Chapter 1
Introduction

Note to Reader: This is a revised draft of the biological goals and objectives of the HCP/NCCP. This material will become part of Chapter 1 of the HCP/NCCP, so it is formatted as a section of this chapter. The introductory material is meant as background for your review and may or may not be included in the final chapter of the HCP/NCCP.

These goals and objectives are tentative until the conservation strategy is developed and approved. Qualitative goals and objectives have been developed as a first step. Final goals and objectives may be more quantitative (e.g., have acreage targets, mitigation ratios, etc.) to provide a measurable target for HCP implementation.

Rationales are presented for selected goals and objectives. Rationales will eventually be written for all biological goals and objectives. This draft has been revised based on comments from the HCPA Coordination Group, the Scientific Advisory Panel, and in conjunction with the development of the preliminary draft conservation strategy. All revisions are visible in this document. Biological goals and objectives will be revised again for the administrative draft HCP/NCCP.

1.X Biological Goals and Objectives

This section describes the goals and objectives for each covered natural communities and covered species. Goals are broad, guiding principles based on the conservation needs of the resource. Goal statements describe the desired future condition for each covered natural community and species with full implementation of the HCP/NCCP. Objective statements are expressed as conservation targets or actions, or as studies to collect information necessary to implement adaptive management. Objectives are measurable and achievable within a given time frame; they clearly state a desired result and will collectively achieve goals.

Biological goals are required in HCPs for covered species by the U.S. Fish and Wildlife Service's "5-Point Policy" (65 FR 35242, June 1, 2000). Biological goals for natural communities are not required for HCPs or NCCPs but they are included in this plan for consistency and because this HCP/NCCP takes a habitat-based approach to conserving covered species. Some of the goals and objectives overlap among species and between species and natural communities. This overlap illustrates that many conservation measures will achieve multiple objectives to conserve covered species and natural communities.

Biological goals and objectives were developed using several sources, including:

- Ecological data from species profiles (Appendix X) and natural community descriptions (Chapter 3)
- Recovery plans for covered species
- Critical habitat rules for covered species
- Species distribution models developed for 19 covered species
- State and federal resource planning documents
- Input from resource specialists
- Documentation of on-going resource management in the inventory area (e.g., Los Vaqueros Watershed management and monitoring)

Goals and objectives for covered natural communities are described first. Goals and objectives for covered species are listed in the order in which they are found in chapter 3.

1.X.2 Biological Goals and Objectives for Natural Communities, Wetlands, and Streams

A Natural Community Conservation Plan (NCCP) is required to "identify and provide for those measures necessary to conserve and manage natural biological diversity within the plan area while allowing compatible and appropriate economic development, growth, and other human uses" (Dept. of Fish and Game Code Sect. 2805(g)). This is done, in part, through measures designed to conserve covered species. However, biological diversity includes many more species than those covered by this HCP/NCCP. Another important component of natural systems is the community, which is composed of multiple species and the interactions among them. At the highest level, ecosystems integrate communities and the physical environment and include all interactions between the biological and physical worlds. NCCPs are required to address conservation at all of these levels.

The NCCP Act does not require developing goals or objectives for covered natural communities. However, this approach is consistent with existing guidelines for HCPs relating to covered species. Because the primary purpose of NCCPs is to conserve communities and biological diversity as a whole, it is appropriate to develop goals for the natural communities in this plan. Having clear goals for natural communities allows anyone to evaluate the HCP/NCCP against these goals to ensure that the broader purpose of the NCCP is met.

This HCP/NCCP includes 5 natural communities, called vegetation communities because they are defined in terms of their vegetation composition (as opposed to wildlife or other composition). The term natural community is also avoided because agricultural lands are not "natural" but they provide important habitat for some covered species. See chapter 3 of the HCP/NCCP for descriptions and definitions of the 5 vegetation communities in this plan:

- Grassland
- Chaparral/scrub
- Oak woodland (including oak savanna)
- Riparian woodland/scrub
- Irrigated agriculture

Wetlands and streams are aquatic features that occur in most of the vegetation communities in the inventory area. We have developed biological goals separately for wetlands and streams to ensure that the regulatory requirements of state and federal laws relating to these features are met. Goals for wetlands and streams apply to any vegetation community in which these features are found; they are listed first.

Each vegetation community, except irrigated agriculture, has a single, similar goal: to establish and maintain a reserve system that maintains and enhances the processes and functions of that community and the biological diversity is supports. Objectives are designed to meet this goal within the framework of the HCP/NCCP.

Wetlands and Streams

Goal 1~~1~~: Establish and maintain a reserve system that maintains and enhances the processes, functions, and values of wetlands, ponds, and streams and the biological diversity they support.

Objective 1.1~~1a~~: Avoid impacts on wetlands from covered activities to the maximum extent practicable. Minimize adverse effects on wetlands from covered activities to the maximum extent practicable.

Objective 1.2~~1b~~: Achieve no-net-loss in wetland functions and values by restoring or creating wetlands of equal or greater function and value than those that are lost.

Objective 1.3: Preserve a full range of the diversity of wetland types within the inventory area, including alkali wetlands, alkali meadows, northern claypan vernal pools, valley rock outcrop intermittent pools, stock ponds, seeps, alkali seeps, springs, seasonal wetlands, and freshwater marsh.

Objective 1.4~~1c~~: Stock ponds lost to covered activities will be compensated through preservation, restoration, and creation of ponds of equal or greater extent and function than those ponds lost.

Objective 1.5~~1d~~: Increase the extent and function of wetlands within the inventory area through restoration and creation of wetlands along streams or in historical seasonal wetland soils (e.g., alkali soils on abandoned agricultural lands), if practicable.

Objective 1.6~~1e~~: Enhance natural wetlands within preserves by limiting or eliminating livestock access.

Objective 1.7~~1f~~: Within preserves, improve the functioning of stock ponds for covered species by draining them annually to remove exotic species and by limiting access by livestock.

Objective 1.8~~1g~~: Ensure wetlands within preserves maintain or improve their hydrologic functions by preserving upland habitat up-gradient of wetlands and maintaining surface hydrologic connections to streams or other water bodies. For wetlands that form complexes, emphasize preservation of the entire complex to maintain the hydrology of the wetland system.

Objective 1.9~~1h~~: Preserve intact watersheds to the maximum extent practicable.

Objective 1.10~~1i~~: ~~Avoid or m~~Minimize the loss or degredation of streams to covered activities. Limit the total loss or channelization of intermittent streams to less than the 5% of remaining streams in the inventory area. Avoid all direct impacts to unchannelized perennial or near-perennial streams.

Rationale: Impacts to streams within the lower elevations of the inventory area cannot be avoided as urban development expands within the Urban Limit Line. Once lost, streams and stream functions cannot be replaced through restoration. Perennial, unchannelized streams are rare within the inventory area, so impacts to these unique resources shall be avoided.

Objective 1.11~~1j~~: Compensate for any loss or degredation of streams by preserving ~~a larger and longer extent of~~ high-quality stream reaches and enhancing degraded streams.

Objective 1.12~~1k~~: Increase riparian woodland/scrub canopy coverage over streams to reduce and mediate stream water temperatures and improve aquatic habitat through active and passive restoration and changes in grazing practices, where appropriate.

Objective 1.13~~1l~~: Reduce stream bank erosion within preserves through active and passive means such as bank stabilization, planting riparian and upland vegetation, and changes in grazing practices.

Objective 1.14: In lower stream reaches, maintain a buffer zone between urban development and unchannelized streams to ensure that these streams can meander within a floodplain.

Rationale: Streams within their lower reaches occur on flat floodplains that allow them to naturally meander and form sinuous channels. This channel patterns helps to create a diversity of aquatic and terrestrial habitat types to support biological diversity. As urban development encroaches on streams, the need increases to channelize and straighten these streams to reduce their flood frequency. This has the undesireable effect of greatly reducing habitat diversity. If a buffer zone between urban development and stream banks is maintained (e.g., agriculture or natural communities), stream channels can still maintain a natural or semi-natural channel while still reducing flood risk to nearby development.

Grassland

Goal 2~~1~~: Establish and maintain a reserve system that maintains and enhances the processes and functions of the full variety of the grassland community and the biological diversity it supports.

Rationale: The grassland vegetation community is the most abundant natural community in the inventory area, supports most of the covered species, and has relatively high biological diversity of birds, amphibians, mammals, and plants. Opportunities exist to enhance this community in preserves (e.g., increasing the proportion of native plants) through changes in management. ~~Restoring~~ Expanding native grassland stands within this community through restoration may be possible in areas where native grasses already occur. ~~and expanding the grassland community is not feasible on a regional scale. However, e~~Expanding annual~~the~~ grassland ~~community through restoration~~ is also possible in limited areas of ruderal land cover (see land cover map).

Objective 2.1. Avoid or minimize impacts to native grassland including unique and rare alliances such as purple needlegrass grassland, wildrye grassland, wildflower fields, squirreltail grassland, one-sided bluegrass grassland, serpentine grassland, saltgrass grassland, and alkali sacaton bunchgrass grassland; enhance these native grassland subtypes within preserves through changes in management.

~~**Objective 1a:** Avoid or minimize impacts to native grassland; enhance native grassland within preserves.~~

~~**Rationale:** Remnant stands of native grassland are rare within the inventory area and in California. These stands provide the only examples of what the grassland community may have looked like prior to the invasion by European and other exotic grasses and herbs. Impacts to stands of this grassland type should be avoided and they should be incorporated into preserves to ensure proper management. Native grassland within preserves should be enhanced through changes in grazing practices and other disturbances such as fire.~~

~~**Objective 1b:** Avoid or minimize impacts to alkali grassland; enhance alkali grassland within preserves.~~

Rationale for Objective 2.1: Remnant stands of native grassland are rare within the inventory area and in California. The inventory area has an unusual diversity of native grassland alliances including purple needlegrass grassland, blue wildrye grassland, wildflower fields,squirreltail grassland, one-sided bluegrass grassland and saltgrass grassland (see *List of Terrestrial Natural Communities Recognized by The California Natural Diversity Database* [CNDDB], May 2002, for a list of all alliances in California). All native grassland alliances listed above except squirreltail grassland are considered rare by the CNDDB. Alkali sacaton bunchgrass grassland may occur within the inventory area (S. Bainbridge, pers. comm.). If it does, impacts to this alliance should be avoided.

