse indirect impacts to the wetland's function (change in hydrological functions, etc.), the project will be required to avoid these indirect effects, as determined on a case-by-case approach by the local jurisdiction, in consultation with the Implementing Entity. If a Local Partner is carrying out the activity, it will coordinate avoidance measures with the Implementing Entity. Wetlands that are not completely avoided, including indirect effects, will be considered permanently impacted and will count towards the impact

caps described in **Table 4-2** and will be assessed fees as described in Chapter 9. If however, the local jurisdiction demonstrates to the Wildlife Agencies that the wetlands to be indirectly affected are highly degraded prior to project impacts, and the Wildlife Agencies agree, impacts will not be counted toward the impact caps described in **Table 4-2** and fees will not be assessed. "Highly degraded" wetlands could include, but are not limited to, those that are indirectly affected by surrounding development or agriculture to the extent that hydrology, water quality, or habitat for covered species is adversely affected.

Construction Actions

- Personnel conducting ground-disturbing activities in or adjacent to wetlands and ponds will be trained by a qualified biologist in these avoidance and minimization measures and the permit obligations of project proponents working under this Plan.
- All wetlands and ponds to be avoided by covered activities will be temporarily staked in the field by a qualified biologist to ensure that construction equipment and personnel avoid these features.
- Fencing will be erected along the outer edge of the project area, between the project area and a wetland or pond. The type of fencing will match the activity and impact types. For example, projects that have the potential to cause erosion will require erosion control barriers (see below), and projects that may bring more household pets to a site will be fenced to exclude pets. The temporal requirements for fencing also depend on the activity and impact type. For example, fencing for permanent impacts will be permanent, and fencing for short-term impacts will be removed after the activity is completed.
- Appropriate erosion control measures (e.g., fiber rolls, filter fences, vegetative buffer strips) will be used on site to reduce siltation and runoff of contaminants into wetlands, ponds, streams, or riparian woodland/scrub. Filter fences and mesh will be of material that will not entrap reptiles and amphibians. Erosion control blankets will be used as a last resort because of their tendency to biodegrade slowly and trap reptiles and amphibians.
- Erosion-control measures will be placed between the wetland or pond and the outer edge of the project site.
- Fiber rolls used for erosion control will be certified as free of noxious weed seed.
- Seed mixtures applied for erosion control will not contain invasive nonnative species, but will rather be composed of native species appropriate for the site or sterile nonnative species. If sterile nonnative species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive nonnatives.

- Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas.
- Trash generated by covered activities will be promptly and properly removed from the site.
- No construction or maintenance vehicles will be refueled within 200 feet of avoided wetlands and ponds unless a bermed and lined refueling area is constructed and hazardous material absorbent pads are available in the event of a spill.
- All management of pest species will be conducted in compliance with the County integrated pest management (IPM) ordinance. In addition, other requirements identified in this chapter that exceed the requirements of the IPM ordinance will be implemented.
- Where appropriate to control serious invasive plants, herbicides that have been approved by EPA for use in or adjacent to aquatic habitats may be used as long as label instructions are followed and applications avoid or minimize impacts on covered species and their habitats. In wetland environments, appropriate herbicides may be applied during the dry season to control nonnative invasive species (e.g., yellow star-thistle). Herbicide drift will be minimized by applying the herbicide as close to the target area as possible. Herbicides will only be applied by certified personnel in accordance with label instructions.
- All organic matter should be removed from nets, traps, boots, vehicle tires and all other surfaces that have come into contact with ponds, wetlands, or potentially contaminated sediments. Items should be rinsed with clean water before leaving each study site (U.S. Fish and Wildlife Service 2005).
- Implement measures to minimize the spread of disease and non-native species based on current Wildlife Agency protocols (e.g., *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog: Appendix B, Recommended Equipment Decontamination Procedures* [U.S. Fish and Wildlife Service 2005]) and other best available science.
- Used cleaning materials (liquids, etc.) should be disposed of safely, and if necessary, taken off site for proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags (U.S. Fish and Wildlife Service 2005).
- Portions of the project that occur in streams will comply with Condition 4.

Condition 13. Serpentine and Associated Covered Species Avoidance and Minimization

Serpentine soils comprise four land cover types in the study area: serpentine bunchgrass grassland, serpentine rock outcrops, serpentine seeps, and serpentine chaparral. These land cover types are estimated to encompass 14,314 acres in the study area. Additional unmapped areas of serpentine may be discovered during

implementation because it often occurs in small patches that could not be discerned at the scale of the mapping and available data.

Most of the serpentine areas in the study area are expected to be acquired as part of the Reserve System (see Chapter 5 for specific targets). However, some impacts on these land cover types may still occur (e.g., allowable impacts to serpentine bunchgrass grassland are limited to 550 acres [**Table 4-2]**). Because of the high importance and rarity of serpentine soils and their habitats, these areas will be avoided whenever feasible during project planning.

In cases where serpentine areas are part of a project site in a developed area, the project will be designed to preserve larger patches of serpentine outside the development area and limit impacts to the smallest patches feasible and to the edges of serpentine patches regardless of their size. The length of the edge of the serpentine patch that is directly adjacent to the developed area will be minimized and will include as large a buffer as possible between the serpentine edge and the developed area. Landscaping will not be planted on serpentine areas except as needed to reduce fire hazards adjacent to structures consistent with County fire hazard reduction regulations (see also Condition 10). Plantings will not include species that are known or suspected to invade serpentine habitats or cross-pollinate with endemic serpentine plant species or other native plants.

On undeveloped sites, the project area and construction staging area must be located to avoid or minimize impacts to any serpentine on site. The guidelines described above for developed areas will also be followed for project sites in undeveloped areas.

Where mapped serpentine cannot be avoided, the minimization measures listed below will be implemented.

- Conduct surveys of the serpentine vegetation to inventory for covered species and evaluate habitat quality for covered species.
- For portions of the development area that are in Bay checkerspot butterfly habitat units identified in Appendix D, survey the site for the presence of larval host plants of Bay checkerspot butterfly. If larval host plants are found, conduct reconnaissance level surveys for adult butterflies during the peak of the flight period to determine species presence or absence.
- Locate the project footprint as far from the covered species or the highest-quality serpentine habitat as is feasible. Utilize applicable buffers as identified in this chapter.
- If covered plants occur on the site and cannot be avoided, notify the Implementing Entity of the construction schedule so that plant salvage can be considered and potentially implemented (see Condition 19).

Condition 14. Valley Oak and Blue Oak Woodland Avoidance and Minimization

Valley oak woodland and blue oak woodland are considered by CDFG to be sensitive biotic communities (California Department of Fish and Game 2003). There is evidence that valley oak woodland was once one of the dominant land cover types on the floor of the Santa Clara Valley, but it has been largely removed by urban and agricultural development (San Francisco Estuary Institute 2006, 2008). These communities can provide important foraging or movement habitat for species covered by the Plan—California red-legged frog, and California tiger salamander—as well as for many other native species. For these reasons, these two oak woodland land cover types would benefit from some avoidance and minimization associated with covered activities.

All covered activities will implement the following actions to avoid or minimize impacts on valley and blue oak woodland.

Project Planning

- Projects on sites supporting substantial stands of valley oak woodland or blue oak woodland will minimize their impacts on these communities and preserve these stands on site when to do so would further the biological goals and objectives of the Plan. For example, projects should preserve oak woodland communities that are adjacent to existing stands of protected oak woodlands to avoid habitat fragmentation and degradation of wildlife linkages.
- Projects will avoid to the maximum extent feasible irrigating in and around valley oak woodland and will avoid altering hydrology of the site, including location of septic leach fields, such that valley oak woodland receives more water than under pre-project conditions.
- Large and healthy trees will be maintained on site whenever feasible. Local jurisdictions may set tree size thresholds for preservation that are consistent with local tree ordinances. Large valley oak trees still healthy today are clearly visible on air photos from as far back as 1939 (San Francisco Estuary Institute 2006), even though they are surrounded by agricultural fields or urban development. Preserved trees can provide habitat value for many decades; they also provide a significant community amenity.
- If trees are maintained on a site, buffer zones will be established between preserved valley oak or blue oak trees and development at a distance equal to or greater than the root protection zone, which is defined as a buffer zone determined by calculating one foot for each inch of trunk diameter measured at 4.5 feet above ground surface (Matheny and Clark 1998).

Project Construction

- Temporary project access points will be constructed as close as possible to the work area to minimize necessity for tree removal.
- Roads and pathways will be aligned outside of the tree's root protection zone (as defined above) whenever possible.
- Roads and pathways designed beneath or within 25 feet of the dripline of oak trees will be graded using hand-held equipment and will use permeable surfacing (e.g., grass pavers that allow runoff to infiltrate the ground).
- Alteration of natural grade through fill or other means within the root protection zone of oak trees will be minimized.
- Trenching for utility lines and other purposes will be minimized within root protection zones. Utilities may be installed in these areas by boring below the root zone.
- If extensive pruning of blue oaks and valley oaks is necessary, pruning will be conducted during the winter dormant period for these species and under the supervision of an arborist certified to International Society of Arboriculture or similar standards.

6.6 Conditions to Minimize Impacts on Specific Covered Species

Species-specific conditions are presented below. The timing of species habitat surveys, preconstruction surveys, and construction monitoring relative to impacts are described below and summarized in **Table 6-8**. For long term projects and projects that are phased[18], the frequency and timing of surveys relative to impacts will be determined by the local jurisdiction or Implementing Entity in coordination with the Wildlife Agencies on a case-by-case basis. At a minimum, surveys and monitoring (if required) will be done prior to each construction phase if the entire project area is not continuously disturbed between phases.

The Implementing Entity will maintain and update modeled habitat maps based on guidance provided in Chapter 7, *Monitoring and Adaptive Management Program.* For species that require surveys based on modeled habitat[19], qualified biologists will utilize the most current modeled habitat maps available from the Implementing Entity to guide where surveys must be conducted. Surveys will be conducted based on modeled habitat maps that are updated throughout Plan implementation. Similarly, the Implementing Entity will track impacts to modeled habitat based on modeled habitat maps updated during Plan implementation.

[18] Phasing may include planned phasing of construction (e.g., multi-year phasing of a road construction project), or unplanned gaps in construction activity.
[19] San Joaquin kit fox, western burrowing owl, and Bay checkerspot butterfly.

6.6.1 Selected Covered Wildlife Species

Conditions 15–18 identify conditions on covered activities that are specific to some of the covered species. Activities that may affect these covered species must also adhere to other applicable conditions in this chapter, including Condition 1, *Avoid Direct Impacts on Legally Protected Plant and Wildlife Species*. A summary of species surveys, preconstruction surveys, and construction monitoring requirements is provided in **Table 6-8**.

Condition 15. Western Burrowing Owl

To avoid or minimize direct impacts of covered activities on western burrowing owls, the procedures described below will be implemented. This condition incorporates survey, avoidance, and minimization guidelines from the following western burrowing owl conservation plans and other sources pertaining to the study area. The avoidance and minimization process for western burrowing owl as required in this condition is illustrated in **Figure 6-4**.

- CDFG *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 1995).
- CDFG *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 2012).
- *Draft Burrowing Owl Habitat Conservation Strategy and Implementation Plan* (City of San José 2000).
- *City of Morgan Hill—Citywide Burrowing Owl Habitat Mitigation Plan* (City of Morgan Hill 2003).
- Personal communication with Jack Barclay regarding ongoing monitoring efforts in the study area including annual monitoring at San José International Airport.
- Various unpublished reports from survey efforts in the study area.
- Guidance from CDFG.

Western Burrowing Owl Habitat Survey

Western burrowing owl habitat surveys will be required in the study area in all modeled occupied nesting habitat (see **Figure 5-11**). Surveys are not required in sites that are mapped as potential burrowing owl nesting or only overwintering habitat. Modeled habitat types may change throughout the permit term based on the best available scientific data. For example, the Implementing Entity will be conducting annual surveys or collecting annual survey data of other organizations in occupied nesting habitat throughout the permitarea to determine the annual status of known nesting areas the number of adult breeding owls present. The Implementing Entity will also coordinate with other South Bay local

governments, special districts, and non-profit organizations every 3 years to assess status of the burrowing owl population in the entire study area and the expanded study area for burrowing owl conservation, outside areas of modeled occupied habitat.

Habitat surveys in occupied nesting habitat are required in both breeding and non-breeding seasons. If the project site falls within occupied nesting habitat, a qualified biologist will map areas with burrows (i.e., areas of highest likelihood of burrowing owl activity) and all burrows that may be occupied (as indicated by tracks, feathers, egg shell fragments, pellets, prey remains, or excrement) on the project site. This mapping will be conducted while walking transects throughout the entire project footprint, plus all accessible areas within a 250-foot radius from the project footprint. 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, while in open areas with little vegetation they can be 50 feet apart.

This methodology is consistent with other accepted survey protocols for this species (California Burrowing Owl Consortium 1993). The Implementing Entity may update this protocol during the permit term based on changes to the accepted protocol with the concurrence of the Wildlife Agencies. 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 habitat survey, and if the project does not fully avoid impacts to the suitable habitat, preconstruction surveys will be required. Suitable habitat is fully avoided if the project footprint does not impinge on a 250-foot buffer around the suitable burrow.

Preconstruction Survey

Prior to any ground disturbance related to covered activities, a qualified biologist will conduct preconstruction surveys in all suitable habitat areas as identified during habitat surveys. The purpose of the preconstruction surveys is to document the presence or absence of burrowing owls on the project site, particularly in areas within 250 feet of construction activity.

To maximize the likelihood of detecting owls, the preconstruction survey will last a minimum of three 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 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 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 project proponent may also conduct a preliminary survey up to 14 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.

Implementation of Covered Activities in Burrowing Owl Habitat

In order to allow covered activities to go forward in burrowing owl habitat prior to the formal take authorization of individuals described above, project applicants will employ avoidance measures described below to ensure that direct take does not occur. Application of these measures is illustrated in **Figure 6-4**. The below avoidance measures apply to all projects that affect any burrowing owl habitat, regardless of whether surveys are required by this condition. In other words, if a project is occurring outside of modeled occupied nesting habitat, the project proponent is obligated to ensure avoidance and minimization of impact to burrowing owls according to the measures described below.

Avoidance Measures

Breeding Season

If evidence of western burrowing owls is found during the breeding season (February 1–August 31), the project proponent will avoid all nest sites that could be disturbed by project construction during the remainder of the breeding season or while the nest is occupied by adults or young (occupation includes individuals or family groups foraging on or near the site following fledging). Avoidance will include establishment of a 250-foot non-disturbance buffer zone around nests. Construction may occur outside of the 250-foot non-disturbance buffer zone. Construction may occur inside of the 250-foot non-disturbance buffer during the breeding season if:

- the nest is not disturbed, and
- the project proponent develops an avoidance, minimization, and monitoring plan that will be reviewed by the Implementing Entity and the Wildlife Agencies prior to project construction based on the following criteria.
    - The Implementing Entity and the Wildlife Agencies approves of the avoidance and minimization plan provided by the project applicant.
    - A qualified 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 qualified 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, these activities will cease within the 250-foot buffer. Construction cannot resume within the 250-foot buffer until the adults and juveniles from the occupied burrows have moved out of the project site.
- If monitoring indicates that the nest is abandoned prior to the end of nesting season and the burrow is no longer in use by owls, the non-disturbance buffer zone may be removed. The biologist will excavate the burrow to prevent reoccupation after receiving approval from the Wildlife Agencies.

The Implementing Entity and the Wildlife Agencies have 21 calendar days to respond to a request from the project proponent to review the proposed construction monitoring plan. If these parties do not respond within 21 calendar days, it will be presumed that they concur with the proposal and work can commence.

Non-Breeding Season

During the non-breeding season (September 1–January 31), the project proponent will establish a 250-foot non-disturbance buffer around occupied burrows as determined by a qualified biologist. Construction activities outside of this 250-foot buffer are allowed. Construction activities within the non-disturbance buffer are allowed if the following criteria are met in order to prevent owls from abandoning important overwintering sites.

- A qualified biologist monitors the owls for at least 3 days prior to construction to determine baseline foraging behavior (i.e., behavior without construction).
- The same qualified 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 nesting and foraging behavior as a result of construction activities, these activities will cease within the 250-foot buffer.
- If the owls are gone for at least one week, the project proponent may request approval from the Implementing Entity that a qualified biologist excavate usable burrows 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.

Construction Monitoring

Based on the avoidance, minimization, and monitoring plan developed (as required in the above section), during construction, the non-disturbance buffer zones will be established and maintained if applicable. A qualified biologist will

monitor the site consistent with the requirements described above to ensure that buffers are enforced and owls are not disturbed. The biological monitor will also conduct training of construction personnel on the avoidance procedures, buffer zones, and protocols in the event that a burrowing owl flies into an active construction zone.

Passive Relocation

Passive relocation would not be allowed under the Plan until the positive growth trend described in Section 5.4.6 is achieved. Once this occurs, passive owl relocation may be allowed, with the approval of the Wildlife Agencies, on project sites in the non-breeding season (September 1–January 31) if the other measures described in this condition do not allow work to continue. Passive relocation would only be proposed if the burrow needed to be removed, or had the potential of collapsing (e.g., from construction activities), as a result of the covered activity.

If passive relocation is eventually allowed, a qualified biologist can passively exclude birds from their burrows during non-breeding season only by installing one-way doors in burrow entrances. These doors will be in place for 48 hours to ensure owls have left the burrow, and then the biologist will excavate the burrow to prevent reoccupation. Burrows will be excavated using hand tools. During excavation an escape route will be maintained at all times. This may include inserting an artificial structure into the burrow to avoid having the overburden collapse into the burrow and trapping owls inside. Other methods of passive relocation, based on best available science, may be approved by the Wildlife Agencies during Plan implementation.

Exceptions to Passive Relocation Prohibition

Due to the relatively low numbers of burrowing owls in the study area, it is not expected that the prohibition of passive relocation will result in project delays. However, it is possible that a covered activity could not proceed due to avoidance measures for burrowing owl in this condition if owls continually persist on a site where avoidance is not feasible. In such cases, a project proponent may apply for an exception based on the following process. For this condition, the term exception means an allowance to conduct passive relocation of burrowing owls during the non-breeding season only when this activity is not otherwise allowed. This exception process is necessary to allow reasonable use and development of a property based on the variety of constraints and factors that may affect the property. In situations where exceptions are granted, other portions of this condition may still apply. Exceptions will be used in a minority of cases with special circumstances that limit or restrict the ability of a landowner to fully apply the condition.

Exceptions may be requested through the standard application process described in Section 6.8, or through a separate request process. Private applicants must apply for a passive relocation exception through their local jurisdiction. Project

proponents must develop and submit with the request for exception a passive relocation plan. The passive relocation plan must document the following.

1. That owls have occupied the site for a full year without relocating voluntarily. Surveys documenting presence must be completed by a qualified biologist and results must be provided in a written report. The report should confirm that one or more individuals (i.e., unique owl[s]) were monitored for a year and that the owl(s) had used the site for a full year[20].
2. The proposed process for relocation, including schedule for the proposed passive relocation and name of the qualified biologist.

The local jurisdiction, the Implementing Entity, and the Wildlife Agencies will meet to discuss the proposed passive relocation plan. Exceptions will be considered based on, but not limited to, the following factors:

1. The parcel is equal to or less than 3 acres and is more than 1,000 feet from other suitable nesting or foraging habitat such that it is unlikely the site can sustain burrowing owls into the future.
2. If the site has historically been used for nesting (within the last 3 years).
3. If the site is a target for a burrowing owl temporary or permanent management agreement.

As part of the review process, the Implementing Entity and Wildlife Agencies will consider the implications of an exception on the burrowing owl population and progress toward the biological goals and objective of the Plan. A passive relocation exception will not be granted if the Implementing Entity and Wildlife Agencies determine that such an exception, as mitigated, would preclude implementation of the conservation strategy of the Habitat Plan or conflict with other applicable requirements of the Habitat Plan and local policies. The local jurisdiction or the Implementing Entity must make written findings that document these considerations and the rationale for the exception.

Additional mitigation may be required as part of an approval to implement passive relocation that is otherwise prohibited by the Plan. The need for and form of additional mitigation will be determined and approved by the Implementing Entity and Wildlife Agencies. Additional mitigation could include payment of additional fees, or contribution of occupied lands to the Reserve System. Applicable fees may be imposed by the local jurisdiction for processing exception requests. Mitigation will be proportional to the impact occurring as a result of a specific eviction and will fully mitigate such evictions.

The Implementing Entity will compile a list of all exceptions granted each calendar year for inclusion in the annual report to the Wildlife Agencies.

[20] If monitoring reveals that an owl(s) has vacated the site for 10 consecutive days or more, the project applicant may assume that the owl has voluntarily relocated and a qualified biologist may take measures to collapse suitable habitat to discourage new owls from occupying the site.

Condition 16. Least Bell's Vireo

To avoid and minimize direct impacts of covered activities on least Bell's vireos, the following procedures will be implemented. These survey requirements provide compliance with the Plan and the MBTA (least Bell's vireo is a listed species, so the HCP permit also serves as a Special Purpose Permit under MBTA; see Chapter 1 for details).

