ES.1 Overview

The Yolo Habitat Conservation Plan/Natural Communities Conservation Plan (Yolo HCP/NCCP) is a comprehensive, county-wide plan to provide for the conservation of 12 sensitive species and the natural communities and agricultural land on which they depend, as well as a streamlined permitting process to address the effects of a range of future anticipated activities on these 12 species. The Yolo HCP/NCCP refers to the range of future anticipated activities as *covered activities* and the 12 sensitive species covered by this HCP/NCCP as *covered species*. The Yolo HCP/NCCP will improve habitat conservation efforts in Yolo County; encourage sustainable economic activity; and maintain and enhance agricultural production.

The Yolo Habitat Conservancy (Conservancy), which consists of Yolo County and the incorporated cities of Davis, West Sacramento, Winters, and Woodland, developed the Yolo HCP/NCCP. This HCP/NCCP provides the basis for issuance of long-term permits under the Federal Endangered Species Act (FESA) and California Natural Community Conservation Planning Act (NCCPA) that cover an array of public and private activities, including activities that are essential to the ongoing viability of Yolo County's agricultural and urban economies. Specifically, the Yolo HCP/NCCP will provide the Permittees (i.e., Yolo County, the four incorporated cities, and the Conservancy) with incidental take permits from both the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) for the 12 covered species. This action is pursuant to Section 10(a)(1)(B) of the FESA and Section 2835 of the NCCPA chapter of the California Fish and Game Code (Fish & Game Code). The Yolo HCP/NCCP ensures compliance with the FESA, NCCPA, and the California Endangered Species Act (CESA) for covered activities that may affect the covered species. In addition to the Permittees, the Yolo HCP/NCCP permits may cover the activities of other entities through certificates of inclusion, as described further in Chapter 3, Covered Activities, and Chapter 7, Plan Implementation.

The Yolo HCP/NCCP will protect, enhance, and/or[1] restore natural communities and cultivated lands, including rare and endangered species habitat, and provide for the conservation of covered species within Yolo County. In place of the current system of separately permitting and mitigating individual projects, the Plan creates a conservation and mitigation program that comprehensively coordinates the implementation of permit requirements through the development of a countywide conservation strategy, including identification of priority acquisition areas in riparian zones or other

[1] The Yolo HCP/NCCP will protect cultivated lands and will enhance these lands for covered species through crop restrictions and in some cases through adding hedgerows and other features to improve the habitat value of the cultivated lands. The Yolo HCP/NCCP does not restore cultivated lands.

locations with important species habitat. The Plan also requires additional habitat conservation that is otherwise unlikely to take place in Yolo County. Effects on natural resources and associated mitigation requirements for at-risk species are addressed more efficiently and effectively than the current piecemeal mitigation process. This approach benefits both listed species and project proponents.

The Conservancy developed the Yolo HCP/NCCP in association with the U.S. Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW), and in consultation with stakeholder groups and the general public. Upon approval of the Plan, the USFWS will issue the Permittees a 50-year permit that authorizes incidental take[2] of covered listed species associated with covered activities under the federal Endangered Species Act (ESA). CDFW will issue Permittees a 50-year permit that authorizes take[3] of all covered listed species associated with covered activities under the Natural Community Conservation Planning Act (NCCP Act). This approach will allow the Permittees to streamline future mitigation requirements into one comprehensive program. In addition to obtaining take authorization for each participating agency's respective activities, the cities and County will be able to extend take authorization to project applicants under their jurisdiction. USFWS and CDFW (collectively the wildlife agencies) will also provide assurances to the Permittees that no further commitments of funds, land, or water will be required to address impacts on covered species beyond the commitments described in the Yolo HCP/NCCP to address changed circumstances.

The Yolo HCP/NCCP strikes a sensible balance between natural resource conservation and economic growth in the region. In addition to strengthening local control over land use and species protection, the Yolo HCP/NCCP will provide a more efficient process for protecting natural resources by creating a new habitat reserve system that will be larger in scale, more ecologically valuable, and easier to manage than the individual mitigation sites created under the current approach. The Yolo HCP/NCCP also will result in additional habitat conservation that is unlikely to happen in the absence of the Plan. The Yolo HCP/NCCP will further provide for a large, interconnected reserve system that maximizes species and habitat benefits, as well as performance based monitoring and adaptive management. The Plan Area will maintain a rural character, consisting almost entirely of open space and working agricultural landscapes, with both existing and planned development clustered primarily in the incorporated cities and unincorporated towns.

The Yolo HCP/NCCP builds on the county and city open space and responsible growth policies, which focus covered activities in clustered growth areas and promote open space protection. To

[2] *Take*, as defined by the Endangered Species Act, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Harm* is defined as "any act that kills or injures the species, including significant habitat modification."

[3] *Take* is defined under the California Fish and Game Code as any action or attempt to "hunt, pursue, catch, capture, or kill."

date, these policies and other conservation efforts have resulted in the conservation of 90,967 acres of public and easement lands in the Plan Area, 34,264 acres of which protect natural communities and special status species habitat in permanent conservation easements. The Conservancy will build on these public and easement lands to create the Yolo HCP/NCCP reserve system.

ES.2 Geographic Scope

The Plan Area includes all lands within the boundaries of Yolo County, totaling approximately 653,549 acres, and a 1,174-acre expanded Plan Area for riparian conservation in Solano County on the south side of Putah Creek (Figure ES-1). The Plan Area is subdivided into 22 geographically based planning units to facilitate development and execution of the conservation strategy and the analysis of potential effects associated with implementation of the covered activities (Figure ES-2). These include four urban planning units, within which most of the development will occur. Another 13 planning units will be the focus for conservation planning efforts in the eastern two-thirds of the Plan Area where most of the covered species habitat occurs. The remaining five planning units are in the western portion of the Plan Area. While the Yolo HCP/NCCP addresses conservation of natural communities in these planning units, they are the focus of the Local Conservation Plan and not the Yolo HCP/NCCP because of the lack of covered species habitat in this area. The Local Conservation Plan is a voluntary, non-regulatory plan to fill in conservation gaps not covered by the Yolo HCP/NCCP.

ES.3 Existing Ecological Conditions

The Conservancy developed a multilevel land cover classification and mapping system for the HCP/NCCP planning process to represent the natural and anthropogenic communities, vegetation types, and other land cover types in the Plan Area under existing conditions. This system integrates existing, commonly used and emerging vegetation classification systems. It provides the basis for characterizing current and future wildlife habitat uses through wildlife habitat relationship models, and a foundation to develop more detailed, site-specific maps in the future.

The foundation of the mapping system is a set of land cover types, which are floristically based or, for unvegetated areas, are based on other land cover attributes (e.g., barren, developed). These land cover types are grouped into 15 natural communities (including the cultivated lands seminatural community), all of which provide habitat value for covered or other sensitive species. Land cover types that provide limited or no habitat value (e.g., orchards, vineyards, developed) are not grouped into natural communities and are termed *other land cover types.* The natural communities in turn fall into five categories: cultivated lands, grassland, shrubland and scrub, woodland and forest, and riparian and wetland. Table ES-1 lists the 15 natural communities, and land cover types that do not fall within natural communities.

Figure ES-1 Yolo NCP/HCCP Plan Area

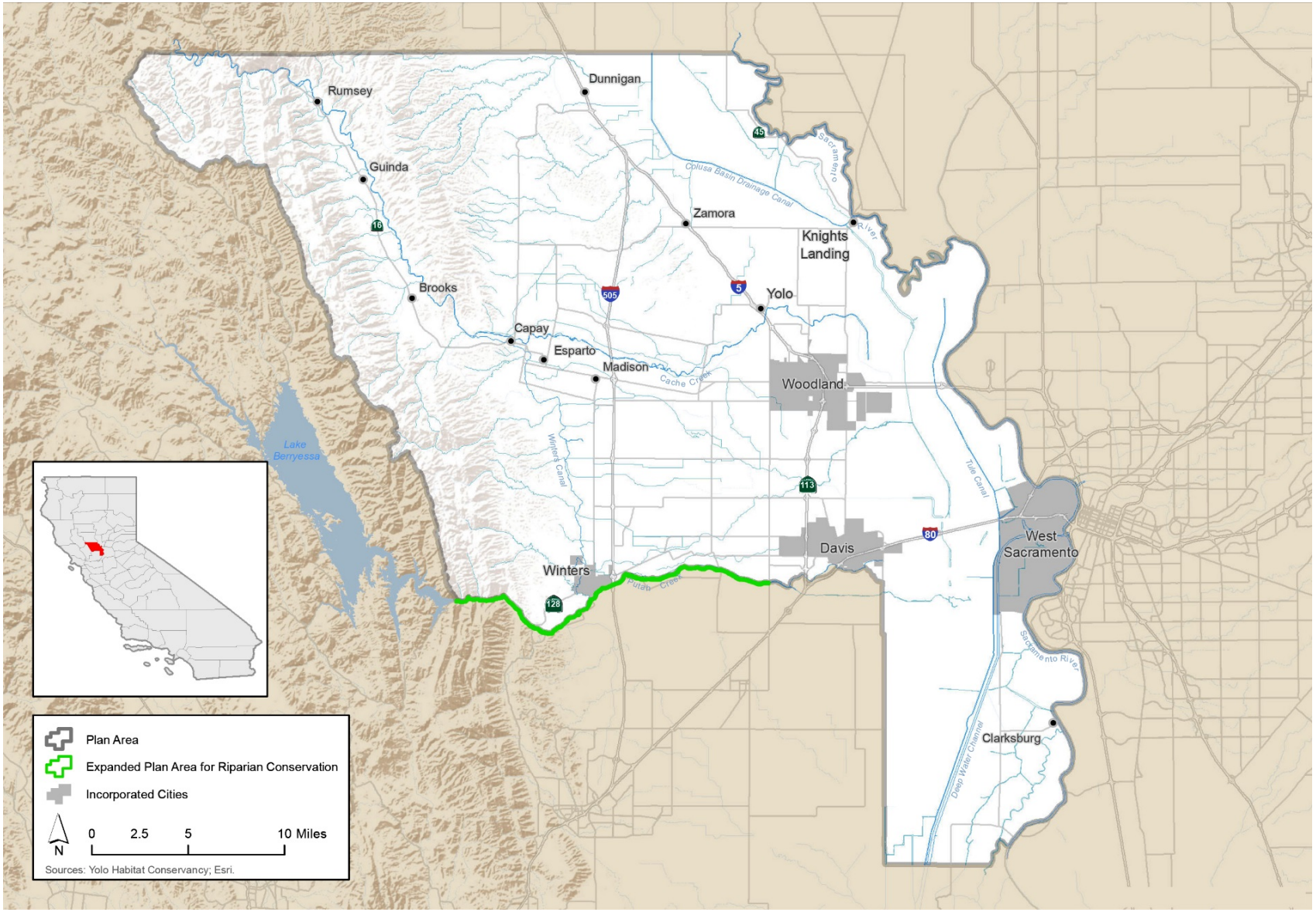


Figure ES-2 Planning Units

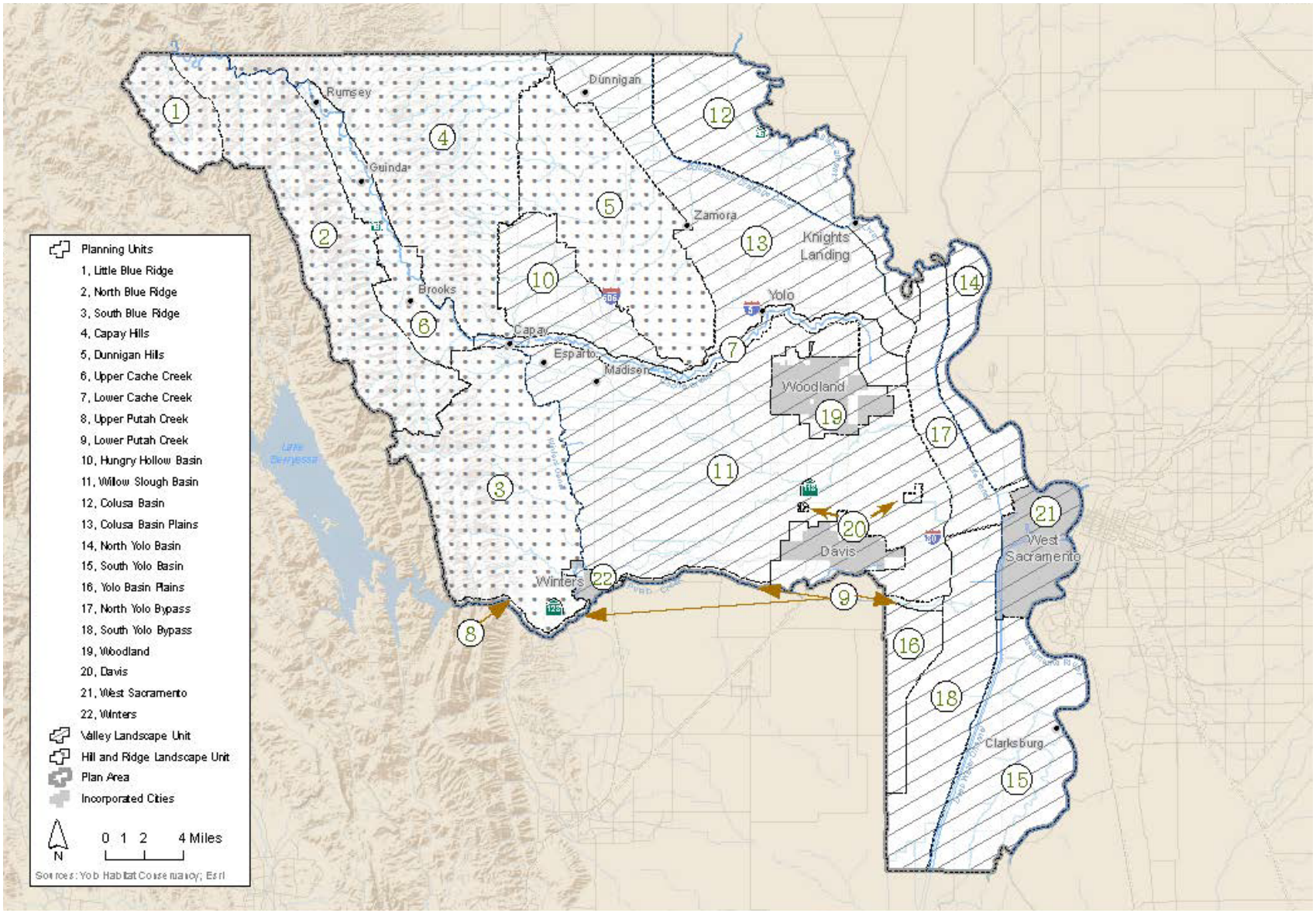


Table ES-1. Natural Communities and Other Land Cover Types

Category	Natural Community (or land cover types for lands that do not fall within a natural community)	Acres in Plan Area
Cultivated Lands	Cultivated Lands Seminatural Community	250,842
Grassland	Grassland Natural Community	80,911
	Serpentine Natural Community	247
Shrubland and Scrub	Chamise Natural Community	30,187
	Mixed Chaparral Natural Community	14,518
Woodland and Forest	Oak-Foothill Pine Natural Community	43,772
	Blue Oak Woodland Natural Community	35,891
	Closed-Cone Pine-Cypress Natural Community	212
	Montane Hardwood Natural Community	3,087
	Valley Oak Woodland Natural Community	181
Riparian and Wetland	Alkali Prairie Natural Community	312
	Vernal Pool Complex Natural Community	299
	Fresh Emergent Wetland Natural Community	26,113
	Valley Foothill Riparian Natural Community	12,565
	Lacustrine and Riverine Natural Community	13,493
Land Cover Types outside Natural Communities	Other Agriculture	62,164
	Semiagricultural/Incidental to Agriculture	30,510
	Eucalyptus	369
	Barren and Developed	47,822
TOTAL		**653,495**[a]

Note:

a. This acre amount differs from the total Plan Area acre amount due to inconsistencies in the boundaries of the land cover and planning unit GIS layers.