These stands provide the only examples of what the grassland community may have looked like in the inventory area prior to the invasion by European and other exotic grasses and herbs. In addition, native grasslands likely support a greater abundance

and diversity of insects than grasslands dominated by exotic annual grasses and herbs. Impacts to stands of native grasslands should be avoided and they should be incorporated into preserves to ensure proper management. Native grassland within preserves should be enhanced where possible through changes in management. Enhancement feasibility will depend largely on site conditions.

~~**Rationale:** Alkali grassland is relatively rare in the inventory area and in California. Alkali grassland supports a unique suite of grassland plants. Impacts to this grassland type should be avoided where practicable and minimized where unavoidable.~~

~~**Objective 1c:** Enhance the grassland community for grassland plants and wildlife within preserves through changes in grazing and fire management and a program for control of invasive plants.~~

Objective 2~~1~~.2~~d~~: Convert ruderal land-cover types in protected areas to grassland communities with a large component of native plants through restoration.

Rationale: Small areas of ruderal land-cover in the inventory area are surrounded by grassland. If incorporated into preserves, these sites should be converted to grassland with a similar component (biomass and species) of native plants as intact grassland. Sites c~~w~~ould be restored to grassland ~~through restoration~~ using active methods such as soil/topographic modification~~, herbicides~~, seeding, planting, or management ~~changes in~~of grazing or fire. ~~The amount of active restoration needed will depend on the site conditions.~~ The type of grassland created (e.g., annual grassland, perennial bunchgrass grassland, or alkali grassland) and the amount of active restoration needed will depend on site conditions including soil type and the species composition of nearby grassland stands.

Objective 2~~1~~.3~~e~~: Compensate for the loss of grassland by preserving large blocks of high-quality grassland capable of supporting covered species and representative grassland biological diversity. Emphasize preserving large blocks of grassland known to support covered species and stands of native grassland listed in Objectives X-X.

Objective 2~~1~~.4~~f~~: Promote populations of key species in grassland to enhance the prey base for raptors and mammals and to increase habitat for various species.

Objective 2~~1~~.5~~g~~: Minimize impacts of covered activities on the transition zones (edges) between grassland and other vegetation communities.

Rationale: The transition zone between grassland and oak woodland or between grassland and chaparral are important areas of high biological diversity. Natural changes in these zones will occur (e.g., shrubs invading grassland, or grasslands replacing chaparral after frequent fires). However, impacts from covered activities to these important transition zones should be minimized.

Objective 2~~1~~.6~~h~~: Minimize the indirect effects of the urban edge on grasslands by preserving grassland at this edge to serve as a buffer zone.

All Wetland and Stream objectives are incorporated into this grassland goal because these aquatic features are common within grassland and they play an important role in the functioning of this community.

Oak Woodland

Goal 3~~1~~: Establish and maintain a reserve system that preserves and enhances the processes and functions of the full variety of the oak woodland community and the biological diversity it supports.

Rationale: Opportunities exist to enhance this community in preserves through careful changes in management such as grazing, fire, and invasive species ~~management~~control. Expansion of the oak woodland community is not feasible on a regional scale because it would be at the expense of other vegetation communities. The historic extent of oak woodlands in undeveloped areas of the inventory area is unknown, so its current distribution is assumed to be "natural".

~~*Note to Science Panel: Jones & Stokes requests advice from the Science Advisory Panel on the possible historic extent of oak woodlands in the inventory area and whether an objective should be added to expand this community at the expense of grassland.*~~

Objective 3.1~~1a~~: Avoid or minimize adverse effects on oak woodlands and individual oak trees.

Rationale: Adverse effects on oak woodland and individual oak trees should be minimized to minimize the effects on the species, including covered species, supported by this community. Even isolated oak trees within urban development provide habitat for some resident wildlife.

Objective 3.2~~1b~~: Compensate for the loss of oak woodlands by preserving stands with a similar species overstory and understory composition and compensate for the loss of oak savanna by creating oak savanna at suitable sites within the preserves.

Rationale: An analysis of historic photos of oak woodland and oak savanna land cover types in the Los Vaqueros watershed between 1939 and 1991 indicated that oak woodland has been stable and oak savanna has been declining (Jones & Stokes Associates, Inc. 1991). It is assumed that this same pattern occurred in the rest of the inventory area. Because of the assumed decline in oak savanna, any losses of this land cover type should be replaced by converting grassland to oak savanna within preserves. The loss of the oak woodland community should be mitigated through preservation of existing oak woodlands with the assumption that a small amount of net loss of oak woodland is acceptable. Preservation is necessary to ensure that presently unprotected oak woodlands are permanently protected.

Objective 3.3~~1c~~: Enhance ecosystem functions of oak woodlands within protected areas through changes in management practices.

Rationale: Enhancement of ecosystem functions in existing oak woodlands serves to compensate for some of the functions lost in removed woodlands. Oak woodland can be managed to improve community functions and enhance populations of native plants and wildlife. Changes in livestock grazing practices may improve the condition of the woodland understory (e.g., decrease cover of exotic grasses and forbs) and allow for greater recruitment of oak seedlings into saplings and ultimately into the canopy as mature trees. In addition, changes in the fire frequency may also increase the chances of oak seedlings reaching maturity.

Objective 3.4~~1d~~: Preserve a range of oak woodland types including blue oak woodland, coast live oak woodland, valley oak woodland, oak savannah, and mixed evergreen forest.

Objective 3.5~~1e~~: Minimize impacts to transition zones (edges) between oak woodland and other vegetation communities.

All Wetland and Stream objectives are incorporated into this oak woodland goal because these aquatic features are common within oak woodlands and they play an important role in the functioning of this community.

Chaparral/Scrub

Goal 4~~1~~: Establish and maintain a reserve system that maintains and enhances the processes and functions of the full variety of the chaparral/scrub community and the biological diversity it supports.

Rationale: The chaparral/scrub community contains many unique plants and wildlife, and several covered species. Impacts on this community should be mitigated. This community can be enhanced through changes in land management. The historic extent of this community in the inventory area is unknown, so its current distribution is assumed to be "natural". Any creation of this community would come at the expense of other natural communities (e.g., grassland, oak woodland) so is not a goal.

Objective 4.1~~1a~~: Minimize adverse effects on stands of the chaparral/scrub community.

Rationale: Effects on the chaparral/scrub community should be minimized because this community is relatively uncommon in the inventory area, especially at lower elevations. Stands of chaparral/scrub within grassland or oak woodland/savanna often provide the best cover for many wildlife species. Chaparral/scrub also provides habitat for several covered species.

Objective 4.2~~1b~~: Mitigate loss of chaparral/scrub by preserving large stands of this community, particularly at lower elevations, and a diversity of chaparral/scrub alliances including Valley sink scrub, chamisal chaparral, California sage scrub, black sage scrub.

Rationale: Impacts on this community should be minimized when possible. Mitigation for the loss of this community is only feasible through protection of

existing stands. Restoration of chaparral/scrub communities is unproven in northern California and would result in the loss of other natural communities, so it is not a viable mitigation strategy. Priority should be given to preserving stands at lower elevation because of these stands will be most similar in species composition and structure to stands affected by covered activities. Chaparral/scrub stands at lower elevation tend to have a different species composition than stands at higher elevation so these unique types should be preserved.

Objective 4.3~~1c~~: Maintain or improve the quality of the chaparral/scrub community within protected areas through changes in management practices.

Rationale: Careful changes in management practices such as grazing or controlled fire may enhance some stands of chaparral/scrub in protected areas by increasing native plant diversity and wildlife habitat. Periodic prescribed burning may be desirable to maintain some stands in a mid-seral condition to provide habitat for species such as the Alameda whipsnake, maintain large-scale variation in successional types and stand structure, and reduce long-term risks of catastrophic fire.

Objective 4.4~~1d~~: Minimize impacts to transition zones (edges) between chaparral/scrub and other vegetation communities.

All stream objectives are incorporated into this chaparral/scrub goal because streams occur within some chaparral stands. In these chaparral/scrub stands, streams play an important role in the functioning of this community.

Riparian Woodland/Scrub

Goal 5~~1~~: Establish and maintain a reserve system that maintains and enhances the processes and functions of the full variety of the riparian woodland/scrub community and the biological diversity it supports.

Rationale: This community is naturally rare in the landscape but supports disproportionately high biological diversity, particularly birds and amphibians. This community is also an important movement corridor for larger mammals. Impacts on this community should be fully mitigated through restoration, enhancement, and protection because of its rarity and biological importance. There are substantial opportunities in the inventory area for both enhancement of existing stands and restoration of stands that have been eliminated.

Objective 5.1~~1a~~: Avoid and minimize adverse effects to riparian woodland/scrub to the maximum extent practicable.

Objective 5.2~~1b~~: Compensate for any adverse effects on this community by enhancing degraded stands or restoring stream corridors to their historic vegetated condition within preserves to replace all ecological functions lost as a result of covered activities.

Objective 5.3~~1c~~: ~~Create buffers of natural communities within preserves of at least 200 foot width~~ Ensure that preserves with riparian woodland/scrub maintain at least 200 feet between development and the edge of riparian corridors as a buffer zone.