Habitat Survey

Least Bell's vireo surveys will only be required for projects occurring within potential breeding habitat. The Implementing Entity will provide maps showing the geographic regions where surveys may be required. These maps will be updated during the permit term to incorporate best available science on where this species may be found. At the time of Plan adoption, the area of required surveys is limited to the Pajaro watershed, including Uvas, Llagas, and Pacheco sub-watersheds.

Projects occurring within the mapped area require surveys if the project-specific verified land cover map (see Section 6.8.3 *Item 3: Land Cover Types on Site*) shows that the project area is within 250 feet of riparian land cover types. If a project meets this criterion, a qualified biologist will conduct a field investigation to identify and map early successional riparian vegetation (typically dominated by willow shrubs and other thick understory vegetation) which may be used for nesting. If early successional riparian vegetation is found, the project proponent may revise the proposed project to avoid all areas within a 250-foot buffer around the potential nesting habitat and surveys will be concluded.

Preconstruction Survey

If the project proponent chooses not to avoid the potential nesting site and the 250-foot buffer, additional nesting surveys are required. Prior to any ground disturbance related to covered activities, a qualified biologist will:

1. Make his/her best effort to determine if there has been nesting at the site in the past 3 years. This includes checking the CNDDB, contacting local experts, and looking for evidence of historical nesting (i.e., old nests).
2. If no nesting in the past 3 years is evident, conduct a preconstruction survey in areas identified in the habitat survey as supporting potential least Bell's vireo nesting habitat. Surveys will be made at the appropriate times of year when nesting use is expected to occur. The surveys will document the presence or absence of nesting pairs of least Bell's vireo. Protocol-level surveys will be used (USFWS's 2001 least Bell's vireo survey guidelines or latest protocol). Surveys will conclude no more than two calendar days prior to construction.

To avoid last minute changes in schedule or contracting that may occur if an active nest is found, the project proponent may also conduct a preliminary survey up to 14 days before construction. If one or more least Bell's vireo nests are found present (through step 1 or 2 above), the nest site(s) plus a 250-foot buffer will be avoided (see below for additional avoidance and minimization details). The Wildlife Agencies will be notified immediately of nest locations.

Avoidance and Minimization

Covered activities must avoid active least Bell's vireo nests during the breeding season (March 15–July 31) by maintaining at least a 250-foot no-activity buffer around all active nests. As long as the nest remains active, no activity will occur within the established buffer. Disturbance to previous nesting sites (for up to 3 years) will also be avoided during the breeding season unless the disturbance is required for the conservation strategy or to maintain public safety. Least Bell's vireos use previous nesting sites, and disturbance during the breeding season may preclude birds from using existing nests.

The required buffer may be reduced in areas where there are sufficient barriers or topographic relief to protect the nest from excessive noise or other disturbance. Implementing Entity technical staff will coordinate with the Wildlife Agencies and evaluate exceptions to the minimum no-activity buffer distance on a case-by-case basis.

Construction Monitoring

If occupied nests are identified, a qualified biologist will monitor construction to ensure that the 250-foot no-activity buffer around all active least Bell's vireo nests is maintained to ensure that covered activities do not affect nest success. If monitoring indicates that construction outside of the buffer is affecting breeding, the buffer will be increased if space allows (e.g., move staging areas farther away). If space does not allow, construction will cease until the young have fledged from the nest or until the end of the breeding season, whichever occurs first. The biological monitor will also conduct training of construction personnel on the avoidance procedures, buffer zones, and protocols in the event that a least Bell's vireo flies into an active construction zone (i.e., outside the buffer zone).

Condition 17. Tricolored Blackbird

To avoid direct impacts of covered activities on nesting tricolored blackbird colonies, the following procedures will be implemented.

Habitat Survey

Projects require surveys if the project-specific verified land cover map (see Section 6.8.3 *Item 3: Land Cover Types on Site*) shows that the project area is within 250 feet of any riparian, coastal and valley freshwater marsh (perennial wetlands), or pond land cover types. If a project meets this criterion, a qualified biologist will conduct a field investigation to identify and map potential nesting substrate. Nesting substrate generally includes flooded, thorny, or spiny vegetation (e.g., cattails, bulrushes, willows, blackberries, thistles, or nettles). If potential nesting substrate is found, the project proponent may revise the proposed project to avoid all areas within a 250-foot buffer around the potential nesting habitat and surveys will be concluded.

Preconstruction Survey

If the project proponent chooses not to avoid the potential nesting habitat and the 250-foot buffer, additional nesting surveys are required. Prior to any ground disturbance related to covered activities, a qualified biologist will:

1. Make his/her best effort to determine if there has been nesting at the site in the past 5 years. This includes checking the CNDDB, contacting local experts, and looking for evidence of historical nesting (i.e., old nests).
2. If no nesting in the past 5 years is evident, conduct a preconstruction survey in areas identified in the habitat survey as supporting potential tricolored blackbird nesting habitat. Surveys will be made at the appropriate times of year when nesting use is expected to occur. The surveys will document the presence or absence of nesting colonies of tricolored blackbird. Surveys will conclude no more than two calendar days prior to construction.

To avoid last minute changes in schedule or contracting that may occur if an active nest is found, the project proponent may also conduct a preliminary survey up to 14 days before construction. If a tricolored blackbird nesting colony is present (through step 1 or 2 above), a 250-foot buffer will be applied from the outer edge of all hydric vegetation associated with the site and the site plus buffer will be avoided (see below for additional avoidance and minimization details). The Wildlife Agencies will be notified immediately of nest locations.

Avoidance and Minimization

Covered activities must avoid tricolored blackbird nesting habitat that is currently occupied or have been used in the past 5 years. If tricolored blackbird colonies are identified during the breeding season, covered activities will be prohibited within a 250-foot no-activity buffer zone around the outer edge of all hydric vegetation associated with the colony. This buffer may be reduced in areas with dense forest, buildings, or other habitat features between the construction activities and the active nest colony, or where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance.

Depending on site characteristics, the sensitivity of the colony, and surrounding land uses, the buffer zone may be increased. Land uses potentially affecting a colony will be observed by a qualified biologist to verify that the activity is not disrupting the colony. If it is, the buffer will be increased. Implementing Entity technical staff will coordinate with the Wildlife Agencies and evaluate exceptions to the minimum no-activity buffer distance on a case-by-case basis.

Construction Monitoring

If construction takes place during the breeding season when an active colony is present, a qualified biologist will monitor construction to ensure that the 250-foot buffer zone is enforced. If monitoring indicates that construction outside of the buffer is affecting a breeding colony, the buffer will be increased if space allows (e.g., move staging areas farther away). If space does not allow, construction will cease until the colony abandons the site or until the end of the breeding season, whichever occurs first. The biological monitor will also conduct training of construction personnel on the avoidance procedures, buffer zones, and protocols in the event that tricolored blackbirds fly into an active construction zone (i.e., outside the buffer zone).

Condition 18. San Joaquin Kit Fox

Disturbance of all San Joaquin kit fox dens will be avoided to the maximum extent possible. To avoid or minimize direct impacts of covered activities on San Joaquin kit fox, the following procedures will be implemented. This program was based on USFWS's *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox prior to or during Ground Disturbance* (U.S. Fish and Wildlife Service 2011).

Habitat Survey

San Joaquin kit fox surveys will only be required for projects occurring within modeled habitat (**Appendix D**). (This model will be updated as needed based on best available scientific information.) The Implementing Entity will provide updated modeled habitat maps to the County (the only jurisdiction in which these areas occur). A qualified biologist will conduct a field evaluation of suitable breeding or denning habitat for kit fox for all covered activities that occur within modeled habitat and map potential den sites. If the project does not fully avoid impacts on suitable dens, preconstruction surveys will be required. Suitable breeding habitat is fully avoided if the project footprint does not overlap with a suitable den or with a 250-foot buffer around the suitable den.

Preconstruction Survey

Prior to any ground disturbance related to covered activities, a qualified biologist will conduct a preconstruction survey for covered activities in areas identified by species surveys as being suitable breeding or denning habitat. The surveys will evaluate use of dens by kit foxes using methods appropriate for the northern edge of the species' range, such as placing a tracking medium in the project area where suitable dens occur. Surveys will conclude no more than two calendar days prior to construction. To avoid last minute changes in schedule or contracting that may occur if a kit fox or active den is found, the project proponent may also conduct a preliminary survey up to 14 days before construction. On the parcel where the activity is proposed, the biologist will survey the proposed disturbance footprint and a 250-foot radius from the perimeter of the proposed footprint to identify San Joaquin kit foxes and/or suitable dens. Adjacent parcels under different land ownership will not be surveyed unless access is granted within the 250-foot radius. The status of all dens will be determined and mapped. Written results of preconstruction surveys will be submitted to USFWS and CDFG within two calendar days after survey completion and before the start of ground disturbance.

If San Joaquin kit foxes and/or suitable dens (i.e., dens greater than 5 inches in diameter) are identified in the survey area, the conditions described below will be implemented.

Avoidance and Minimization

The goal of the avoidance and minimization measures for San Joaquin kit fox are to avoid all injury or death to kit fox in the study area, and to minimize harm or harassment to the species. No take authorization for injury or death to kit fox is provided by this Plan due to the rarity of the species in the study area. The following avoidance and minimization conditions will be applied to projects that do not fully avoid suitable dens or kit fox individuals.

- If a suitable San Joaquin kit fox den is discovered in the proposed development footprint, the den will be monitored for 3 days by a USFWS- and CDFG-approved biologist using a tracking medium or an infrared beam camera to determine if the den is currently being used.
- Unoccupied dens will be destroyed immediately to prevent subsequent use.
- If a natal or pupping den is found, USFWS and CDFG will be notified immediately. The den will not be destroyed until the pups and adults have vacated and then only after further consultation with USFWS and CDFG.
- If kit fox activity is observed at the den during the initial monitoring period, the den will be monitored for an additional 5 consecutive days from the time of the first observation to allow any resident animals to move to another den while den use is actively discouraged. For dens other than natal or pupping dens, use of the den can be discouraged by partially plugging the entrance with soil such that any resident animal can easily escape. Once the den is

determined to be unoccupied it may be excavated under the direction of the biologist. Alternatively, if the animal is still present after 5 or more consecutive days of plugging and monitoring, the den may have to be excavated by hand when, in the judgment of a biologist, it is temporarily vacant (i.e., during the animal's normal foraging activities). If at any point during excavation a kit fox is discovered inside the den, the excavation activity shall cease immediately and monitoring of the den as described above will be resumed. Destruction of the den may be completed when, in the judgment of the biologist, the animal has escaped from the partially destroyed den.

- Construction and on-going operational requirements from *Standardized Recommendations for Protection of the Endangered San Joaquin Kit Fox prior to or during Ground Disturbance* (U.S. Fish and Wildlife Service 2011) or the latest guidelines will be implemented.
- If active or suitable dens are identified within the proposed disturbance footprint or outside the proposed project footprint but within a 250-foot buffer, exclusion zones around each den entrance or cluster of entrances will be demarcated. The configuration of exclusion zones will be circular, with a radius measured outward from the den entrance(s). No covered activities will occur within the exclusion zones. Exclusion zone radii for atypical dens and suitable dens will be at least 50 feet and will be demarcated with four to five flagged stakes. Exclusion zone radii for known dens will be at least 100 feet and will be demarcated with staking and flagging that encircles each den or cluster of dens but does not prevent access to the den by the foxes.

Construction Monitoring

If construction takes place while kit fox dens are occupied, a qualified biologist will be present to ensure compliance with the avoidance and minimization measures listed above. The frequency of monitoring will be approved by USFWS and CDFG and will be based on the frequency and intensity of construction activities and the likelihood of disturbance to the active dens. In most cases, monitoring will occur at least weekly, but in some cases daily monitoring may be appropriate to ensure that disturbance of San Joaquin kit fox is minimized.

6.6.2 Covered Plant Species

Impacts on covered plant occurrences are constrained by limits on the number of occurrences impacted, as described in Chapter 4 (see **Table 4-6**). Accordingly, only two additional conditions on covered activities is needed to meet regulatory requirements for covered plants.

Condition 19. Plant Salvage when Impacts are Unavoidable

Where impacts on covered plant species cannot be avoided and plants will be removed by approved covered activities, the Implementing Entity has the option of salvaging the covered plants. Salvage of covered plants is conducted in addition to mitigation that may be required for impacts on covered plants.

Plant salvage as mitigation is acknowledged as a technique that rarely succeeds; it is opposed by conservation organizations as a primary mitigation tool (Howald 1996; California Native Plant Society 1998). Therefore, the Implementing Entity must carefully weigh the expected costs and potential benefits of the salvage effort before undertaking it. Salvage guidelines are presented below for all covered plants, for perennial species, and for annual species.

All Covered Plants

All salvage operations will be conducted by the Implementing Entity or a third party contractor approved by the Implementing Entity. Translocation activities will be reviewed and approved by the Wildlife Agencies in advance of translocation activities occurring. Translocated plants should be moved during their dormant season in order to minimize impacts to individuals. To ensure enough time to plan salvage operations, project proponents will notify the Implementing Entity of their schedule for removing the covered plant occurrence.

The Implementing Entity may conduct investigations into the efficacy of salvaging seeds from the soil seed bank for both perennial and annual species. The soil seed bank may add to the genetic variability of the occurrence. Covered species may be separated from the soil though garden/greenhouse germination or other appropriate means. Some topsoil taken from impact sites may also be moved to the transplant site in the reserve to introduce soil microorganisms.

The Implementing Entity will transplant new occurrences such that they constitute separate populations and do not become part of an existing population of the species, as measured by the potential for genetic exchange among individuals through pollen or propagule (e.g., seed, fruit) dispersal. Transplanting or seeding *receptor* sites (i.e., habitat suitable for establishing a new population) will be carefully selected on the basis of physical, biological, and logistical considerations (Fiedler and Laven 1996); some examples of these are listed below.

- Historic range of the species.
- Soil type.
- Soil moisture.
- Topographic position, including slope and aspect.

- Site hydrology.
- Mycorrhizal associates.
- Presence or absence of typical associated plant species.
- Presence or absence of herbivores or plant competitors.
- Site accessibility for establishment, monitoring, and protection from trampling by cattle or trail users.

Perennial Covered Plants

Salvage methods for perennial species will be tested for whole individuals, cuttings, and seeds. Salvage measures will include the evaluation of techniques for transplanting as well as germinating seed in garden or greenhouse and then transplanting to suitable habitat sites in the field. Techniques will be tested for each species, and appropriate methods will be identified through research and adaptive management. Where plants are transplanted or seeds distributed to the field, they will be located in reserves in suitable habitat to establish new populations. Field trials will be conducted to evaluate the efficacy of different methods and determine the best methods to establish new populations. Transplanting within the reserves will only minimally disturb existing native vegetation and soils. Supplemental watering may be provided as necessary to increase the chances of successful establishment, but must be removed following initial population establishment. Supplemental watering will include watering throughout first growing season to mimic natural rainfall patterns. During establishment, areas will be fenced off as necessary to prevent trampling or grazing by livestock. These areas will not be selected for controlled burns. Once the population has established itself, as determined by success criteria that may include setting seed, 3-year survival, or other criteria developed in agreement with the Wildlife Agencies, then fencing and irrigation will be removed and the site may be burned for management purposes if that is appropriate for the target plant.

Annual Covered Plants

For annual covered plants, mature seeds will be collected from all individuals for which impacts cannot be avoided (or if the population is large, a representative sample of individuals). If storage is necessary, seed storage studies will be conducted to determine the best storage techniques for each species. A seed storage facility will also be contacted and consulted regarding collecting and storage requirements of the facility. One of the leading seed banks in California is the Rancho Santa Ana Botanic Garden in Claremont, CA (Rancho Santa Ana Botanic Garden 2010). This facility has strict seed collection and storage guidelines available on its website (http://www.rsabg.org).

If needed, studies will be conducted on seeds germinated and plants grown to maturity in garden or greenhouse to propagate larger numbers of seed. Such

studies can be contracted with research institutions such as the Rancho Santa Ana Botanic Garden, or carried out by other qualified biologists. Seed propagation methods will ensure that genetic variation is not substantially affected by propagation (i.e., selection for plants best adapted to cultivated conditions). Field studies will be conducted under the Adaptive Management Program to determine the efficacy and best approach for dispersal of seed into suitable habitat. Where seeds are distributed to the field, they will be located in reserves in suitable habitat to establish new populations. If seed collection methods fail (e.g., due to excessive seed predation by insects), alternative propagation techniques will be necessary.

Condition 20. Avoid and Minimize Impacts to Covered Plant Occurrences

Almost all known occurrences of covered plants in the study area are outside the planning limits of urban growth and outside the footprint of covered activities. Many of these occurrences are expected to be included in the Reserve System. However, uncertainty remains regarding impacts on covered plants because of the lack of surveys in many areas, the general nature of some plant occurrence data, and the uncertainty in the location of some covered activities. To account for this uncertainty, impacts on covered plants are tracked by occurrence[21], as described in Chapter 4. To ensure compliance with the requirements in Chapter 5, surveys for covered plants will be conducted in certain areas in order to 1) identify occurrences of covered plants, and 2) assess the condition of these occurrences.

Covered Plant Surveys

To ensure that plants are adequately conserved relative to impacts of covered activities, plant surveys will identify occurrences of covered plants that may be affected by covered activities (see Section 5.3.1 *Land Acquisition and Restoration Actions* subheading *Incorporating Covered Plant Species*). Surveys are required in locations where covered plant occurrences are most likely to occur. Covered plant surveys will be required in the following land cover types and specific habitats. The plant species for which surveys are required are also indicated. These land cover types and habitats were identified because the majority of covered species occur primarily or exclusively in serpentine land cover types.

- Serpentine bunchgrass grassland: Survey for smooth lessingia, fragrant fritillary, Metcalf canyon jewelflower, most beautiful jewelflower, Tiburon paintbrush, and Coyote ceanothus.

[21] Occurrence can be synonymous with population for some species. However, some plant species may have several occurrences in one population. Definitions of plant populations will be developed for covered plants during implementation.

- Serpentine rock outcrop: Survey for Santa Clara Valley dudleya, smooth lessingia, Metcalf canyon jewelflower, most beautiful jewelflower, and Tiburon paintbrush.
- Serpentine seep: Survey for Mount Hamilton thistle.
- Mixed serpentine chaparral: Survey for Coyote ceanothus and most beautiful jewelflower.
- Mixed oak woodland and forest with serpentine soils: Survey for Loma Prieta hoita.
- Coast live oak forest and woodland with serpentine soils: Survey for Loma Prieta hoita.
- Northern coastal scrub and Diablan sage scrub with serpentine soils: Survey for Coyote ceanothus, Metcalf canyon jewelflower, most beautiful jewelflower, and smooth lessingia.

Plant surveys will also be required in suitable habitat within a 0.25 mile (1,320 feet) radius of a known occurrence of a covered plant to ensure that known occurrences are located (in most cases, these survey areas will overlap with the land cover types listed above). The Implementing Entity will maintain a map of known occurrences and the survey radius around each one based on this Plan and updates provided by the CNDDB (every six months) for the study area.

These surveys will be performed according to the current applicable guidelines of CDFG and/or USFWS for plant surveys (if available) except no floristic surveys are required. The appropriate survey period for each covered plant species is described in **Table 6-9**[22]. Surveys must be conducted at the time of year when the species can be identified in the field. In some cases, plants may be identifiable outside of the flowering period (e.g., Mount Hamilton thistle, Coyote ceanothus).

Inside the urban service area, surveys for covered plants will occur in land cover types and habitats listed above within the area on which the land cover fee will be levied and in any other areas where indirect effects could occur. The survey area must include buffers around structure where required vegetation clearing will occur to meet state and local fuel reduction regulations.

If a covered plant occurrence is observed on site, the condition of this occurrence must be described in the application package according to the guidelines in Chapter 5, Section 5.3.1 *Land Acquisition and Restoration Activities* subheading *Incorporating Covered Plant Species.* The condition of each covered plant occurrence must be documented as a baseline to compare future monitoring (if necessary) and to ensure that occurrences are protected within the Reserve System that are in as good or better condition than those lost to covered activities.

[22] These survey periods should be used as a guide only. Some plants can be readily identified by qualified botanists outside of the species' blooming period.

If a covered plant occurrence is found on the project site, the local jurisdiction will obtain the opinion of a qualified biologist regarding the projected long-term viability of a covered plant occurrence given the plant occurrence condition, site conditions, and project-level construction details. The qualified biologist will make this determination based on best available scientific information. In cases where it is difficult to project long-term viability, the qualified biologist will conservatively error in favor of the covered plant and assume that long-term viability will be reduced and the occurrence will be considered lost for tracking purposes. Impacts to covered plants will be avoided or minimized wherever possible by implementing the following conditions.

Avoidance and Minimization

In order to reduce impacts to covered plants, all covered activities will be confined to the minimum area necessary to complete the activity or construction. A setback buffer will be established around covered plant occurrences located on any project site or in an adjacent area that could be affected by construction traffic or activities. The setback buffer will be adequate to prevent or minimize impacts during or after project implementation. The plants and buffer area will be protected from encroachment and damage during construction by installing temporary construction fencing. Fencing will be bright-colored and highly visible. Fencing will be designed to keep construction equipment away from plants and prevent unnecessary damage to or loss of plants on the project site. Fencing will be installed under the supervision of a qualified biologist to ensure proper location and prevent damage to plants during installation. Fencing will be installed before any site preparation or construction work begins and will remain in place for the duration of construction. Construction personnel will be prohibited from entering these areas (the exclusion zone) for the duration of project construction.