ES.4 Permit Term

The Permittees are seeking permits from the wildlife agencies with terms of 50 years, which the wildlife agencies will issue to all Permittees collectively. The permit term is the time period in which all covered activities can receive take authorization under the Plan, consistent with the requirements of the Plan. The permit term is also the time in which the Conservancy must successfully complete all conservation actions to offset the impacts of the covered activities. The Conservancy requested a permit term of 50 years because it allows for the full and successful implementation of the covered activities, the conservation strategy, the monitoring and adaptive management program, and the funding strategy. The permits are tied to the Yolo HCP/NCCP and to the implementing agreement.

ES.5 Covered Species

This HCP/NCCP provides take authorization for 12 listed and non-listed species (i.e., covered species) (Table ES-2). The Conservancy selected the 12 covered species from a larger pool of 175 special status species in the region based on their potential to be affected by covered activities, their occurrence in the Plan Area, the adequacy of data for the species, and plan-specific factors such as the availability of funding to meet NCCP standards over the 50-year permit term. Appendix C provides details as to how the Conservancy evaluated 175 species for coverage. The list of 175 species includes some that are California Species of Special Concern: these species will be addressed on a non-regulatory basis in a Local Conservation Plan (Appendix E), which is described further in Chapter 1. The Yolo HCP/NCCP includes conservation measures to provide for the conservation of all 12 species selected for coverage under the HCP/NCCP, whether or not they are currently listed. Accordingly, the wildlife agencies will not require any additional conservation measures if any non-listed, covered species are listed during the permit term.

ES.6 Covered Activities

Covered activities in the Yolo HCP/NCCP fall into the following five categories. The following two categories are spatially defined as geographic information system (GIS) data and cover 17,550 acres[4].

- Urban projects and activities.
    - General urban projects and urban public services, infrastructure, and utilities.
    - Urban projects in rural areas.
- Rural projects and activities.
    - General rural development.
    - Rural public services, infrastructure, and utilities.
    - Agricultural economic development.
    - Parks/open space
    - Aggregate mining.

The remaining three categories are not spatially defined in GIS, but the Conservancy estimated effects based on a set of assumptions described in Chapter 5, *Effects on Covered Species and Natural Communities*:

[4] While the extent of these activities are defined for the GIS, they are not determinative for future coverage. That future coverage will be limited only by type of activity and type of habitat cover impacted.

- Public and private operations and maintenance activities, and other spatially undefined temporary activities associated with construction projects (706 acres)
- Conservation strategy implementation (956 acres of restoration, and management and enhancement activities throughout the reserve system)
- Neighboring landowner agreements (2,347 acres)

Table ES-2. Covered Species

Common Name	Scientific Name	Status Federal/State/Other[a]
Plants		
1 Palmate-bracted bird's beak	*Chloropyron palmatum*[b]	E/E/1B
Invertebrates		
2 Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T/-/-
Amphibians		
3 California tiger salamander (Central California DPS)	*Ambystoma californiense*	T/T/-
Reptiles		
4 Western pond turtle	*Actinemys marmorata*	-/CSC/-
5 Giant garter snake	*Thamnophis gigas*	T/T/-
Birds		
6 Swainson's hawk	*Buteo swainsoni*	-/T/-
7 White-tailed kite	*Elanus leucurus*	-/FP/-
8 Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/E/-
9 Western burrowing owl	*Athene cunicularia hypugaea*	-/CSC/-
10 Least Bell's vireo	*Vireo bellii pusillus*	E/E/-
11 Bank swallow	*Riparia riparia*	-/T/-
12 Tricolored blackbird	*Agelaius tricolor*	-/C/-

[a] Status:

Federal
- C = Candidate for listing under FESA
- E = Listed as endangered under FESA
- PT = Proposed as threatened under FESA
- T = Listed as threatened under FESA
- - = no designation

State
- CSC = California species of special concern
- C = Candidate for listing under CESA Under CESA, a candidate for listing is afforded the status of a listed species.
- E = Listed as endangered under CESA
- FP = Fully protected under California Fish and Game Code
- T = Listed as threatened under CESA
- - = No designation

Other:
- 1B = California Native Plant Society (CNPS) designation for species rare or endangered in California and elsewhere.
- - = no designation

[b] Formerly *Cordylanthus palmatus*.

DPS = distinct population segment; FESA = federal Endangered Species Act; CESA = California Endangered Species Act

ES.7 Effects on Covered Species and Natural Communities

The Conservancy overlaid a GIS data layer for covered activities over a GIS layer for natural communities and other land cover types, and the intersection of these two layers provided the estimated amount of conversion of natural communities and other land cover types as a result of spatially defined covered activities. The Conservancy then applied a set of assumptions to the spatially undefined covered activities (described in Chapter 5, *Effects on Covered Activities*) to estimate the amount of land conversion resulting from these activities. The covered activities layer intersected with 18,826 acres of land, 11,510 acres of which consist of natural communities. Another estimated 1,134 acres of natural communities are expected to be permanently lost as a result of spatially undefined activities (including operations and maintenance and restoration), for a total of 12,644[5] acres of natural communities affected. The Conservancy applied a similar approach for estimating habitat loss for covered species, intersecting the covered activities layer with GIS layers representing habitat models for each covered species to estimate loss from spatially defined activities, and applying a set of assumptions to estimate loss from spatially undefined activities.

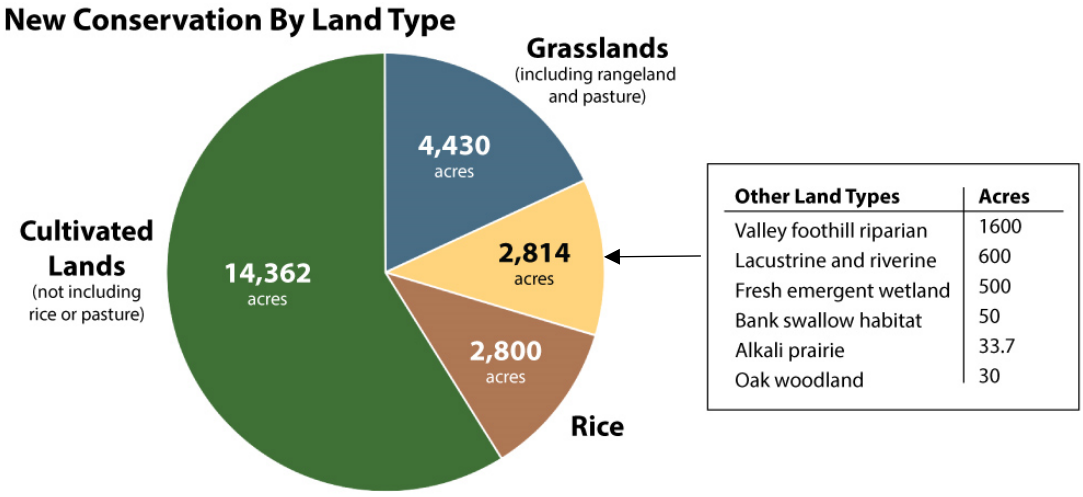
In addition to the quantitative analysis of natural community and covered species habitat loss, the Conservancy quantitatively estimated the effects of habitat fragmentation on California tiger salamander, western pond turtle, giant garter snake, Swainson's hawk, and white-tailed kite. The Conservancy also qualitatively analyzed the effects of covered activities due to factors such as habitat fragmentation, noise, lighting, and introduction of invasive species. The Conservancy developed measures to avoid and minimize these effects, as described in ES.11, *Conditions on Covered Activities.*

ES.8 Conservation Strategy

The conservation strategy was designed to provide for the conservation of covered species in the Plan Area and to mitigate the effects of covered activities. The conservation strategy provides for the protection, management, enhancement, and restoration of natural resources at multiple scales including landscape, natural-community, and species-specific levels.

[5] Due to rounding differences, the total natural community loss varies between 12,644 and 12,649. Table 5-1, *Maximum Allowable Loss of Natural Communities,* provides the maximum allowable loss for each natural community, for a total of 12,649 acres maximum loss.

Figure ES-3. Natural community composition of the 24,406 acres of new conservation.



The conservation strategy is based on a set of biological goals and objectives developed specifically for the Yolo HCP/NCCP. The Conservancy identified conservation measures to achieve these goals and objectives. The conservation strategy consists of the following conservation measures, each of which includes numerous conservation actions for meeting the biological goals and objectives.

- Conservation Measure 1, Establish Reserve System
- Conservation Measure 2, Restore Natural Communities
- Conservation Measure 3, Manage and Enhance the Reserve System

The Conservancy determined the general level of conservation effort for each covered species and natural community, beyond mitigation, based on the following criteria.

- The life history needs of each species.
- Conservation needs based on recovery plans, five-year reviews, and other relevant conservation planning documents.
- The importance of the Plan Area to species conservation, in terms of the rarity of the species and the proportion of the species' range and population that is present in the Plan Area.
- The extent to which species habitat is already protected in the Plan Area.
- Reserve land configuration and quality.
- Plan specific factors such as land use policies and growth patterns in the Plan Area.

Table ES-5, located at end of this chapter, summarizes the benefits of the conservation strategy for each of the covered species.

ES.8.1 Conservation Measure 1: Establish Reserve System

The heart of the conservation strategy is the creation of a reserve system that will include at least 33,406 acres (and up to 956 acres of additional restored natural community if loss of all allowable acres occurs) for the benefit of covered species, natural communities, biological diversity, and ecosystem function. The Conservancy will select lands for the reserve system based on reserve system assembly principles, criteria, and guidelines described in Conservation Measure 1. Of the 32,406 acres, 24,406 acres will consist of newly protected lands[6] (see Figure ES-3 for the natural community composition of the newly protected lands) and 8,000 acres will consist of pre-permit reserve lands[7] that the Conservancy enrolls into the reserve system and manages and monitors consistent with the Yolo HCP/NCCP. Table ES-3 provides the acres of effect and a breakdown of the conservation by mitigation and conservation beyond mitigation.

The Yolo HCP/NCCP describes a detailed but flexible process to assemble the reserve system using acquisition of fee title or conservation easements from willing sellers and partnerships with other conservation organizations already active in the region. The Yolo HCP/NCCP requires the Conservancy to ensure reserve assembly stays ahead of the impacts of covered activities. The Conservancy will complete all land acquisition by Year 45 of the permit term.

Table ES-3. Effects and Commitments over Permit Term

Effects (acres)	**12,649[a]**
Mitigation (acres)	17,087[b]
Conservation beyond Mitigation (acres)	16,275[c]
Total Conservation (acres)	**33,362**

Notes:

a. This is the amount of loss of natural communities with covered species habitat. This does not include conversion of other land cover types such as orchards and vineyards.

b. This includes 16,175 acres of newly protected lands and 912 acres of restored/created lands.

c. This includes 8,000 acres of pre-permit reserve lands, 8,231 acres of newly protected lands, and 44 acres of restored/created lands.

[6] Newly protected lands are lands that were not previously protected through a conservation easement or other mechanism, and that the Conservancy places under a permanent conservation easement and enrolls in the reserve system.

[7] Categories 1 and 2 baseline public and easement lands (Table 6-1(a)) that are enrolled into the reserve system. Category 2 baseline public and easement lands that are counted as newly protected lands are not counted as pre-permit reserve lands. See Appendix M, *Glossary*, for definitions of land categories.

ES.8.2 Conservation Measure 2, Restore Natural Communities

In addition to the protection of all natural communities described above, the Conservancy will restore riparian, wetland, and aquatic land cover types at a ratio of one acre restored for each acre lost. If all loss occurs, the Conservancy will restore up to 956 acres of riparian woodland and scrub, fresh emergent wetlands, and lacustrine and riverine natural communities. The Conservancy will complete construction of all habitat restoration projects by Year 40 of the permit term.

ES.8.3 Conservation Measure 3, Manage and Enhance the Reserve System

The Conservancy will manage and enhance all terrestrial and aquatic land cover types in the reserve system to benefit natural communities and covered species. The reserve system will be managed to maintain ecological values and prevent their degradation. The Conservancy will identify opportunities, based on site-specific conditions, to enhance the biological values of protected natural communities and species habitats through manipulation of physical, chemical, or biological characteristics, as described in Conservation Measure 3.

ES.9 Monitoring and Adaptive Management

The Yolo HCP/NCCP's monitoring and adaptive management program will incorporate important principles of "learning by doing" into the operation of the reserve system. Adaptive management is a decision-making process promoting flexible management such that actions can be adjusted as uncertainties are better understood or as conditions change. Monitoring the outcomes of management is the foundation of an adaptive approach. The Yolo HCP/NCCP contains guidelines and recommendations for monitoring landscapes as well as the management, enhancement, or restoration of natural communities and covered species habitat. The monitoring and adaptive management program therefore includes the following three phases.

1. Inventory phase. During this phase, the Conservancy documents baseline conditions on lands as they are added to the reserve system. The Conservancy also initiates management planning tasks during this phase, such as developing management plans, prioritizing management

actions, selecting monitoring protocols and sampling design for status and trends monitoring, and developing criteria for measuring success of enhancement, restoration, or creation efforts.

2. Targeted studies phase. During this phase, the Conservancy will develop ecological models identifying the relationships between ecosystem components and identifying management assumptions. The Conservancy will also test and refine monitoring protocols and develop experiments to resolve critical uncertainties during this phase.
3. Long-term monitoring and adaptive management phase. During this phase, the Conservancy will use the framework developed during the prior phases to determine the status and trends of natural communities and covered species in the reserve system, and to assess the effectiveness of reserve system management in achieving the HCP/NCCP biological goals and objectives.

The Yolo HCP/NCCP describes monitoring actions the Conservancy will implement at the landscape, natural community, and covered species levels. At the landscape level, the Conservancy will implement the following:

Assimilate results of pre-acquisition assessments and other surveys;

- Refine land cover maps;
- Assess and monitor landscape linkages; and
- Track invasive species.

For each natural community, the Conservancy will implement the following:

- Assess natural community conditions;
- Monitor natural community use by covered species; and
- Monitor the effectiveness of management, enhancement, and restoration actions.

The HCP/NCCP also describes monitoring actions for each covered species, including:

- Monitor the status and trends of covered species within the reserve system;
- Monitor the response of covered species to conservation measures and adaptive management; and
- Direct studies to resolve critical management uncertainties for some covered species.

Table ES-5 summarizes monitoring actions for each covered species.

ES.10 Application Process

The HCP/NCCP describes the processes for receiving take authorization under the following three categories.

- Public projects proposed by Permittees. The Permits authorize incidental take associated with HCP/NCCP covered activities proposed by Permittees. The Permittees must document compliance with the required conditions on covered activities (ES.11, *Conditions on Covered Activities*), and provide a copy of this documentation to the Conservancy for tracking and reporting purposes (e.g., to track the amount of take coverage the Conservancy has granted).

- Private projects under the discretionary authority of Permittees. Project proponents implementing private projects that require discretionary land use approval from a Permittee will submit an HCP/NCCP application package to the relevant Permittee, and the Permittee will undertake review of take authorization applications concurrent with California Environmental Quality Act (CEQA) environmental review. Once the application package is complete, the Permittee will specify all conditions on covered activities and fees as conditions of project approval. The project proponent will pay fees or contribute land in lieu of fees prior to any project related ground disturbance.
- Projects proposed by Special Participating Entities. Special Participating Entities (SPEs) are entities with proposed projects or activities that are not subject to the land use authority of the Permittees through the CEQA process, and therefore cannot receive coverage under this HCP/NCCP through the process described above. These entities may choose to request coverage under the HCP/NCCP as SPEs to obtain take authorization for their projects or activities. The Conservancy will determine eligibility for SPE status based on factors described in Section 3.4.2, *Criteria for Coverage*, including whether the SPE can meet HCP/NCCP conditions and if the amount of take requested (i.e., acres of natural community or covered species habitat loss) is available for the project. The project also must not unduly reduce the take authorization of the Permittees. If the entity qualifies as an SPE, the Conservancy may issue take coverage at the Conservancy's discretion. To grant take authorization to an SPE, the Conservancy must establish a legally enforceable contractual relationship with the SPE.

ES.11 Conditions on Covered Activities

A primary component of regional species protection is the development of comprehensive avoidance and minimization measures to help ensure that effects of covered activities are reduced. As such, the Yolo HCP/NCCP includes conditions on covered activities to avoid and minimize effects. The Yolo HCP/NCCP refers to these conditions as *avoidance and minimization measures,* or *AMM*s. All Permittees and private applicants will adhere to these measures to receive take authorization. All parties covered by the HCP/NCCP will submit an application package to receive or document take authorization.

The AMMs described in Chapter 4 are as follows.