Rationale: Riparian woodland/scrub communities require adjacent upland habitat for optimal functioning. For example, some riparian-dependent birds also utilize adjacent upland habitats for foraging. Maintaining upland habitat at least 200 feet wide between development and riparian woodland/scrub will also serve as a buffer to reduce the indirect effects of the development such as noise and light pollution.

Objective 5.4~~1d~~: Maintain riparian corridors within preserves free of noxious weeds ~~such as giant reed and tamarisk~~.

Rationale: Noxious weeds such as giant reed (*Arundo donax*), tamarisk (*Tamarix ramosissima*), yellow star-thistle (*Centaurea solstitialis*), and perennial pepperweed (*Lepidium latifolium*) are a serious threat to riparian communities in the inventory area. These and other species have the potential to displace native species and significantly degrade the functioning of these systems.

All stream objectives are incorporated into this riparian woodland/scrub goal because all riparian woodland/scrub communities occur in streams.

Irrigated Agriculture

Goal 6~~1~~: Establish conservation easements in agricultural areas suitable for covered species and enhance the habitat for covered species and biological diversity in ways compatible with economically-viable agricultural uses.

Rationale: Irrigated agriculture in the inventory area supports habitat for several covered species. Impacts on this community should be mitigated. Because this community is a working landscape, habitat enhancement opportunities must be limited to what is compatible with maintaining the agricultural operation.

Objective 6.1~~1a~~: Mitigate lost irrigated agriculture that provides habitat for covered species through preservation of agricultural land with equal or greater habitat value for these species through the purchase of conservation easements.

Rationale: Effects on irrigated agriculture from covered activities cannot be avoided. Mitigation for lost agricultural land through preservation of agricultural land of similar value is necessary to ensure preservation of this vegetation community for the benefit of certain covered species.

Objective 6.2: Purchase conservation easements on agricultural lands to require agricultural practices that enhance wildlife habitat values, while maintaining an economically-viable agricultural operation.

Rationale: Enhancing agricultural conservation easements for wildlife will offset the expected net loss in agricultural areas in the inventory area that result from covered activities. Changes in agricultural operations or additions of habitat

features to achieve this must be compatible with an economically-viable agricultural operation.

Objective 6.3~~1b~~: Increase habitat value for wildlife on agricultural lands not on conservation easements by encouraging voluntary agricultural practices that benefit wildlife and that are compatible with agricultural operations.

Rationale: ~~Enhancing agricultural areas for wildlife will offset the expected net loss in agricultural areas in the inventory area that result from covered activities.~~ Measures to enhance wildlife habitat on agricultural lands must be compatible with an active agricultural operation in order to be feasible.

1.X.3 Biological Goals for Covered Species

This section establishes the biological goals and objectives for each covered species. For each covered species, the first goal addresses avoidance, minimization, and mitigation of impacts of covered activities on the species. Achieving this goal would meet the requirements of the federal ESA for covered species to avoid, minimize, and mitigate adverse effects to the maximum extent practicable. Each species also has a second goal to enhance population viability and contribute to recovery of the species within the inventory area. This goal exceeds the federal regulatory standard and is designed to meet the standards of the NCCP Act of 2002. The first goal applies to all covered species; the second goal applies to those covered species for which there is the opportunity in the inventory area to benefit to the species' recovery or, in the case of non-listed species, to reduce the likelihood of future listing under CESA and the federal ESA.

To achieve the goal of contributing to recovery, HCP/NCCP participants will implement conservation measures to the maximum extent practicable. The magnitude of contribution to species recovery is based on several factors, including the proportion of the species' range that occurs in the inventory area, the sensitivity of the species to covered activities, existing draft and final recovery plans, and the practicability of actions under control of the HCP/NCCP participants. For plants, the proportion of population occurrences found in the inventory area was also considered.

The HCP/NCCP presents a habitat-based approach for conserving covered species. Consequently, goals and objectives for covered species are primarily expressed in terms of avoiding, minimizing, and compensating impacts of covered activities on covered species habitat, and contributing to recovery of covered species by protecting, enhancing, and/or restoring covered species habitat. For some covered species additional species-specific objectives (e.g., population augmentation, predator control, and focused research) are required to achieve goals.

Townsend's Western Big-eared Bat

Goal 1.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on Townsend's western big-eared bat and its habitat.

Objective 1.1.1~~a~~. Avoid direct mortality, and minimize adverse effects on Townsend's western big-eared bat habitat.

Objective 1.1.2~~b.~~ Minimize or avoid disturbance to active roosts, particularly winter hibernacula and summer maternity roosts.

Objective 1.1.3~~c~~. Compensate for the loss of foraging and roosting habitat as a result of covered activities by protecting areas of equal or greater function.

Goal 1.2. Establish and maintain a habitat reserve system capable of sustaining a Townsend's western big-eared bat population in the inventory area to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 1.2.1~~2a~~. To the maximum extent practicable, protect key areas of foraging and roosting habitat including caves and abandoned mines.

Objective 1.2.2~~2b~~. Enhance foraging habitat by restoring streams, wetlands, and associated riparian habitat in habitat preserves, and prohibiting the use of insecticides in preserves.

Rationale for Objectives 1.2.1 and 1.2.2: Suitable foraging and roosting habitat are limiting factors for bat populations. Opportunities for conserving bat populations in the inventory area are largely limited to protecting and enhancing these resources.

San Joaquin Kit Fox

Goal 2.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on San Joaquin kit fox and its habitat.

Objective 2.1.1~~1a~~. Avoid direct mortality, and minimize adverse effects on San Joaquin kit fox habitat.

Objective 2.1.2~~1b~~. Compensate for suitable habitat lost as a result of covered activities by protecting areas of equal or better quality habitat.

Goal 2.2. Establish and maintain a habitat reserve system capable of supporting a portion of the northwest extension of the San Joaquin kit fox population (i.e., San Joaquin Kit fox in the inventory area) to contribute to the recovery of this species.

Objective 2.2.1~~2a~~. Protect key areas of core habitat sufficiently large, at a minimum of 5 square miles, and connected to sustain a portion of the San Joaquin kit fox population.~~.~~

Objective 2.2.2~~b~~. Emphasize the protection of suitable habitat within the inventory area where breeding San Joaquin kit foxes have been documented ~~in the last 10 years~~within the last 10-year period.

Objective 2.2.3~~c~~. Establish and maintain buffers around protected habitats sufficient to minimize human disturbances to kit foxes, suitable habitat, and prey populations.

Rationale for Objectives 2.2.1 to 2.2.3~~a–2c~~: The ~~San Joaquin kit fox Recovery Plan~~Recovery Plan for Upland Species of the San Joaquin Valley (recovery plan) identifies the protection of existing kit fox habitat in the northern portion of its range as a primary recovery action. Protecting and buffering habitats that currently support, or have the highest potential to support, San Joaquin kit foxes is the most cost-effective approach to preventing a population decline as a result of covered activities, and expanding these populations in the inventory area.

Objective 2.2.4~~d~~. Link occupied or suitable kit fox habitat in a configuration that ensures successful movement within the reserve system and from the reserve system to the southern boundary of the inventory area, to promote connectivity between the inventory area and the core San Joaquin Valley population; to the extent feasible, link suitable or occupied habitat with grassland-dominated corridors at least 0.5 mile wide and situated in valley bottoms~~.~~

Rationale: The recovery plan identifies the protection of existing connections between habitat in Contra Costa County and habitat farther south as primary recovery actions. This objective would facilitate colonization of the inventory area from adjacent areas, as well as dispersal from within to outside the inventory area.

Objective 2.2.5~~e~~. Protect suitable low-use habitat near Byron in agricultural easements to provide a buffer between core habitat and any future development to the north and east.

Rationale: Protecting undeveloped lands at the urban edge will ensure a fixed and adequate buffer between urban development and core habitat; opportunity exists near Byron to accomplish this while maintaining some agricultural production.

~~**Objective 2.2.6f.** Convert ruderal land-cover types to higher-quality grassland in protected areas where there is opportunity.~~

Objective 2.2.7~~g~~6. Manage habitat reserves to promote kit fox prey and commensal species populations where appropriate.

Rationale: The suitability of kit fox habitat is proportional to the availability of prey populations and den sites. Some fossorial species, particularly California ground squirrel, enhance habitat suitability by creating burrows, which are often used as den sites by kit foxes. Although ground squirrel populations appear to be increasing recently in the area, they are probably still a limiting resource for kit fox populations.

Tricolored Blackbird

Goal 3.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on tricolored blackbird and its habitat.

Objective 3.1.1~~a~~. Minimize adverse effects on tricolored blackbird nesting and foraging habitat.

Objective 3.1.2~~1b~~. Avoid or minimize disturbances to active tricolored blackbird colonies by establishing adequate buffer zones within preserves and limiting activities within and adjacent to these buffers.

~~**Rationale:** **explain that "buffers" will be inside preserves, not outside them on private land), and that the buffers are meant to keep uses within the preserves such as recreation away from sensitive nesting sites.~~

Rationale: Establishing buffers around colonies within preserves will keep uses such as recreation away from sensitive nest sites, and minimize adverse effects on blackbird productivity.

Objective 3.1.3~~1c~~. Compensate for suitable foraging and nesting habitat lost as a result of covered activities by protecting existing areas of equal or better quality habitat, and/or restoring or creating suitable habitat in protected areas.

Goal 3.2. Establish and maintain a habitat reserve system capable of enhancing the abundance and- productivity of tricolored blackbird colonies in the inventory area to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 3.2.1~~2a~~. Protect key areas of suitable nesting and foraging habitat sufficiently large, abundant, and configured to sustain multiple, large nesting colonies in the inventory area. Emphasize maintaining suitable nesting habitat within or adjacent to suitable foraging areas. At a minimum, ensure that suitable nesting habitat is within 3 miles of suitable foraging areas.