Site Monitoring, Assessment, and Management

If a qualified biologist determines that the long-term viability of a covered plant occurrence will be reduced (as described below) by implementation of covered activities, the loss must be offset by protection, management, and monitoring of covered plant occurrences in the Reserve System prior to impacts (**Table 5-16**).

Some covered plant occurrences may only be disturbed or partially affected by covered activities, and viability may be maintained. It is important to monitor and, if possible, maintain these occurrences of covered plants where they occur, even if they are not protected within the Reserve System. Covered plant occurrences that are determined to be partially permanently affected by a qualified biologist (i.e., only a portion of the occurrence is impacted) by covered activities will be monitored by the Implementing Entity. The purpose of the monitoring will be 1) to assess whether the impact reduces the long-term viability of the occurrence and whether supplemental management actions are feasible and warranted, and 2) to determine whether the Implementing Entity must protect and

enhance or create[23] occurrences in the Reserve System according to **Table 5-16**. If the impact occurs to less than 5% of the total occurrence as measured by the number of individuals at the time of impact, then the impact is assumed not to affect long-term viability and will not require monitoring nor will it count as a permanent impact (**Table 4-6**). This allowance does not apply to Coyote ceanothus.

When determining viability for the purpose of assessing a partial or permanent impact, the Implementing Entity will consider the following factors.

1. Results of monitoring plant occurrences affected by covered activities (e.g., correlation between pre-project observations and actual viability post-project).
2. Impacts to date to the covered plant species and how close total impacts are to the allowable impact cap in the Plan (e.g., extra care taken when near cap not to exceed the cap).

Specific monitoring protocols and success criteria will be developed during implementation as appropriate for each covered species, according to the guidelines discussed here. Monitoring protocols can draw on those developed for other HCP/NCCPs. It is possible that only a portion of the occurrence will be located on the covered activity project site. In such instances, the monitoring protocol will address this issue. Three possible approaches include the following.

1. If the landowner agrees, the Implementing Entity will obtain access to the adjacent sites on which the rest of the plant occurrence is located, and surveys will include the entire occurrence.
2. If access to adjacent site(s) is not possible, or if for some other reason it is not feasible to survey the entire occurrence, then an alternative will be developed to estimate the extent and condition of the adjacent portion of the occurrence.
3. If only a small portion of the occurrence is on adjacent properties, then only the portion of the occurrence on the project site will be monitored and assessed for viability. The determination whether this is a full impact will be made based on the results for this portion of the occurrence only.

Population monitoring will be conducted by the Implementing Entity before the covered activity is implemented to document the baseline condition. For annual species, the minimum post-construction monitoring period will be 5 years. If extreme or unusual climate conditions affect the species, then monitoring will be extended 1 or 2 years, as appropriate to assess impacts and success. Monitoring will include estimates of percent cover and number of individuals. An occurrence will be assumed to retain long-term viability and will not require replacement in the Reserve System if the decline in occurrence size and percent cover from pre-project conditions is less than 25% over the monitoring period,

[23] Creation is only allowed to mitigate effects for Coyote ceanothus. All other plant occurrence creation would contribute to recovery (**Table 5-16**).

unless site-specific conditions otherwise suggest substantial declines in occurrence viability.

For perennial species, the minimum post-construction monitoring period will be 3 years. Monitoring will include estimates of density (percent cover), recruitment of seedlings if impacts included removing individuals, and measurements of adult plant health (e.g., signs of disease, herbivory, nutrient deficiencies, etc.). An occurrence of a perennial covered species will be assumed to retain long-term viability and will not require replacement in the reserve system if the decline in seedling recruitment and density from pre-project conditions is less than 25% over the monitoring period, unless site-specific conditions otherwise suggest substantial declines in occurrence viability.

The Implementing Entity will implement conservation actions on the site that would help to maintain or improve the condition of the occurrence, as long as an agreement can be reached with the landowner to conduct these measures. Possible conservation measures are described in Chapter 5. If plant occurrences are determined to not be viable based on post-project monitoring, the Implementing Entity must assess the loss as a full permanent impact and implement conservation actions accordingly. In these cases, mitigation would occur after the impact. However, the potential for mitigation to occur after impacts is unlikely given that the qualified biologist and Implementing Entity will make conservative determinations regarding projected impacts on long-term viability.

6.7 Receiving Take Authorization under the Plan

Take authorization will be provided by the Plan to three broad categories of covered activities: public projects proposed by the Permittees, private projects under the jurisdiction of the Permittees, and public projects by non-Permittees in the study area that are approved for inclusion by the Implementing Entity. Each of these situations is explained below.

6.7.1 Evaluation Process for Permittee Projects

The Plan permits provide the Permittees with take authorization along with the authority to approve covered activities complying with the terms of the Plan. If a Permittee undertakes a covered activity (see Chapter 2), the Permittee must document compliance with the Habitat Plan and provide a copy of this documentation to the Implementing Entity for tracking purposes (i.e., to track the amount of take coverage granted) before the Permittee take authorization may be used. As described in Chapter 8, the Permittees will develop a template Habitat Plan application package for use by private applicants and Permittees that includes all items described in this section prior to permit issuance. It is expected that the documentation will be similar to the *Habitat Plan application package*

required of private project proponents[24] applying to local jurisdictions for coverage (this application package is described in detail in Section 6.8 *Habitat Plan Application Package*, below).

Review and CEQA for Permittee Projects

Many covered activities are expected to be subject to CEQA[25]. When Permittees initiate projects that are also subject to CEQA, the terms of the Habitat Plan should generally be integrated into the CEQA environmental review process. To facilitate CEQA coordination, the Permittee should begin preparation of the Habitat Plan application package (or equivalent material) when the CEQA project description and alternatives for the project are developed such that requirements of the Habitat Plan can be used to inform site design and selection of the preferred alternative. The completed Habitat Plan documentation should be evaluated and approved by the appropriate CEQA lead agency of the Permittee concurrently with the lead agency's review of the associated CEQA documents. Projects exempt from CEQA may still be covered activities under this Plan and require compliance with the conditions of this Plan as described in this chapter.

Receiving Take Authorization for Permittee Projects

Incidental take associated with covered activities carried out by the Permittees is authorized under the permits issued for the Habitat Plan. These projects are therefore "pre-approved" for take authorization by the Wildlife Agencies as long as their effects were adequately analyzed, they meet the conditions of the Plan, and they pay the appropriate fees, if applicable. Each Permittee is responsible for ensuring that its covered activity is compliant with the conditions of approval described in this chapter. Take authorization will be in effect once the Permittee documents consistency with the Habitat Plan. The form developed by the Implementing Entity to document the consistency of private development with the Plan may also be used by Permittees for their own projects. Documentation of Plan consistency and a complete Habitat Plan application package must be submitted to the Implementing Entity for tracking purposes. The process for receiving take authorization under the Plan for public projects of the Permittees is shown in **Figure 6-5**.

[24] The term *project proponent* is used interchangeably with the term *applicant* or *project applicant* in this and subsequent chapters.
[25] Permittee covered activities that may not be subject to CEQA include operations and maintenance activities and projects that only require ministerial approval within local jurisdictions such as single family home construction.

6.7.2 Application Process for Private Projects

Private applicants seeking coverage under the Habitat Plan, including applicants that wish to opt in to the Plan[26], will apply to their local jurisdiction by submitting a *Habitat Plan application package* described in Section 6.8 *Habitat Plan Application Package*. A checklist for evaluating these applications will be developed by the Implementing Entity prior to the first ordinance implementing the Plan taking effect. The local jurisdiction will review the Habitat Plan application package for completeness in accordance with the checklist. For requests to opt in, the local jurisdiction will also evaluate the amount of take requested (i.e., acres of impacts) and whether or not take coverage is available for the project. If the application package is not complete, it will be returned to the project proponent with an explanation of why it is incomplete. If the application package is complete, the local jurisdiction will calculate the required fees on the basis of the requirements described in Chapter 9 and consistent with the local ordinance implementing the Plan. The determination of completeness of the application package rests with the local jurisdiction. If they choose, local jurisdictions may request technical assistance from the Implementing Entity staff in their review.

All applicable conditions will be identified and fees paid at (or before) the time of issuance of the first authorization of ground disturbance (typically a grading permit or building permit). In cases where there is no grading or other ground disturbance permit, the fees will be due upon issuance of the first permit that authorizes construction. If the project proponent requests to contribute land in lieu of fees or requests special project conditions, such requests must be reviewed and approved by the Implementing Entity. See Chapter 8, Section 8.2.1 *Permittees* for Permittees that may grant take authorization and Section 8.7 *Roles and responsibilities in Reviewing Applications for Take Authorization* for additional detail on application review.

The process for receiving take authorization for private projects is shown in **Figure 6-6**. Local agencies reviewing the Plan application package will be subject to the processing time and other requirements of the Permit Streamlining Act (Section 65920 et seq.) which requires public agencies to follow standardized time limits and procedures when making specific types of land use decisions.

Application Review and CEQA for Private Projects

Many private covered activities will require a land use approval and be subject to CEQA. For such covered activities, review of applications for take authorization should generally be undertaken concurrently with the CEQA environmental review. To facilitate this approach, the local jurisdiction should generally request

[26] Private parties that are not subject to the Plan (see **Figure 2-5**) have the option to request coverage under the Plan from the applicable local jurisdiction.

that project proponents submit initial Habitat Plan application package information as part of the land use approval application and CEQA process.

There are many benefits to drafting the Habitat Plan application early in the planning process. First, submitting initial Plan application package information during the land use approval / CEQA process will illustrate the various requirements of the Habitat Plan on 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 draft Plan application. Finally, it will enable the local jurisdiction to provide early review of the Plan application for completeness. Based on a review of this initial information and a determination of the Habitat Plan requirements, the local jurisdiction can establish conditions of approval specifying the Habitat Plan conditions and fee requirements. Habitat Plan fees will need to be paid prior to the issuance of construction permits (grading / building permits).

Each local jurisdiction is responsible for ensuring that covered activities, upon issuance of take, fully comply with the terms of the Habitat Plan.

Granting Take Authorization for Private Projects

Proponents of private projects that are covered by the Plan and not exempt (see Section 6.2 *Exemptions from Conditions*) must have their projects conditioned by the local jurisdiction obligating compliance with all terms and conditions of the Implementing Agreement, the Plan, and the state and federal permits that apply to the project prior to the local jurisdiction issuing take authorization. Such terms and conditions include, but are not limited to, those listed below.

- Compliance with all relevant avoidance, minimization, surveys, monitoring, and conservation measures determined by the local jurisdiction to apply to the project as required by the Plan.
- The right for the Permittee to monitor the applicant's compliance with all applicable conditions of this Plan.
- Imposition of a fee or dedication of land in lieu of the fee as described in Chapter 9 and in the local Implementing Ordinance.

Before take authorization is granted, Permittees must prepare a written determination of the project's consistency with the Plan. A template form for private applicants that documents this determination of consistency will be developed by the Implementing Entity prior to the first local ordinance taking effect (this consistency determination will be made based on the application checklist described above).

Once the Habitat Plan application package is deemed complete, the conditions of approval have been established and imposed, and the required fees (if applicable) have been paid, the project proponent will be granted take authorization by the

appropriate Permittee (see Chapter 9 for required fees and payment times). At this point, the project proponent will be allowed to proceed with the project consistent with other applicable local, state, and federal laws and local entitlements. Take authorization for impacts on covered species will be provided by the applicable Permittee consistent with the state and federal permits issued to all Permittees. Each local jurisdiction, working with the Implementing Entity will develop a process to document projects that receive take authorization but do not proceed with the project to have the take authorization removed from the Implementing Entity's records.

When Habitat Plan application packages are completed, each Permittee must provide a copy of the application material to the Implementing Entity for entry into the Habitat Plan database (described in Chapter 8 *Plan Implementation*).

6.7.3 Application Process for Non-Permittee Public Projects

Because the list and evaluation of covered activities in Chapter 2 is meant to be comprehensive, the Plan has included some projects that will be proposed by public entities that are not Permittees. For example, a special district or local school district may propose to build a project in one of the three participating cities or the unincorporated County. Although the special district or school district is not subject to the land use jurisdiction of the participating jurisdictions, the impacts of its project have been covered by the Plan and evaluated as part of the planned urban development within the jurisdiction. To receive coverage under the Plan, projects proposed by an entity that is neither a Permittee nor subject to the land use authority of a Permittee, the project proponent must apply directly to the Implementing Entity as a *Participating Special Entity*. The entity will provide the same Habitat Plan application package as private entities seeking coverage. See Chapter 8, Section 8.4 *Participating Special Entities*, for more details on the process by which Participating Special Entities receive take authorization under the Plan.

6.8 Habitat Plan Application Package

Private projects that are covered by the Plan must submit a *Habitat Plan application package* to the local jurisdiction for review and approval in order to receive coverage under the Habitat Plan. For their own projects, Permittees must submit an application package to the Implementing Entity for tracking purposes and pay the appropriate fees if applicable. The project proponent is responsible for preparing the application package and paying for any necessary field surveys, if required. The application package must contain the following items, if applicable, each of which is described in detail in this section.

- Item 1: An application form for coverage under the Plan.

- Item 2: A brief description and map of the project.
- Item 3: Documentation of land cover types on site.
- Item 4: Map of wetlands and waters, if applicable.
- Item 5: Results of applicable surveys for selected covered species.
- Item 6: Documentation of any additional and applicable avoidance and minimization requirements that will be implemented.

Each item in the application package builds on the previous item. For example, surveys for certain covered wildlife and plants (Item 5) are required only if specific land cover types are documented on the site (Items 3 and 4). Many covered activities will be able to comply with the Habitat Plan by only completing Items 1, 2, and 3 of the application package. For others, field surveys are limited to only the highest-value biological resources.

Most components of the application package can be prepared by the applicant, with the assistance of local planning staff. In some cases, the Plan requires that components be prepared or surveys or monitoring be conducted by *qualified biologist*. Please see *Qualified Biologists* below for details on the qualification process.

Templates for all these application components will be provided by the Implementing Entity to each local jurisdiction prior to the first local ordinance taking effect. These templates will also be posted on the Habitat Plan web site for use by private applicants and their consultants. Use of the templates will streamline the review and approval process by local jurisdictions. The Permittees may adjust the required components of the application package over time, consistent with the requirements of the Plan. To recover the costs of reviewing and processing these application packages, local jurisdictions may charge a fee associated with the application (see Chapter 9 for details).

The Habitat Plan application package, survey requirements, and conditions of approval were designed with the following principles in mind.

- Provide the necessary data to track impacts of all covered activities to allow the Implementing Entity to meet Plan requirements (e.g., land acquisition, Stay-Ahead provisions, wetland restoration).
- Simplify and reduce pre-project survey requirements relative to current and future environmental regulations throughout the Habitat Plan.
- Avoid and minimize impacts on covered species and natural land cover types to the maximum extent practicable on a regional scale, in compliance with federal and state endangered species laws.
- Ensure that survey requirements are proportional to impacts—the survey burden is lower on low-quality habitat than on high-quality habitat.
- When possible, limit survey requirements under the Plan to those required for other local, state, or federal environmental compliance (e.g., CEQA or

NEPA), and redirect resources previously spent on biological surveys to improve regional conservation.

Each of the required application components is described below.

6.8.1 Item 1: Project Application Form

The project application form will contain basic information about the project. The Implementing Entity will develop a form prior to issuance of the state and federal Plan permits that will be made available to the Permittees. Required forms will be available through the local jurisdictions and on the Habitat Plan website.

6.8.2 Item 2: Project Description and Map

The application package will include a brief project description including the location, assessor's parcel number, construction activity or maintenance methods, a description of the nature of the impacts (permanent or temporary), and timing (including duration) of the project or activity. The project description will be sufficient to document that it is a covered activity in the Plan (see Chapter 2). A legible vicinity map of the project site will also be provided to document that the project is within the Habitat Plan study area. A vicinity map will include any streams or water bodies that fall within the mapped area. If the project is located in Fee Zone A or B, but the project applicant believes that the project qualifies for Fee Zone C, the project applicant must demonstrate compliance with the criteria provided in Chapter 9, Section 9.4.1 *Habitat Plan Development Fees*, subheading *Land Cover Fee Zones*. A project detail map will be included that shows the area on which fees will be levied, as well as the full project parcel if inside the urban service area or the full development area if outside the urban service area, and any relevant landforms, roads, water bodies, and existing and proposed structures that will be affected by the proposed project.

6.8.3 Item 3: Land Cover Types on Site

As described in Chapter 3 *Physical and Biological Resources* a detailed land cover map was developed for the study area for this Plan. This land cover map was essential in estimating impacts of the covered activities (Chapter 4) and developing the conservation strategy (Chapter 5). However, due to limitations in the land cover mapping (see **Table 3-4**) and the potential for land cover to change over time, land cover types must be verified at the time applications are submitted. This step is also critical because almost all impacts under the Plan are tracked by land cover type.

Proponents of all projects and activities with quantifiable impacts, including approved Participating Special Entities, will specify the amount and type of land cover that will be permanently and temporarily impacted. All fees are paid on the development area (see **Figure 6-1**) except for land inside the urban service area designated with a land use of Urban Development or Rural Residential (see **Figure 2-2**) that is less than 10 acres, where fees are assessed on the parcel. In addition, all public corridor projects (e.g., stream and utility) pay fees based on the project footprint, regardless of parcel size. As described in Condition 12, projects that do not completely avoid indirect effects to wetlands (including wetlands on parcels adjacent to the covered activity development area) will be considered permanently impacted and will count towards the impact caps described in **Table 4-2** and will be assessed fees as described in Chapter 9.

Project proponents of activities that have temporary impacts are required to provide photographs that document the condition of the project site before the activity is implemented. These photographs will be compared to those required for post-project conditions (see Item 6) to determine if impacts were temporary and that appropriate fees were paid.

All calculations and other information provided in application packages will be verified by the local jurisdiction or Implementing Entity so that all impacts to land cover types can be tracked appropriately and fees paid. This exercise can be performed through air-photo analysis or field verification. Project proponents may request assistance from local planning staff in this analysis (for exempt projects, local jurisdictions will document land cover types present). For sites outside urban or suburban areas that support natural land cover types, land cover verification may need to be performed by a qualified biologist. Land cover type classification will be done in accordance with the descriptions provided in Section 3.3.5 *Natural Communities and Land Cover Types*. If the project site supports or may support any wetland or stream land cover types that would be affected by the proposed project, a qualified biologist must be retained (see Item 4 below).

All land cover determinations provided by private applicants will be verified by local planning staff. All land cover determinations provided by a Permittee will be verified by Implementing Entity staff. A private applicant or Permittee may retain Implementing Entity staff (at cost) to conduct this land cover mapping. Local jurisdiction staff may also be available to provide this service to private applicants as part of the application review process.

Land cover mapping of sites with the following land cover types, as mapped by the Plan, can be conducted by the applicant or local planning staff.

- California annual grassland[27];
- reservoirs;

[27] See definition of annual grassland in Chapter 3. When trees are present in annual grassland at low density, the land cover may instead be oak woodland. In these cases, a qualified professional is needed to make the determination.

- all agricultural land cover types; and
- all development land cover types.

Additions to existing development encompassing an area of 10,000 square feet (approximately 0.2 acre) or less on any land cover type, other than stream, riparian, serpentine, pond, or wetland land cover types, do not require land cover mapping by a qualified biologist or other professional. These projects may be mapped based on aerial photos by planners or applicants.

All other land cover types must be mapped by a qualified biologist. Forest land cover types can also be mapped by a professional forester or arborist. Accurate mapping of the remaining land cover types is necessary because of the Implementing Entity's obligation to stay ahead of impacts by land cover type and to ensure the appropriate species surveys are conducted. The Implementing Entity will provide a list of qualified biologists to conduct land cover mapping and other surveys required by the Habitat Plan. The Implementing Entity may also provide a list of qualified professionals (e.g., non-biologists such as foresters and arborists) to conduct land cover mapping. Biologists and other professionals qualified to conduct land cover mapping will have demonstrated experience conducting vegetation mapping in the field or from air photos at the scale of the proposed project and in vegetation types similar to those on the project site. This list will be updated regularly and made available to project proponents and the Permittees. Biologists conducting species surveys that could result in take must also be pre-approved by USFWS and CDFG (see Item 5 below).

Land cover mapping is not required for operations and maintenance activities conducted by Permittees except where serpentine land cover will be impacted (land cover mapping is required for all private applicants and Participating Special Entity projects). However, Permittees must still implement all applicable conditions including plant surveys. As such, some projects with operations and maintenance covered activities may require land cover mapping to determine applicable conditions. If no land cover mapping is conducted, Permittees will rely on the most recent land cover map developed by the Implementing Entity to quantify impacts.

For covered activities that result in temporary impacts, in lieu of aerial photo or field-verified land cover mapping, applicants have the option of assuming that the entire footprint of the covered activity permanently affects natural land cover types based on the Plan's most recent land cover map (and therefore pays a fee on these impacts as described in Chapter 9). This option is available for temporary impacts because the footprint of many of these activities is expected to be relatively small. If the land cover types assumed to be permanently impacted include those land cover types that trigger covered species surveys, then covered species surveys must be conducted.