General Project Design

- AMM1, *Establish Buffers*
- AMM2, *Design Developments to Minimize Indirect Effects at Urban-Habitat Interfaces*

General Construction and Operations and Maintenance

- AMM3, *Confine and Delineate Work Area*
- AMM4, *Cover Trenches and Holes during Construction and Maintenance*
- AMM5, *Control Fugitive Dust*

- AMM6, *Conduct Worker Training*
- AMM7, *Control Night-Time Lighting of Project Construction Sites*
- AMM8, *Avoid and Minimize Effects of Construction Staging Areas and Temporary Work Areas*

Sensitive Natural Communities

- AMM9, *Establish Buffers Around Sensitive Natural Communities*
- AMM10, *Avoid and Minimize Effects on Wetlands and Waters*

Covered Species

- AMM11, *Minimize Take and Adverse Effects on Palmate-Bracted Bird's Beak*
- AMM12, *Minimize Take and Adverse Effects on Habitat of Valley Elderberry Longhorn Beetle*
- AMM13, *Minimize Take and Adverse Effects on Habitat of California Tiger Salamander*
- AMM14, *Minimize Take and Adverse Effects on Habitat of Western Pond Turtle*
- AMM15, *Minimize Take and Adverse Effects on Habitat of Giant Garter Snake*
- AMM16, *Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite*
- AMM17, *Minimize Take and Adverse Effects on Habitat of Western Yellow-Billed Cuckoo*
- AMM18, *Minimize Take and Adverse Effects on Western Burrowing Owl*
- AMM19, *Minimize Take and Adverse Effects on Least Bell's Vireo*
- AMM20, *Minimize Take and Adverse Effects on Habitat of Bank Swallow*
- AMM21, *Minimize Take and Adverse Effects on Habitat of Tricolored Blackbird*

Table ES-5 summarizes AMMs for each of the covered species.

ES.12 Implementation

The Conservancy is currently responsible for preparing the Yolo HCP/NCCP. Just prior to Permit issuance, the Conservancy's roles will shift to overseeing assembly and operation of the reserve system; overseeing implementation of other conservation actions; developing and overseeing the management and monitoring program; and ensuring compliance with all terms of the Yolo HCP/NCCP, permits, and implementing agreement. The Yolo HCP/NCCP includes a detailed process for land acquisition from willing sellers and allowances for landowners to provide land in lieu of fees under certain circumstances.

The Conservancy will implement the Yolo HCP/NCCP through its Board of Directors and Executive Director, as well as staff and consultants working at the Executive Director's direction. The wildlife agencies, local land management agencies, the Science and Technical Advisory Committee (STAC), and the Advisory Committee will also provide input. The wildlife agencies will retain full

responsibility to determine whether HCP/NCCP implementation is proceeding in compliance with the terms and conditions of the regulatory authorizations; enforce the terms and conditions of the regulatory authorizations; and modify, suspend, or revoke regulatory authorizations, consistent with the HCP/NCCP terms and conditions, the implementing agreement, the permits, and applicable state or federal law.

The Conservancy expects to partner with existing agencies and organizations to conduct a significant portion of its responsibilities, including the STAC and the Advisory Committee. The Conservancy will continue to use the STAC and the Advisory Committee, which were established during the planning process by the Conservancy to select "mitigation receiving sites" for Swainson's hawk. A "mitigation receiving site" is property encumbered by a conservation easement for the purpose of providing mitigation credits to offset impacts to Swainson's hawk. Once approved, the Yolo HCP/NCCP will replace the county's Swainson's hawk mitigation fee program, and pre-existing mitigation receiving sites may continue to operate through the HCP/NCCP. During HCP/NCCP implementation, landowners may continue to sell credits through the in-lieu program described in Section 7.5.8.1, *Criteria for Providing Land in Lieu of HCP/NCCP Mitigation Fees.* As a result, the role of the STAC will broaden from meeting Swainson's hawk mitigation needs (through "mitigation receiving sites") to meeting the HCP/NCCP's biological goals and objectives at the landscape, natural community, and covered species levels. Mitigation receiving sites with unsold credits at the time of HCP/NCCP approval will be eligible to sell the portion of their land with remaining credits to the Conservancy or to third parties that wish to provide HCP/NCCP development fees for land in lieu, according to the criteria in Chapter 7. Otherwise, these lands may count toward the Yolo HCP/NCCP's commitment of 8,000 acres of pre-permit reserve lands.

ES.13 Cost and Funding

A summary of the Yolo HCP/NCCP costs and funding strategy is presented in **Table ES-4**. The cost of implementing the HCP/NCCP during the 50-year permit term is estimated at an average of approximately $8.1 million annually. This includes the cost of land acquisition, HCP/NCCP administration, natural community management and restoration, biological monitoring, remedial measures, and a contingency. The Conservancy estimated HCP/NCCP costs from a detailed model of all expected cost components based on actual costs of tasks.

Plan funding will come from several different sources as summarized below:

- **HCP/NCCP Development Fees.** This source includes private and public sector development impact fees. Land cover fees will apply to all land cover types except developed and other types with no conservation value. Additionally, three types of wetland fees will apply: fresh emergent wetland, valley foothill riparian, and lacustrine and riverine. Fees will also apply to temporary effects (temporary impact fee). To account for inflation, the Conservancy will update the development fees automatically on an annual basis. The Conservancy also may update the fee at any time if land acquisition costs increase.
- **Local Funding.** Non-fee local funding will complement fee-based funding sources, and will be used for portions of this HCP/NCCP that provide for the conservation of natural communities and covered species in the Plan Area (i.e., not for mitigation). Non-fee local funding will take many forms and primarily consist of activities funded and managed by local government agencies in cooperation with the Conservancy that will offset HCP/NCCP implementation costs.

Additional funding is expected from private foundations. These non-fee local funding sources cannot be used for mitigation purposes and will be directed towards the NCCP portion of this HCP/NCCP (i.e., provides for the conservation of covered species in the Plan Area necessary to meet the requirements of the NCCPA).

- **Interest Income.** The Conservancy is expected to gain substantial revenue from interest on this HCP/NCCP endowment as it grows prior to its use to fund costs in perpetuity after the 50-year permit term. The Conservancy will also gain limited income from interest on revenue not yet spent.
- **State and Federal Funding.** This source includes federal and state grant programs. Certain state and federal funding can only be used for portions of this HCP/NCCP that provide for the conservation of natural communities and covered species in the Plan Area (i.e., not for mitigation)[8]. The HCP/NCCP funding analysis is based on a cost share between local funding (see above) and state and federal funding (Table ES-4) for acquisition of conservation lands.

Annual costs beyond the permit term are estimated to be about 21 percent of average annual costs in the final years of the permit term. The Conservancy will create an endowment during the permit term to fund all needed implementation after the permit term. An endowment of approximately $13.7 million in 2017 dollars is needed to generate average annual real returns to fund post-permit term management and monitoring of the reserve system.

Table ES-4. Yolo HCP/NCCP Cost and Funding Overview

Type	Amount (rounded to nearest $1,000)
Estimated costs over Permit Term	
Establish reserve system, except restored lands	$218,376,000
Restore natural communities	$68,150,000
Manage and enhance easement & pre-permit reserve lands	$14,468,000
Monitoring, research and scientific review, except restored lands	$18,802,000
Plan administration	$34,145,000
Local partner activities in riparian corridors	$21,520,000
Contingency fund	$30,727,000
Total estimated implementation costs	**$406,187,000**
Required endowment fund balance, Year 50	$13,699,000
Plan preparation	$5,076,000
Total Yolo HCP/NCCP costs	**$424,962,000**
Projected funding	
HCP/NCCP Development Fees	
Land cover fee	$210,782,000
Wetland fee[a]	$69,493,000
Subtotal development fee funding	**$280,725,000**
Local, state, and federal funding	

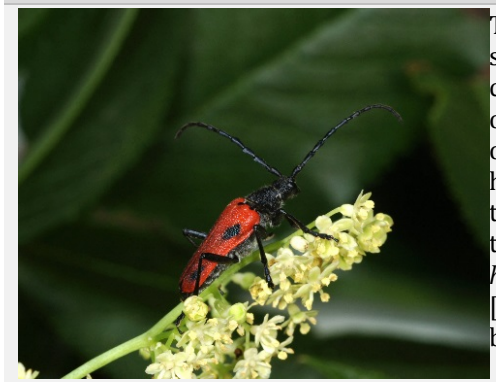
[8] The exception to this rule is if a state agency seeks permit coverage for a public project under the HCP/NCCP as a Special Participating Entity (see Section 8.4.1.9, *Special Participating Entities*).

Type	Amount (rounded to nearest $1,000)
Local sources	
Davis Open Space Program	$5,146,000
CCRMP/CCIP	$16,666,000
SCWA/LPCCC	$10,437,000
Local foundations and other	$10,000,000
Subtotal local sources	**$42,249,000**
State and federal sources	$93,039,000
Subtotal local, state, and federal funding	**$135,288,000**
Other funding	
Endowment fund investment income	$8,149,000
Operational interest income	$1,250,000
Subtotal other funding	**$9,449,000**
Total projected funding	***$424,962,000***

Note:

[a] This includes fresh emergent wetland fee, valley foothill riparian fee, and lacustrine and riverine fee.

Table ES-5. Summary Evaluation of Species Covered by the Yolo HCP/NCCP

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Valley Elderberry Longhorn Beetle (T/–)			
 The valley elderberry longhorn beetle lays between 8-20 eggs per year in bark crevices on the elderberry shrub. The baby larvae feed on the stems and branches of the tree for 1-2 year while maturing, then chew a circular hole. Several weeks later, the adult emerges into the world and flies freely between shrubs. Habitat occupied by valley elderberry longhorn beetle tends to form and exist in riparian corridors and on the level, open ground of periodically flooded river and stream terraces and floodplains. This geomorphic setting historically has been desirable for agricultural, urban, or industrial development and much of this habitat type has been converted through dams and levees for use as developable land. The greatest current threat to valley elderberry longhorn beetle is from the invasive nonnative pests Argentine ant (*Linepithema humile*) and European earwig (*Forficula auricularia*), and invasive nonnative plants (e.g., black locust [*Robinia pseudoacacia*], giant reed [*Arundo donax*], red sesbania [*Sesbania punicea*], and Himalaya blackberry [*Rubus armeniacus*]).			
Status in Range: California Central Valley and the Sacramento River Delta. 201 occurrences range-wide.	**Reserve System Components:** 1,600 acres newly protected modeled habitat, prioritizing occupied habitat. Up to 576 acres restored riparian habitat (1 acre of riparian restored for each acre of riparian lost as a result of covered activities). Valley elderberry longhorn beetle habitat restored within the riparian natural community, consistent with 1999 USFWS guidelines.	**Permanent:** 584 acres of modeled habitat (4% of habitat in Plan Area). This includes 523 acres riparian and 61 acres non-riparian habitat.	On suitable habitat in the reserve system, monitoring of distribution, relative abundance, relative health, and age of elderberry shrubs; distribution and relative abundance of valley elderberry longhorn beetle; proximity to other habitat, and presence of threat factors. Evaluation of responses to habitat enhancement and restoration by monitoring patch occupancy and relative abundance in enhanced and restored sites.
Status in Plan Area: 13,379 acres of modeled habitat, 2,080 acres of which are in categories 1 and 2 baseline public and easement lands. 18 occurrences in the Plan Area (9% of range-wide occurrences) throughout the	**Management and Enhancement:** Habitat management and enhancement in the reserve system to sustain or improve habitat values.	**Temporary:** one acre of modeled habitat	

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Sacramento River corridor, Putah Creek from Monticello Dam east to Davis and along Cache Creek. Since comprehensive surveys for valley elderberry longhorn beetle in Yolo County have not been conducted and known occurrences throughout the species' range, the population size and locations of this species in the Plan Area are not fully known.	This will include invasive species control and other measures deemed necessary to reduce threats on reserve lands, as determined through monitoring.	(<1% of habitat in Plan Area),	
Conditions on Covered Activities: Project applicants will design projects to avoid elderberry shrubs with a setback of at least 100 feet. Prior to construction, the project proponent will transplant elderberry shrubs identified within project footprint that cannot be avoided, and quantify affected stems. The Conservancy will mitigate for loss of unavoidable shrubs consistent with 1999 USFWS guidelines. On lands in the reserve system, farmers and land managers will retain elderberry shrubs and maintain 100-foot buffers wherever the land counts toward the protection commitment for the species, except for land management activities that will not result in take such as hand weeding.			
Net effects: The Yolo HCP/NCCP will result in an estimated net increase of 53 acres (576 acres restored and 523 acres lost, or less than 1% increase) of riparian valley elderberry longhorn habitat in the Plan Area, and a net decrease (61 acres lost, not restored, or less than 1% decrease) of non-riparian habitat for this species. With full HCP/NCCP implementation, 42% of the valley elderberry longhorn beetle habitat in the Plan Area will be conserved on categories 1 and 2 public and easement lands, including baseline and newly protected lands. At least 1,600 acres of these categories 1 and 2 public and easement lands will be newly protected and incorporated into the reserve system. The habitat that will be lost as a result of covered activities is widely distributed throughout the Plan Area, and only a small fraction of it supports elderberry shrubs. The habitat to be restored will include elderberry shrubs and is therefore much more likely to support valley elderberry longhorn beetle than the habitat lost. Moreover, these shrubs will be planted near sites the species is known to occupy. Restoring suitable habitat near occupied areas is necessary to expand populations of valley elderberry longhorn beetle because of the species' poor dispersal ability. Additionally, shrubs that are removed will be transplanted to restoration sites, many of which will continue to provide suitable habitat for the species despite being counted as lost habitat. Therefore, although there is only a small net gain in riparian habitat amount (53 acres), the net gain to the population is expected to be substantial because transplanting will minimize losses, and restoration will provide the highest-value habitat most likely to be colonized by the species. These measures are expected to offset any population effects resulting from covered activities and to facilitate expansion of valley elderberry longhorn beetle populations in the Plan Area. Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the valley elderberry longhorn beetle through the increase in available habitat adjacent to known occupied habitat. These restored areas will be protected, and will be managed and monitored to support the species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on valley elderberry longhorn beetle, to the maximum extent practicable, and will provide for the conservation of this species in the Plan Area.			