Rationale: Habitat requirements for breeding colony sites include accessible water, protected nesting sites (flooded or surrounded by thorny or spiny vegetation), and suitable foraging area within a few kilometers of the nesting colony .

Objective 3.2.2~~2b~~. To the maximum extent practicable, protect ~~recently-active~~ colony sites active within the last 5-year period and nearby foraging habitats to provide sites for future colonization.

Objective 3.2.3~~2c~~. Achieve a no-net-loss of nesting habitat function in the inventory area through habitat enhancement, restoration, or creation on protected lands in appropriate locations (i.e., near foraging areas). Emphasize expanding the size of or enhancing existing suitable or occupied nesting habitats during the nonbreeding period.

Rationale for Objectives 3.2.2 and 3.2.3: Protecting and buffering habitats that currently support, or have the highest potential to support, tricolored blackbirds is the most cost-effective approach to preventing a population decline as a result of

covered activities, and expanding these populations in the inventory area. Expanding or enhancing existing suitable or occupied nesting habitat increases the likelihood that these activities are focused in the most appropriate areas with minimal establishment cost. Conducting enhancement and restoration activities during the nonbreeding season will prevent disturbances as a result of these activities during the sensitive nesting period.

Objective 3.2.4~~2d~~. Enhance reproductive success of colonies in preserves by minimizing predation at colony sites, and controlling the use of pesticides and other toxic contaminants in preserves.

Rationale: Tricolored blackbird reproductive success is strongly limited by predation in some areas. Colony nesters are particularly susceptible to high predation rates where predation occurs. Pesticides and other toxic contaminants can have a negative effect on existing tricolor populations. Controlling pesticide and other contaminant use in preserves will minimize the risk of contamination and reduced reproductive success.

Objective 3.2.5~~2e~~. To the extent feasible and where appropriate, provide incentives for land owners to improve foraging opportunities and minimize mortality on irrigated agricultural lands that provide foraging habitat (e.g., delaying harvest until after a colony has fledged young).

Rationale: Foraging habitat loss poses one of the greatest threat to tricolored blackbird populations. A California Department of Fish and Game and U.S. Fish and Wildlife Service program for purchasing portions of crops to preserve several large colonies of tricolors in Kings, Fresno, and Tulare Counties was implemented in 1993 and 1994 with significant conservation results. These actions and participation by landowners in delaying harvest to protect active nesting colonies resulted in an addition of an estimated 37,000 and 4 4,000 first-year added to the 1994 and 1995 breeding seasons (Beedy and Hamilton 1999). Similar conservation measures could be used in the inventory area to enhance populations.

Golden Eagle

Goal 4.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on golden eagle and its habitat.

Objective 4.1.1~~1a~~. Avoid direct mortality, and minimize adverse effects on golden eagle foraging and nesting habitat.

Objective 4.1.2~~1b~~. Avoid or minimize disturbances to nesting golden eagles.

Objective 4.1.3~~1c~~. Compensate for suitable foraging and nesting habitat lost as a result of covered activities by protecting areas of equal or better quality habitat.

Goal 4.2. Establish and maintain a habitat reserve system capable of supporting a resident golden eagle population and foraging opportunities for migrant golden eagles.

Objective 4.2.1~~2a~~. Protect key areas of foraging and nesting habitat sufficiently large to, at a minimum, sustain the existing resident golden eagle population.

Objective 4.2.2~~2b~~. Emphasize protecting known territories (i.e., nest sites and associated foraging habitats).

Objective 4.2.3~~2c~~. Emphasize protecting large expanses of open foraging habitat adjacent to or near suitable or occupied nesting habitat (e.g., near the Los Vaqueros watershed), and where the risk of collision with wind turbines is low.

Objective 4.2.4. Manage preserves to minimize or avoid wind turbine strikes and electrocution.

Objective 4.2.5. Minimize the risk of contamination to golden eagles by controlling the use of poisons in preserves.

Rationale for Objectives 4.2.1-5: Existing threats to Golden Eagle survival in the central Coast Ranges of California include both foraging- and nesting-habitat loss; human disturbance of nesting birds; and direct fatalities from wind turbine strikes, electrocution, and poisoning.

Objective 4.2.6~~42d~~. ~~Enhance foraging habitat by converting ruderal land cover types to higher quality grassland in habitat reserves where there is opportunity, and managing~~ Manage protected foraging habitat to promote golden eagle prey populations.

Rationale: The suitability of golden eagle habitat is proportional to the availability of prey populations (e.g., ground squirrels and rabbits).

~~**Objective 4.2.52e.** Manage preserves to minimize or avoid wind turbine strikes and electrocution.~~

~~**Objective 4.2.62f.** Minimize the risk of contamination to golden eagles by controlling the use of poisons in preserves.~~

Western Burrowing Owl

Goal 5.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on Western burrowing owl and its habitat.

Objective 5.1.1~~1a~~. Minimize adverse effects on burrowing owl breeding, wintering, and foraging habitat.

Objective 5.1.2~~1b~~. Avoid or minimize disturbance to nesting burrowing owls.

Objective 5.1.3~~1c~~. Where loss of occupied breeding or wintering burrowing owl habitat cannot be avoided, avoid injury and direct mortality of individual owls by implementing passive displacement and relocation techniques during the non-nesting period if necessary.

Rationale: Implementing passive displacement and relocation measures, such as installing one-way doors over occupied burrows during the non-nesting period and creating artificial nesting habitat nearby, would reduce the likelihood of mortality and injury of individuals and provide an opportunity for displaced birds to colonize other suitable areas.

Objective 5.1.4~~1d~~. Achieve no-net-loss of habitat function by protecting areas of equal or greater habitat function as those lost, and restoring and enhancing habitat in habitat reserves.

Goal 5.2. Establish and maintain a habitat reserve system capable of enhancing and sustaining the burrowing owl population in the inventory area to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 5.2.1~~a~~. Protect key areas of foraging and nesting habitat sufficient to increase and sustain the burrowing owl population in the inventory area. Emphasize protecting occupied habitat and adjacent or nearby suitable breeding/foraging habitat. To minimize adverse effects of habitat fragmentation on breeding and foraging owls, emphasize protecting large contiguous blocks of nesting and foraging habitat.

Objective 5.2.2~~b~~. Where necessary, provide opportunity for individuals to colonize unoccupied suitable habitat in habitat preserves by protecting undeveloped lands sufficiently large and configured to function as movement corridors for burrowing owls.

Objective 5.2.3~~c~~. Where feasible, protect a series of temporary "stepping stone" or transition habitats to attract owls out of occupied habitat to be lost to covered activities and into preserved habitats.

Rationale for Objectives 5.2.1 to 5.2.3~~2a–2c~~: For western burrowing owl, what constitutes an isolated habitat patch and the minimum size of a viable patch of habitat is not well documented. These parameters are affected by habitat quality, the juxtaposition of the site relative to other suitable habitat, surrounding land uses, and prey availability. Although the spatial requirements of burrowing owls are not well understood, it is assumed that small and isolated patches of habitat are not likely to sustain robust prey populations, or high reproductive success and long-term persistence of burrowing owls. It is assumed that movement corridors between small habitats and other suitable areas would partly offset the insular effects of small or isolated habitats on owl populations, by increasing foraging potential and facilitating dispersal or colonization. The size and dimensions of corridors that would be adequate to facilitate movements of burrowing owls between suitable habitats has not been studied. However, in some locations, burrowing owls are known to occur within railroad corridors as narrow as 100 meters.

Objective 5.2.4~~d~~. ~~Enhance foraging habitat by converting ruderal land cover types to higher quality grassland in habitat reserves where possible, and managing protected foraging habitat to promote burrowing owl prey populations.~~Manage protected foraging habitat to promote burrowing owl prey populations.

Objective 5.2.5e. Enhance breeding habitat in preserves by creating artificial burrows where the availability of natural burrows is limiting, promoting fossorial rodent populations, and managing grazing to maintain suitable vegetation structure (e.g., short sparse vegetation).

Rationale for Objectives 5.2.4 and 5.2.5: Burrowing owls require habitat with three basic attributes: open, well-drained terrain; short, sparse vegetation; and underground burrows or burrow facsimiles. Managing protected lands to ensure that they support these attributes and prey populations would enhance habitat for burrowing owls. Some fossorial species, particularly California ground squirrel, enhance habitat suitability by creating burrows. Although ground squirrel populations appear to be increasing recently in the area, they are probably still a limiting resource for burrowing owl populations.

Objective 5.2.6f. Establish and maintain buffers around protected habitats to minimize intrusion from humans and domestic animals (including predators).

Rationale: Harassment and predation, particularly during the breeding season, can reduce survival and reproductive success of burrowing owls. Maintaining an adequate buffer between development and core habitat would minimize these adverse effects.

Swainson's Hawk

Goal 6.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on Swainson's hawk and its habitat.

Objective 6.1.1a. Avoid direct mortality, and minimize adverse effects on Swainson's hawk foraging and nesting habitat.

Objective 6.1.2b. Avoid or minimize disturbances to nesting Swainson's hawks.

Objective 6.1.32c. Compensate for suitable foraging and nesting habitat lost as a result of covered activities by protecting areas of equal or higher function.

Goal 6.2. Establish and maintain a habitat reserve system capable of enhancing the Swainson's hawk breeding population in the inventory area to contribute to the species' recovery.

Objective 6.2.1a. Protect key areas of high-quality foraging and nesting habitat sufficiently large and abundant to enhance the Swainson's hawk breeding population in the inventory area. Emphasize maintaining nesting habitat adjacent to or near large blocks of high-quality foraging areas.

Objective 6.2.2b. To the maximum extent practicable, protect suitable nest sites that have been active within the last 10 years period and nearby foraging habitats.