The application package must include a map showing all land cover types on the project parcel(s) if the project is located inside the urban service area or within the development area if the project is outside the urban service area, and a table showing the amount of each land cover type to the nearest 0.1 acre for all non-

stream land covers or linear foot for streams (blank tables will be provided in the template application package). These final values will be used to calculate any required fees (Chapter 9).

Table 6-8 describes land cover types and habitat elements that, when present, trigger the need for preconstruction surveys for five covered wildlife species. For example, if a project is located within occupied nesting habitat modeled for burrowing owls, a qualified biologist would need to conduct a habitat survey and possibly a pre-construction survey to map any burrows within 250 feet of the activity footprint. In some cases, presence of the habitat feature itself, regardless of land cover, may trigger additional survey requirements (**Table 6-8**).

The presence of certain land cover types on site may also trigger the need to survey for specific covered plants, as described in Item 5 below.

6.8.4 Item 4: Map of Wetlands, Ponds, Streams, and Riparian Woodlands

A map of all coastal and valley freshwater marsh, seasonal wetlands, ponds, riparian woodland, and streams is required for any project subject to the Habitat Plan that may directly or indirectly affect these aquatic land cover types.

Although Section 404 Clean Water Act wetland delineations are a tool that can be employed, jurisdictional delineations completed to meet the requirements of Section 404 do not necessarily account for all aquatic habitat for species proposed for coverage under this Plan (e.g., they do not address waters of the state that are not also waters of the U.S.). The Implementing Entity will use the wetland and waters map[28] developed for Item 4 of the application package to track impacts to coastal and valley freshwater marsh, seasonal wetlands, ponds, riparian woodland, and streams and to determine the wetland fee owed (see Chapter 9, Section 9.4.1, subheading *Wetland Mitigation Fee* and **Table 9-6**). Fees on wetlands, ponds, and riparian woodland will be determined by the acres of impact (see Condition 12 above and Chapter 9). Stream fees and impacts will be determined by the linear feet of stream affected, measured at the stream centerline.

Project proponents will not need to provide Item 4 of the application package if the Implementing Entity or permitting local jurisdiction determines that aquatic features will not be directly or indirectly affected by covered activities.

Formal delineations are typically required to identify waters of the U.S. and support compliance with Section 404 of the Clean Water Act. Maps of non-jurisdictional aquatic features are typically required to identify waters of the state

[28] Although delineations can be conducted any time of the year, they will be based on an evaluation of multiple factors by a qualified biologist, including but not limited to, hydrology, vegetation, and soils. Wetland features do not need to be holding water at the time of the field investigation to be delineated.

and support compliance with the Porter-Cologne Water Quality Control Act and Section 1602 of the California Fish and Game Code.

Project proponents are encouraged to produce maps for Item 4 that support other necessary state or federal permitting needs, but maps do not need to be verified by the Corps or Regional Boards prior to submission of the application package. If the Habitat Plan application will also meet the application requirements of the Habitat Plan RGP, once such a permit is in place, the delineation method must be consistent with Corps's delineation protocol. Such delineations may be verified by the Corps prior to application submittal, or delineations may be verified by the Corps as part of application processing once the application is submitted.

If a process for permitting projects affecting waters of the U.S. and/or waters of the state is not provided by local jurisdictions or the Implementing Entity in conjunction with the Plan, proponents of projects that could affect such resources must seek such permits on their own. In such cases, this Plan does provide the framework for CESA and ESA compliance for covered activities that would result in impacts on state or federal wetlands and waters.

6.8.5 Item 5: Results of Applicable Species Surveys and Monitoring

As described in Item 3, the presence of certain land cover types on the project site triggers an evaluation of whether specific habitat elements for selected wildlife species or for occurrences of covered plants. **Figure 6-7** summarizes these triggers and survey process. Survey requirements for these selected wildlife species are based on avoiding take of individual species—particularly animals with lower reproductive outputs (e.g., western burrowing owl) than other species (e.g., fish and amphibians). If suitable breeding habitat of these selected wildlife species is found, preconstruction surveys are triggered (see Conditions 15–18). If the preconstruction survey identifies occupied breeding habitat, project proponents must implement defined avoidance and minimization measures to avoid the resource during breeding seasons. Compliance during construction will be monitored by a qualified biologist.

As described below in this section under *Surveys for Covered Plants*, covered plant surveys will be required for specified land cover types. If an occurrence of a covered plant is present on the site, additional field assessment is required to document the occurrence's condition.

The purpose of these surveys is to comply with the avoidance and minimization requirements of ESA and CESA. If surveys are planned far enough in advance (typically 6–8 months), it is expected that in most cases identification of selected occupied habitat will not change the project design or schedule. These survey requirements and avoidance measures are designed to avoid or minimize take of individuals (as required by law), to document key resources for tracking

purposes, and to ensure that impacts on plant occurrences are properly mitigated by the Implementing Entity.

Although surveys are required in specific cases, overall, impacts on covered species are assumed to occur on all project sites. However, if the results of the preconstruction survey documents a large or important population of a covered species other than those acknowledged in the Plan, the local agency reviewing or proposing the project must consult the Implementing Entity for advice on species avoidance and minimization measures[29]. The Implementing Entity will also contact the Wildlife Agencies for technical advice. Protocol-level surveys to document species presence or absence are not required for the Habitat Plan, with the exception of the least Bell's vireo (Condition 16).

Species surveys are required for all covered activities, including some operations and maintenance activities, subject to the conditions on covered activities except as noted in the following section. Species survey requirements and exemptions are described in greater detail below.

Exemptions from Species Surveys, Preconstruction Surveys, and Construction Monitoring

The following types of covered activities are exempt from species survey and construction monitoring requirements for target covered wildlife species and covered plants. A summary of the types of exemptions available is described in **Table 6-1**. Activities exempt from species surveys must still submit an application package as described above.

- Covered operations or maintenance activities, including those on the Reserve System, that do not result in any ground disturbance or removal of natural land cover types not identified in the following exemptions.
- Covered operations or maintenance activities that occur more than once annually within the same location, as long as applicable surveys are conducted once before initiating the activity in the appropriate season (i.e., wildlife and plant surveys must be conducted during the appropriate time of year) and there are negative survey results. Such activities are likely to result in repeated disturbance that will preclude establishment or persistence of the covered species targeted by these surveys. If species surveys identify wildlife covered species, preconstruction surveys and construction monitoring must be conducted according to the conditions in this chapter. Unavoidable impacts to covered plant species will be tracked toward the Plan's impact limits (**Table 5-16**). All applicable wildlife and plant surveys must be conducted prior to implementation of the covered operations or maintenance activity until the covered species has not been detected at the site for three consecutive years. Applicable surveys will once again be

[29] If new information is found through surveys or other data that greatly changes the understanding of covered species distribution or habitat requirements from that described in this Plan, the Plan would need to be re-evaluated and an amendment may be necessary (see Chapter 10 for the amendment process).

required if operations and maintenance activities cease for three or more consecutive years.

- Covered activities that occur entirely on one or more of the following land cover types[30].
  - Coyote brush scrub.
  - Reservoir.
  - Stream (i.e., riverine) where no riparian or wetland vegetation occurs.
  - Agricultural developed[31].
  - Urban-suburban.
  - Rural-residential.
  - Ornamental woodland.

In addition to the exemptions listed above, covered activities occurring on the land cover types listed below, while subject to the wildlife species surveys, preconstruction surveys, and construction monitoring requirements, will not trigger any covered plant surveys[32].

- Willow riparian forest and scrub.
- Redwood forest.
- Coastal and valley freshwater marsh.
- Pond.
- Orchard.
- Vineyard.
- Grain, row crop, hay and pasture, disked/short-term fallowed.
- Golf courses/urban parks.
- Barren.

Qualified Biologists

Several types of monitoring will be conducted for this Plan including species surveys, preconstruction surveys, construction monitoring, and effectiveness monitoring conducted on the Reserve System. This requirement applies to all monitoring described in this Plan including conditions on covered activities described in this chapter and effectiveness monitoring described in Chapter 7.

[30] These land cover types do not support any of the covered species for which surveys are required.
[31] The land cover type "agriculture developed" (also known as agriculture developed/covered ag) is defined in Chapter 3 as intensive agricultural operations such as nurseries and greenhouses.
[32] Focused surveys for selected covered wildlife may still be required; consult **Table 6-8** and Conditions 13 and 15–18.

Qualified biologists are those biologists who have the experience, education, and training necessary to perform the tasks described in this Plan accurately and in an unbiased fashion. The term "qualified biologist" is used generically to mean a biologist who is trained to perform the given task; such a person is, more specifically, a fisheries biologist, wildlife biologist, or botanist. Training must be in the field to which the task is related. For example, a wildlife biologist may not perform a covered plant survey or delineate land covers for a project application unless the individual is also competent in those fields.

If the task does not have the potential to result in take of covered species (e.g., land cover mapping, establishing perimeters around an active nest or burrows, or monitoring the compliance of construction crews), applicants (or Permittees) may choose their own biologists to conduct these specialized tasks. Applicants will provide the local jurisdiction with a brief resume of the biologist so that the local jurisdiction (or in the case of a Permittee project, the Implementing Entity) can verify the qualifications of the biologist. The local jurisdictions will review these qualifications with the application package. If the local jurisdiction finds the qualifications lacking, they may ask the applicant for additional information or for another survey by a more qualified biologist.

If the task has the potential to result in take of covered species (e.g., discouraging use of a den by a San Joaquin kit fox, handling a California tiger salamander, or conducting effectiveness monitoring described in Chapter 7), the biologist must be approved by the Implementing Entity and Wildlife Agencies prior to conducting such tasks. Biologists conducting this work may be Implementing Entity staff or consultants hired by the Implementing Entity.

To be approved, these biologists must provide the Implementing Entity with credentials demonstrating that he or she has an understanding of the monitoring protocols, data collection techniques, and handling procedures for the covered species. If the Implementing Entity deems the biologist qualified, then the Implementing Entity will forward the recommendation to the Wildlife Agencies for approval. The names, contact information, and written certification of training and qualifications for these biologists will be provided to the appropriate Wildlife Agencies for approval. This documentation will also be on file with the Implementing Entity.

Upon Implementing Entity and Wildlife Agency approval, the Implementing Entity will maintain a list of *pre-approved* qualified biologists who may conduct monitoring work for a 5-year period. This approval process will reduce the need for 2081(a) and/or 10(a)(1)(b) permits as well as the need for the Wildlife Agencies to review qualifications on a case-by-case basis during implementation.

Individuals who are not pre-approved by the Implementing Entity and Wildlife Agencies to conduct monitoring with the potential for take may conduct monitoring if they have a valid recovery permit for the species that they are monitoring. In either case, the biologist will possess all of the qualifications that would otherwise be required under a recovery permit.

Surveys for Breeding Habitat of Select Covered Wildlife Species

While take of covered species and impacts to their known and suitable habitat is assumed and mitigated under the regional approach to mitigation and conservation described above, avoidance of breeding habitat for selected covered wildlife species is required. The selected species have the greatest potential to benefit from avoidance measures and are generally species with lower reproductive rates, such as birds and mammals, which suffer greater consequences from take of individuals, particularly when breeding. Survey requirements for these species are triggered by the presence of specific land cover types and habitat features as described in **Table 6-8**. These species and their habitat features are listed below.

- Western burrowing owl (occupied and nesting habitat, see **Figure 5-11**).
- Least Bell's vireo (breeding habitat in South County[33], see species habitat distribution model in **Appendix D**).
- Tricolored blackbird (breeding habitat, see species habitat distribution model in **Appendix D**).
- San Joaquin kit fox in the Pacheco corridor (denning habitat; see species habitat distribution model in **Appendix D**).
- Bay checkerspot butterfly in serpentine bunchgrass grassland inBay checkerspot butterfly habitat units (see **Appendix D**).

If suitable breeding habitat[34] for these species as defined in **Table 6-8** and in Conditions 13 and 15–18 is identified on site, and if the proposed project could affect this habitat, additional preconstruction surveys are required for the San Joaquin kit fox, western burrowing owl, tricolored blackbird, and least Bell's vireo. Specific survey requirements for these species are detailed in Conditions 13 and 15–18. Surveys for these species will occur on all areas on which the land cover fee will be levied and within any areas that may be encroaching within a required species buffer.

If applicable land cover types or habitat features are present on site, the application package must describe the methods used for the required surveys and the results of these surveys. As indicated in **Table 6-8**, a map of habitat features (e.g., suitable kit fox dens, suitable burrowing owl burrows) is required. If a covered species is observed on site, details of this observation will also be included in the application. CNDDB California Native Species Field Survey Forms will be included for all covered species encountered on the site. Copies of these forms will also be submitted to the CNDDB.

[33] The least Bell's vireo range may expand to the northern portion of the study area during the permit term. The Implementing Entity will periodically monitor outside of the vireo's modeled habitat in the study area to determine if the species' range is expanding (see Section 7.3.3 of Chapter 7, *Species-Level Actions*).
[34] Suitable breeding habitat is defined as habitat identified in the field as suitable for breeding by the target species. Suitable breeding habitat may be different from modeled habitat.

Preconstruction Surveys for Select Covered Wildlife

If the appropriate land cover type and habitat feature listed in **Table 6-8** are present on site, then a preconstruction survey is required for one or more of the five covered wildlife species listed above (**Figures 6-5 and 6-6**). Preconstruction surveys will be required to establish presence or absence of occupied breeding habitat for the applicable species. For example, if a freshwater wetland that could provide suitable breeding habitat for tricolored blackbird is present on site, a preconstruction survey on the site would need to be conducted prior to construction to determine if the site is occupied. If results indicate that breeding tricolored blackbirds are present, then avoidance and minimization measures and construction monitoring must occur, as described in **Table 6-8** and Condition 17.

The Habitat Plan application package will be prepared before project construction in order to receive project approvals from the local agency (or if by a Permittee, to ensure compliance with the Habitat Plan). To ensure compliance with preconstruction survey requirements, project proponents must describe in the application package which surveys are required, when they will be performed, and how they will be applied to the project. This description will follow the requirements in **Table 6-8** and Conditions 15–18 and will be incorporated into the conditions of project approval.

Construction Monitoring for Certain Covered Wildlife

Identification of occupied breeding habitat as defined above will trigger the specified avoidance and minimization requirements described in **Table 6-8** and Conditions 15–18. Construction monitoring will be carried out by a qualified biologist to ensure that these avoidance and minimization requirements are being implemented properly and that they are adequately protecting the target species (**Figures 6-4, 6-5, and 6-6**). Because the selected wildlife species are rare in the study area, it is expected that few projects will require construction monitoring. If required, the construction monitoring frequency and protocols are described for the appropriate species in Conditions 15–18.

Like preconstruction surveys, construction monitoring will occur well after the Habitat Plan application package is prepared. To ensure compliance with the Plan, the application package must describe which construction monitoring and avoidance and minimization requirements may be required and how they will be applied to the project if preconstruction surveys identify occupied breeding habitat. This description will follow the requirements in **Table 6-8** and Conditions 15–18 and will be incorporated into the conditions of project approval. The application will include a description of monitoring frequency and duration (including the time when monitoring will be initiated relative to impacts) and specific construction activities to be monitored. The application will also include a description of the authority of the onsite construction monitor to modify or temporarily stop implementation of the activity if necessary to ensure compliance with the Plan.

Construction monitoring is necessary to ensure that avoidance and minimization measures are implemented in accordance with permit requirements and is the responsibility of the project proponent.

Covered Plant Surveys

Project proponents wishing to affect occurrences of covered plants must notify the Implementing Entity of their construction schedule to allow the Implementing Entity the opportunity to salvage the occurrence (see Condition 19).

The application package must describe the methods used for the required plant surveys and the results of these surveys. If a covered plant occurrence is observed on site, the condition of this occurrence must be described in the application package according to the guidelines in Chapter 5, Section 5.3.1 *Land Acquisition and Restoration Activities* subheading *Incorporating Covered Plant Species*. The condition of each covered plant occurrence must be documented to ensure that occurrences are protected within the Reserve System that are in as good or better condition than those lost to covered activities. CNDDB California Native Species Field Survey Forms will be included in the application package for all covered plants encountered on the site. Copies of these forms will be submitted to the CNDDB.

6.8.6 Item 6: Compliance Documentation

The final component of the Habitat Plan application package is documentation of how any remaining applicable conditions (Conditions 1–14) have been incorporated into the proposed project. If appropriate, a map will be provided to document this compliance.

Verification that conditions have been implemented is primarily the responsibility of the local jurisdiction conducting or approving the covered activity. Participating local jurisdictions will be responsible for reporting the relevant details of approved projects to the Implementing Entity (for entry into the Habitat Plan database and for required reporting to the Wildlife Agencies). The Implementing Entity may contact the local jurisdiction to verify and ensure that the conditions are appropriately implemented.

If the project includes activities for which temporary fees are paid, the project applicant is required to file compliance information at the conclusion of the project. The compliance information will include documentation that the area for which temporary fees were paid was disturbed by covered activities for less than one year. The project proponent must also provide photographs that document the condition of the site before project initiation and (or less) after completion of the covered activity. Based on this information, the local jurisdiction or Implementing Entity will make a determination that the site was recovered to pre-project or ecologically improved conditions within one year of completing

construction, that the impacts were actually temporary, and that the fees paid were adequate.

6.9 Confirming Exemption from the Plan

Project proponents seeking permits from a local jurisdiction for activities that would otherwise be covered will need to demonstrate that the project is not a covered activity per the criteria in Chapter 2. Project proponents will need to:

1. demonstrate the size of the project;
2. show that the project is located in an area in **Figure 6-8** where private development is not subject to the Plan;
3. provide a map consistent with the requirements in Section 6.8.3 *Item 3: Land Cover Types on Site* showing that no serpentine, wetland, stream, riparian, or pond land cover types are present on the site;
4. demonstrate that no adverse indirect impacts to wetlands were identified through the applicable environmental review process; and
5. demonstrate that the project is not located in occupied nesting habitat for western burrowing owl based on the most recent western burrowing owl occupied nesting habitat map provided by the Implementing Entity.

Table 6-1. Covered Activities Exempt from Plan Conditions and/or Plan Fees

Covered Activity	Exemptions from Conditions (✓ = exempt)					
	All Chapter 6 Conditions	Wildlife Species Surveys (Conditions 15–18)	Preconstruction Surveys (Conditions 15–18)	Construction Monitoring (Conditions 15–18)	Covered Plant Surveys (Condition 20)	Development Fees[1]
Public Activities						
Routine infrastructure maintenance by public agencies within the planning limit of urban growth that do not affect stream, riparian, serpentine, ponds, or wetland land cover types.	✓	✓	✓	✓	✓	
Routine infrastructure maintenance by public agencies that occurs in urban-suburban, landfill, reservoir, or agriculture developed land cover types that do not affect stream, riparian, serpentine, pond, or wetland cover types. Examples of such activities include filling pot-holes and resurfacing existing roads without expansion of the paved area.	✓	✓	✓	✓	✓	
Private Activities						
Projects that do not result in ground disturbance, do not result in release of potential water quality contaminants, or do not create new wildlife barriers.	✓	✓	✓	✓	✓	
Private-sector, routine-maintenance activities that require a development, grading, or building permit, and that occur inside the Urban Service Area[2].	✓	✓	✓	✓	✓	
Private-sector, routine-maintenance activities that require a development, grading, or building permit; that occur outside of the Urban Service Area; and that occur within 50 feet of all existing structures at the time of Plan commencement or within 50 feet of structures that are permitted for incidental take under the Habitat Plan.	✓	✓	✓	✓	✓	
Additions to existing structures, or new structures that are within 50 feet of an existing structure (e.g., a new garage) that result in less than 5,000 square feet of impervious surface as long as no stream, riparian woodland, wetlands, ponds, or serpentine land cover type are affected[3].	✓	✓	✓	✓	✓	✓

Table 6-1. Continued

Covered Activity	Exemptions from Conditions (✓ = exempt)					
	All Chapter 6 Conditions	Wildlife Species Surveys (Conditions 15–18)	Preconstruction Surveys (Conditions 15–18)	Construction Monitoring (Conditions 15–18)	Covered Plant Surveys (Condition 20)	Development Fees[1]
Any covered activity described in Chapter 2 that occurs in urban-suburban, landfill, reservoir, or agriculture developed land cover types as verified in the field, unless the activity may affect a mapped or unmapped stream, riparian, serpentine, ponds, or wetland land cover types, or the activity is located in a stream setback.	✓	✓	✓	✓	✓	
A covered activity on a parcel of less than 0.5 acre or less as long as no serpentine, stream, riparian woodland, pond, or wetland land cover type is within the parcel.	✓	✓	✓	✓	✓	
Covered operations or maintenance activities, including those on the Reserve System, that do not result in any ground disturbance or removal of natural land cover types.		✓	✓	✓		
Covered operations or maintenance activities that occur more than once annually within the same location, as long as applicable surveys are conducted once before initiating the activity and there are negative survey results[4, 5].		✓	✓	✓		
Covered activities that occur entirely on one or more of the following land cover types: coyote brush scrub, reservoir, stream (i.e., riverine) where no riparian or wetland vegetation occurs, agricultural developed[6], urban-suburban, rural-residential, or ornamental woodland.		✓	✓	✓		
Covered activities that occur entirely on one or more of the following land cover types: willow riparian forest and scrub, redwood forest, coastal and valley freshwater marsh, pond, orchard, vineyard, grain, row crop, hay and pasture, disked/short-term fallowed, golf courses/urban parks or barren.					✓	
Urban development covered activities (see Section 2.3.2 *Urban Development* in Chapter 2) in Zones A, B, or C on parcels less than 0.5 acre as long as the parcel does not contain or is not adjacent to a stream, riparian woodland or forest, wetland, pond, or serpentine land cover type[8].						✓

Table 6-1. Continued

Covered Activity	Exemptions from Conditions (✓ = exempt)					
	All Chapter 6 Conditions	Wildlife Species Surveys (Conditions 15–18)	Preconstruction Surveys (Conditions 15–18)	Construction Monitoring (Conditions 15–18)	Covered Plant Surveys (Condition 20)	Development Fees[1]
All development that occurs on land mapped by the Habitat Plan as "urban-suburban", "landfill", "reservoir", or "agriculture developed" land cover types if it is not located in or adjacent to a parcel that contains a stream, riparian woodland or forest, wetland, or serpentine land cover type[9, 10].						✓
Construction of recreational facilities within the Reserve System[11].						✓

Notes:

[1] Does not include the Nitrogen Fee. See Chapter 9 for a complete discussion of all Development Fees.