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
California Tiger Salamander/(T/T)			
 Tiger salamanders breed in ponds and spend most of their adult lives upland, but underground, in burrows created by mammals such as ground squirrels. "Tiger" comes from the white or yellow bars on their skin. Instead of drinking water, these salamanders absorb water through their skin while lying in puddles or on top of rocks covered in dew. The California tiger salamander is restricted to grasslands, oak savannah, and coastal scrub communities where aquatic sites are available for breeding. Breeding sites generally consist of natural ephemeral pools, such as vernal pools, or artificial ponds that mimic them (e.g., stock ponds that are allowed to dry). Breeding sites may also include perennial features with open water refugia that do not support populations of bullfrog (*Rana catesbeiana*) or predatory fishes. Conversion of land to residential, commercial, and agricultural activities is considered the most significant threat to California tiger salamanders, additional threats include exotic species such as bullfrogs (*Ranacates beiana)*, mosquitofish (*Gambusia affinis*), sunfish species (e.g., largemouth bass [*Micropterus salmoides*] and bluegill [*Lepomis macrochirus*]), catfish (*Ictalurus* spp.), and fathead minnows (*Pimephales promelas*).			
Status in Range: Discontinuous distribution in west-central California: coast ranges between Sonoma and Santa Barbara counties, Central Valley and surrounding foothills from southern Colusa County to north-western Kern County on the west side of the valley and southern Butte County to northern Tulare County on the east side. It has been eliminated from much of its former range in the Central Valley as a result of agricultural and urban development, but still occurs throughout most of its overall historical range and can be locally common (Trenham *et al.* 2000). Most populations occur at elevations of 200–1,500 feet, having been extirpated at lower elevations due to presence nonnative species in breeding ponds; however, extirpation has occurred across species range due to habitat loss. Species is reported to be declining throughout its limited California range.	**Reserve System Components:** Protection of 2,000 acres of upland habitat within 1.3 miles of aquatic habitat, and 36 acres of aquatic habitat in the Dunnigan Hills planning unit, prioritizing protection of critical habitat. The 36 acres of protected aquatic will be in association with the 2,000 acres of protected upland. Restoration of 36 acres of aquatic habitat. Within the protected and restored aquatic habitat, at least five California tiger salamander breeding pools that are each found to support all life stages of the salamander through at least all water year types.	**Permanent:** Up to 398 acres (less than 1%) of upland habitat and 12 acres (1%) of aquatic habitat. No loss of critical habitat.	Conducting annual surveys of occupied and potential breeding and upland habitat. Evaluating species response to habitat enhancement, restoration, or creation. Determining species response to predator control programs. Determining effects of and response to additional threats, such as diseases.
Status in Plan Area: 87,509 acres of modeled habitat, with 1,004 acres of aquatic breeding habitat and 86,505 acres of upland habitat. Known occurrences include one occurrence near the southern end of the	**Management and Enhancement:** Management and enhancement of habitat on reserve system lands through grazing and invasive species	**Temporary:** Up to 1 acre of modeled aquatic habitat (<1%)	

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Capay Hills Planning Unit (Planning Unit 4), one occurrence at the western edge of the Colusa Basin Plains Planning Unit (Planning Unit 13), and four occurrences at the northern end of the Dunnigan Hills Planning Unit (Planning Unit 5).	control. Elimination or reduction of other threats identified through monitoring.	and 1 acre of modeled upland habitat (<1%).	
Conditions on Covered Activities: Applicants will design project to avoid critical habitat within the Dunnigan Creek Unit. Outside critical habitat, if species is present or assumed to be present in aquatic habitat, applicants will design project to avoid adverse effects within 500 feet if outside urban planning units. The covered activity will not remove occupied (or assumed to be occupied) aquatic habitat until at least four new occupied breeding pools are discovered or established, and protected in the Plan Area. After the four new occupied breeding pools are protected and with concurrence of USFWS and CDFW, up to three occupied breeding pools may be affected. The breeding habitat may not be removed if USFWS and CDFW determine that the covered activity would remove a significant occurrence of this species that is necessary to maintain the genetic diversity or regional distribution of the species. Farmers and land managers will avoid injuring or killing California tiger salamanders within the reserve system.			
Net effects: 66% of the aquatic habitat and 13% of the upland habitat in the Plan Area will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. At least 36 acres of aquatic habitat and 2,000 acres of upland habitat will consist of newly protected lands. Full implementation of the Yolo HCP/NCCP will result in a 2% increase of California tiger salamander aquatic habitat and less than a 1% net decrease in upland habitat in the Plan. The Yolo HCP/NCCP will provide a substantial net benefit to the species through the assembly of a reserve system and conservation that is managed and monitored to support the species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on California tiger salamander, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area			
Western Pond Turtle/(–/CSC)			
 Western pond turtles eat a balanced diet of algae, plants, crustaceans and insects, and love to sunbathe on warm summer days. These turtles have been known to bump and shove their turtle friends to fight for prime sunbathing locations. The western pond turtle, although primarily found in natural aquatic habitats, also inhabits impoundments, irrigation ditches, and other artificial and natural water bodies. The species is usually found in fresh water, but brackish habitats are also utilized. Upland habitats are also important to western pond turtles for nesting, overwintering, and overland dispersal. Nesting sites may be as far as 1,312 feet or more from the aquatic habitat. The most significant threats to the western pond turtle are the continuing loss, degradation, and fragmentation of occupied habitats. Agricultural-related disturbances to wetlands and streams (e.g., water diversions) and removal of aquatic vegetation can render wetlands unsuitable for pond turtles. The destruction of upland habitats for agricultural or urban development can have significant adverse consequences on nesting success. Water releases from reservoirs may adversely affect downstream habitat by eliminating or altering basking sites, refugia, foraging areas, and hatchling microhabitat.			
Status in Range: Species range extends from most Pacific slope drainages from Klickitat County, Washington, along the Columbia River, to Arroyo Santa	**Reserve System Components:** Protection of 2,400 acres of aquatic habitat and 3,475 acres of nesting and	**Permanent:** Up to 3,502 acres of habitat, including	Assessment of habitat quality and documentation of baseline population levels in

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Domingo in northern Baja California. In California, it was historically present in most Pacific slope drainages between the Oregon and Mexican borders. Occurring in 90% of its historic California range in the Central Valley and west of the Sierra Nevada, its numbers have been greatly reduced. Species is reported to be declining at a global scale; however, the species status in California is unknown due to lack of data.	overwintering habitat for western pond turtle. The Conservancy will protect at least three western pond turtle breeding sites. The Conservancy will also restore freshwater emergent wetland to result in no net loss of this natural community,	up to 369 acres of aquatic habitat and 3,133 acres of nesting and overwintering habitat (1% of the total habitat in the Plan Area)	potential habitat within reserve system lands. Determination of population response (i.e., changes in the average number of individuals basking) to enhancement and restoration of occupied habitat. Assessment of effects of habitat management (e.g., livestock exclusion) on nesting and basking habitat and determine population response.
Status in Plan Area: 191,092 acres of modeled habitat, of which 43,945 acres are in categories 1 and 2 baseline public and easement lands. The distribution of western pond turtles throughout suitable habitat in the Plan Area is not well known. The species has been documented in Davis Creek in the Davis planning unit (planning unit 20), Lower Putah Creek planning unit (planning unit 9), Lower Cache Creek planning unit (planning unit 7), and in the Willow Slough Bypass in the Willow Slough Basin planning unit (planning unit 11).	**Management and Enhancement:** Management and enhancement of habitat in the reserve system through invasive species control and creation of basking sites.	**Temporary:** Up to 143 acres of habitat, including up to 31 acres of aquatic habitat and 112 acres of nesting and overwintering habitat (<1% of the total habitat in the Plan Area).	
Conditions on Covered Activities: Avoidance and minimization measures for the valley foothill riparian and lacustrine natural communities (which require a 100-foot (minimum) permanent buffer zone from the canopy drip-line), wetlands, ponds, and streams will ensure that effects of covered activities are avoided and minimized. If modeled upland habitat will be impacted, a qualified biologist must be present and will assess the likelihood of western pond turtle nests occurring in the disturbance area (based on sun exposure, soil conditions, and other species habitat requirements). If a qualified biologist determines that there is a moderate to high likelihood of western pond turtle nests within the disturbance area, the qualified biologist will monitor all initial ground disturbing activity for nests that may be unearthed during the disturbance, and will move out of harm's way any turtles or hatchlings found. Farmers and land managers in the reserve system will follow practices to minimize disturbance during ditch maintenance.			

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Net effects: With full implementation of the Yolo HCP/NCCP, an estimated 27% of the habitat in the Plan Area will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. Of these lands, at least 5,875 acres will consist of newly protected lands in the reserve system. All lands in the reserve system supporting western pond turtle habitat will be adaptively managed to sustain habitat values for this species in the Plan Area. Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the western pond turtle through the assembly of a reserve system in association with existing conservation lands, and the management and monitoring of reserve system lands to support the species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on western pond turtle, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			
Giant Garter Snake/(T/T)			
 In Yolo County, giant garter snakes are often found in rice fields, where they can find small fish, tadpoles and frogs to eat. Female garter snakes grow to be a foot longer and are three times heavier than male snakes. Garter snakes are not dangerous to humans. Giant garter snakes overwinter in burrows and crevices as far as 820 feet from the edge of wetland habitats, presumably to reach areas above the annual high water mark. Movement between high quality foraging habitats is important for giant garter snakes and in an agricultural setting, giant garter snakes rely largely upon the interconnected network of canals and ditches for movement. Continued loss of wetland or other suitable habitat resulting from agricultural and urban development constitutes the greatest threat to this species' survival. However, populations in Yolo County persist primarily in agricultural areas such as rice fields. Snakes remaining in rice fields are subject to threats from mechanical harvesting, including disrupted foraging, thermoregulating, or direct mortality; the extent of these threats is unknown.			
Status in Range: The current known distribution extends from near Chico in Butte County south to the Mendota Wildlife Area in Fresno County. Within this range, garter snakes are distributed in 13 unique population clusters coinciding with historical flood basins, marshes, wetlands, and tributary streams of the Central Valley. These populations are isolated, without protected dispersal corridors to other adjacent populations, and are threatened by land use practices and other human activities, including development of wetland and suitable agricultural habitats.	**Reserve System Components:** 7,195 acres newly protected lands, including 2,800 acres rice habitat, 500 acres fresh emergent wetland habitat, 420 acres lacustrine and riverine habitat, 1,160 acres active seasonal upland and moving habitat (within 200 feet of aquatic habitat), and 2,315 acres overwintering habitat (between 200 and 800 feet from aquatic habitat). All land counting toward this commitment will be occupied as defined in Section 6.4.1.8.3, *Giant Garter Snake.*	**Permanent:** 1,966 acres (3%) of aquatic and surrounding upland habitat An estimated 57 miles (5%) of drainage channels providing habitat	Conducting surveys of occupied and potential habitat. Evaluating sites against performance criteria for occupancy. Evaluating species response to habitat management, enhancement, and restoration. Determining species response to predator control programs. Determining effects of and response to additional threats, such as diseases.

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
	2,910 acres modeled habitat added to reserve system from pre-permit reserve lands. Restoration of aquatic habitat at a ratio of 1 acre restored for each acre lost as a result of covered activities.		
Status in Plan Area: 77,056 acres of modeled giant garter snake habitat, of which 25,074 acres are in categories 1 and 2 baseline public and easement lands. Giant garter snakes are documented in two distinct subpopulations in the Plan Area. The Colusa Basin subpopulation is in the northeastern portion of the Plan Area, in the Colusa Basin and Colusa Basin Plains planning units (planning units 12 and 13). The Willow Slough/Yolo Bypass subpopulation is in the southeastern portion of the Plan Area, primarily in the Willow Slough Basin and South Yolo Bypass planning units (planning units 11 and 18) but extending into the Woodland planning unit (planning unit 19).	**Management and Enhancement:** Management and enhancement of habitat in the reserve system to benefit the species through invasive species control, leaving vegetation along channels where possible, and other measures deemed necessary to reduce or eliminate threats to the species as identified through monitoring. Adaptive management to maximize occupancy on reserve system lands.	**Temporary:** Nine acres, including one acre of aquatic, three acres of active season upland habitat, and five acres of overwintering habitat.	
Conditions on Covered Activities: For avoidance, project proponents will design projects to remain at least 200 feet from aquatic habitat. If avoidance is infeasible, applicants will implement standard construction monitoring and minimization measures for giant garter snake as specified in AMM 15. Farmers and land managers in the reserve system will follow practices to minimize disturbance during ditch maintenance.			
Net effects: Less than 1% net loss of rice habitat for giant garter snake, no net loss of fresh emergent wetland and aquatic habitat, and a net 2% decrease in total habitat for this species. 43% of the giant garter snake habitat in the Plan Area will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. Of this 43%, at least 7,195 acres will be newly protected lands, and at least 2,910 acres will be pre-permit reserve lands. All of the reserve system lands will be monitored and adaptively managed to sustain habitat values for giant garter snake. Management will include providing water during the giant garter snake's active season. Most of the habitat that will be lost as a result of covered activities is located outside of the two subpopulation centers for giant garter snake that occur in the Plan Area. Giant garter snake habitat will be protected in and around these two subpopulations to protect and facilitate their expansion. Additional lands will be protected and restored to provide connectivity and facilitate genetic exchange between these two important subpopulations. Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the giant garter snake through the assembly of a reserve system in association with existing conservation lands consistent with the recovery needs for the giant garter snake. The reserve system will be monitored and adaptively managed to support the species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on giant garter snake, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Swainson's Hawk/(-/T)			
 The Swainson's hawk arrives to the Central Valley from its winter home in Central Mexico around March each year. Breeding mother hawks sometimes travel up to 18 miles from their nests to forage for food. The Swainson's hawk often will hunt behind tractors to find exposed small rodents. The Swainson's hawk inhabits grasslands, prairies, shrub-steppes, and agricultural landscapes, including dry and irrigated row crops, alfalfa and hay fields, pastures, and rangelands. They nest in trees most often in riparian woodlands and farm shelterbelts, as well as in urban/suburban areas with large trees adjacent to suitable foraging habitat. In California, causes of population decline are thought to be loss of nesting and foraging habitat to urban development and conversion to unsuitable agriculture such as orchards and vineyards. The most effective approach for Swainson's hawk conservation may be in the management of agricultural landscapes.			
Status in Range: Breeds in the open grasslands, shrub-steppe and agricultural regions of western North America from southern Canada to northern Mexico. Central Valley Swainson's hawks winter from Central Mexico, to northern and central South America. With the conversion of much of the species' historical range to agriculture, the Swainson's hawk has adapted to agricultural landscapes compatible with its foraging needs and in proximity to suitable nesting habitat.	**Reserve System Components:** 20,392 newly protected acres, including 1,600 acres of nesting habitat, 4,430 acres of natural foraging habitat, and 14,362 acres of agricultural foraging habitat. 4,580 acres modeled habitat added to reserve system from pre-permit reserve lands. At least 20 newly protected nest trees. Restored valley foothill riparian forest at a ratio of 1 acre restored for each acre lost, providing Swainson's hawk nesting habitat.	**Permanent:** 11,757 acres (4%), including 651 acres of nesting, 1,407 acres of natural foraging, and 9,399 acres of agricultural foraging habitat. Up to 20 nest trees.	Every 5 years, conducting a complete census of the breeding population. Monitoring cropping patterns. If the nesting population declines by more than 10% below the baseline number (300 pairs), this will initiate a meet and confer process with the wildlife agencies as described in Chapter 7. The Conservancy and the wildlife agencies will examine causes for population declines, and will develop a strategy for addressing the decline if it is found to be related to Swainson's hawk loss as a result of changing cropping patterns.
Status in Plan Area: 309,087 acres of modeled Swainson's hawk habitat, with 15,673 acres of nesting habitat, 79,336 acres of natural foraging habitat, and 214,078 acres of agricultural foraging habitat. 25,075 acres of habitat in the Plan Area are in categories 1 and 2 baseline public and easement lands. The population in the Plan Area is large and widely distributed, with an estimated 300 nesting pairs, representing about 14% of the statewide population.	**Management and Enhancement:** Management and enhancement of Swainson's hawk habitat in the reserve system as follows: plant trees within agricultural foraging habitat in the reserve system as needed to achieve a density of one suitable nesting tree per 10 acres; protect remnant noncultivated areas of high value to wildlife within cultivated	**Temporary:** 224 acres of agricultural foraging habitat.	