Objective 6.2.3c. Achieve a no-net-loss of high-quality foraging habitat in the inventory area through habitat restoration or creation, and/or agricultural conversion, on protected lands.

Objective 6.2.4~~d~~. ~~Enhance foraging habitat by converting ruderal land cover types to higher quality grassland in habitat reserves where there is opportunity, and managing~~Manage protected foraging habitat to promote Swainson's hawk prey populations.

Rationale for Objectives 6.2.1-4: In California's Central Valley, 2 primary elements are necessary for Swainson's hawk reproduction: suitable nest trees and proximity to high-quality foraging habitat. Loss of high-quality foraging habitat is probably the most significant threat to the species' population within the inventory area. Because, Swainson's hawks typically use traditional nesting areas when they are available, protecting sites that are suitable and have been active recently would maximize successful breeding.

Objective 6.2.5~~e~~. Manage protected foraging and nesting habitats to minimize or avoid wind turbine strikes and electrocution.

Rationale: Threats to Swainson's hawks include direct fatalities from wind turbine strikes and electrocution.

Objective 6.2.6~~f~~. To the extent feasible and where appropriate, provide incentives for agricultural land owners to maintain or enhance foraging habitat. Emphasize maintaining crops that provide high-quality foraging habitat (e.g., alfalfa).

Rationale: The breeding density of Swainson's hawks is influenced strongly by land use. High densities of breeding birds are associated with alfalfa fields, while low densities are associated with irrigated pasture and weedy fields. Home-range size is dependent on proximity to foraging sites and the distribution of high-quality foraging habitat. In the Central Valley, the smallest home ranges have been observed in areas where nest sites in riparian forest habitat were close to alfalfa or similar, recently harvested row crops (Estep 1989).

Silvery Legless Lizard

Goal 7.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on silvery legless lizard and its habitat.

Objective 7.1.1~~a~~. Minimize adverse effects of covered activities on silvery legless lizard core habitat.

Objective 7.1.2~~b~~. Compensate for suitable habitat lost as a result of covered activities by protecting habitat areas of equal or higher function.

Goal 7.2. Establish and maintain a habitat reserve system capable of supporting sustainable silvery legless lizard populations in the inventory area at the northern extent of its range to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 7.2.1~~a~~. Protect key areas of core habitat sufficiently large and connected to sustain silvery legless lizard populations in the inventory area.

Objective 7.2.2b. Maintain or promote suitable soil types (e.g., sandy or loose loamy soils) in protected core habitats. Limit activities that could substantially compact suitable soils within protected core habitat.

Rationale for Objectives 7.2.1 and 7.2.2: Silvery legless lizards occur primarily in areas with sandy or loose loamy soils. The legless lizard's specialization for a fossorial existence in substrates with a high sand fraction makes it vulnerable to many types of habitat loss and disturbance. Legless lizards cannot survive in urbanized, agricultural, or other areas where a loose substrate in which to burrow has been removed or altered (e.g., disturbed by blowing or bulldozing) (Jennings and Hayes 1994). Other factors can alter the substrate such that the species cannot survive in the area any longer. These factors include livestock grazing, off-road vehicles activities, sand mining, beach erosion, excessive recreational use of coastal dunes, and the introduction of exotic plant species, such as ice plants (*Carpobrotus edulis* and *Mesembryanthemum crystallinum*), Marram grass (*Ammophila arenaria*), veldt grass (*Ehrharata calycina*) and eucalyptus trees (*Eucalyptus* spp.). These factors decrease soil moisture or alter the conformation of the substrate, which may act to limit the food base or make the substrate physically unsuitable for legless lizards (Jennings and Hayes 1994).

Alameda Whipsnake

Goal 8.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on Alameda whipsnake and its habitat.

Objective 8.1.1a. Avoid adverse effects of covered activities on Alameda whipsnake core habitat. Minimize adverse effects of covered activities on movement habitat.

Rationale: Because most of the Alameda whipsnake core habitat in the inventory area occurs outside of the urban limit line, there is good potential to avoid impacts to core habitat. Effects on the chaparral/scrub community should be minimized because this community is relatively uncommon in the inventory area, especially at lower elevations. Stands of chaparral/scrub within grassland or oak woodland/savanna often provide the best cover for many wildlife species. Chaparral/scrub also provides habitat for several covered species.

Objective 8.1.2b. Compensate for the loss of suitable movement habitat by protecting areas of equal or higher quality habitat.

Goal 8.2. Contribute significantly to the recovery of the Alameda whipsnake by protecting and managing a network of reserves that contain core habitat and are connected by movement habitat. ~~to contribute significantly to the species' recovery.~~

Objective 8.2.1a. To the maximum extent practicable, protect all Alameda whipsnake core habitat in the inventory area.

Objective 8.2.2~~2~~b. Maintain dispersal/movement of whipsnakes among core habitat areas by protecting key movement corridors between core habitat areas.

Objective 8.2.3~~2c~~. Establish and maintain buffers around protected habitats sufficient to minimize intrusion by humans and domestic animals.

Objective 8.2.4~~2d~~. Where appropriate, implement fire and grazing management practices that enhance the long-term persistence of the Mount Diablo-Black Hills population of the Alameda whipsnake.

Rationale for Objectives 8.2.1 to 8.2.4~~2a–2d~~. A large portion of the Mount Diablo-Black Hills population of the Alameda whipsnake occurs in the inventory area. The USFWS lists this population as having a high potential for recovery if threats from urban development, catastrophic wildfire, and grazing practices can be managed well. There is high potential for the HCP/NCCP to contribute to recovery of this species because nearly all Alameda whipsnake core and movement habitat inventory area occurs outside the urban limit line.

Giant Garter Snake

Goal 9.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on giant garter snake and its habitat.

Objective 9.1.1~~1a~~. Avoid or minimize adverse effects on giant garter snake core habitat. Minimize adverse effects on giant garter snake movement habitat.

Objective 9.1.2~~b~~. Compensate for suitable habitat lost as a result of covered activities by protecting areas of equal or greater function.

Goal 9.2. Establish and maintain a habitat reserve system capable of sustaining the portion of the giant garter snake population that occurs in the inventory area.

Objective 9.2.1~~a~~. Protect key areas of core and movement habitat in agricultural areas sufficiently large to sustain a portion of the giant garter snake population that occurs in the inventory area.

Objective 9.2.2~~b~~. Increase habitat function for giant garter snake on agricultural lands by encouraging voluntary agricultural practices that benefit this species and that are compatible with economically-viable agricultural uses.

Rationale for Objective 9.2.1 and 9.2.2: Nearly all identified suitable habitat for giant garter snake occurs in the slough areas and drainage network associated with agricultural fields in the northeast section of the County. Therefore, opportunities in the inventory area to contribute to recovery of giant garter snake should be focused in these areas.

California Tiger Salamander

Goal 10.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on California tiger salamander and its habitat.

Objective 10.1.1~~a~~. Avoid or minimize adverse effects of covered activities on California tiger salamander individuals, suitable breeding habitat, and key movement routes.

Objective 10.1.2~~b~~. Compensate for loss of suitable breeding habitat by protecting existing areas of equal or greater function habitat, and restoring or creating breeding habitat of equal or greater function in habitat reserves.

Objective 10.1.3~~c~~. Compensate for loss of suitable aestivation/movement habitat by protecting areas of equal or greater function habitat.

Goal 10.2. Establish and maintain a habitat reserve system capable of sustaining an increased population of California tiger salamander in the inventory area to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 10.2.1~~a~~. Protect complexes of suitable breeding and aestivation/movement habitat sufficiently large and connected to sustain California tiger salamander populations. Complexes should include multiple breeding sites surrounded by abundant suitable aestivation/movement habitat.

~~**Rationale:** Reserves of multiple breeding ponds surrounded by abundant upland habitat have been recommended to ensure the persistence of California tiger salamander. Preserving wetland-upland complexes is more likely to maintain "core" breeding – refuge site ensembles than more isolated sites. This approach will increase the area of contiguous suitable habitat and decrease fragmentation. In this HCP/NCCP, the suitability of upland habitat is assumed to increase with the number of available refuge sites and decrease with the distance from a breeding site Although probability of upland use by tiger salamanders is likely to decrease with distance to a breeding site, the strength of this relationship in an area probably depends on the abundance and distribution of available refuge sites. Juvenile salamanders are known to migrate distances up to 1 mile from breeding sites. However, DFG suggests that upland habitats greater than 0.62 mile (1 km) from a breeding site are probably not suitable for California tiger salamanders (California Department of Fish and Game 1997).~~

Objective 10.2.2~~2b~~. Emphasize the protection of breeding sites that have been productive (i.e., source populations) ~~during the last 10 years~~within the last 10-year period.

Objective 10.2.3~~2c~~. Support dispersal of tiger salamanders among protected habitat complexes; protect key areas of aestivation/movement habitat sufficiently large and configured to function as movement corridors among complexes.

Objective 10.2.4~~2d~~. In areas targeted to function as primary tiger salamander movement corridors, maintain or create appropriately-distributed "stepping-stone" aquatic breeding sites and upland refugia (e.g., ground squirrel burrows).

Objective 10.2.5~~2e~~. Enhance protected areas by restoring or creating suitable aquatic habitat and increasing the abundance of upland refugia. Design created or restored aquatic habitat to meet the specific breeding habitat requirements of California tiger salamander (e.g., sufficient ponding depth and duration).