[2] Private-sector activities that do not require a development, grading, or building permit are not subject to the Plan or its conditions or fees.

[3] Additions are cumulative and must be calculated based on the footprint of the structure at time of Plan implementation to determine whether this threshold has been crossed.

[4] Such activities are likely to result in repeated disturbance that will preclude establishment or persistence of the covered wildlife species targeted by these surveys.

[5] If surveys identify covered species, subsequent surveys must be conducted.

[6] The land cover type "agriculture developed" (also known as agriculture developed/covered ag) is defined in Chapter 3 as intensive agricultural operations such as nurseries and greenhouses.

[7] These land cover types do not support any of the covered species for which surveys are required.

[8] If new vehicle trips are generated, the nitrogen deposition fee may be assessed.

[9] The category "reservoir" excludes dams, which are subject to Habitat Plan fees.

[10] Barns, corrals, ranch homes, and other small patches of existing development were not mapped as these four exempt land cover types because they fell below the 10-acre minimum mapping unit. These sites would also be exempt from the same development fees as long as project proponents demonstrate that they were existing at the time of Plan adoption through air photos or other documentation.

[11] Instead of paying a fee for construction of infrastructure within the Reserve System, new disturbance for infrastructure does not count toward land cover type land acquisition requirements in Chapter 5, but it does count toward the total Reserve System size requirements.

Table 6-2. Aquatic Avoidance and Minimization Measures

ID	Avoidance and Minimization Measure
	General
1	Minimize the potential impacts on covered species most likely to be affected by changes in hydrology and water quality.
2	Reduce stream pollution by removing pollutants from surface runoff before the polluted surface runoff reaches local streams.
3	Maintain the current hydrograph and, to the extent possible, restore the hydrograph to more closely resemble predevelopment conditions.
4	Reduce the potential for scour at stormwater outlets to streams by controlling the rate of flow into the streams.
5	Invasive plant species removed during maintenance will be handled and disposed of in such a manner as to prevent further spread of the invasive species.
6	Activities in the active (i.e., flowing) channel will be avoided. If activities must be conducted in the active channel, avoidance and minimization measures identified in this table will be applied.
7	Personnel shall prevent the accidental release of chemicals, fuels, lubricants, and non-storm drainage water into channels.
8	Spill prevention kits shall always be in close proximity when using hazardous materials (e.g., crew trucks and other logical locations).
9	Personnel shall implement measures to ensure that hazardous materials are properly handled and the quality of water resources is protected by all reasonable means when removing sediments from the streams.
10	If ground disturbing activities are planned for a stream channel that is known or suspected to contain elevated levels of mercury, the following steps should be taken. 1. Avoid disturbing soils in streams known or suspected to contain high levels of mercury. 2. Soils that are likely to be disturbed or excavated shall be tested for mercury. Soils shall be remediated if: a. disturbed or excavated soils exposed to flood flows below the 2.33-year channel flow level exceed 1 ppm Hg, or b. disturbed or excavated soils above the 2.33-year flow level exceed 20 ppm Hg.
11	Vehicles shall be washed only at approved areas. No washing of vehicles shall occur at job sites.
12	No equipment servicing shall be done in the stream channel or immediate flood plain, unless equipment stationed in these locations cannot be readily relocated (i.e., pumps, generators).
13	Personnel shall use the appropriate equipment for the job that minimizes disturbance to the stream bottom. Appropriately-tired vehicles, either tracked or wheeled, shall be used depending on the situation
14	If high levels of groundwater in a work area are encountered, the water is pumped out of the work site. If necessary to protect water quality, the water shall be directed into specifically constructed infiltration basins, into holding ponds, or onto areas with vegetation to remove sediment prior to the water re-entering a creek.

Table 6-2. Continued

ID	Avoidance and Minimization Measure
15	If native fish or non-covered, native aquatic vertebrates are present when cofferdams, water bypass structures, and silt barriers are to be installed, a native fish and aquatic vertebrate relocation plan shall be implemented when ecologically appropriate as determined by a qualified biologist to ensure that significant numbers of native fish and aquatic vertebrates are not stranded. Prior to the start of work or during the installation of water diversion structures, native aquatic vertebrates shall be captured in the work area and transferred to another reach as determined by a qualified biologist. Timing of work in streams that supports a significant number of amphibians will be delayed until metamorphosis occurs to minimize impacts to the resource. Capture and relocation of aquatic native vertebrates is not required at individual project sites when site conditions preclude reasonably effective operation of capture gear and equipment, or when the safety of biologist conducting the capture may be compromised. Relocation of native fish or aquatic vertebrates may not always be ecologically appropriate. Prior to capturing native fish and/or vertebrates, the qualified biologist will use a number of factors, including site conditions, system carrying capacity for potential relocated fish, and flow regimes (e.g., if flows are managed) to determine whether a relocation effort is ecologically appropriate. If so, the following factors will be considered when selecting release site(s): 1. similar water temperature as capture location; 2. ample habitat availability prior to release of captured individuals; 3. presence of other same species so that relocation of new individuals will not upset the existing prey/predation function; 4. carrying capacity of the relocation location; 5. potential for relocated individual to transport disease; and 6. low likelihood of fish reentering work site or becoming impinged on exclusion net or screen. Proposals to translocate any covered species will be reviewed and approved by the Wildlife Agencies.
16	When work in a flowing stream is unavoidable, the entire streamflow shall be diverted around the work area by a barrier, except where it has been determined by a qualified biologist that the least environmentally disruptive approach is to work in a flowing stream. Where feasible, water diversion techniques shall allow stream flows to gravity flow around or through the work site.
17	Coffer dams shall be installed both upstream and downstream not more than 100 feet from the extent of the work areas. Coffer dam construction shall be adequate to prevent seepage into or from the work area. Stream flow will be pumped around the work site using pumps and screened intake hoses. All water shall be discharged in a non-erosive manner (e.g., gravel or vegetated bars, on hay bales, on plastic, on concrete, or in storm drains when equipped with filtering devices, etc.).
18	Small in-channel berms that deflect water to one side of the channel during project implementation may be constructed of channel material in channels with low flows.
19	Sumps or basins may also be used to collect water, where appropriate (e.g., in channels with low flows).
20	Diversions shall maintain ambient stream flows below the diversion, and waters discharged below the project site shall not be diminished or degraded by the diversion. All materials placed in the channel to dewater the channel shall be removed when the work is completed. Normal flows shall be restored to the affected stream as soon as is feasible and safe after completion of work at that location.
21	To the extent that stream bed design changes are not part of the project, the stream bed will be returned to as close to pre-project condition as appropriate.
22	To the extent feasible, all temporary diversion structures and the supportive material shall be removed no more than 48 hours after work is completed.
23	Temporary fills, such as for access ramps, diversion structures, or cofferdams, shall be completely removed upon finishing the work.
24	To prevent increases in temperature and decreases in dissolved oxygen (DO), if bypass pipes are used, they shall be properly sized (i.e., larger diameter pipes to better pass the flows). Use of bypass pipes may be avoided by creating a low-flow channel or using other methods to isolate the work area.

Table 6-2. Continued

ID	Avoidance and Minimization Measure
25	Diversions shall maintain fish passage when the project meets the following conditions: 1) the length of the area dewatered exceeds 500 feet, and/or 2) the length of time the stream is dewatered exceeds two weeks in length. Conditions for fish passage shall be met as long as the diversion 1) maintains contiguous flows through a low flow channel in the channel bed or an artificial open channel, 2) presents no vertical drops exceeding six (6) inches and follows the natural grade of the site, 3) maintains water velocities that shall not exceed eight feet per second (8 ft/sec), and 4) maintains adequate water depths consistent with normal conditions in the project reach. An artificial channel used for fish passage shall be lined with cobble/gravel. A closed conduit pipe shall not be used for fish passage. The inlets of diversions shall be checked daily to prevent accumulation of debris.
26	Any sediment removed from a project site shall be stored and transported in a manner that minimizes water quality impacts.
27	Sediment from the San Francisco Bay Watershed, including that for reuse, will not be removed to areas any farther south than Metcalf Road in south San Jose.
28	Where practical, the removed sediments and gravels will be re-used.
29	Existing native vegetation shall be retained by removing only as much vegetation as necessary to accommodate the trail clearing width. Maintenance roads should be used to avoid effects on riparian corridors.
30	Vegetation control and removal in channels, on stream banks, and along levees and maintenance roads shall be limited to removal necessary for facility inspection purposes, or to meet regulatory requirements or guidelines.
31	When conducting vegetation management, retain as much understory brush and as many trees as feasible, emphasizing shade producing and bank stabilizing vegetation. If riparian vegetation is to be removed with chainsaws, consider using saws currently available that operate with vegetable-based bar oil.
32	In-channel vegetation removal may result in increased local erosion due to increased flow velocity. To minimize the effect, the top of the bank shall be protected by leaving vegetation in place to the maximum extent possible.
33	Regional Board objectives for temperature change in receiving waters (measured 100 feet downstream of discharge point) shall not be exceeded. Receiving water and discharge water may be monitored for temperature changes after a comparison of ambient temperature to pipeline water temperature suggests the potential for change.
	Project Design
34	Use the minimum amount of impermeable surface (building footprint, paved driveway, etc.) as practicable.
35	Use pervious materials, such as gravel or turf pavers, in place of asphalt or concrete to the extent practicable.
36	Use flow control structures such as swales, retention/detention areas, and/or cisterns to maintain the existing (pre-project) peak runoff.
37	Direct downspouts to swales or gardens instead of storm drain inlets.
38	Use flow dissipaters at runoff inlets (e.g., culvert drop-inlets) to reduce the possibility of channel scour at the point of flow entry.
39	Minimize alterations to existing contours and slopes, including grading the minimum area necessary.
40	Maintain native shrubs, trees and groundcover whenever possible and revegetate disturbed areas with local native or non-invasive plants.
41	Combine flow-control with flood control and/or treatment facilities in the form of detention/retention basins, ponds, and/or constructed wetlands.
42	Use flow control structures, permeable pavement, cisterns, and other runoff management methods to ensure no change in post-construction peak runoff volume from pre-project conditions for all covered activities with more than 5,000 square feet of impervious surface.
43	Site characteristics will be evaluated in advance of project design to determine if non-traditional designs, such as bioengineered bank treatments that incorporate live vegetation, can be successfully utilized while meeting the requirements of the project.
44	Maintenance of natural stream characteristics, such as riffle-pool sequences, riparian canopy, sinuosity, floodplain, and a natural channel bed, will be incorporated into the project design.

Table 6-2. Continued

ID	Avoidance and Minimization Measure
45	Stream crossings shall incorporate a free-span bridge unless infeasible due to engineering or cost constraints or unsuitable based on minimal size of stream (swale without bed and banks or a very small channel). If a bridge design cannot free-span a stream, bridge piers and footings will be designed to have minimum impact on the stream. A hydraulics analysis must be prepared and reviewed by the jurisdictional partner, including SCVWD as appropriate, demonstrating that piers or footings will not cause significant scour or channel erosion. Whenever possible, the span of bridges will also allow for upland habitat beneath the bridge to provide undercrossing areas for wildlife species that will not enter the creek. Native plantings, natural debris, or scattered rocks will be installed under bridges to provide wildlife cover and encourage the use of crossings.
46	Whenever possible, the span of bridges will also allow for upland habitat beneath the bridge to provide undercrossing areas for wildlife species that will not enter the creek.
47	If a culvert is used, up- and downstream ends of the culvert must be appropriately designed so that the stream cannot flow beneath the culvert or create a plunge pool at the downstream end. Preference will be given to designs that allow a natural bottom (arch culvert) and/or which do not alter natural grade.
48	Trails will be sited and designed with the smallest footprint necessary to cross through the in-stream area. Trails will be aligned perpendicular to the channel and be designed to avoid any potential for future erosion. New trails that follow stream courses will be sited outside the riparian corridor.
49	The project or activity must be designed to avoid the removal of riparian vegetation, if feasible. If the removal of riparian vegetation is necessary, the amount shall be minimized to the amount necessary to accomplish the required activity and comply with public health and safety directives.
50	If levee reconstruction requires the removal of vegetation that provides habitat value to the adjacent stream (e.g., shading, bank stabilization, food sources, etc.), then the project will include replacement of the vegetation/habitat that was removed during reconstruction unless it is determined to be inappropriate to do so by the relevant resource agencies (e.g., CDFG and USFWS).
51	All projects will be conducted in conformance with applicable County and/or city drainage policies.
52	Adhere to the siting criteria described for the borrow site covered activity (see Chapter 2 for details).
53	When possible, maintain a vegetated buffer strip between staging/excavation areas and receiving waters.
54	When not within the construction footprint, deep pools within stream reaches shall be maintained as refuge for fish and wildlife by constructing temporary fencing and/or barrier so as to avoid pool destruction and prevent access from the project site.
55	For stream maintenance projects that result in alteration of the stream bed during project implementation, its low flow channel shall be returned to its approximate prior location with appropriate depth for fish passage without creating a potential future bank erosion problem.
56	Increased water velocity at bank protection sites may increase erosion downstream. Therefore, bank stabilization site design shall consider hydraulic effects immediately upstream and downstream of the work area. Bank stabilization projects will be designed and implemented to provide similar roughness and characteristics that may affect flows as the surrounding areas just upstream and downstream of the project site.
57	When parallel to a stream or riparian zone and not located on top of a levee, new trails shall be located behind the top of bank or at the outside edge of the riparian zone except where topographic, resource management, or other constraints or management objectives make this not feasible or undesirable.
58	Existing access routes and levee roads shall be used if available to minimize impacts of new construction in special status species habitats and riparian zones.
59	Trails in areas of moderate or difficult terrain and adjacent to a riparian zone shall be composed of natural materials or shall be designed (e.g., a bridge or boardwalk) to minimize disturbance and need for drainage structures, and to protect water quality.
60	Trail crossings of freshwater stream zones and drainages shall be designed to minimize disturbance, through the use of bridges or culverts, whichever is least environmentally damaging. Structures over water courses shall be carefully placed to minimize disturbance. Erosion control measures shall be taken to prevent erosion at the outfalls of drainage structures.

Table 6-2. Continued

ID	Avoidance and Minimization Measure
	Construction
61	Minimize ground disturbance to the smallest area feasible.
62	Use existing roads for access and disturbed area for staging as site constraints allow. Off-road travel will avoid sensitive communities such as wetlands and known occurrences of covered plants.
63	Prepare and implement sediment erosion control plans.
64	No winter grading unless approved by City Engineer and specific erosion control measures are incorporated.
65	Control exposed soil by stabilizing slopes (e.g., with erosion control blankets) and protecting channels (e.g., using silt fences or straw wattles).
66	Control sediment runoff using sandbag barriers or straw wattles.
67	No stockpiling or placement of erodible materials in waterways or along areas of natural stormwater flow where materials could be washed into waterways.
68	Stabilize stockpiled soil with geotextile or plastic covers.
69	Maintain construction activities within a defined project area to reduce the amount of disturbed area.
70	Only clear/prepare land which will be actively under construction in the near term.
71	Preserve existing vegetation to the extent possible.
72	Equipment storage, fueling and staging areas will be sited on disturbed areas or non-sensitive habitat outside of a stream channel.
73	Avoid wet season construction.
74	Stabilize site ingress/egress locations.
75	Dispose of all construction waste in designated areas and prevent stormwater from flowing onto or off of these areas.
76	Prevent spills and clean up spilled materials.
77	Sweep nearby streets at least once a day.
78	In-stream projects occurring while the stream is flowing must use appropriate measures to protect water quality, native fish and covered wildlife species at the project site and downstream of the project site.
79	If mercury contamination may be present, the channel must be dewatered prior to commencement of the activity.
80	All personnel working within or adjacent to the stream setback (i.e., those people operating ground-disturbing equipment) will be trained by a qualified biologist in these avoidance and minimization measures and the permit obligations of project proponents working under this Plan.
81	Temporary disturbance or removal of aquatic and riparian vegetation will not exceed the minimum necessary to complete the work.
82	Channel bed temporarily disturbed during construction activities will be returned to pre-project or ecologically improved conditions at the end of construction.
83	Sediments will be stored and transported in a manner that minimizes water quality impacts. If soil is stockpiled, no runoff will be allowed to flow back to the channel.
84	Appropriate erosion control measures (e.g., fiber rolls, filter fences, vegetative buffer strips) will be used on site to reduce siltation and runoff of contaminants into wetlands, ponds, streams, or riparian vegetation. Fiber rolls used for erosion control will be certified as free of noxious weed seed. Filter fences and mesh will be of material that will not entrap reptiles and amphibians. Erosion control measures will be placed between the outer edge of the buffer and the project site.
85	Seed mixtures applied for erosion control will not contain invasive nonnative species and will be composed of native species or sterile nonnative species. If sterile nonnative species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive nonnatives.
86	Topsoil removed during soil excavation will be preserved and used as topsoil during revegetation when it is necessary to conserve the natural seed bank and aid in revegetation of the site.
87	Vehicles operated within and adjacent to streams will be checked and maintained daily to prevent leaks of materials that, if introduced to the water, could be deleterious to aquatic life.

Table 6-2. Continued

ID	Avoidance and Minimization Measure
88	Vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas.
89	The potential for traffic impacts on terrestrial animal species will be minimized by adopting traffic speed limits.
90	All trash will be removed from the site daily to avoid attracting potential predators to the site. Personnel will clean the work site before leaving each day by removing all litter and construction-related materials.
91	To prevent the spread of exotic species and reduce the loss of native species, aquatic species will be netted at the drain outlet when draining reservoirs or ponds to surface waters. Captured native fish, native amphibians, and western pond turtles will be relocated if ecologically appropriate. Exotic species will be dispatched.
92	To minimize the spread of pathogens all staff working in aquatic systems (i.e., streams, ponds, and wetlands)—including site monitors, construction crews, and surveyors—will adhere to the most current guidance for equipment decontamination provided by the Wildlife Agencies at the time of activity implementation. Guidance may require that all materials that come in contact with water or potentially contaminated sediments, including boot and tire treads, be cleaned of all organic matter and scrubbed with an appropriate cleansing solution, and that disposable gloves be worn and changed between handling equipment or animals. Care should be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.
93	When accessing upland areas adjacent to riparian areas or streams, access routes on slopes of greater than 20% should generally be avoided. Subsequent to access, any sloped area should be examined for evidence of instability and either revegetated or filled as necessary to prevent future landslide or erosion.
94	Personnel shall use existing access ramps and roads if available. If temporary access points are necessary, they shall be constructed in a manner that minimizes impacts to streams.
95	To prevent inadvertent entrapment of animals during excavation, all excavated, steep-walled holes or trenches more than 2-feet deep will be covered at the close of each working day by plywood or similar materials, or provided with one or more escape ramps constructed of earth fill or wooden planks.
96	Isolate the construction area from flowing water until project materials are installed and erosion protection is in place.
97	Erosion control measures shall be in place at all times during construction. Do not start construction until all temporary control devices (straw bales, silt fences, etc.) are in place downstream of project site.
98	When needed, utilize in-stream grade control structures to control channel scour, sediment routing, and headwall cutting.
	Post-Construction
99	Conduct street cleaning on a regular basis
100	Potential contaminating materials must be stored in covered storage areas or secondary containment that is impervious to leaks and spills
101	Runoff pathways shall be free of trash containers or trash storage areas. Trash storage areas shall be screened or walled
102	Immediately after project completion and before close of seasonal work window, stabilize all exposed soil with mulch, seeding, and/or placement of erosion control blankets .
103	All disturbed soils will be revegetated with native plants and/or grasses or sterile nonnative species suitable for the altered soil conditions upon completion of construction. Local watershed native plants will be used if available. If sterile nonnative species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive nonnatives. All disturbed areas that have been compacted shall be de-compacted prior to planting or seeding. Cut-and-fill slopes will be planted with local native or non-invasive plants suitable for the altered soil conditions.
104	Measures will be utilized on site to prevent erosion along streams (e.g., from road cuts or other grading), including in streams that cross or are adjacent to the project proponent's property. Erosion control measures will utilize natural methods such as erosion control mats or fabric, contour wattling, brush mattresses, or brush layers. For more approaches and detail, please see the *Bank Protection/ Erosion Repair Design Guide* in the Santa Clara Valley Water Resources Protection Collaborative's *User Manual: Guidelines & Standards for Land Use Near Streams* (Santa Clara Valley Water Resources Protection Collaborative 2006).