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
	land reserves; establish new hedgerows along field borders and roadsides to enhance prey populations; and manage and enhance natural foraging lands to further enhance prey populations and habitat suitability. Prioritize protection of lands that are regularly planted in high value crop types for the species.		
Conditions on Covered Activities: For avoidance, project proponents will design projects to avoid potential nest trees by with minimum 1,320 foot setbacks from the trees. If this avoidance cannot be accomplished, project proponents will implement minimization measures. For construction, from March 15 to August30, no activity will be allowed within 1,320 feet of active nests (as identified through preconstruction surveys), unless a qualified biologist has determined that the young have fledged and the nest is no longer active, or unless the Conservancy, USFWS, and CDFW agree to a lesser buffer distance. For activities that involve tree pruning and removal, if occupied nest sites are present within 1,320 feet, tree pruning and removal will be deferred until the nest is no longer being used.			
Net Effects: Full implementation of the Yolo HCP/NCCP will result in an estimated 2% net decrease of total Swainson's hawk natural foraging habitat and a 4% net decrease of agricultural foraging habitat in the Plan Area. The Yolo HCP/NCCP will result in an estimated 3% net decrease in nesting habitat for Swainson's hawk, but the actual net loss is expected to be less than 3% because this does not factor in the tree plantings required. 19,286 acres of natural foraging habitat and 22,508 acres of agricultural foraging habitat will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. This represents 14% of the natural and agricultural foraging habitat in the Plan Area. Additionally, 4,517 acres of nesting habitat, representing 31% of the nesting habitat in the Plan Area, will be conserved in categories 1 and 2 public and easement lands. At least 20,285 acres of this will consist of newly protected lands, and at least 4,795 acres will consist of pre-permit reserve lands. These newly protected and pre-permit reserve lands will be included in the HCP/NCCP reserve system, and will be monitored and adaptively managed to sustain Swainson's hawk habitat values. Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the Swainson's hawk. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on Swainson's hawk, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
White-tailed Kite/(MBTA/CSC, FP)			
 The white-tailed kite has a distinctive white underside with a gray back and red eyes. The kite often nests near fellow kites and raptors such as the Swainson's hawk. White-tailed kites are often found in areas with high populations of meadow voles, its favorite meal. The white-tailed kite inhabits low elevation, open grasslands, savannah-like habitats, agricultural areas, wetlands, and oak woodlands. Habitat elements that influence nest site selection and distribution include habitat structure and prey abundance (primarily the meadow vole), while the association with specific vegetation types appears less important. Residential, commercial and infrastructure development is one of the principal causes of habitat loss for white-tailed kite. In general, kites are intolerant of noise and human activities and will abandon nesting areas that are subject to increasing levels of human disturbances. Kites are also sensitive to habitat fragmentation; low density urbanization or isolation of habitats, even if relatively large patches remain undisturbed, also leads to territory abandonment.			
Status in Range: East Coast and southeast United States, the southwest United States from Texas to California, and north to Washington State, and from Mexico to South America. California is currently considered the breeding range stronghold for the white-tailed kite in North America, with nearly all areas up to elevations at the western Sierra Nevada foothills and southeastern deserts occupied.	**Reserve System Components:** 18,685 acres of foraging habitat and 1,600 acres of nesting habitat. Restored valley foothill riparian forest at a ratio of 1 acre restored for each acre lost, providing white-tailed kite nesting habitat. At least two nest trees on protected lands.	**Permanent:** Up to 11,239 acres (4%) of modeled habitat, including 661 acres of nesting habitat, 10,578 acres of foraging habitat. Up to two nest trees.	Conducting surveys of occupied and potential habitat. Evaluating species response to habitat management, enhancement, and restoration. Determining species response to predator control programs. Determining effects of and response to additional threats.
Status in Plan Area: 268,230 acres of modeled habitat of which 20,092 acres are in categories 1 and 2 baseline public and easement lands. Comprehensive surveys of the Plan Area for white-tailed kite have not been conducted. Jim Estep surveyed the lowland portion of Yolo County in 2007, and reported a total of 13 nest sites. Most of these nests were found in riparian areas, including three along Putah Creek, three along Willow Slough, two along Dry Slough, one along the Sacramento River, one along Willow Slough Bypass, and along the Knights Landing Ridge Cut. Two nonriparian sites were reported in West Sacramento and Dunnigan.	**Management and Enhancement:** Management and enhancement of habitat in the reserve system as follows: plant trees within agricultural foraging habitat in the reserve system as needed to achieve a density of one suitable nesting tree per 10; protect remnant noncultivated areas of high value to wildlife within cultivated land reserves; establish new hedgerows along field borders and roadsides to enhance prey populations; and	**Temporary:** Up to 234 acres of foraging habitat.	

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
	manage and enhance natural foraging lands to further enhance prey populations and habitat suitability. Prioritize protection of lands that are regularly planted in high value crop types for the species.		

Conditions on Covered Activities: For avoidance, project proponents will design projects to avoid potential nest trees by with minimum 1,320 foot setbacks from the trees. If this avoidance cannot be accomplished, project proponents will implement minimization measures. For construction, from March 15 to August 30, no activity will be allowed within 1,320 feet of active nests (as identified through preconstruction surveys), unless a qualified biologist has determined that the young have fledged and the nest is no longer active, or unless the Conservancy, USFWS, and CDFW agree to a lesser buffer distance. For activities involving tree pruning and removal, if occupied nest sites are present within 1,320 feet, tree pruning and removal will be deferred until the nest is no longer being used.

Net Effects: With full implementation of the Yolo HCP/NCCP, an estimated 0% net decrease of nesting habitat and a 4% decrease in foraging habitat for white-tailed kite in the Plan Area. 16% (41,342 acres) of white-tailed kite habitat in the Plan Area will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. Of these, at least 20,285 acres will be newly protected and incorporated into the reserve system, and an additional 4,795 acres of pre-permit reserve lands will be enrolled into the reserve system. All reserve system lands will be monitored and adaptively managed to sustain white-tailed kite habitat values. The Yolo HCP/NCCP will minimize and mitigate impacts on white-tailed kite, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

Western Yellow-billed Cuckoo/(T/T)

The western yellow-billed cuckoo migrates north from South America to California around May each year. They breed in June and July, likely due to a seasonal abundance of large insects. Male and female parents share incubating and brooding duties and deliver food to their young. The western yellow-billed cuckoo nests and forages in riparian habitats. Nests are primarily in willow (*Salix* spp.) trees and cottonwood (*Populus fremontii*) trees are important as foraging habitat, particularly as a source of insect prey. All studies indicate a highly significant association with relatively expansive stands of mature cottonwood-willow forests, especially dynamic riverine habitats where the river is allowed to meander. Meandering streams create habitat for new rapidly-growing young stands of willow, which create preferred nesting habitat conditions. Channelized streams or levied systems that do not allow for these natural processes become over-mature and presumably less optimal. Habitat loss and degradation continues to be the most significant threat to remaining populations. Habitat loss continues as a result of bank stabilization and flood control projects, urbanization along edges of watercourses, agricultural activities, and river management that alter flow and sediment regimes.

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Status in Range: Breeding populations of the western subspecies are limited to California, Nevada, Utah, Arizona, southwestern Wyoming, southeastern Idaho and the western parts of New Mexico, Texas, and Colorado. There may be fewer than 50 breeding pairs of western yellow-billed cuckoo in California.	**Reserve System Components:** 1,600 acres of newly protected valley foothill riparian natural community, at least 500 acres of which will provide modeled habitat for western yellow-billed cuckoo, and design at least 60 acres to provide suitable habitat. Restored valley foothill riparian forest at a ratio of 1 acre restored for each acre lost, providing western yellow-billed cuckoo habitat.	**Permanent:** Up to 59 acres of modeled habitat.	Monitoring and evaluation of habitat conditions in the reserve system. Evaluation of species response to habitat management, enhancement, and restoration. Monitoring occupied breeding habitat, if any, for threats.
Status in Plan Area: 3,868 acres of modeled habitat in the Plan Area, 1,162 acres of which are on categories 1 and 2 baseline public and easement lands. Although sustained breeding populations occur to the east of the Plan Area at isolated sites along the Sacramento River, no western yellow-billed cuckoo breeding has been recorded recently in the Plan Area. Since 1965, nine occurrences of western yellow-billed cuckoo have been recorded in the Plan Area, two of which (both in the vicinity of Fremont Weir) are from the last 10 years. All of these records are presumed to be migrants and nonbreeding individuals.	**Management and Enhancement:** Management and enhancement of habitat in the reserve system through invasive species control and other measures deemed necessary to eliminate or reduce threats to the species as determined through monitoring.	**Temporary:** 0 acres.	
Conditions on Covered Activities: Project proponents will avoid activities within 500 feet of occupied nesting habitat			
Net Effects: Full implementation of the Yolo HCP/NCCP will result in no net loss of habitat in the Plan Area. 45% of western yellow-billed cuckoo habitat in the Plan Area will be conserved, including baseline and newly protected lands. Of these, at least 500 acres will consist of newly protected lands incorporated into the reserve system. All reserve system lands supporting western yellow-billed cuckoo habitat will be monitored and adaptively managed to sustain habitat values for this species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on western yellow-billed cuckoo, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Western Burrowing Owl/(-/CSC)			
	Burrowing owls do not make their own burrows. They instead choose burrows from other species, most commonly ground squirrels. Burrowing owls often adopt burrows near airports, golf courses and roads. Burrowing owls are found in open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals. They also occupy golf courses, airports, road and levee embankments, and other disturbed sites where there is sufficient friable soil for burrows. Because they typically use the burrows created by other species, presence of these species is usually a key indicator of potential occurrence of burrowing owl. Optimal nesting locations are within an open landscape with level to gently sloping topography, sparse or low grassland or pasture cover, and a high density of burrows. Burrowing owls forage in open grasslands, pasturelands, agricultural fields and field edges, fallow fields, and along the edges of roads and levees. Urbanization, including residential and commercial development, is one of the principal causes of habitat loss for burrowing owls and is a continuing threat to remaining northern California populations. As some owls nest on the edge of, and forage within, agricultural fields, the conversion of field crops such as hay and pasture to incompatible crop types can lead to the abandonment of traditional nest sites.		
Status in Range: Species is found throughout western North American, west of the Mississippi River and south into Mexico. In California, species range extends through the lowlands south and west from north central California to Mexico, with small, scattered populations occurring in the Great Basin and the desert regions of the southwestern part of the state. Species is absent from the coast north of Sonoma County and from high mountain areas. Populations have been greatly reduced or extirpated from most of the San Francisco Bay Area and along the California coast to Los Angeles. The remaining major population densities are in the Central and Imperial Valleys. Species is reported to be declining at a global scale, as well as within California.	**Reserve System Components:** 3,000 acres of newly protected modeled primary habitat. 2,500 acres of newly protected modeled other habitat. At least two western burrowing owl active nesting sites and surrounding habitat to sustain these occurrences. Additionally, at least at least two active nesting sites for each nesting pair displaced by covered activities, and one active nesting site or single owl site for each non-breeding single owl displaced by covered activities. (An active nesting site is defined as a breeding burrow or burrow complex occupied by a single breeding pair. A single owl site is defined as a burrow or burrow complex occupied by a nonbreeding individual.)	**Permanent:** Up to 3,172 acres of modeled western burrowing owl habitat, including 861 acres of primary habitat and 2,311 acres of other habitat. Loss of up to four occupied sites, provided criteria for protecting occupied sites are met.	Assessment of habitat quality and document available nesting, foraging, and overwintering habitat within the reserve system. Tracking species response to grassland management by monitoring California ground squirrel colonies to determine burrow availability.

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
	1,100 acres of pre-permit reserve lands supporting habitat for this species, to be enrolled into the reserve system.		
Status in Plan Area: 103,854 acres of modeled habitat in the Plan Area, 6,205 acres of which are in categories 1 and 2 baseline public and easement lands. Although the Plan Area has not been comprehensively surveyed for this species, the majority of *known* locations are in the southern portion of Yolo County, centered in and around the City of Davis, the Yolo Bypass Wildlife Area, and the South Yolo Bypass Planning Unit.	**Management and Enhancement:** Management and enhancement of habitat in the reserve system by creating conditions for increasing the abundance of native rodents and reducing the relative cover of nonnative grasses and forbs that reduces habitat value for covered and native species. Maintenance and enhancement of other habitat (cultivated lands) to maintain or increase the abundance of native rodent species that provide prey for raptors. Elimination or reduction of other threats as identified through monitoring.	**Temporary:** Up to 219 acres.	
Conditions on Covered Activities: Project proponents will avoid all nest sites consistent with AMM18 (Chapter 4). Construction may occur inside the disturbance buffer if the project proponent develops an avoidance minimization, and monitoring plan as described in AMM18.			
Net effects: With full implementation of the Yolo HCP/NCCP there will be an estimated net 3% decrease of modeled habitat in the Plan Area. 17% of the habitat in the Plan Area will be conserved on categories 1 and 2 public and easement lands, including baseline and newly protected lands. Of these lands, at least 5,500 acres will consist of newly protected lands supporting modeled habitat, which will be incorporated into the reserve system, and an additional 1,100 acres of pre-permit reserve lands supporting modeled western burrowing owl habitat will be enrolled into the reserve system. All reserve system lands will be monitored and adaptively managed to sustain habitat value for this species. At least two active nest sites will be protected and managed in the reserve system as described above. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on western burrowing owl, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Least Bell's Vireo/(E/E)			
	The Least Bell's vireo is a small bird that lives in California during the summer months before migrating to Mexico around August each year. It nests in dense woodlands near rivers. Least Bell's vireos are migratory and usually arrive to their California breeding grounds in mid-March to early April from their wintering grounds in Mexico. Observations of banded birds suggest that returning adult breeders may arrive earlier than first-year birds by a few weeks . Least Bell's vireos begin departing for their wintering grounds by late July but are generally present on their breeding grounds until late September.		
Status in Range: Breeds in North America and overwinters primarily along the Pacific Coast in southern Mexico. Breeding range extends from north central to southwestern U.S. and into central Mexico. Additional breeding sites have been documented from southwestern California and northwestern Baja California to central South Dakota, east to Illinois and northwestern Indiana, south to the gulf coast and into southern Sonora. Recently, breeding individuals have been reported as far north as southern Santa Clara County along Llagas Creek and in southeastern Monterey, western Merced, and Stanislaus Counties, demonstrating that the species may be expanding back into its historical range. Species is reported to be declining at a global scale, as well as in California; however, there is recent evidence of range extensions in San Joaquin Valley.	**Reserve System Components:** 1,600 acres newly protected valley foothill riparian natural community, of which at least 600 acres will provide suitable habitat for least Bell's vireo. Restoration at a ratio of 1 acre restored for each acre lost as a result of covered activities.	**Permanent:** Up to 39 acres (2%) of modeled habitat	Surveying riparian woodland during the nesting season to document and monitor species status. Evaluation of species response to habitat enhancement and restoration. Documenting nesting success, once breeding pairs becomes established in the permit area.
Status in Plan Area: 4,719 acres modeled habitat, 1,284 acres of which are in categories 1 and 2 baseline public and easement lands. The USFWS indicates the least Bell's vireo may have been extirpated from the Plan Area by 1996. In April 2010, however, two least Bell's vireos were positively identified in the southern portion of the Yolo Bypass Wildlife Area, and the two birds subsequently returned in the spring of 2011. Breeding has not yet been	**Management and Enhancement:** Enhancement and maintenance of habitat functions in the reserve system by reducing the relative extent of nonnative plants that degrade habitat function, and improving native plant diversity and vegetation structure. Eliminating or reducing	**Temporary:** 0 acres	

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
confirmed in the Plan Area. It is likely to occur during the permit term because incidences of breeding pairs have been increasing in the species' northern range.	other threats to breeding vireos as identified through monitoring.		
Conditions on Covered Activities: Project proponents will avoid suitable nesting habitat, and if habitat is unavoidable, project proponents will maintain a minimum 500-foot setback from active nests. A lesser buffer may be approved by the wildlife agencies on a case-by-case basis.			
Net Effects: With full implementation of the Yolo HCP/NCCP there will be an 11% net increase of habitat in the Plan Area. 63% of least Bell's vireo habitat in the Plan Area will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. At least 1,168 acres (600 protected and 568 restored) of these lands will consist of newly protected lands. All of the least Bell's vireo habitat in the reserve system will be monitored and adaptively managed will be to sustain habitat values for this species. The Yolo HCP/NCCP will minimize and mitigate impacts on least Bell's vireo, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			
Bank Swallow/(–/T)			
	The bank swallow is a small gray and white bird that breeds in burrows on vertical cliffs near bodies of water. Female bank swallows frequently reject burrows that males have painstakingly cleared for them until they find a burrow suited to their high standards.		
Status in Range: Breeding range extends throughout most of Alaska and Canada, southward from eastern Montana to Nevada, and eastward across the United States to Georgia. They are variably distributed throughout California, Texas, and New Mexico. In California, regular breeding occurs in Siskiyou, Shasta, Lassen, and Yolo Counties, and along the Sacramento River from Shasta County south to Yolo County. Between 2000 and 2008, estimated numbers of breeding pairs in California have fluctuated between 6,320 and 8,530.	**Reserve System Components:** 50 acres of newly protected habitat, on a site that is occupied by bank swallows. A *site* is a habitat patch within one tenth of a mile of an occupied burrow.	**Permanent:** 37 acres	Documentation and monitoring of species status and document additional threats.