Rationale for Objectives 10.2.1-5: California tiger salamanders require two major habitat components: aquatic breeding sites and terrestrial aestivation or refuge sites. Increasing the availability and function of these features where they may be limiting factors, and protecting recently occupied suitable habitat, are expected to enhance tiger salamander populations. Reserves of multiple breeding ponds surrounded by abundant upland habitat have been recommended to ensure the persistence of California tiger salamander. Preserving wetland-upland complexes is more likely to maintain "core" breeding - refuge site ensembles than more isolated sites. This approach will increase the area of contiguous suitable habitat and decrease fragmentation. In this HCP/NCCP, the suitability of upland habitat is assumed to increase with the number of available refuge sites and decrease with the distance from a breeding site Although probability of upland use by tiger salamanders is likely to decrease with distance to a breeding site, the strength of this relationship in an area probably depends on the abundance and distribution of available refuge sites. Juvenile salamanders are known to migrate distances up to 1 mile from breeding sites. However, DFG suggests that upland habitats greater than 0.62 mile (1 km) from a breeding site are probably not suitable for California tiger salamanders (California Department of Fish and Game 1997).

Objective 10.2.6~~2f~~. To the extent feasible, prohibit habitat modifications that result in movement barriers or hazards between breeding and upland habitat (e.g., berms, fences, roads, and some pipelines). Where roads or other structures must traverse a known or possible movement route, establish safe movement routes for tiger salamanders. Remove structures or close roads within reserves where possible to reduce risks to dispersing tiger salamanders.

Rationale: Movement between aquatic and upland habitats is essential for this species. Minimizing impediments to movement will increase the likelihood of successful dispersal and colonization. Vehicular related mortality is an important threat to California tiger salamander populations (Barry and Shaffer 1994, Jennings and Hayes 1994). California tiger salamanders will readily attempt to cross roads during migration, and roads that sustain heavy vehicle traffic or barriers that impede seasonal migrations may have impacted tiger salamander populations in some areas (Shaffer and Fisher 1991, Shaffer and Stanley 1992, Barry and Shaffer 1994). Therefore, establishing artificial structures that could impede movements or maintaining roads that support a considerable amount of vehicle traffic in areas that support California tiger salamander populations can severely degrade salamander habitat (see Jennings and Hayes 1994).

Objective 10.2.7~~2g~~. Establish and maintain adequate buffers around protected habitats to minimize intrusion from humans and domestic animals.

Rationale: Intrusion by humans can harm California tiger salamanders, and predation or disturbance by domestic animals such as cats and dogs can affect local populations.

Objective 10.2.8~~2h~~. Manage protected movement/aestivation habitat to promote ground squirrel populations.

Rationale: The viability of California tiger salamander populations depends on the availability of aestivation sites. Some fossorial species, particularly California ground squirrel, enhance habitat suitability by creating burrows, which are frequently used as aestivation sites by tiger salamanders. Burrowing-mammal

control programs are considered a threat to California tiger salamander populations. Rodent control through destruction of burrows and release of toxic chemicals into burrows can cause direct mortality to individual salamanders and may result in a decrease of available suitable habitat (U.S. Fish and Wildlife Service 2000).

Objective 10.2.9~~2i~~. Control tiger salamander predators (e.g., bullfrogs and fish) in protected breeding habitat.

Rationale: Predation by bullfrogs, non-native fish, and other species has contributed to declines in tiger salamander populations. Monitoring and controlling predation by non-native species will enhance tiger salamander populations and productivity.

Objective 10.2.10~~2j~~. To the maximum extent practicable, prohibit activities that may threaten water quality in habitat reserves and their watersheds.

Rationale: Preventing contamination of aquatic habitat used by the species is expected to reduce mortality of individuals, eggs and larvae, and prey species.

California Red-legged Frog

Goal 11.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on California red-legged frog and its habitat.

Objective 11.1.1~~1a~~. Avoid or minimize adverse effects of covered activities on California red-legged frog individuals, suitable breeding habitat, and key migration/aestivation habitat.

Objective 1.1.2~~1b~~. To the extent feasible, relocate California red-legged frogs from areas where impacts cannot be avoided to suitable but unoccupied breeding sites in preserves. ~~[Still unsure about this one]~~

Objective 11.1.3~~1c~~. Compensate for loss of suitable breeding habitat, and achieve a no-net-loss of breeding habitat function, by protecting areas of equal or greater function, and restoring or creating breeding habitat of equal or greater function in preserves. Stock ponds lost to covered activities will be compensated through preservation, restoration, and creation of ponds of equal or greater extent and function than those ponds lost.

Objective 11.1.4~~1d~~. Compensate for loss of migration/aestivation habitat by protecting upland areas of equal or greater function.

~~**Objective 11.1.51e.** To the extent feasible, prohibit habitat modifications that result in movement barriers or hazards between breeding and upland habitat (e.g., berms, fences, roads, and some pipelines). Where roads or other structures must traverse a known or possible movement route, establish safe movement routes for red-legged frogs.~~

Goal 11.2. Establish and maintain a habitat reserve system capable of sustaining larger populations of California red-legged frog in the inventory area, and contribute to the recovery of this species in the Mount Diablo vicinity core area in the South and East San Francisco Bay Recovery Unit.

Objective 11.2.1~~2a~~. Protect complexes of suitable breeding and migration/aestivation habitat sufficiently large and connected to sustain several large California red-legged frog populations. Complexes should include multiple breeding sites surrounded and connected by abundant suitable aestivation/migration habitat.

Objective 11.2.2~~2b~~. Emphasize the protection of larger populations that are well-connected by upland habitat, and that are likely to serve as source populations. To the extent feasible, link potential source populations to other suitable or occupied breeding habitat by protecting key areas of aestivation/migration habitat sufficiently large and configured to function as movement corridors.

Objective 11.2.3~~2c~~. Identify areas to function as key red-legged frog movement corridors, and maintain or create appropriately-distributed "stepping-stone" aquatic breeding sites and abundant suitable upland refugia (e.g., ground squirrel burrows) within these areas.

Objective 11.2.4~~2d~~. Enhance habitat function in reserves by restoring or creating aquatic breeding sites and increasing the abundance of suitable upland refugia in habitat reserves. Design created or restored aquatic habitat to meet the specific breeding habitat requirements of California red-legged frog (e.g., sufficient ponding depth).

Rationale for Objectives 11.2.1-4: California red-legged frogs require two major habitat components: aquatic breeding sites and terrestrial migration, aestivation, or refuge habitat. Increasing the availability and function of these features where they may be limiting factors, and protecting recently occupied suitable habitat, are expected to enhance red-legged frog populations. Reserves of multiple breeding ponds surrounded by abundant upland habitat have been recommended to ensure the persistence of California red-legged frog populations. Preserving wetland-upland complexes is more likely to maintain "core" breeding - refuge site ensembles than more isolated sites. This approach will increase the area of contiguous suitable habitat and decrease fragmentation. In this HCP/NCCP, the suitability of upland habitat is assumed to increase with the number of available refuge sites and decrease with the distance from a breeding site. Although probability of upland use by red-legged frogs is likely to decrease with distance to a breeding site, the strength of this relationship in an area probably depends on the abundance, distribution, and quality of available upland habitat.

~~**Objective 11.2.5 2e.** Attempt to establish red-legged frog populations in restored or created breeding habitat that is unlikely to be naturally colonized by red-legged frogs from existing populations.~~

Objective 11.2.6~~2f~~. ~~Remove structures or close roads within reserves where possible to reduce barriers and risks to dispersing frogs.~~To the extent feasible, prohibit habitat modifications that result in movement barriers or hazards between breeding and upland habitat (e.g., berms, fences, roads, and some pipelines).

Remove structures or close roads within reserves where possible to reduce barriers and risks to dispersing frogs. Where roads or other structures must traverse a known or possible movement route, establish safe movement routes for red-legged frogs.

Rationale: Movement between aquatic and upland habitats, and dispersal among suitable habitats, are important for this species. Minimizing impediments to movement will increase the likelihood of successful dispersal and colonization. Vehicular related mortality is an important threat to red-legged frog populations. California red-legged frogs will readily attempt to cross roads during migration, and roads that sustain heavy vehicle traffic or barriers that impede seasonal migrations may have impacted populations in some areas. Therefore, establishing artificial structures that could impede movements or maintaining roads that support a considerable amount of vehicle traffic in areas that support red-legged frog populations can severely degrade frog habitat.

Objective 11.2.7~~2g~~. Establish and maintain adequate buffers around protected habitats to minimize intrusion from humans, domestic animals, and contaminants.

Rationale: Intrusion by humans can harm California red-legged frogs, and predation or disturbance by domestic animals such as cats and dogs can affect local populations.

Objective 11.2.8~~2h~~. Manage protected movement/aestivation habitat to promote ground squirrel populations.

Rationale: The viability of California red-legged frog populations depends on the availability of aestivation sites. Some fossorial species, particularly California ground squirrel, enhance habitat suitability by creating burrows, which are frequently used as aestivation sites by red-legged frogs. Burrowing-mammal control programs are considered a threat to California red-legged frog populations. Rodent control through destruction of burrows and release of toxic chemicals into burrows may cause direct mortality to individual frogs and may result in a decrease of available suitable habitat.

Objective 11.2.9~~2i~~. Control red-legged frog predators (e.g., bullfrogs and non-native predatory fish) in protected breeding habitat.

Rationale: Predation by bullfrogs, non-native fish, and other species has contributed to declines in California red-legged frog populations. Monitoring and controlling predation by non-native species will enhance frog populations and productivity.

Objective 11.2.10~~2j~~. To the maximum extent practicable, prohibit activities that may threaten water quality in habitat reserves and their watersheds.

Rationale: Preventing contamination of aquatic habitat used by the species is expected to reduce mortality of individuals, eggs and larvae, and prey species. In a comprehensive evaluation of prevailing hypotheses on the causes of declines in the California red-legged frog populations, Davidson et al. (2001) determined that there is a strong statistical correlation between locations where frog numbers had

declined and upwind agricultural land use. They concluded that wind-borne agrochemicals may be an important factor in these declines.