Table 6-2. Continued

ID	Avoidance and Minimization Measure
105	Vegetation and debris must be managed in and near culverts and under and near bridges to ensure that entryways remain open and visible to wildlife and that passage through the culvert or bridge remains clear.
106	Prior to undertaking stream maintenance activities, reach conditions will be assessed to identify tasks that are necessary to maintain the channel for the purpose for which it was designed and/or intended (e.g., flood control, groundwater recharge). Only in-stream work that is necessary to maintain the channel will be conducted.
107	On streams managed for flood control purposes, when stream reaches require extensive vegetation thinning or removal (e.g., when the channel has been fully occluded by willows or other vegetation), removal will be phased so that some riparian land cover remains and provides some habitat value. In addition, vegetation removal will be targeted and focused on removing the least amount of riparian vegetation as possible while still meeting the desired flood control needs. For example, vegetation removal should be focused on shrubby undergrowth at the toe-of-slope that is most likely to increase roughness and create a flooding hazard. Vegetation on the upper banks, particularly mature tree canopy, should be maintained to the extent possible to provide habitat for birds and small mammals and shading for the active channel.
108	When reaches require sediment removal, approaches will be considered that may reduce the impacts of the activity. Examples of potential approaches include phasing of removal activities or only removing sediment along one half of the channel bed, allowing the other half to remain relatively undisturbed.
109	In streams not managed for flood control purposes, woody material (including live leaning trees, dead trees, tree trunks, large limbs, and stumps) will be retained unless it is threatening a structure, impedes reasonable access, or is causing bank failure and sediment loading to the stream.
110	If debris blockages threaten bank stability and may increase sedimentation of downstream reaches, debris will be removed. When clearing natural debris blockages (e.g., branches, fallen trees, soil from landslides) from the channel, only remove the minimum amount of debris necessary to maintain flow conveyance (i.e., prevent significant backwatering or pooling). Non-natural debris (e.g., trash, shopping carts, etc.) will be fully removed from the channel.
111	If bank failure occurs due to debris blockages, bank repairs will only use compacted soil, and will be re-seeded with native grasses or sterile nonnative hybrids and stabilized with natural erosion control fabric. If sterile nonnative species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive nonnatives. If compacted soil is not sufficient to stabilize the slope, bioengineering techniques must be used. No hardscape (e.g., concrete or any sort of bare riprap) or rock gabions may be utilized in streams not managed for flood control except in cases where infrastructure or human safety is threatened (e.g., undercutting of existing roads). Rock riprap may only be used to stabilize channels experiencing extreme erosion, and boulders must be backfilled with soil and planted with willows or other native riparian species suitable for planning in such a manner. If available, local native species will be utilized as appropriate.
112	Pumps and generators shall be maintained and operated in a manner that minimizes impacts to water quality and aquatic species.
113	The channel bottom shall be re-graded at the end of the work project to as close to original conditions as possible.
114	Erosion control methods shall be used as appropriate during all phases of routine maintenance projects to control sediment and minimize water quality impacts.
115	All construction pipes, culverts, or similar structures with a diameter of 4 inches or greater that are stored at a construction site for one or more overnight periods will be thoroughly inspected for wildlife by properly trained construction personnel before the pipe is subsequently buried, capped, or otherwise used or moved in anyway.

Table 6-3. Conditions on Covered Transportation Projects

Design Requirements and Construction Practices	Highway Projects	Roadway Projects [1] and Interchange Upgrades	Mass Transit Projects	Road Safety and Operational Improvements	Dirt Road Construction
Transportation Project Design Requirements					
Background data collection by Habitat Plan Implementing Entity	R	R	R	–	–
Design coordination with Wildlife Agencies[2]	R	R	R	–	–
Enhance existing undercrossings	R	R	R	R	–
• Implement minimum sizing of culverts	R	R	R	R	–
• Install grating over tunnels/culverts for light penetration	P	P	P	P	–
• Install fencing around undercrossings to maximize crossing use	R	R	R	R	–
Road or rail barrier and passage designs for wildlife (to direct wildlife to safe crossings)	R	P	R	R	–
Construction Practices					
Avoidance and minimization measures	R	R	R	R	R
Post-Construction Practices					
Control roadside vegetation adjacent to reserves	R	R	R	R	R
Revegetate cut/fill slopes with native vegetation	R	R	R	R	R
Vegetation management around undercrossings	R	R	R	R	R

Notes:

R = Required

P = Possible (required unless data demonstrate action would not benefit wildlife and CDFG and USFWS agree to omit).

[1] Major roadway projects are identified in Table 2-6 and include those projects most likely to adversely affect habitat linkages in the study area.

[2] The scope of this review will be limited to the design, location, and extent of the median barrier.

Table 6-4. Rural Road Maintenance Avoidance and Minimization Measures

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
1	Incorporate erosion control into the planning, construction and follow up phases for all road activities.	X	X	X		X	X	X	X	X	X	X	X	X		X		
2	If working during times when rain might be possible, always have erosion control measures onsite in case of a storm event.	X	X	X		X	X	X	X	X	X	X	X	X				
3	Plan for projects involving disturbance of soil (earthwork) within the riparian setback to occur during the salmonid avoidance season (June 15–October 15) with the exception of emergency or public safety related projects (e.g., clearing a landslide across a road). If avoidance is not possible, utilize appropriate avoidance and minimization measures as described in Conditions 4 and 5.	X	X	X		X	X	X	X	X	X	X	X	X		X		X
4	Set up the work and staging area to minimize the area of soil that will be disturbed and the tracking of soil out of the work area by vehicles and equipment.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	When possible, avoid staging projects in areas where runoff will be concentrated.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	Do not stage maintenance equipment in riparian areas or adjacent to streams with the exception of emergency or public safety related projects where no other staging options exist. Avoidance and minimization measures described in Conditions 4 and 5 will be applied as appropriate.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	Use appropriate erosion and sediment control avoidance and minimization measures to secure the staging and project area so that sediment runoff is avoided. Avoidance and minimization measures described in Conditions 4 and 5 will be applied as appropriate.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	Protect storm drain inlets and watercourses using appropriate avoidance and minimization measures. Avoidance and minimization measures described in Conditions 4 and 5 will be applied as appropriate.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9	Mulch or revegetate bare soil adjacent to stream channels, or other flow transport paths, to the break-in-slope near those areas.	X	X	X	X	X			X	X		X	X			X		

Table 6-4. Continued

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
10	Keep runoff from bare soil well dispersed across a vegetated area to prevent sediment delivery to streams.	X	X	X	X	X			X	X	X	X	X					
11	When possible, direct any concentrated runoff from bare soil areas into natural buffers of vegetation or to gentler sloping areas where sediment can settle out.	X							X		X							
12	Dewater active gullies to prevent their enlargement and to reduce their capacity for sediment transport.	X									X							
13	Dewater old gullies, even if they are not actively eroding, so they no longer carry fine sediment to streams.	X									X							
14	Prevent accelerated landsliding by avoiding, minimizing or eliminating future sidecasting on steep or streamside hillslopes.				X	X					X			X				
15	When possible, divert surface runoff and subsurface drainage to stable sites away from steep, unstable or potentially unstable slopes.				X	X					X							
16	Fit shotgun culvert (culverts with outlets above grade) outlets with downspouts or energy dissipation. When reconstructing culverts, also set the slope of the culvert to match the grade of the streambed.	X						X										
17	Maintain culvert inlets, outlet, and bottom in open and sound condition.							X	X									
18	Identify storm drain inlets, manholes, and watercourses before beginning work. If there is any risk of discharge of sediment or road-related material, protect storm drains with appropriate erosion control and sediment management avoidance and minimization measures. Avoidance and minimization measures described in Conditions 4 and 5 will be applied as appropriate.	X							X									
19	Dispose of all excess materials from paved road maintenance activities at designated sites consistent with spoil disposal and stockpile requirements for various materials. Recycle excess materials.								X									

Table 6-4. Continued

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
20	Avoid sidecasting of soil in all cases where it could be delivered into a watercourse, riparian area, roadside ditch or storm drain. Do not sidecast at all if the slope is sparsely vegetated and it appears that sediment will travel with rain runoff into a stream or estuary system.		X		X	X	X							X				
21	Temporary spoils stockpiles should be located in areas that are relatively level; relatively free of vegetation and away from streams and wetlands areas.	X		X		X			X					X				
22	Remove temporary stockpiles to permanent disposal locations before the rainy season.	X		X		X			X					X				
23	Do not leave loose soil piled in berms alongside the road or ditch. Loose or exposed soil berms are erodible and readily flushed into waterways and storm drains.	X		X					X	X	X			X				
24	If any berm is left in place it must be compacted and stabilized with seeding or asphalt. Frequent well placed breaks in the berms are necessary to allow water to drain from road, preserving the natural drainage pattern of the slope.	X		X														
25	Avoid concentrating sidecasting repeatedly in the same place. Never sidecast large amounts of soil from major landslides.										X			X				
26	In general, maintain unpaved roads to obtain a less erosive running surface and to minimize the need for frequent surface grading. Blade and compact a smooth surface and compact loose soils as needed.										X							
27	Do not apply chemical dust palliatives during rain or immediately before anticipated rain. Approved dust control agents are preferred over water drafting and application.																X	
28	Do not apply chemical or petroleum-based palliatives where they may enter a stream or watercourse unless specifically approved for such use.																X	

Table 6-4. Continued

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
29	Avoid disturbance of vegetation outside the essential shoulder area, especially near ditches, streams or watercourses. These vegetated areas help filter sediment from water run-off into ditches or streams and helps prevent erosion.	X							X							X		
30	Grade ditches only when necessary to keep the ditchline free flowing and restore capacity. Unnecessary mechanical grading can cause excess erosion, undermine banks, and expose the toe of the cutslope to erosion or slope failure.											X	X					
31	To control vegetation (rather than remove it entirely), use methods like mowing or weed-whacking when feasible. Vegetation prevents scour and filters out sediment.		X						X			X				X		
32	Whenever feasible, maintain a buffer of vegetation between the ditch and the road. This helps filter sediment from runoff and can be accomplished by using a steeper angle on the grader blade.	X	X						X			X				X		
33	Avoid harming existing vegetation on the cutbank above the ditch to reduce erosion and prevent slope failure.	X	X				X		X			X						
34	When “pulling” a ditch (mechanically grading and removing fine sediment), when possible, avoid spreading ditch spoils across or into the surface rock of the road or shoulder. Consider incorporating the removed soil into localized infrastructure (e.g., trails) and compact soil in place.											X						
35	The recommended minimum diameter for all new culverts, including cross drains, but exclusive of driveway culverts, is 18 inches. Often, small diameter culverts (12 inches or less) plug with debris, causing significant road damage. They are also difficult to clean out.	X						X	X				X					

Table 6-4. Continued

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
36	New culverts on anadromous fish bearing streams will be sized for the 100-year storm event. When replacing smaller existing culverts on anadromous fish bearing streams, and space does not allow for a 100-year storm event culvert without creating excessive disturbance (e.g., additional excavation) culverts will be sized as close to 100-year storm event as possible given site constraints.	X						X										
37	Implement energy dissipation avoidance and minimization measures at cross drain outlets to prevent erosion. Discharges from cross drains onto road fill or other erosive areas often cause significant erosion and slope failure. Make sure that newly-installed cross drains are properly designed to minimize erosion problems. Where erosion is already occurring, work to halt and reverse it with appropriate erosion control avoidance and minimization measures. Avoidance and minimization measures described in Conditions 4 and 5 will be applied as appropriate.	X						X	X				X					
38	Clean cross drains as needed; including clearing vegetation and sediment immediately upslope or downslope of the drain if needed.							X	X				X					
39	Inspect equipment for leaks or damage prior to performing concrete work. Perform maintenance at designated repair facilities.																	X
40	Prior to concrete work, identify storm drain inlets, manholes, and watercourses. Protect storm drains with appropriate sediment management avoidance and minimization measures. Avoidance and minimization measures described in Conditions 4 and 5 will be applied as appropriate.																	X

Table 6-4. Continued

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
41	Designate areas to be used for concrete washout and perform washout only in properly constructed containments. When washing equipment or vehicles to remove cement or concrete residue, use only as much water as is needed so that rinse water can be properly contained. For example, use a positive shutoff on the washout hose.																	X
42	Follow these procedures for concrete mixing on site. - Ensure that contractors who fuel and operate cement mixing operations on site have an adequate spill plan and materials for spill containment. - Avoid mixing excess amounts of fresh concrete or cement on site. - Establish mixing plants outside of riparian corridors or near watercourses. - Dry and wet materials should be stored away from waterways and storm drains and should be covered and contained to prevent runoff from rainfall.																	X
43	Remove concrete grindings, rubble, and debris from the site for proper disposal and do not discharge into drain inlets, the storm water drainage system or watercourses.																	X
44	Contain coolant water from concrete cutting and do not discharge into drain inlets, the storm water drainage system or watercourses.																	X
45	When fresh concrete may be exposed to water, (e.g. rainy weather work), use concrete sealants that are approved by the California Department of Fish and Game for this purpose.																	X
46	Perform all in-stream work in dry conditions, and do not work in flowing waters. If a stream is flowing, use a cofferdam or other dewatering avoidance and minimization measures as needed. See Condition 4 for dewatering avoidance and minimization measures.	X						X	X				X					

Table 6-4. Continued

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
47	Identify and map existing permanent disposal sites that can be used for long-term disposal of materials from routine and emergency maintenance activities and provide this information to maintenance crews. These sites should be in upland areas, such as rock pits, ridges, and benches. Locations should be above the 100-year floodplain of the closest stream and away from any groundwater seeps or wetlands.			X	X				X									
48	Minimize disturbance of ground cover or grass on the shoulder to the extent possible (the shoulder is part of the road right-of-way and may need to be kept clear for safety purposes), near ditches and outside of the road right-of-way. If the ground is bladed clean during mowing, the exposed soil will be vulnerable to erosion and could run-off into a creek. Vegetation can also act as a pollution filter that traps sediment and other runoff before it gets into ditches or streams.															X		
49	General guidelines for working within the road right-of-way: - Do not mow beyond 8 feet from the edge of the pavement unless that vegetation must be removed to retain existing drainage patterns or for safety reasons. - Do not remove brush more than 20 feet on either side of the road at bridge structures, unless additional removal is required to address safety concerns or to control noxious weeds. - Do not remove brush more than 10 feet on either side of a culvert, or 10 feet up and downstream from culverts that are 6-feet in diameter or larger, unless management is required for safety concerns or to control noxious weeds. NOTE: Fire management requirements must be considered when using this avoidance and minimization measure.							X	X	X							X		

Table 6-4. Continued

		Sediment Management and Erosion Control							Road Maintenance									
	Avoidance and Minimization Measures	General Construction	Hillside Activities	Spoils Handling and Disposal	Mass Wasting Repair	Minor Slide Repair	Storm-Proofing	Culverts	General	Shoulder Maintenance	Dirt Road Maintenance	Ditch Maintenance	Drainage Systems	Sidecasting	Water Drafting	Vegetation Management	Dust Control	Concrete Work
50	Small quantities of cut brush and trees may be left in riparian areas, adjacent to streams, when cut vegetation: - Does not cause a safety concern or fire hazard; - Does not disturb existing drainage patterns. - Does not contain noxious weeds (consult with appropriate staff about types and locations of noxious weeds); - Is not stockpiled in concentrated areas that can release leachate to surface water.															X		
51	When removing invasive plants and noxious weeds, use complete and thorough treatments. (*Arundo donax* is particularly difficult and requires at least two treatments to remove all underground root networks.)															X		
52	Dispose of larger amounts of vegetation and debris in approved upland disposal areas. Do not dispose of vegetation directly into waterbodies such as streams or wetlands. Do not permanently dispose of concentrated amounts of vegetation that can generate leachate that could affect surface or groundwater quality, unless disposal is at a location permitted for this purpose.															X		

Table 6-5. Habitat for Covered Species Avoided due to the Stream and Riparian Setback Condition

Species/Modeled Habitat	Total Modeled Habitat in Study Area[1]	Amount in Open Space Types 1, 2, and 3[2]	Commitment to Acquire Modeled Habitat for Reserve System[1]	Additional Modeled Habitat Avoided due to Setbacks[3]	Percent of Modeled Habitat Avoided due to Setbacks
California red-legged frog					
Primary habitat (acres)	10,101	3,230	1,300	2,855	28%
Foothill yellow-legged frog					
Primary habitat (miles)	244	70	30	119	49%
Secondary habitat (miles)	447	1526	50	229	51%
Western pond turtle					
Primary habitat (acres)	82,895	28,568	7,000	13,480	16%
Least Bell's vireo					
Primary habitat (acres)	3,097	330	460	837	55%

Notes:
[1] Source: **Table 5-17**.
[2] Open space Types 1, 2, and 3 are assumed to provide some conservation value for covered species.
[3] Excludes setbacks that could occur within the Reserve System and existing open space. Represents a reasonable estimate of avoidance during the permit term if all covered activities occurred. Estimate does not include setbacks from rural residential development, which are difficult to predict in locations precise enough to estimate setback distances.

Table 6-6. Recommended Setbacks to Preserve Riparian and Stream Function (from studies throughout the United States since 1990)

	Function	Citation	Recommended Setback
Physical Properties	Sediment and Nutrient Reduction	Corley et al. 1999	>33 feet
		Nichols et al. 1998	>60 feet
		Woodward and Rock 1995	>50 feet
		Desbonnet et al. 1994	80 feet
		Petersen et al. 1992	>33 feet
		Castelle et al. 1992	>50 feet
		Schellinger and Clausen 1992	75 feet
		Welsch 1991	>85 feet
	Removal of Fecal Coliform	Johnson and Ryba 1992*	75–300 feet
	Moderation of Stream Temperature/Microclimate	Lynch and Corbett 1990	100 feet
	Channel Complexity	Brosofske et al. 1997	>145 feet
		Chapel et al. 1991	135–220 feet
Biological Properties	Salmonid Habitat	Ligon et al. 1999	>150 feet
		Welsch 1991	>85 feet
	Reptile/Amphibian Habitat	Burbink et al. 1998	>325 feet
		Semlitsch 1998	540 feet
		Buhlmann 1998	440 feet
		Rudolph and Dickson 1990	98 feet
	Bird Habitat/Diversity	RHJV 2000	250 feet
		Whitaker and Montevechi 1999	>160 feet
		Hagar 1999	>130 feet
		Kilgo et al. 1998	>1,600 feet
		Richardson and Miller 1997	>160 feet
		Mitchell 1996	>325 feet
		Hodges and Krementz 1996	>325 feet
		Spackman and Hughes 1995	450 feet for 90% of species diversity
	Mammal Habitat/Diversity	Hilty et al. 2006	>1,000 feet
	Plant Diversity	Spackman and Hughes 1995	30–100 feet for 90% of species
	General Riparian/Ecosystem Function	NH FSSWT 2000	100 feet, 300 feet, 600 feet by stream order
		Spence et al. 1996	98–145 feet
		Johnson and Ryba 1992*	> 98 feet
		Chapel et al. 1991	160–650 feet
		Welsch 1991	>85 feet

* Article does not present new data, but instead is a review of existing data.

Table 6-7. Required Stream Setback Distances[1]

Stream Category	Category 1 Streams		
Slope Class	Inside Existing Urban Service Area[2]	Outside Existing Urban Service Area[2]	Category 2 Streams
0–30%	100 feet	150 feet	35 feet
> 30%	150 feet	200 feet	

[1] All distances measured from top of bank. For Category 1 streams, if the edge of riparian vegetation extends beyond setback, the riparian edge becomes the setback plus a 35-foot buffer from riparian edge inside or outside the Urban Service Area. For Category 2 streams, if the site supports riparian vegetation, the setback will extend from the riparian edge plus a 35-foot buffer.

[2] Urban service areas existing at the time of permit issuance for the Habitat Plan.