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Status in Plan Area: 962 acres of modeled nesting habitat, 6 acres of which are on baseline public and easement lands. An active colony is present along Cache Creek. In 2000, four colonies with an estimated 202 pairs were found along the Sacramento River in Yolo County between Verona and Knights Landing.	**Management and Enhancement:** Management of the protected floodplain along Cache Creek to provide high-value foraging habitat for bank swallows by promoting open grass and wildflower vegetation and by controlling invasive plant species. Elimination or reduction of additional threats on reserve lands identified through monitoring.	**Temporary:** Up to 37 acres of erodible floodplain (does not include actual banks)	
Conditions on Covered Activities: No activity within 500 feet of nesting colony that has been active within the last 5 years unless approved by the Conservancy, USFWS and CDFW.			
Net Effects: With full implementation of the Yolo HCP/NCCP there will be a 4% decrease in bank swallow habitat in the Plan Area. 6% of the bank swallow habitat in the Plan Area will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. Of this, 50 acres of habitat will be newly protected, monitored, and adaptively managed to sustain habitat values for this species. The Yolo HCP/NCCP will minimize and mitigate impacts on the bank swallow, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			
Tricolored Blackbird/(–/E)			
 The tricolored blackbird is almost entirely white, except for a bright red shoulder patch with a white border, explaining its name. While the red-winged blackbird can be found all over the continent, nearly all tricolored blackbirds are found in California.			
Status in Range: Species is endemic to the west coast of North America, mostly in California. The breeding population is concentrated in the Central Valley with scattered sites occurring in Oregon, Washington, Nevada, and the western coast of Baja California. In California, the historic breeding range included Sacramento and San Joaquin Valleys, lowlands of the Sierra Nevada south to Kern County, the coast region	**Reserve System Components:** 16,810 acres of newly protected grasslands and cultivated lands seminatural community expected to provide tricolored blackbird foraging habitat. 300 acres of fresh emergent wetland natural community, at least 200 acres	**Permanent:** Up to 9,028 acres of modeled habitat, including 86 acres of nesting habitat and 8,942 acres of foraging habitat.	Assessment of habitat quality, species occupancy, and colony size of all suitable nesting habitat in reserve system. Evaluation of species response to habitat enhancement, restoration, or creation. Monitoring nesting

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
from Sonoma County to the Mexican border, and sporadically on the Modoc Plateau. Species has experienced major declines since 1994. Species is reported to be declining at a global scale, as well as within California.	of which will be sited in modeled tricolored blackbird nesting habitat. Restoration of fresh emergent wetland to achieve no net loss of this natural community, potentially providing additional nesting opportunities for tricolored blackbird. 4,150 acres of pre-permit reserve lands supporting tricolored blackbird habitat to be enrolled into the reserve system. The reserve system will include at least two tricolored blackbird colonies and prioritize protection of additional colonies.	This loss represents 2% of the modeled habitat in the Plan Area.	colony response to nonnative plant removal. Determining need for predator control programs.
Status in Plan Area: 265,813 acres nesting and foraging habitat in the Plan Area, 19,893 acres of which are on categories 1 and 2 baseline public and easement lands. Comprehensive surveys of the Plan Area have not been conducted. Species locality databases document fourteen colonies in Yolo County from 1994 to 2004. Most of these occurrences were in the Yolo Slough and Yolo Bypass areas. Surveys in 2007 identified a colony of 30,000 breeding adults nesting in milk thistle on the Conaway Ranch in the Yolo Bypass.	**Management and Enhancement:** Management and enhancement of habitat within the reserve system to maintain or improve habitat value for this species. Elimination or reduction of threats to the species identified on the reserve system through monitoring.	**Temporary:** Up to 230 acres foraging habitat.	
Conditions on Covered Activities: If active colony is present or has been present within the last 5 years, project proponents will design project to avoid adverse effects within 1,300 feet of the colony site(s) unless a shorter distance is approved by the Conservancy, USFWS, and CDFW based on site-specific conditions. Measures are also provided to avoid take of tricolored blackbirds potentially nesting within cultivated crops in the reserve system.			
Net Effects: Full implementation of the Yolo HCP/NCCP will result in no net change in acres of nesting habitat, and a net 3% decrease in foraging habitat in the Plan Area. 49% of nesting habitat (2,260 acres) and 14% of foraging habitat (34,529 acres) in the Plan Area will be conserved in categories 1 and 2 public and easement lands, including baseline and newly protected lands. At least 16,810 acres of these lands will be newly protected lands in the reserve system, and an additional 4,150 acres of pre-permit reserve lands will be enrolled into the reserve system. At least two nesting colonies will be protected within the reserve system. All reserve system lands supporting tricolored blackbird habitat will be monitored and adaptively managed to sustain habitat value for tricolored blackbird. The Yolo HCP/NCCP will minimize and mitigate impacts on tricolored blackbird, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.			

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Palmate-bracted Bird's Beak/(E/E)			
	The palmate-bracted bird's-beak is actually a plant! The whole plant stands less than 1 foot tall and is covered in short hairs that excrete salt crystals. Bees help the bird's-beak transfer pollen between its male and female reproductive systems to produce seeds.		
Status in Range: The species is currently known from seven small population groups. Two population groups (Delevan National Wildlife Refuge and Colusa National Wildlife Refuge) are large and relatively stable, both being protected and managed on federal lands. One group (at Sacramento National Wildlife Refuge) consists of three small populations, all of which were established via translocated seeds, and another group (at Mendota Wildlife Area/Alkali Sink Ecological Reserve) consists of two small populations, one of which was established via translocated seeds. A group on private lands in western Madera County consisted of a few widely scattered individuals; the habitat at that location has been disked, and the population may no longer be present. Habitat for the population in Livermore is partially preserved, but no management activities have been implemented to maintain the population.	**Reserve System Components:** 33 acres newly protected modeled habitat (Woodland Regional Park)	**Permanent:** Up to 4 acres of modeled habitat. This loss represents 2% of the total modeled habitat in the Plan Area.	Completion of baseline surveys to document species occurrence and relative abundance within habitat on the reserve system, and assess whether population is meeting the objective of a 10% increase based on a 10-year average. Annual monitoring for a minimum of three years (however the length of this survey will be dependent on water year types) that will continue until population has been determined to be stable or increasing, or as directed by the monitoring

Species/Status (Federal/State)	Protection, Restoration, Management and Enhancement	Habitat Loss	Monitoring
Status in Plan Area: 309 acres of modeled habitat, 141 acres of which are on categories 1 and 2 public and easement lands. Modeled habitat is located in the Colusa Basin Plains planning unit: the species has not been documented at this location. A second location overlaps the Woodland and Willow Slough Basin planning units, and supports two known occurrences. Based on genetic studies, these two occurrences represent a single population.	**Management and Enhancement:** Management and enhancement of the habitat function in the reserve system to maintain or increase the population in the Plan Area. This may involve translocation of plants from another location upon wildlife agency approval.	**Temporary:** Up to 0 acre of modeled habitat.	requirements for future restoration activities. Monitoring response of actions to expand the population on the reserve system.
Conditions on Covered Activities: Project proponents will design projects to avoid disturbance within 250 feet of occupied habitat.			
Net effects: With full implementation of the plan there will be a net loss of 1% (four acres) of palmate-bracted bird's beak habitat in the Plan Area. The Yolo HCP/NCCP will place a conservation easement on 33 acres of habitat on Woodland Regional Park. With full implementation of the Yolo HCP/NCCP, 56% of the palmate-bracted bird's beak habitat in the Plan Area will be protected on category 1 public and easement lands. 100% of the occupied habitat will be protected. This land will be monitored and adaptively managed and enhanced to sustain and improve values for palmate-bracted bird's beak. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on palmate-bracted bird's beak, to the maximum extent practicable, and will provide for the conservation of this species in the Plan Area.			

1. Status

Federal	State
E = Federally Listed as Endangered	E = State Listed as Endangered
T = Federally Listed as Threatened	T = State Listed as Threatened
MBTA = Migratory Bird Treaty Act	SR = State Listed as Rare
CNPS = California Native Plant Society	CSC = California Special Concern Species
	FP = Fully Protected

1B. Rare, Threatened, or Endangered in California and Elsewhere

Chapter 1
Introduction

The *Yolo Habitat Conservation Plan/Natural Communities Conservation Plan* (Yolo HCP/NCCP) is a comprehensive, county-wide plan to provide Endangered Species Act permits and associated mitigation for planned covered activities including infrastructure (e.g. roads and bridges), development (e.g. agricultural processing facilities, housing, and commercial buildings), and operation and maintenance activities, and implementation of the HCP/NCCP over the next 50 years. The Yolo HCP/NCCP provides for the conservation of 12 sensitive species and the natural communities and agricultural land on which they depend. The Yolo HCP/NCCP refers to the range of future anticipated activities as *covered activities* and the 12 sensitive species covered by this HCP/NCCP as *covered species.* The Yolo HCP/NCCP strikes a sensible balance between natural resource conservation and economic growth by improving habitat conservation efforts in Yolo County; encouraging sustainable economic activity; and maintaining and enhancing agricultural production.

The Yolo Habitat Conservancy (Conservancy) is a joint powers agency which consists of Yolo County and the incorporated cities of Davis, West Sacramento, Winters, and Woodland. The Conservancy, as well as individual member agencies (defined as Yolo County and the four participating cities listed above), developed the Yolo HCP/NCCP. This HCP/NCCP provides the basis for issuance of long-term permits under the Federal Endangered Species Act (FESA) and California Natural Community Conservation Planning Act (NCCPA) that cover an array of public and private activities, including activities that are essential to the ongoing viability of Yolo County's agricultural and urban economies. Specifically, the Yolo HCP/NCCP will provide the Permittees (i.e., Yolo County, the four incorporated cities, and the Conservancy) with incidental take permits from both the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) for the 12 covered species. This action is pursuant to Section 10(a)(1)(B) of the FESA and Section 2835 of the NCCPA chapter of the California Fish and Game Code (Fish & Game Code). The Yolo HCP/NCCP ensures compliance with the FESA, NCCPA, and the California Endangered Species Act (CESA) for covered activities that may affect the covered species. In addition to the Permittees, the Yolo HCP/NCCP permits may cover the activities of other entities through certificates of inclusion, as described further in Chapter 3, *Covered Activities*, and Chapter 7, *Plan Implementation*.

The Yolo HCP/NCCP outlines a comprehensive approach to Endangered Species Act compliance that provides the benefits outlined below.

- Local Control: The Yolo HCP/NCCP moves compliance with state and federal endangered species laws for public and private activities from state and federal agencies to the local level. The Conservancy will administer the permits with oversight from the CDFW and the USFWS, as well as the Conservancy's Advisory Committee and other partners.
- Improved and increased species conservation: The Yolo HCP/NCCP will provide a more efficient process for protecting natural resources by creating a new reserve system that will be larger in scale, more ecologically valuable, and easier to manage than individual mitigation sites typical of a project-by-project permitting approach. As an NCCP, the Yolo HCP/NCCP also provides for conservation of habitat beyond mitigation requirements.
- Streamlined permitting: With increased local control of the Endangered Species Act compliance process, permitting times will be reduced. In addition, the Yolo HCP/NCCP provides a

comprehensive road map for the avoidance, minimization, and mitigation of covered species effects, further reducing permitting times and creating certainty around project costs and reducing litigation potential. Reduced permitting time and increased certainty around permitting requirements will provide an economic benefit to the Yolo HCP/NCCP Permittees and those entities extended permit coverage through a certificate of inclusion.

1.1 Purpose and Background

1.1.1 Purpose

The Yolo HCP/NCCP is a comprehensive, county-wide plan that has been designed to meet the following purposes:

- Provide for the conservation of covered species in Yolo County, referred to as the Plan Area, and the natural and seminatural communities upon which they depend, including the agricultural landscape that supports covered species, while accommodating appropriate and compatible economic growth and development consistent with applicable local land use laws and associated general plans.
- Provide a comprehensive means for coordinating and standardizing the mitigation and compensation requirements of the FESA, NCCPA, California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), and other applicable laws and regulations related to covered species and associated natural communities in the Plan Area (Figure 1-1). This will ensure that public and private actions will be governed equally and consistently, thereby reducing delays, expenses, and regulatory duplication.
- Provide a less costly, more efficient project review process that results in greater conservation values than the current project-by-project, species-by-species review and regulatory regime.
- Serve as a platform for coordination and cooperation among various and ongoing conservation planning efforts occurring both within Yolo County and in neighboring jurisdictions.
- Provide a basis for the permits and authorizations necessary to take covered species lawfully that have been listed as threatened or endangered pursuant to the terms of the FESA and/or CESA.
- Provide a process for the issuance of take authorizations for covered species that are not currently listed but may be listed in the future without the imposition of additional mitigation or conservation requirements outside of the HCP/NCCP process.
- Reinforce the role of local government in overseeing local land use planning and decision-making.
- Support agriculture as a critical economic engine and habitat community.
- Streamline and coordinate existing processes for review and permitting of public and private activities that potentially affect covered species.
- Provide clear expectations and regulatory predictability for land users and conservation efforts related to the covered species and associated natural communities within the Plan Area by identifying relevant conservation requirements for ongoing and future activities.

The Yolo HCP/NCCP is intended to meet the requirements for an HCP pursuant to Section 10(a)(2)(A) of the FESA and an NCCP pursuant to the NCCPA. To fulfill this purpose, this HCP/NCCP provides a strategy that includes measures to conserve the 12 covered species in perpetuity and ensure that effects on covered species are minimized and mitigated. To meet NCCPA requirements, the Conservancy developed the Yolo HCP/NCCP to conserve representative natural and seminatural landscapes and maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity.

The Yolo HCP/NCCP strikes a balance between natural resource conservation and economic growth in the region. The covered activities encompass existing and future activities associated with buildout of local general plans and other expected economic activities, as described in Chapter 3, *Covered Activities*. This HCP/NCCP provides for the issuance of permits that will authorize take of the listed covered species over a 50-year period, pursuant to the FESA and NCCPA (Section 1.2.2, *Covered Species*). The permits will also provide take authorization for any of the covered species that are not currently listed (i.e., nonlisted covered species) if they become listed during the 50-year permit term. If any of the covered species become de-listed during the permit term, the Conservancy will still be required to conserve the species consistent with the obligations in the Yolo HCP/NCCP.

1.1.2 Background

In 2001, the Permittees rejected a conservation plan that consisted of an HCP only (with no NCCP component) and encompassed only the eastern portion of Yolo County. The cities and the County embarked on the "Gaining Ground" cooperative effort to develop a common plan to protect agriculture, habitat, and open space in Yolo County. The Gaining Ground committee initially tried to find agreement on which parts of the county to focus preservation, with particular emphasis on establishing buffers between the cities. The committee eventually focused its efforts on development of an HCP/NCCP and in 2002, evolved into the joint powers agency that is known today as the Yolo Habitat Conservancy. Yolo County and the incorporated cities of Davis, West Sacramento, Winters, and Woodland (with the University of California, Davis as an *ex officio* member) are the original members of the Conservancy, known then as the Yolo County HCP/NCCP Joint Powers Agency. The First Administrative Draft of this HCP/NCCP, completed in June 2013, proposed 32 covered species. The Conservancy determined, however, that the conservation commitments in the First Administrative Draft were economically infeasible for the Permittees to achieve. Therefore, in late 2013, USFWS and CDFW coordinated closely with the Conservancy to modify the scope of the Yolo HCP/NCCP by decreasing the number of covered species and refining the conservation strategy. This approach was reflected in subsequent drafts of the HCP/NCCP including the final HCP/NCCP.

1.1.3 Regional Conservation Investment Strategy/Local Conservation Plan

The Yolo Regional Conservation Investment Strategy and Local Conservation Plan (RCIS/LCP) is a joint RCIS and LCP for Yolo County that complements the Yolo HCP/NCCP. The RCIS/LCP provides a framework for future voluntary conservation efforts, including stewardship-driven conservation and mitigation-driven conservation, to further enhance conservation in Yolo County.

The RCIS/LCP may guide stewardship-driven conservation efforts, assist in obtaining grants for these efforts, and promote the protection of wildlife corridors. Additionally, RCIS/LCP

implementation may include development of a system of voluntary incentives to discourage conversion from wildlife-friendly agricultural practices or crops to other crop types or practices that do not support wildlife. Various entities, including but not limited to landowners, land trusts, nonprofit organizations, and municipalities developing their regional planning documents, may use the RCIS/LCP to guide such stewardship-driven efforts.

This RCIS/LCP also provides a framework within which public or private entities with projects that are not Yolo HCP/NCCP covered activities may consider mitigation-driven conservation that augments the habitat values in the landscape. The RCIS/LCP may streamline and simplify negotiations on the adequacy of mitigation and the issuance of permits for state projects or other projects not covered by the Yolo HCP/NCCP, by establishing priorities for mitigation beyond what the Yolo HCP/NCCP provides. The RCIS/LCP does not specify mitigation requirements, but provides a framework from which mitigation can be designed within a context of desired conservation in the region. The RCIS/LCP does not create any new regulations in Yolo County, nor is it changing the process by which a project applicant would obtain permits for impacts to biological resources.

The subsections below provide background information for the RCIS and LCP components of the Yolo RCIS/LCP. These subsections describe the LCP component first, because the RCIS/LCP originally began as an LCP, and the RCIS component began later in the plan development process.