Objective 11.2.11~~2k~~. To the extent practicable, minimize the spread of disease and parasites among breeding sites.

Rationale: Disease and parasite transmission among breeding sites by humans (e.g., surveyors) has been identified as a threat to red-legged frog populations. Implementing measures to reduce transmission will reduce local population declines or extirpations as a result of infection.

Foothill Yellow-legged Frog

Goal 12.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on foothill yellow-legged frog and its habitat.

Objective 12.1.1~~1a~~. Avoid or minimize adverse effects of covered activities on suitable foothill yellow-legged frog habitat. ~~Limit the total loss of perennial streams to less the 5% of remaining perennial streams in the planning area.~~

Objective 12.1.2~~1b~~. Compensate for loss of suitable habitat by protecting existing areas of equal or greater function habitat, and restoring breeding habitat of equal or greater function in habitat reserves.

Goal 12.2. Establish and maintain a habitat reserve system capable of enhancing foothill yellow-legged frog populations in the inventory area to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 12.2.1~~2a~~. Protect key areas of core habitat sufficient to expand yellow-legged frog populations. To the extent feasible, emphasize the protection of core habitat that has been occupied during the last 10 -year period~~s~~, and nearby suitable habitat.

Objective 12.2.2~~2b~~. Achieve no-net-loss in habitat function through stream and riparian habitat enhancement and restoration in preserves. Design and manage yellow-legged frog habitat to meet the specific breeding habitat requirements of the species by improving streamflow and substrate conditions.

Objective 12.2.3~~2c~~. Preserve intact watersheds to the maximum extent practicable to maintain streamflow patterns and ensure perennial streams remain perennial.

Objective 12.2.4~~2d~~. Ensure streams within preserves maintain or improve their hydrologic functions by preserving upland habitat adjacent to streams.

Objective 12.2.5~~2e~~. Enhance habitat quality within preserves by limiting or eliminating livestock access to riparian areas and adjacent uplands.

Objective 12.2.6~~2f~~. Increase riparian woodland/scrub canopy coverage over streams to reduce and mediate stream water temperatures.

Objective 12.2.7~~2g~~. Reduce stream bank erosion within preserves through means such as bank stabilization, planting riparian and upland vegetation, and changes in grazing practices.

Objective 12.2.8~~2h~~. Establish and maintain adequate buffers around protected habitats to minimize intrusion from humans, domestic animals, and contaminants.

Objective 12.2.9~~2i~~. Control non-native yellow-legged frog predators (e.g., bullfrogs) in protected breeding habitat.

Objective 12.2.10~~2j~~. To the maximum extent practicable, prohibit activities that may threaten water quality in habitat reserves and their watersheds.

Rationale for Objectives 12.2.1-10: Habitat loss and degradation, introduction of exotic predators, and toxic chemicals (including pesticides) pose continued and increasing threats to the long-term viability amphibians, including yellow-legged frogs, throughout California. In addition, poorly timed water releases from upstream reservoirs can scour egg masses of this species from their oviposition substrates, and decreased flows can force adult frogs to move into permanent pools, where they may be more susceptible to predation,

Longhorn Fairy Shrimp, Vernal Pool Fairy Shrimp, Midvalley Fairy Shrimp, and Vernal Pool Tadpole Shrimp

Goals and objectives for the four covered fairy shrimp are included together because of their similar ecology, habitat requirements, range, and conservation needs. Goals and objectives for all four species are assigned to species code 13. Codes 14 through 16 are reserved in case goals and objectives for specific vernal pool invertebrates need to be added later.

Goal 13.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects of covered activities on covered shrimp and their habitat.

Objective 13.1.1~~1a~~. Avoid impacts to vernal pools from covered activities when practicable. Minimize adverse effects to vernal pools from covered activities to the extent practicable.

Objective 13.1.2~~1b~~. Compensate for the loss of suitable habitat lost as a result of covered activities by preserving 2 acres and restoring or creating 1 acre of suitable habitat in habitat reserves for each acre removed.

Goal 13.2. Establish and maintain a habitat reserve system capable of enhancing vernal pool fairy shrimp, midvalley fairy shrimp, longhorn fairy shrimp, and vernal pool tadpole shrimp populations to contribute to the species' recovery or to reduce the likelihood of future listing under CESA or the federal ESA.

~~**Rationale:** Protecting occupied habitat, particularly habitat complexes, is important to maintaining and enhancing shrimp populations in the inventory area~~

~~(also see below). However, little is presently known about the occurrence and distribution of these species in the inventory area.~~

Objective 13.2.1~~2b~~. Achieve a net increase in habitat function for covered shrimp through vernal pool restoration or creation. Restore or create suitable pools in a quantity that exceeds Objective 1b.

Rationale: Increasing the amount of suitable habitat for covered shrimp provides opportunity for population enhancement and expansion in the inventory area.

Objective 13.2.2~~2c~~. Emphasize protecting vernal pool complexes, including the upland habitat surrounding pools, rather than isolated pools; to the extent feasible, protect occupied habitat~~.~~

Rationale: Protecting occupied habitat, particularly habitat complexes, is important to maintaining and enhancing shrimp populations in the inventory area (also see below). However, little is presently known about the occurrence and distribution of these species in the inventory area.~~-~~Achieving this objective maintains or enhances habitat function and the likelihood of long-term persistence by minimizing habitat fragmentation and the potential for local extirpation, and maintains or improves hydrologic function of vernal pools.

Objective 13.2.3~~2d~~. Establish and maintain buffers around protected vernal pools and surrounding uplands to minimize intrusion from humans and equipment and maintain the local hydrologic regime that supports the pools.

Objective 13.2.4~~2e~~. Enhance vernal pools and control exotic plants within and around pools in preserves by appropriate control and management of livestock.

Objective 13.2.5~~2f~~. Maintain or improve the hydrologic functions of vernal pools in habitat preserves by ~~-~~preserving adjacent upland habitat; maintain surface hydrologic connections to swales or other water features; preserve vernal pools that form complexes; and prohibit activities that could adversely affect vernal pool hydrology.

Objective 13.2.6~~2g~~. To the maximum extent practicable, prohibit or limit activities that may threaten water quality in habitat reserves and their watersheds.

Rationale for Objectives 13.2.3-6: Threats to shrimp species include aquatic and surrounding upland habitat degradation; and, the conservation of these species is directly tied to the conservation of suitable vernal pool habitat. The limited and disjunct distribution of vernal pools, coupled with the even more limited distribution of these shrimp species, means that any degradation of habitat quality, could adversely affect these species. Achieving these objectives collectively would maintain or improve aquatic and upland habitat quality.

Mount Diablo Manzanita

Goal 17.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on Mt. Diablo manzanita and its habitat.

Objective 17.1.1~~a~~. Avoid or minimize adverse effects on Mt. Diablo manzanita populations; minimize adverse effects on suitable habitat.

Objective 17.1.2~~b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 17.1.3~~c~~. If impacts are unavoidable, ~~S~~salvage cuttings and seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 17.2. Establish and maintain a habitat reserve system capable of supporting sustainable Mt. Diablo manzanita populations in the inventory area, and increase the size of these populations in this system through improved habitat management to significantly reduce the likelihood of future listing under CESA or the federal ESA.

Objective 17.2.1~~a~~. To the maximum extent practicable, protect all remaining populations of Mt. Diablo manzanita in the inventory area not affected by covered activities.

Rationale: This species is endemic to the Diablo Range in Contra Costa County. The inventory area includes a majority of the range of this species and 77% of known occurrences thought to be extant. Suitable habitat for the species is relatively uncommon in the inventory area. Protection of all remaining populations in the inventory area is necessary to prevent listing of this species or to recover the species if it becomes listed in the future. Impacts to this species or its suitable habitat are expected to be low from covered activities. Therefore, protection of known populations and suitable habitat should be to the maximum extent practicable within this plan.

Objective 17.2.2~~2b~~. Protect stands of suitable chaparral habitat to allow expansion of Mt. Diablo manzanita populations or colonization of new areas.

Objective 17.2.3~~2c~~. Study the ecology of this species to learn what factors may be limiting its distribution and populations size, and to determine what management techniques could be used to increase the size of known populations. Implement these management techniques on an experimental basis.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species.

Brittlescale

Goal 18.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on brittlescale and its habitat.

Objective 18.1.1~~a~~. Avoid or minimize adverse effects on brittlescale populations; minimize adverse effects on suitable habitat.

Objective 18.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 18.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 18.2. Establish and maintain a habitat reserve system capable of supporting sustainable brittlescale populations in the inventory area, and increase the size of these populations in this system through improved habitat management to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 18.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of brittlescale in the inventory area not affected by covered activities. Protect multiple populations in the reserve system to maximize long-term viability of the species in the inventory area.

Rationale: The inventory area includes a small portion of the range of this species and 20% of the known occurrences. To make a substantial contribution to recovery, all remaining populations in the inventory area should be preserved. However, this should be done to the maximum extent practicable because this action may not be required to prevent listing of this species.

Objective 18.2.2~~2b~~. Protect suitable habitat in alkali soils to allow expansion of brittlescale populations.

Objective 18.2.3~~2c~~. Conduct experimental management within preserves to determine what techniques can increase the population size of brittlescale. Enhance populations of brittlescale using successful techniques.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species.

San Joaquin Spearscale

Goal 19.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on San Joaquin spearscale and its habitat.

Objective 19.1.1~~1a~~. Avoid or minimize adverse effects on San Joaquin spearscale populations; minimize adverse effects on suitable habitat.

Objective 19.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 19.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 19.2. Establish and maintain a habitat reserve system capable of supporting sustainable San Joaquin spearscale populations in the inventory area, and increase the size of these populations in this system through improved habitat management to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 19.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of San Joaquin spearscale in the inventory area not affected by covered activities. Protect multiple populations in the reserve system to maximize long-term viability of the species in the inventory area.