Table 6-8. Summary of Habitat Survey Requirements and Preconstruction Survey and Monitoring for Select Covered Wildlife Species

Land Cover Type	Species	Specific Habitat Elements	Requirements			
			Species Habitat Survey[1]	Preconstruction Survey	Avoidance and Minimization Requirements	Construction Monitoring
Any Grassland, Oak Woodland, or Agricultural Land Cover Types	San Joaquin kit fox	• Within the modeled habitat in the study area (see species account in Appendix D for model and parameters)	• Identify and map potential den sites	• Determine status and map all dens (>5 in. diameter) within 250 feet of activity footprint	• Monitor dens • Destroy unoccupied dens • Discourage use of occupied (non-natal) dens	• Establish exclusion zones (>50 feet) for potential dens • Establish exclusion zones (>100 feet) for known dens • Notify USFWS and CDFG of any occupied natal dens • Construction or maintenance personnel must participate in training
	Western burrowing owl	• Within all occupied nesting habitat (**Figure 5-11**). Surveys are not required in sites that are mapped as potential nesting/overwintering or only overwintering habitat	• Identify and map burrows and potential burrows within 250 ft of activity footprint • Document evidence of presence/absence (owls, pellets, whitewash, prey remains) • Species survey in occupied habitat are required in both breeding and non-breeding	• Conduct burrowing owl survey within 2 calendar days of ground disturbance (see Condition 15 for details of required survey methods)	• Avoid occupied nests within a 250-foot buffer during breeding season (Feb 1–Aug 31) or develop a monitoring plan that allows activity within 250-foot buffer (see Condition 15 for requirements) • Avoid occupied burrows during non-breeding season (Sept 1–Jan 31) or meet requirements in Condition 15 if allowing activity within a 250-foot buffer	• Establish buffer zones (250 feet) around active nests if applicable • Establish buffer zones (250 feet) around occupied burrows during non-breeding season if applicable • Implement construction monitoring consistent with monitoring plan or requirements if activities occur within the buffer • Construction or maintenance personnel must participate in training

Table 6-8. Continued

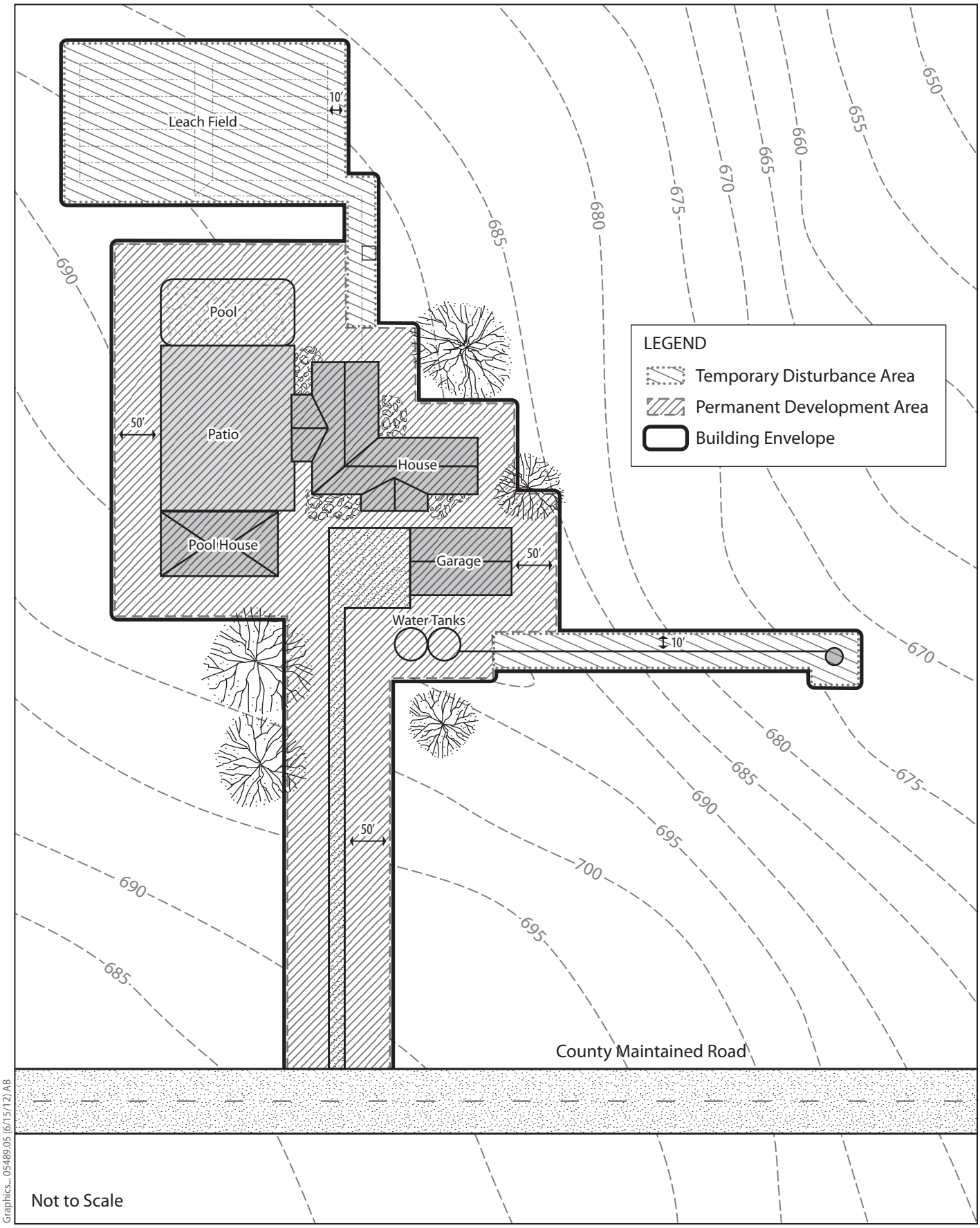
Land Cover Type	Species	Specific Habitat Elements	Requirements: Species Habitat Survey[1]	Requirements: Preconstruction Survey	Requirements: Avoidance and Minimization Requirements	Requirements: Construction Monitoring
Pond or Coastal/ Valley Freshwater Marsh	Tricolored blackbird	• Within 250 feet of verified riparian land, coastal and valley freshwater marsh, or pond cover types	• Identify and map nesting substrate, and marsh habitat	• Document presence/absence of breeding colony within 2 calendar days of disturbance • Document use of habitat (e.g., breeding, foraging) • Determine if the site has been used for nesting in the past 5 years	• Avoid occupied nests colonies during breeding season (Mar 15–July 31) • Avoid nest sites that were occupied in the past 5 years	• Establish 250-foot buffer around outer edge of all hydric vegetation associated with breeding habitat • Construction or maintenance personnel must participate in training • Notify CDFG and USFWS of nest locations immediately
Any Riparian Forest and Scrub Land Cover Types	Least Bell's vireo	• Within potential breeding habitat, as mapped by the Implementing Entity • Within 250 feet of verified riparian land cover types	• Identify and map early successional riparian forest or scrub	• Document presence/absence of nesting least Bell's vireo within 2 calendar days of disturbance • Document use of habitat (e.g., breeding, foraging) • Determine if the site has been used for nesting in the past 3 years	• Avoid occupied nests during breeding season (Mar 15–July 31) • Avoid nest sites that were occupied in the past 3 years	• Establish a 250-foot buffer around occupied nest site • Construction or maintenance personnel must participate in training • Notify CDFG and USFWS of nest locations immediately
Serpentine bunchgrass grassland	Bay checkerspot butterfly	• In Bay checkerspot butterfly habitat units identified in Appendix D • In mapped serpentine that cannot be avoided	• Identify and map extent of larval host plants • Report results of reconnaissance level surveys for adult butterflies	• None	• Locate the project footprint as far from field-verified occupied Bay checkerspot habitat or the highest-quality serpentine habitat as feasible	• None

[1] Changes to project design that result from planning survey information will help avoid impacts to covered species. If no project design changes are needed and site is relatively simple, species habitat surveys could be combined with preconstruction surveys.

Table 6-9. Survey Periods for Covered Plant Species

Species		Survey Period											
Common Name	Scientific Name	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Covered Species													
Tiburon Indian paintbrush	*Castilleja affinis* ssp. *neglecta*				√	√	√	√					
Coyote ceanothus	*Ceanothus ferrisiae*	√	√	√	√	√							
Mount Hamilton thistle	*Cirsium fontinale* var. *campylon*		(√)	(√)	√	√	√	√	√	√	(√)		
Santa Clara Valley dudleya	*Dudleya abramsii* ssp. *setchellii*				√	√	√						
Fragrant fritillary	*Fritillaria liliacea*		√	√	√								
Loma Prieta hoita	*Hoita strobilina*					(√)	√	√	(√)	(√)	(√)		
Smooth lessingia	*Lessingia micradenia* var. *glabrata*							√	√	√	(√)	(√)	
Metcalf Canyon jewelflower	*Streptanthus albidus* ssp. *albidus*				√	√	√	√					
Most beautiful jewelflower	*Streptanthus albidus* ssp. *peramoenus*			√	√	√	√						

Note: (√) indicates flowering periods which are possible but uncommon for the species.



Graphics... 05489.05 (6/15/12) AB

Figure 6-1
Schematic for Calculating Development Area

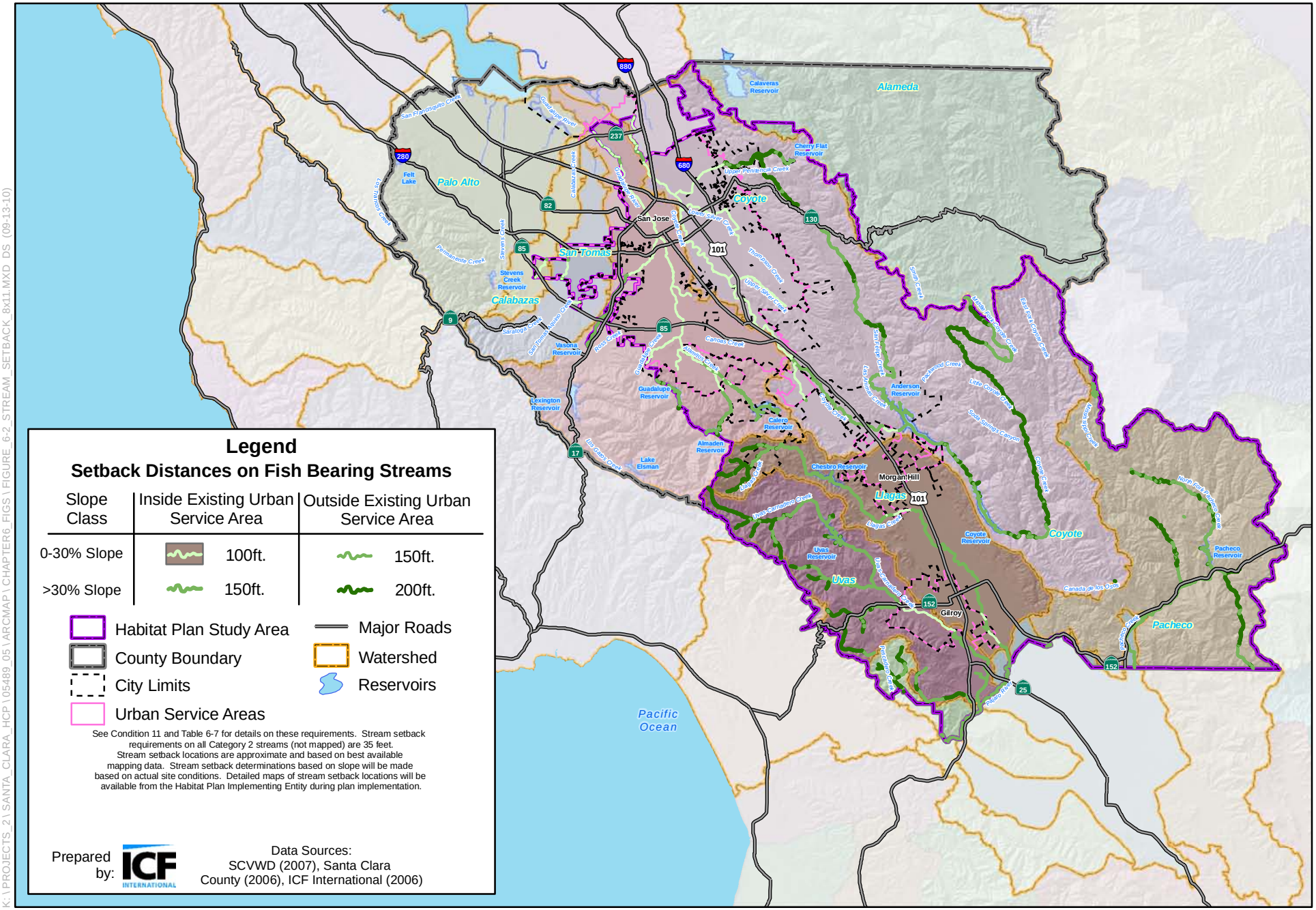


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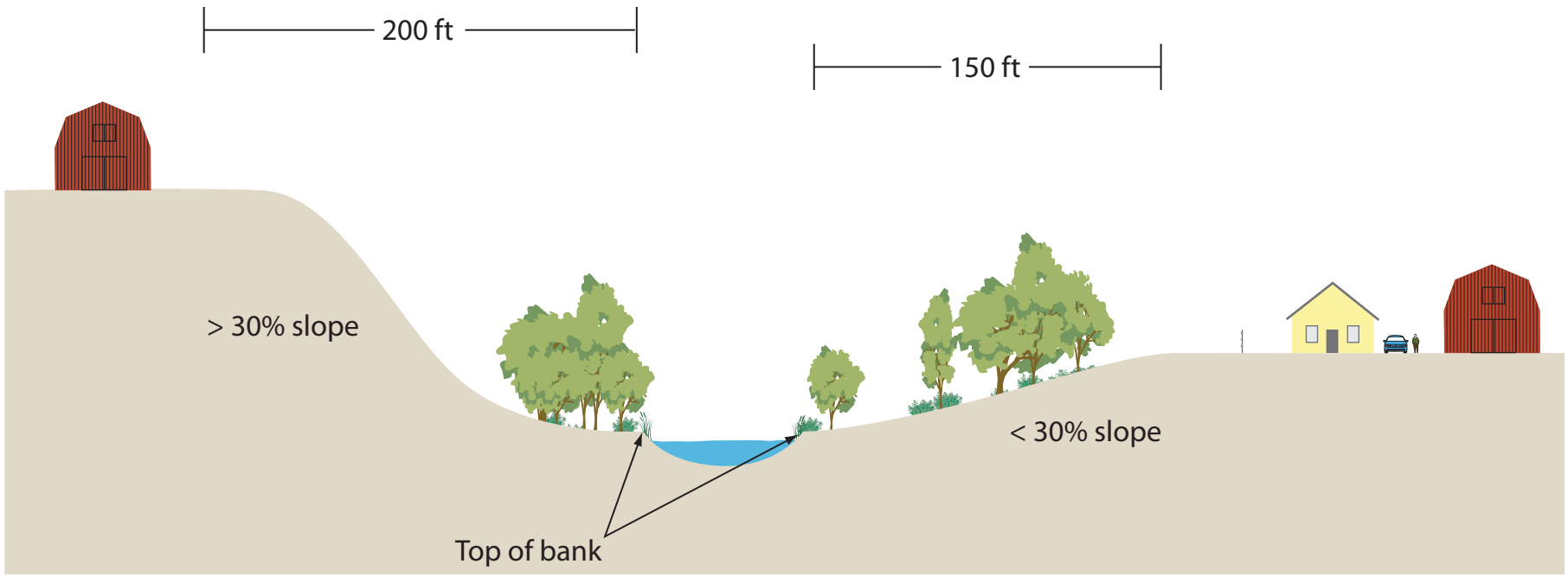
Figure 6-2
Stream Setback Requirements for Category 1 Streams



Not to Scale

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Figure 6-3a
Stream Setback Condition – Slope Examples
Category 1 Stream Outside Urban Service Area

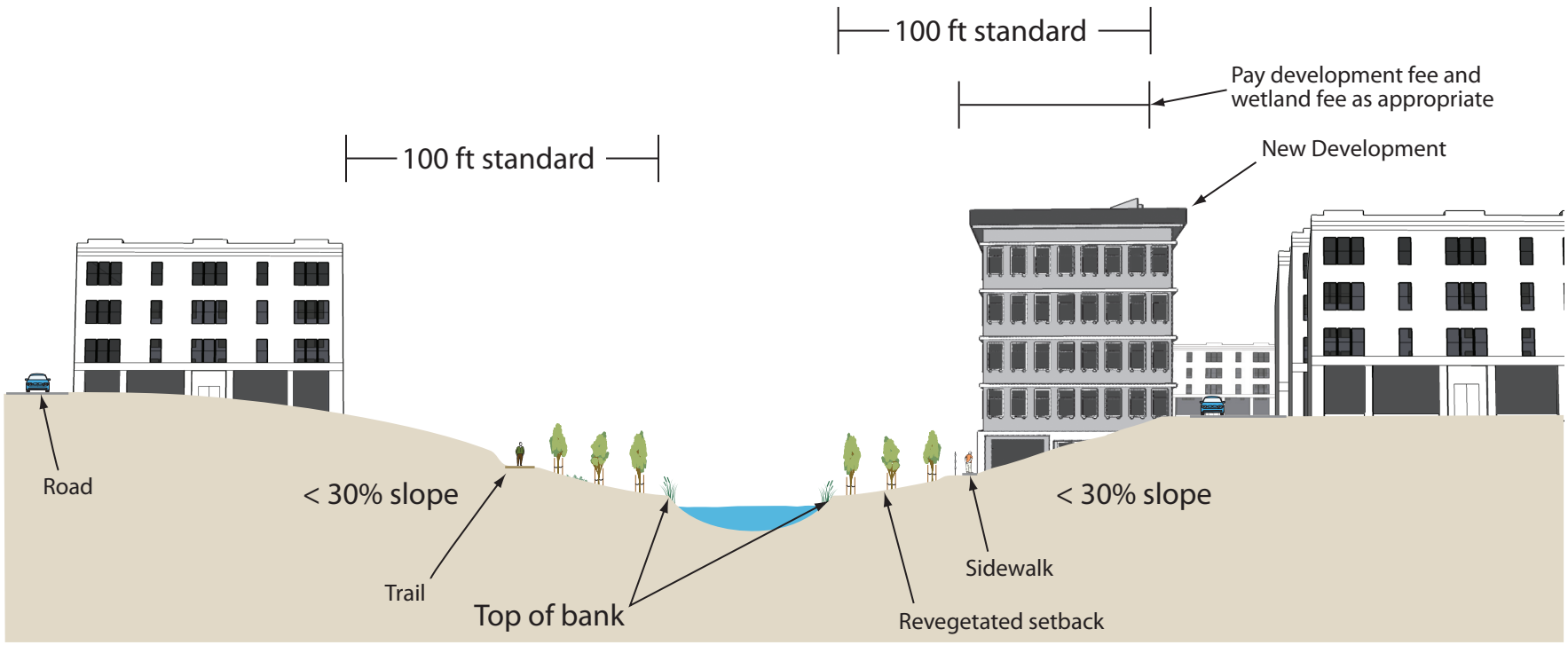

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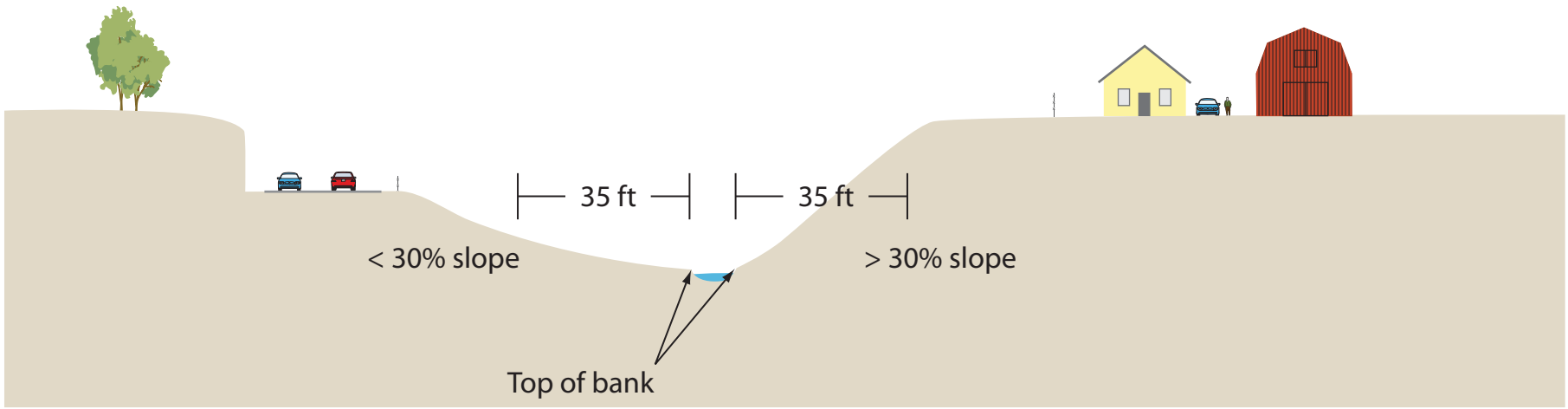
Figure 6-3b
Stream Setback Condition
Category 1 Inside Urban Sevice Area