1.1.3.1 Local Conservation Plan

The Conservancy prepared the LCP component of the joint RCIS/LCP in parallel with the Yolo HCP/NCCP (ICF 2017). The LCP is a compatible but separate plan from the Yolo HCP/NCCP that establishes conservation priorities to help focus implementation efforts to conserve biological resources in addition to those addressed in the Yolo HCP/NCCP. The LCP is not a part of the Yolo HCP/NCCP, is non-regulatory, and implementation of the LCP strategy is voluntary.

In 2013, the Conservancy revised the Yolo HCP/NCCP to: (1) cover 12 of the 32 species previously identified for coverage in the First Administrative Draft Yolo HCP/NCCP; (2) focus conservation in the eastern portion of the Yolo HCP/NCCP Plan Area where the 12 covered species occur; and (3) remove discussion of other species of local concern. The Yolo HCP/NCCP Advisory Committee concurred with this approach, provided that the Conservancy simultaneously prepare a Local Conservation Plan (LCP) to address the species not addressed in the Yolo HCP/NCCP and to advance other countywide conservation opportunities for additional species and natural communities.

The Conservancy prepared an administrative draft of the LCP in early 2016. After the inception of the RCIS program in late 2016 (described below), the California Natural Resources Agency and the California Department of Water Resources asked the Yolo Habitat Conservancy to consider expanding the LCP into an RCIS. Since many components of the LCP were consistent with the requirements of an RCIS, the Yolo Habitat Conservancy agreed to this approach.

1.1.3.2 Regional Conservation Investment Strategy

In 2016, the California State Legislature (Legislature) passed, and Governor Brown signed, Assembly Bill 2087 (AB 2087), a new law to guide voluntary conservation and mitigation actions for the state's most vulnerable species and resources and to help streamline the mitigation process for state and local projects, such as infrastructure and forest management. AB 2087 amended the California Fish and Game Code, Division 2, Chapter 9, to add Sections 1850–1861. It creates a program to identify and prioritize the conservation needs of vulnerable species and resources at a regional scale,

including actions to address the impacts of climate change and other stressors that influence the resiliency of those species and natural resources. Since the concept is new, AB 2087 created a pilot program for development of regional conservation investment strategies through January 1, 2020. AB 2087 ensured the new program would complement Habitat Conservation Plans and Natural Community Conservation Plans.

The program allows the California Department of Fish and Wildlife (CDFW) or any local or state public agency to develop a Regional Conservation Investment Strategy (RCIS) to guide voluntary conservation actions and mitigation actions for a suite of species. The RCIS must include specific information about conservation actions and conservation priorities necessary to eliminate or reduce stressors and negative pressures on those species. Once CDFW approves an RCIS, public agencies or conservation organizations can use it to identify conservation priorities that will help guide their conservation investments. Public infrastructure agencies or private developers can voluntarily use an approved RCIS to inform their selection of appropriate mitigation sites or actions.

A person or entity, including a state or local agency, can sponsor the development of a mitigation credit agreement (MCA) for a region within an RCIS area (e.g. a watershed or conservation zone in which mitigation credits may be purchased) and request approval of the agreement from CDFW. An MCA allows project proponents to negotiate compensatory mitigation with CDFW before project impacts occur. Once CDFW approves the MCA, the MCA sponsor submits mitigation project proposals to CDFW to establish and release the credits consistent with the MCA's mitigation framework. Mitigation credits created pursuant to a MCA may be used to satisfy the mitigation requirements of any State or federal law, if the respective entity administering that law agrees. Once approved, this RCIS will enable MCAs to be developed and executed in the strategy area.

1.2 Scope of the Yolo HCP/NCCP

1.2.1 Geographic Scope of the Plan Area and Planning Units

The Plan Area encompasses all areas within the boundaries of Yolo County that are eligible for regulatory coverage under this HCP/NCCP, totaling approximately 653,549 acres (Figure 1-1). The Plan Area also includes a 1,174-acre expanded Plan Area for riparian conservation in Solano County, on the south side of Putah Creek (Figure 1-1). The Plan Area is subdivided into 22 geographically based planning units to facilitate development and execution of the analysis of potential effects associated with implementation of the covered activities (Chapter 5, *Effects on Covered Species and Natural Communities*) (Figure 1-2) and the conservation strategy (Chapter 6, *Conservation Strategy*).

Figure 1-1. Regional Location of the Yolo HCP/HCCP Plan Area

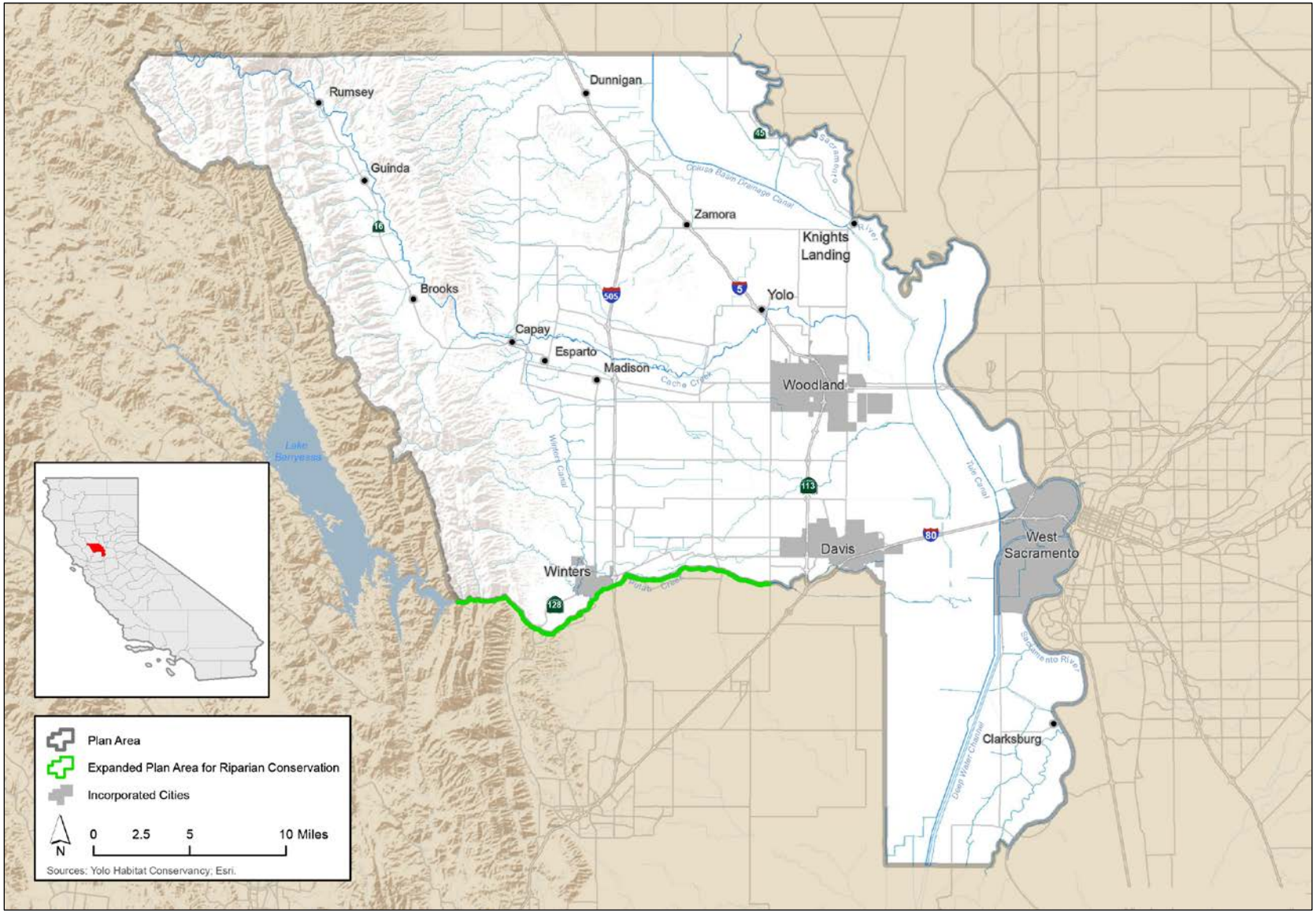
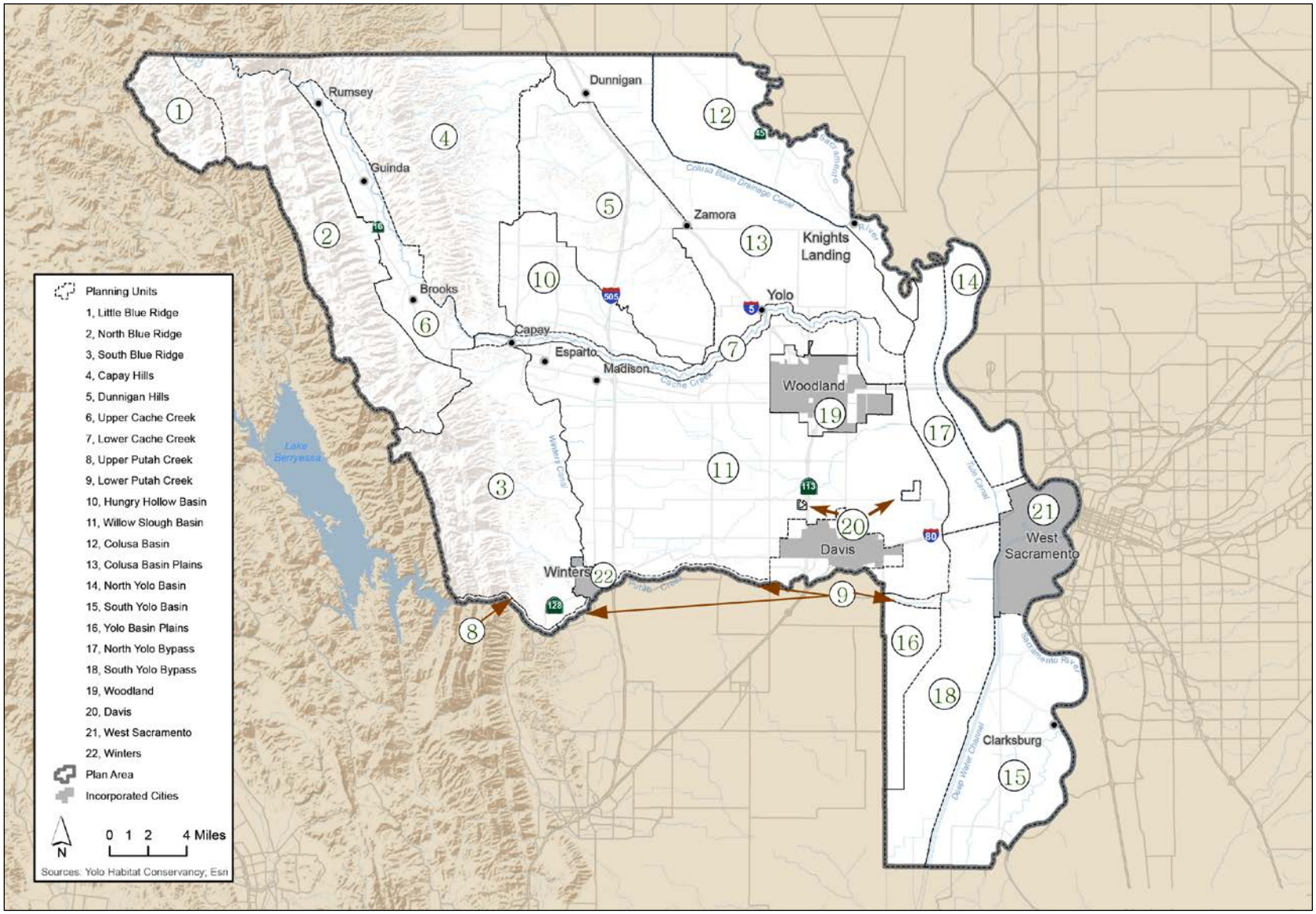


Figure 1-2. Planning Units



1.2.2 Natural Communities

The Yolo HCP/NCCP addresses issues related to the following natural communities, which have been grouped into five categories. Although cultivated lands are not a *natural* community, crop types that provide habitat for covered species are included within the scope of this HCP/NCCP as a *seminatural* community.

Cultivated lands

- Cultivated lands seminatural community.

Grassland

- Grassland natural community.
- Serpentine natural community.

Shrubland and scrub

- Chamise natural community.
- Mixed chaparral natural community.

Woodland and forest

- Oak-foothill pine natural community.
- Blue oak woodland natural community.
- Closed-cone pine-cypress natural community.
- Montane hardwood natural community.
- Valley oak woodland natural community.

Riparian and wetland

- Alkali prairie natural community.
- Vernal pool complex natural community.
- Fresh emergent wetland natural community.
- Valley foothill riparian natural community.
- Lacustrine and riverine natural community.

Chapter 2, *Existing Ecological Conditions,* provides definitions and descriptions for each of these natural communities.

1.2.3 Covered Species

The Yolo HCP/NCCP was designed to provide the basis for issuance of federal and state endangered species permits for 12 species, including eight species that are currently listed (state, federal, or jointly listed species) and four species that are not listed but could become listed during the term of the permits (Table 1-1). These species, for which incidental take coverage is sought, are collectively referred to as *covered species*. Section 2.6.1, *Development of the Covered Species List,* and Appendix C, *Evaluation of Species Considered for Coverage,* describe the process by which the Conservancy developed the covered species list.

Table 1-1. Covered Species

	Common Name	Scientific Name	Status Federal/State/Other[a]
Plants			
1	Palmate-bracted bird's beak	*Chloropyron palmatum*[b]	E/E/1B
Invertebrates			
2	Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T/-/-
Amphibians			
3	California tiger salamander (Central California DPS)	*Ambystoma californiense*	T/T/-
Reptiles			
4	Western pond turtle	*Actinemys marmorata*	-/CSC/-
5	Giant garter snake	*Thamnophis gigas*	T/T/-
Birds			
6	Swainson's hawk	*Buteo swainsoni*	-/T/-
7	White-tailed kite	*Elanus leucurus*	-/FP/-
8	Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/E/-
9	Western burrowing owl	*Athene cunicularia hypugaea*	-/CSC/-
10	Least Bell's vireo	*Vireo bellii pusillus*	E/E/-
11	Bank swallow	*Riparia riparia*	-/T/-
12	Tricolored blackbird	*Agelaius tricolor*	-/C/-

a. Status:

Federal
- C = Candidate for listing under the FESA
- E = Listed as endangered under the FESA
- PT = Proposed as threatened under the FESA
- T = Listed as threatened under the FESA
- - = No designation

State
- C = Candidate. Under CESA, a candidate for listing is afforded the status of a listed species
- CSC = California species of special concern
- E = Listed as endangered under the CESA
- FP = Fully protected under California Fish and Game Code
- T = Listed as threatened under the CESA
- - = No designation

Other:
- 1B = California Native Plant Society (CNPS) designation for species that are rare or endangered in California and elsewhere.
- - = No designation

b. Formerly *Cordylanthus palmatus*.

DPS = distinct population segment: FESA = Federal Endangered Species Act; CESA = California Endangered Species Act

1.2.4 Covered Activities

By covering a broad range of activities, this HCP/NCCP facilitates comprehensive protection of the covered species while providing assurances that existing land uses and future growth and development within the Plan Area can proceed in a streamlined and efficient manner.

The Yolo HCP/NCCP sets out five broad classes of activities, as listed below, for which the Permittees are seeking take coverage. Some activities may span more than one category.

- Urban projects and activities.
- Rural projects and activities.
- Public and private operations and maintenance activities.
- Conservation strategy implementation.
- Neighboring landowner protection program.

Chapter 3, *Covered Activities*, identifies the types of activities and specific projects that are covered under each of these five classes of activities.

1.2.5 Permit Term

The permit term is the period during which all covered activities can receive take authorization under the Yolo HCP/NCCP, consistent with requirements of this HCP/NCCP. The permit term is also the period during which all conservation actions must be successfully completed to offset the adverse effects of covered activities.

The Permittees are seeking take permits from USFWS and CDFW for a term of 50 years. The 50-year permit term is necessary to allow for full implementation of the covered activities, the conservation strategy, the monitoring and adaptive management program, and the funding strategy. Each of these components is discussed below.