Rationale: The inventory area includes a small portion of the range of this species but over 40% of known occurrences. To make a substantial contribution to recovery, all remaining populations in the inventory area should be preserved in order to prevent listing or if the species is listed, to recover it.

Objective 19.2.2~~2b~~. Protect suitable habitat in alkali soils to allow expansion of San Joaquin spearscale populations.

Objective 19.2.3~~2c~~. Increase the population size of San Joaquin spearscale within preserves by applying techniques learned from monitoring and managing San Joaquin spearscale populations in the Los Vaqueros watershed.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species. Such an approach has been underway since 1999 in the Los Vaqueros Watershed as mitigation for impacts to this species from construction of the reservoir. Results from this study should be available by the time the HCP/NCCP is implemented to inform management within preserves.

Big Tarplant

Goal 20.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on big tarplant and its habitat.

Objective 20.1.1~~1a~~. Avoid or minimize adverse effects on big tarplant populations; minimize adverse effects on suitable habitat.

Objective 20.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 20.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 20.2. Establish and maintain a habitat reserve system capable of supporting sustainable big tarplant populations in the inventory area, and increase the size of these populations in this system through improved habitat management to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 20.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of big tarplant in the inventory area not affected by covered activities.

Rationale: This species is found largely in the foothills of Mt. Diablo in Contra Costa, Alameda, and San Joaquin Counties. The inventory area contains a significant portion of the species' range and approximately 40% of the occurrences thought to be extant. Protection of all remaining populations in the inventory area is necessary to prevent listing of this species or if it becomes listed, to recover the species.

Objective 20.2.2~~2b~~. Protect suitable habitat in soils of the Altamont series to allow expansion of big tarplant populations.

Objective 20.2.3~~2c~~. Study the ecology of this species to learn what factors may be limiting its distribution and populations size, and to determine what management techniques could be used to increase the size of known populations. Implement these management techniques on an experimental basis.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species. Other agencies such as the Lawrence Livermore National Laboratories are studying the ecology of this species. Data from their studies could inform management in the preserves.

Mt. Diablo Fairy Lantern

Goal 21.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on Mt. Diablo fairy lantern and its habitat.

Objective 21.1.1~~1a~~. Avoid or minimize adverse effects on Mt. Diablo fairy lantern populations; minimize adverse effects on suitable habitat.

Objective 21.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 21.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 21.2. Establish and maintain a habitat reserve system capable of supporting sustainable Mt. Diablo fairy lantern populations in the inventory area, and increase the size of these populations in this system through improved habitat management to significantly reduce the likelihood of future listing under CESA or the federal ESA.

Objective 21.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of Mt. Diablo fairy lantern in the inventory area not affected by covered activities.

Rationale: This species is endemic to the Diablo Range in Contra Costa County. The inventory area accounts for a substantial portion of the species range and approximately 20% of occurrence records. Protection of all remaining populations in the inventory area is necessary to prevent listing of this species or if it becomes listed, to recover the species.

Objective 21.2.2~~2b~~. Protect suitable habitat to allow expansion of Mt. Diablo fairy lantern populations.

Objective 21.2.3~~2c~~. Study the ecology of this species to learn what factors may be limiting its distribution and populations size, and to determine what management techniques could be used to increase the size of known populations. Implement these management techniques on an experimental basis.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species.

Recurved Larkspur

Goal 22.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on recurved larkspur and its habitat.

Objective 22.1.1~~1a~~. Avoid or minimize adverse effects on recurved larkspur populations; minimize adverse effects on suitable habitat.

Objective 22.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 22.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 22.2. Establish and maintain a habitat reserve system capable of supporting sustainable recurved larkspur populations in the inventory area, and increase the size of these populations in this system through improved habitat management to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 22.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of recurved larkspur in the inventory area not affected by covered activities. Protect multiple populations in the reserve system to maximize long-term viability of the species in the inventory area.

Rationale: The inventory area includes a small portion of the range of this species and approximately 5% of known occurrences. To make a substantial contribution to recovery (or prevention of listing), all remaining populations in the inventory area should be preserved. However, this should be done to the maximum extent

practicable because this action is likely not required to prevent listing of this species.

Objective 22.2.2~~2b~~. Protect suitable habitat in alkali soils to allow expansion of recurved larkspur populations.

Objective 22.2.3~~2c~~. Conduct experimental management within preserves to determine what techniques can increase the population size of recurved larkspur. Enhance populations of recurved larkspur using successful techniques.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species.

Diablo Helianthella

Goal 23.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on Diablo helianthella and its habitat.

Objective 23.1.1~~1a~~. Avoid or minimize adverse effects on Diablo helianthella populations; minimize adverse effects on suitable habitat.

Objective 23.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 23.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 23.2. Establish and maintain a habitat reserve system capable of supporting sustainable Diablo helianthella populations in the inventory area, and increase the size of these populations in this system through improved habitat management to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 23.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of Diablo helianthella plant in the inventory area not affected by covered activities.

Rationale: This species is found only in Contra Costa, Alameda, and San Mateo Counties. The inventory area contains a majority of the species' range and approximately 20% of known occurrences. Protection of all remaining populations in the inventory area is necessary to prevent listing of this species or if it becomes listed, to recover the species.

Objective 23.2.2~~2b~~. Protect suitable habitat to allow expansion of Diablo helianthella populations.

Objective 23.2.3~~2c~~. Study the ecology of this species to learn what factors may be limiting its distribution and populations size, and to determine what management techniques could be used to increase the size of known populations. Implement these management techniques on an experimental basis.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species.

Brewer's Dwarf Flax

Goal 24.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on Brewer's dwarf flax and its habitat.

Objective 24.1.1~~1a~~. Avoid or minimize adverse effects on Brewer's dwarf flax populations; minimize adverse effects on suitable habitat.

Objective 24.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 24.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 24.2. Establish and maintain a habitat reserve system capable of supporting sustainable Brewer's dwarf flax populations in the inventory area, and increase the size of these populations in this system through improved habitat management to significantly reduce the likelihood of future listing under CESA or the federal ESA.

Objective 24.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of Brewer's dwarf flax in the inventory area not affected by covered activities.

Rationale: This species is found in the foothills of Mt. Diablo in Contra Costa County and in the Vaca Mountains of Solano and Napa Counties. The inventory area contains a significant portion of the species' range and 48% of the known occurrences. Protection of all remaining populations in the inventory area is necessary to prevent listing of this species or if it becomes listed, to recover the species.

Objective 24.2.2~~2b~~. Protect suitable habitat in oak woodland and chaparral to allow expansion of Brewer's dwarf flax populations.

Objective 24.2.3~~2c~~. Study the ecology of this species to learn what factors may be limiting its distribution and populations size, and to determine what management techniques could be used to increase the size of known populations. Implement these management techniques on an experimental basis.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species.

Showy Madia

Goal 25.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on showy madia and its habitat.

Objective 25.1.1~~1a~~. Avoid or minimize adverse effects on showy madia populations; minimize adverse effects on suitable habitat.

Objective 25.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 25.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 25.2. Establish and maintain a habitat reserve system capable of supporting sustainable showy madia populations in the inventory area at the northern extent of its range, and increase the size of these populations in this system through improved habitat management to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 25.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of showy madia in the inventory area not affected by covered activities. Protect multiple populations in the reserve system to maximize long-term viability of the species in the inventory area.

Rationale: The inventory area includes a small but important portion of the range of this species because it represents the northern extent of its range. The species is known to occur in the inventory only near Sand Creek in Antioch. Suitable habitat exists elsewhere. To make a substantial contribution to recovery, any populations found in the inventory area should be preserved.

Objective 25.2.2~~2b~~. Protect suitable habitat to allow expansion of showy madia populations.

Objective 25.2.3~~2c~~. Study the ecology of this species to learn what factors may be limiting its distribution and populations size, and to determine what management techniques could be used to increase the size of known populations. Implement these management techniques on an experimental basis.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing

populations in preserves in order to determine which approaches are most effective for this species.

Adobe Navarretia

Goal 26.1. To the maximum extent practicable, avoid, minimize, and mitigate adverse effects on adobe navarretia and its habitat.

Objective 26.1.1~~1a~~. Avoid or minimize adverse effects on adobe navarretia populations; minimize adverse effects on suitable habitat.

Objective 26.1.2~~1b~~. Compensate for individuals lost as a result of covered activities by protecting an area of habitat of equal or higher function occupied by the species.

Objective 26.1.3~~1c~~. If impacts are unavoidable, salvage ~~Salvage~~ seeds from individuals lost to covered activities and plant in suitable habitat within preserves.

Goal 26.2. Establish and maintain a habitat reserve system capable of supporting sustainable adobe navarretia populations in the inventory area, and increase the size of these populations in this system through improved habitat management to reduce the likelihood of future listing under CESA or the federal ESA.

Objective 26.2.1~~2a~~. To the maximum extent practicable, protect all remaining populations of adobe navarretia in the inventory area not affected by covered activities. Protect multiple populations in the reserve system to maximize long-term viability of the species in the inventory area.

Rationale: The inventory area includes a small portion of the range of this species. At least 2 populations are found in the inventory area. To make a substantial contribution to recovery, all remaining populations in the inventory area should be preserved.

Objective 26.2.2~~2b~~. Protect suitable habitat to allow expansion of adobe navarretia populations.

Objective 26.2.3~~2c~~. Study the ecology of this species to learn what factors may be limiting its distribution and populations size, and to determine what management techniques could be used to increase the size of known populations. Implement these management techniques on an experimental basis.

Rationale: Little is known of the ecology of this species and what management techniques may enhance its populations. Because of the uncertainty in management needs, a scientifically-valid experimental approach should be taken to managing populations in preserves in order to determine which approaches are most effective for this species.