Not to Scale

Graphics... 05489.05 HCP (6/15/12) AB

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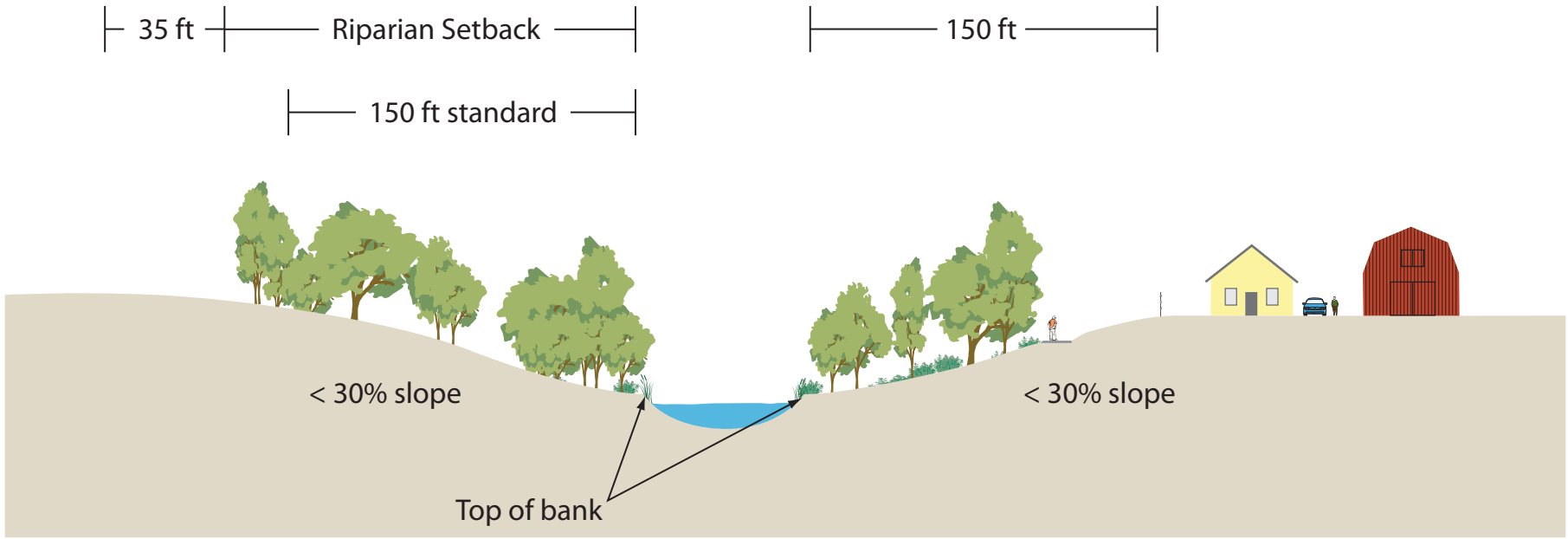
Figure 6-3c
Stream Setback Condition – Ephemeral Stream (Category 2) Example



Not to Scale

Graphics... 05489.05 HCP (6/15/12) AB

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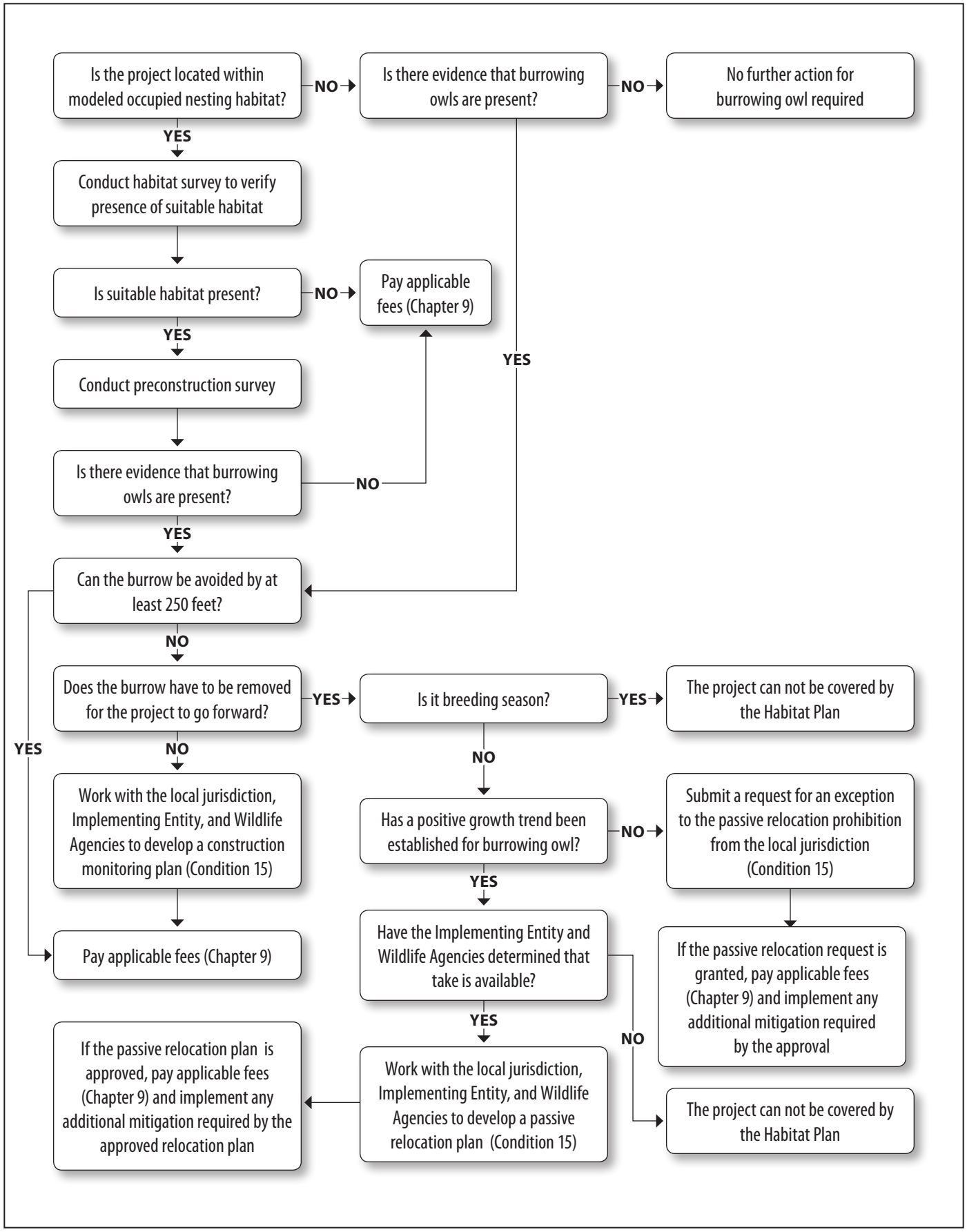
Figure 6-3d
Stream Setback Condition – Riparian Vegetation Examples
Category 1 Stream Outside Urban Service Area



Graphics … 05489.05 (8/2/12) AB

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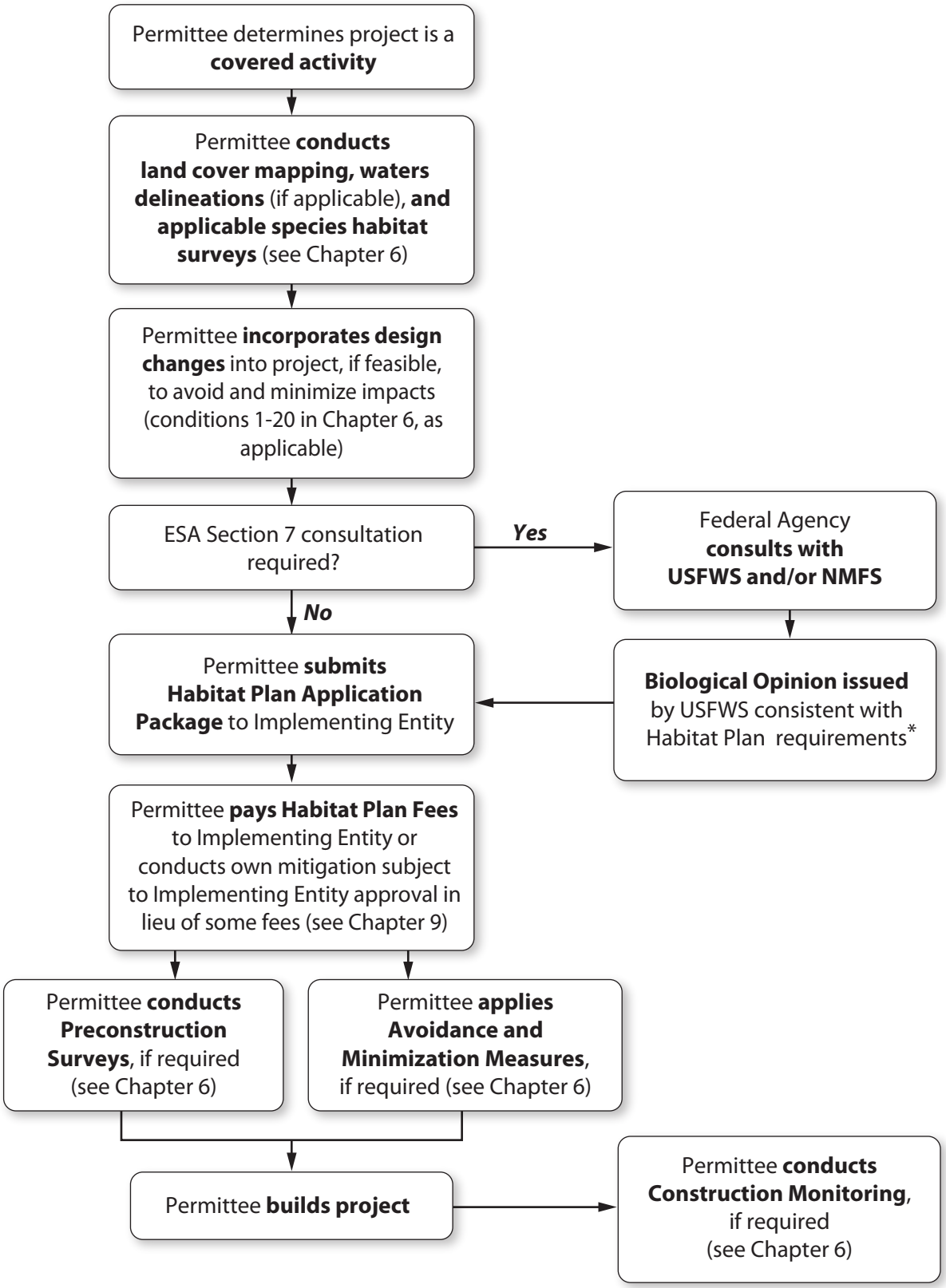
Figure 6-4
Western Burrowing Owl Survey and Monitoring Requirements Flow Chart



* Other permits may require different mitigation than required by the Habitat Plan.

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Figure 6-5
Process for Project Compliance with Habitat Plan for Public Projects (by Permittees)

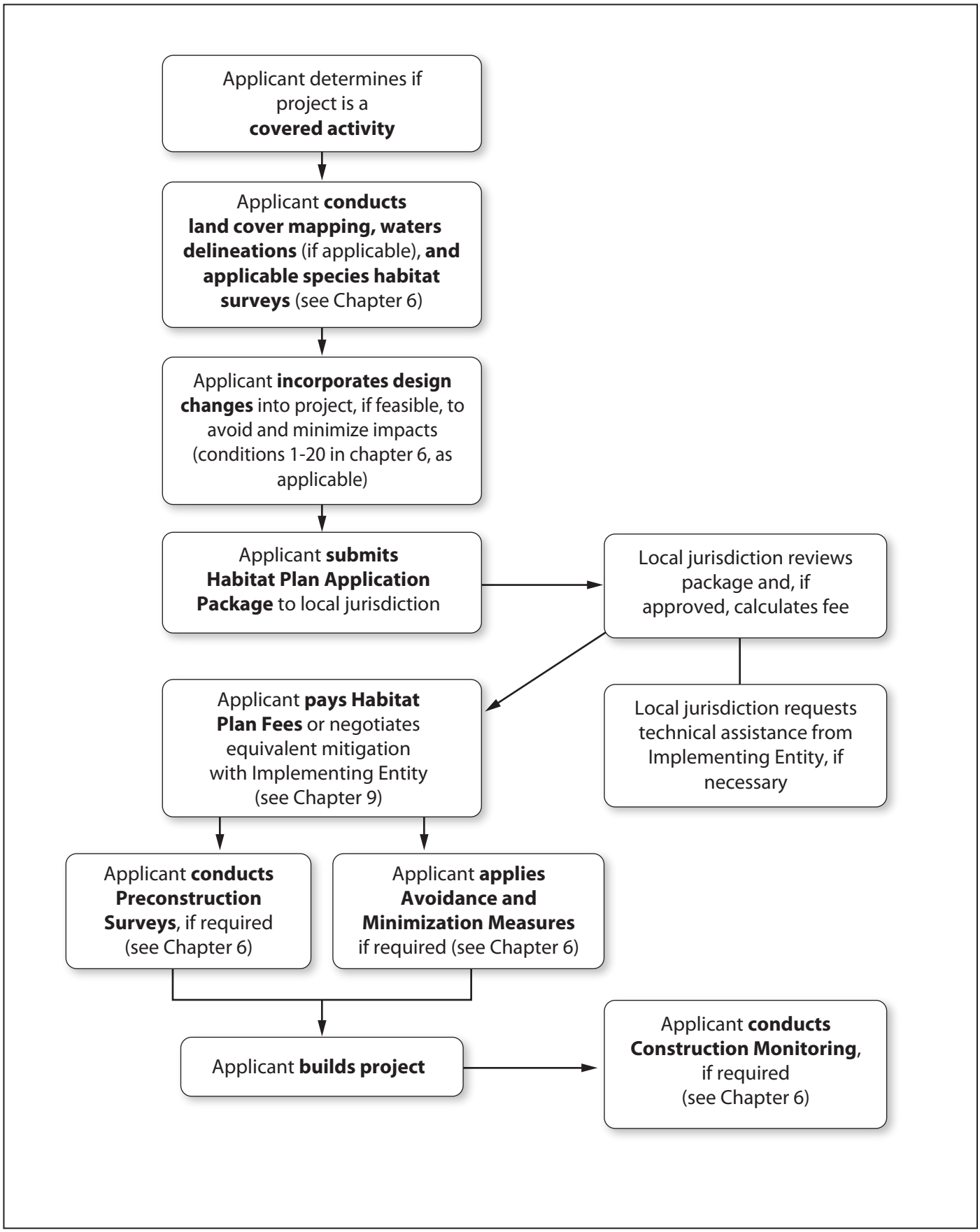

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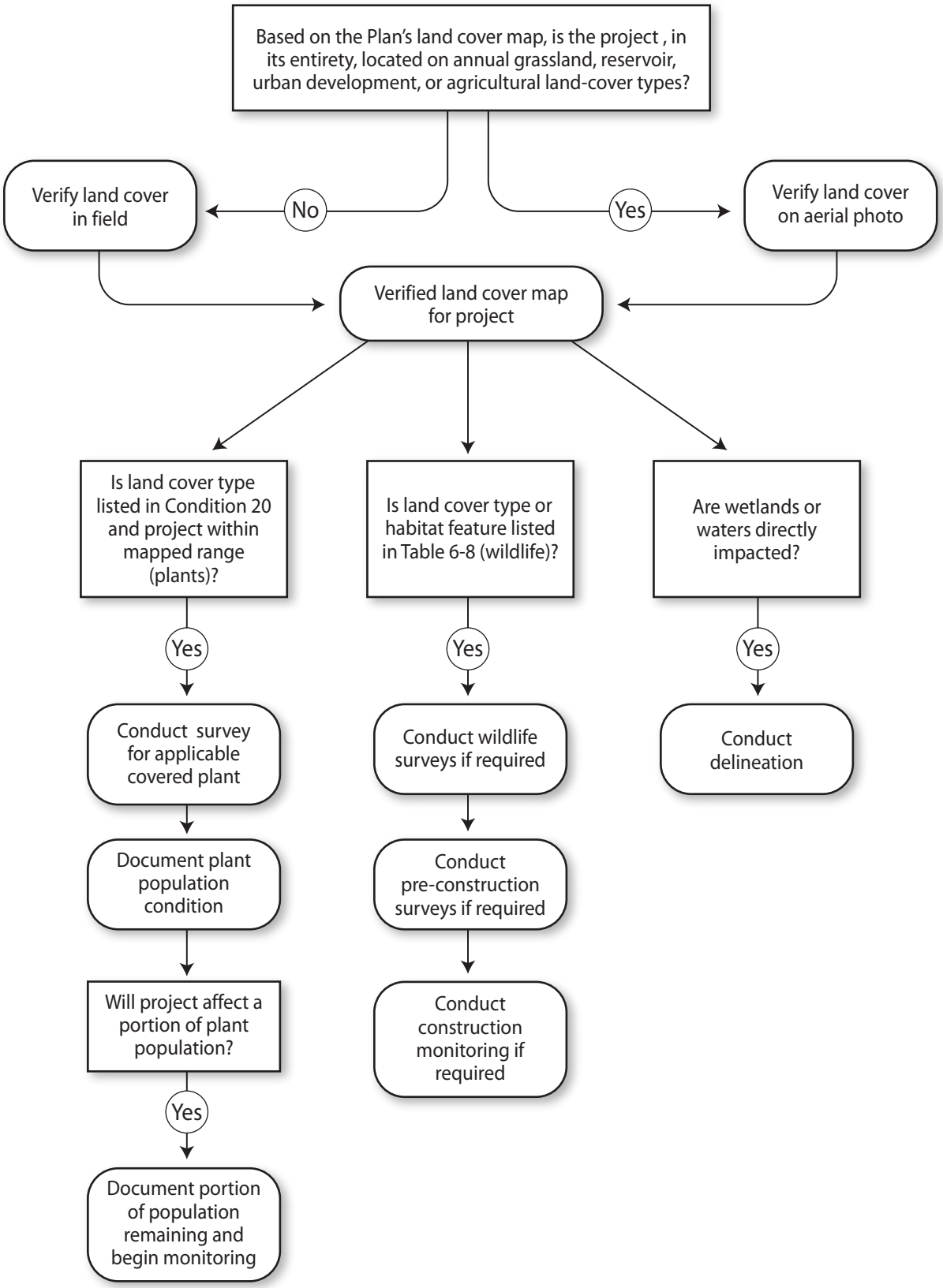
Figure 6-6
Process for Project Approval under Habitat Plan for Private Projects Covered by Plan



Note: If "no" action is not specified, then no action is required.

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Figure 6-7
Survey Requirements for Covered Activities

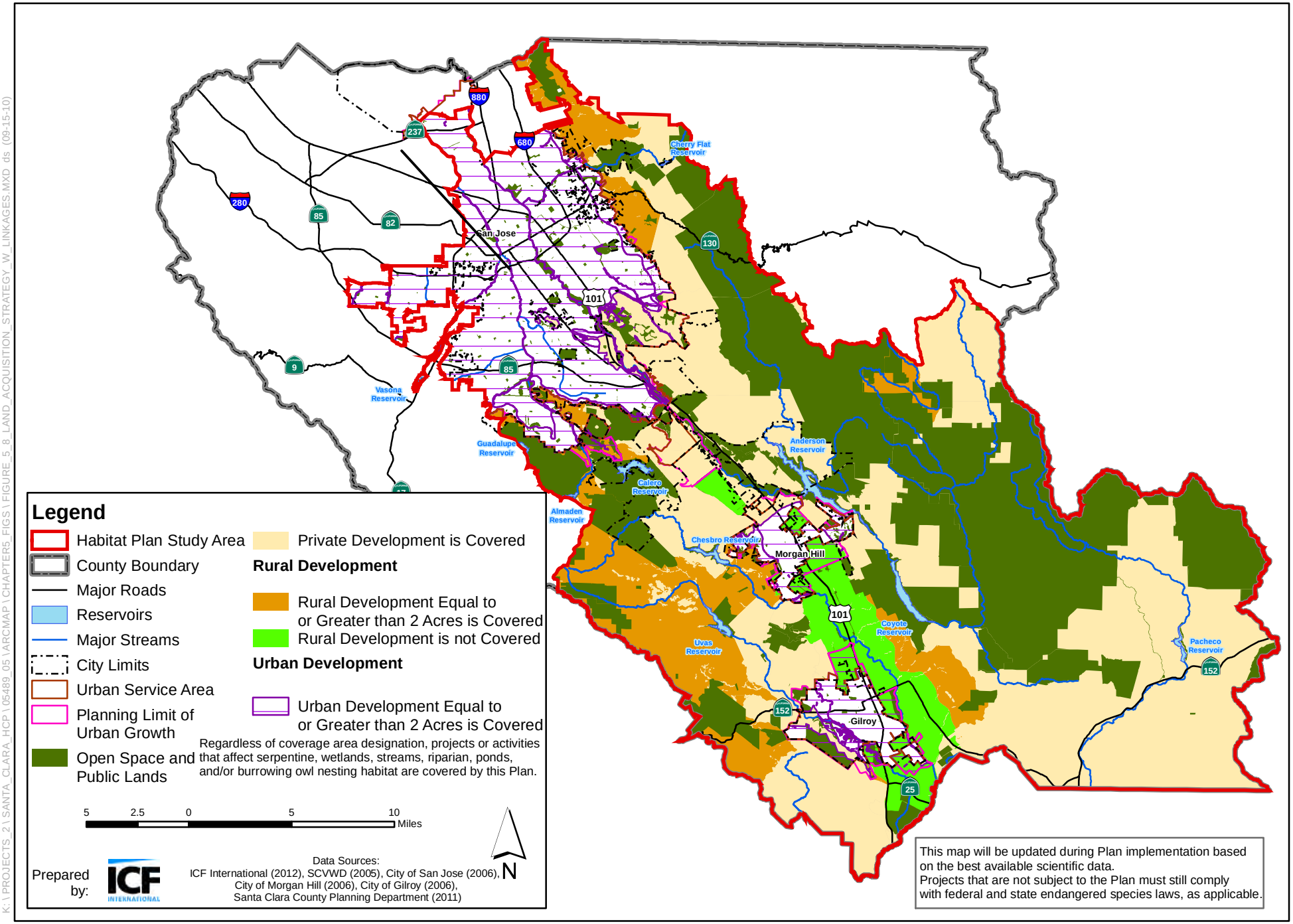

Figure 6-8
Private Development Areas Subject to the Plan

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