USFWS regulations for incidental take permits outline factors to consider when determining permit duration (50 Code of Federal Regulations [CFR] 17.32 and 222.307). These regulations state that the durations of incidental take permits issued with HCPs will provide adequate assurances to the permit holder who will commit the funding necessary for the activities authorized by the permit, including conservation actions. USFWS' Five-Point Policy provides further guidance on factors to consider when determining permit duration (U.S. Fish and Wildlife Service 2000a). These factors include the expected duration of the activities proposed for coverage and the length of time necessary to implement and achieve the benefits of the operating conservation program. Factors considered in determining the permit duration for the Yolo HCP/NCCP are described below.

1.2.5.1 Time to Implement Covered Activities

The 50-year permit term will provide adequate time to implement activities covered under the Yolo HCP/NCCP. Growth scenarios developed by the Sacramento Area Council of Governments (2012) predict that 80 percent of residential development and 56 percent of nonresidential development will build out by 2035. Extrapolating these economic assumptions forward, residential development will be completely built out by approximately 2042 and nonresidential development by 2056. Therefore, a minimum of 40 years is necessary to cover buildout of the covered activities.

1.2.5.2 Time to Implement, Monitor, and Adjust Conservation Actions

USFWS policy guidance states that the permit term must be of sufficient length to implement and achieve the benefits of the operating conservation program (U.S. Fish and Wildlife Service 2000a). Within the permit term, all reserve land must be acquired, monitoring and adaptive management must be in place, and sufficient time must be provided to ensure that the program is operating effectively and allowing for adjustments as needed.

The 50-year length of the permit term provides adequate time for the assembly of a reserve system and development of a management program on conservation lands. This includes the time necessary for willing landowners[1] to become available and for the land agents of the Yolo HCP/NCCP to negotiate a fair price for the land in fee title or conservation easement. It may take several years to complete a single land acquisition or purchase a conservation easement. Given the large number of transactions required to assemble a reserve system, adequate time is needed to ensure that it happens before the end of the permit term. A permit term of 50 years also allows the monitoring and adaptive management programs to become well established so that they can continue successfully in perpetuity. As described in Chapter 6, *Conservation Strategy*, the adaptive management and monitoring program will go through three distinct phases: inventory, targeted studies, and long-term monitoring. Each phase will take many years to complete.

The Conservancy needs a permit term of 50 years to ensure sufficient numbers of willing sellers. There is currently a trend toward converting agricultural lands to orchards and vineyards. Between 2006 and 2014, the amount of land devoted to orchards (both bearing orchards and orchards too new to bear fruit) in Yolo County increased by 24,621 acres. In the short term, it may be difficult for the Conservancy to find willing sellers for the reserve system while orchards and vineyards are in high demand. Therefore, a 50-year permit term is necessary to ensure affordable acquisition costs and sufficient numbers of willing sellers to meet the Yolo HCP/NCCP conservation commitments.

One type of monitoring used in the Yolo HCP/NCCP, status and trend monitoring, will track long-term trajectories of species populations and other physical and biological conditions in the Plan Area. The 50-year permit term will provide adequate time (i.e., approximately 10 years beyond Plan Area buildout) for collecting trend data for all of the covered species and making any necessary adjustments to management techniques. Monitoring the success of restoration actions is expected to take five to 10 years for each restoration project. Most restoration actions cannot be initiated until land is acquired for the reserve system. A permit term of 50 years is necessary to allow enough time to complete land acquisition, with at least five to 10 years to initiate or complete (and remediate, if necessary) all restoration actions successfully.

A successful program for monitoring and adaptive management is essential to the continued success of the reserve system after the permit term. The Permittees will be obligated during the permit term to address potential changes in circumstances and remediate conservation areas that have been affected by these changes. A longer permit term is more likely to encompass a changed circumstance that will require a remedial action.

[1] The Conservancy will acquire land only from willing sellers.

1.2.5.3 Time to Secure Adequate Funding and Maintain Acceptable Fees

The Conservancy needs a 50-year permit term to generate the necessary funding for implementation. As described in Chapter 8, *Costs and Funding*, the Yolo HCP/NCCP will be funded by a wide variety of local, state, and federal sources. The Conservancy based the funding strategy for this HCP/NCCP on 50 years of local funding from the City of Davis open space tax, the *Cache Creek Resources Management Plan*, and the Solano County Water Agency Lower Putah Creek Coordinating Committee (see Chapter 8, *Costs and Funding*, for details). The funding sources will provide an estimated $0.5 million per year (in 2014 dollars) for acquisition of conservation easements on agricultural lands that will support covered species, among other critical conservation actions. Shorter permit terms of 30 and 40 years were evaluated but were found to provide insufficient revenue from these sources with respect to supporting the conservation strategy and providing essential local matching funds to accompany state and federal funding sources. A 30- or 40-year permit term would reduce local funding sources by approximately $25 million (a 44 percent reduction in local funding) or $13 million (a 23 percent decrease), respectively (both in 2014 dollars), because of the shorter period over which revenues could be collected. Costs were also estimated for the 40-year permit term. Although total costs were reduced by approximately $14 million (a five percent reduction), average annual costs increased by $1 million (a 19 percent increase). The 40-year permit term therefore has a net reduction in revenue of approximately $11 million. Without this additional revenue, the Conservancy will be unable to meet its land acquisition commitment under the Yolo HCP/NCCP with local funding sources.

Funding is also needed for management and monitoring after the permit expires (e.g., an endowment), as described in Chapter 8, *Costs and Funding*. The permit term must therefore allow sufficient time for accruing long-term funding. A shorter permit term would increase total costs (and the per-acre fees) because fewer years would be available over which to build the endowment before the need to start funding post-permit costs. That is, a longer permit term provides more years to take advantage of compounding returns on the endowment during the permit term and thus keeps endowment costs lower than they would be with a shorter permit term. The Conservancy has estimated that a 30- or 40-year permit term would raise the cost of the endowment by eight percent or four percent, respectively (the shortest permit term raises the cost of the endowment the most). This would also raise Yolo HCP/NCCP fees charged to development by the same proportion. Therefore, a 50-year permit term will allow the Conservancy to utilize local funding sources fully, meet local commitments to fund open space preservation under the Yolo HCP/NCCP, meet NCCP standards for conservation, and keep Yolo HCP/NCCP fees to acceptable levels.

1.2.5.4 Conclusions

Given the implementation horizon for covered activities, the need to acquire lands and ensure successful implementation of the conservation strategy through monitoring and adaptive management, and the need for adequate funding, the Conservancy has determined a 50-year permit term will best address regulatory, financial, and biological considerations. The 50-year permit term provides sufficient time to accomplish the following critical elements of this HCP/NCCP:

- Fully implement the general plans and other long-range plans of the cities and Yolo County.
- Assemble the reserve system from willing sellers and partnerships with local agencies and private landowners.

- Develop an effective adaptive management program that will be implemented in perpetuity, given the current uncertainties regarding the ecology of covered species and responses to resource management.
- Secure all necessary funding for implementation during the permit term from local, state, and federal sources, and generate funding for the Yolo HCP/NCCP in perpetuity.
- Charge an acceptable fee on development that will facilitate local approvals and continued support of the Yolo HCP/NCCP by the development community during implementation.
- Provide sufficient incentive for the Conservancy to commit the substantial resources necessary to complete the Yolo HCP/NCCP.

1.3 Overview of the Planning Process

1.3.1 Role of the Conservancy

The Conservancy Board of Directors, which consists of elected representatives who have been appointed by the member jurisdictions, has two primary functions: to assist in the planning, preparation, and subsequent administration of the Yolo HCP/NCCP and facilitate acquisition of conservation easements that preserve habitat for mitigating specific adverse effects on Swainson's hawk foraging habitat. The Conservancy's role in overseeing the Swainson's hawk mitigation program arose out of a 2002 Memorandum of Understanding between the Conservancy and CDFW that established a process to allow development activities to proceed during development of the Yolo HCP/NCCP. Once the permits are issued, the Conservancy will cease to operate a separate Swainson's hawk mitigation program.

In 2004, the Conservancy entered into a Planning Agreement with CDFW and the USFWS, pursuant to the NCCPA, that defined the initial scope of the program and defined the roles and responsibilities of the parties in the development of this HCP/NCCP. In 2009, the Conservancy and the wildlife agencies extended the Planning Agreement to 2013. The Conservancy and the wildlife agencies later extended the Planning Agreement to 2019.

1.3.2 Role of the Advisory Committee

In 2004, the Conservancy appointed the Advisory Committee[2] to provide input and advice during the development of this HCP/NCCP. The Advisory Committee consists of representatives from the primary groups with an interest in this HCP/NCCP (the stakeholders), including Conservancy member agencies, landowners, the agricultural community, conservation organizations, and land developers. The group held open meetings on a regular basis (generally monthly) to review relevant materials and documents; evaluate and synthesize ideas, data, and information; and discuss and resolve complex issues. The Advisory Committee sought to reach a consensus when possible and provide recommendations to the Conservancy Board of Directors on a range of matters, as reflected in the Yolo HCP/NCCP.

[2] The Advisory Committee was formerly known as the Steering Advisory Committee, or SAC; the name was changed to Advisory Committee in 2012.

Advisory Committee member agencies and organizations[3] are listed below. Members were selected according to their expertise, interest in the program, and capacity to represent the interests of their particular stakeholders.

- Building Industry Association.
- California Native Plant Society.
- Tuleyome.
- Chambers of Commerce.
- City of Davis.
- City of West Sacramento.
- City of Winters.
- City of Woodland.
- Institute for Ecological Health.
- Various landowners.
- University of California, Davis.
- Yolo Audubon Society.
- Yolo County.
- Yolo County Agricultural Commissioner.
- Yolo County Farm Bureau.
- Yolo County Flood Control and Water Conservation District.
- Yolo County Resource Conservation District.

During meetings conducted between August and October 2008, the Advisory Committee prepared and unanimously adopted the following planning principles to help guide the preparation of the Yolo HCP/NCCP:

- The planning process will be a collaborative effort that is open, inclusive, and actively participatory.
- Everyone participating in the process will be treated with respect, dignity, courtesy, and responsiveness, and the same will be expected from them.
- When shared values and goals are identified, they will be articulated and written into the Yolo HCP/NCCP.
- Partnerships that promote the Yolo HCP/NCCP and its implementation will be cultivated.
- The planning process will be conducted in a cost-effective and efficient manner without compromising conservation values and goals.
- Administration of the program will provide predictability, permit streamlining, and efficiency related to state and federal regulatory programs that protect covered species, including endangered species.

[3] See Chapter 10, *List of Preparers,* for past and present Advisory Committee representatives.

- The process and the Yolo HCP/NCCP will complement other efforts designed to protect, enhance, restore, and manage biodiversity as well as natural and intrinsic resource values in Yolo County.
- The process will seek to leverage local, state, and federal funding to help achieve the Yolo HCP/NCCP's goals and objectives.
- The Yolo HCP/NCCP will assemble a shared knowledge base that describes the key concepts of the HCP/NCCP planning process.
- The Yolo HCP/NCCP includes willing participants, landowners, and sellers who are interested in preserving their land and the predominantly rural and agricultural character of Yolo County for future generations.
- The Yolo HCP/NCCP will be based on a strong scientific foundation.
- The Yolo HCP/NCCP will encourage farm and rangeland management practices that are compatible with species and habitat conservation objectives.
- The goal of the Yolo HCP/NCCP is to restore, enhance, and conserve the natural heritage of Yolo County while encouraging smart, sensible, and sustainable economic activity; maintaining and enhancing agricultural production; and including and expanding recreational opportunities.

The Advisory Committee formed working groups to focus on specific issues regarding development of the Yolo HCP/NCCP. These groups included the Biological Working Group, Agriculture Working Group, Urban Interface Working Group, and Riparian Resources Working Group. The working groups met on an *ad hoc* basis to develop supporting information and consider how HCP/NCCP components—including scientific data and analysis, approaches to conservation strategies, adaptive management and monitoring—should be shaped in relation to the specific issues considered by each working group. Many of the results of workgroup deliberations were used in development of the conservation strategy (Chapter 6, *Conservation Strategy*).

The Advisory Committee extensively reviewed elements of the First Administrative Draft of the Yolo HCP/NCCP and provided recommendations regarding HCP/NCCP content for consideration by Conservancy staff members and consultant personnel. The overall framework for the conservation approaches presented in the Yolo HCP/NCCP reflects substantial engagement and input from Advisory Committee members during the course of plan development.

In 2013, the Conservancy initiated a process to review and resolve the remaining substantive HCP/NCCP planning and implementation issues prior to preparation of the Second Administrative Draft. The Advisory Committee reviewed and provided input for five papers prepared by the Conservancy that served as the framework for resolving the following issues with USFWS and CDFW:

- The Conservancy's proposed approach for conserving agricultural habitat values for covered species during the 50-year permit period.
- Coordination and implementation issues related to implementation of *Bay-Delta Conservation Plan* (BDCP) conservation actions in the HCP/NCCP Plan Area.[4]
- The Conservancy's proposed approach for conserving Swainson's hawk.

[4] The BDCP effort has since been abandoned.

- The Conservancy's proposed approach for conserving giant garter snake.
- A proposed approach for addressing conservation for Yolo County Species of Local Concern.

The Advisory Committee subsequently participated in the preparation and review of the Second Administrative Draft and Public Review Draft HCP/NCCP. They also participated extensively in the preparation of the Regional Conservation Investment Strategy/Local Conservation Plan.

1.3.3 Coordination with Federal and State Agencies

Since the release of the First Administrative Draft in June 2013, USFWS and CDFW staff participated in many half-day and full-day meetings to resolve important issues related to the first administrative draft plan. These agencies provided technical input on the baseline data, covered species list, covered species accounts, existing ecological conditions report, covered activities, effects analysis, and conservation strategy. USFWS and CDFW staff involvement also included attendance at Advisory Committee meetings and regular communications with and attendance at meetings of the Conservancy Board of Directors. USFWS and CDFW reviewed and commented on each of the 2013 issue papers (Section 1.3.2, *Role of the Advisory Committee*) and reviewed and commented on each chapter prior to release of the Second Administrative Draft in 2015 and Public Review Draft in 2017. The Conservancy coordinated extensively with USFWS and CDFW in 2016 to resolve remaining issues in preparation of the Public Review Draft. In addition, USFWS and CDFW assisted the Conservancy with securing sufficient grant funding to prepare this HCP/NCCP.

1.3.4 Public Participation and Engagement

The NCCPA requires the establishment of a process for public participation and outreach throughout development of an NCCP (Fish & Game Code Section 2815). Similarly, policies governing the FESA emphasize the importance of public involvement in the development of large-scale HCPs and encourage plan participants to engage the public (U.S. Fish and Wildlife Service 2000a). Extensive public involvement and comment from stakeholders across the region have benefited the Yolo HCP/NCCP. At the initial stage of the Yolo HCP/NCCP planning process, the Conservancy developed an outreach program to create a wide range of opportunities for the public to learn about the various elements of the Yolo HCP/NCCP and facilitate public input during the course of its development. The Conservancy developed and maintained an electronic mailing server to notify interested members of the public of upcoming meetings and to distribute draft documents pertaining to the planning process as they became available. The Yolo Conservancy Board of Directors and Advisory Committee held regular, public meetings beginning in mid-2013, and posted all meeting agendas and minutes online.

The Conservancy Advisory Committee advises Conservancy staff and the Board of Directors and has been the primary forum for soliciting input from the public. All meetings of the Advisory Committee and its working groups were open to the public. All documents reviewed or prepared by the Advisory Committee, including its working groups, were made available to the public. At meetings, both oral and written public comments were received by the Advisory Committee; comments received in writing were posted to the website. The notes and records of Advisory Committee meetings also reflect comments and input offered by the public.

In addition to regular public meetings by the Conservancy Board of Directors and the Advisory Committee, representatives of the Yolo HCP/NCCP conducted dozens of briefings for community organizations, local jurisdictions within and adjacent to the Plan Area, and environmental

organizations. Representatives made public presentations throughout the Plan Area and regularly distributed information about the Yolo HCP/NCCP through newsletters and updated fact sheets that explained its purpose and described its various components. In 2017, representatives conducted nine public meetings surrounding the June 1, 2017 release of the Public Review Draft HCP/NCCP and Public Review Draft Environmental Impact Statement/Report (EIS/EIR).

To facilitate the dissemination of information, the Conservancy maintained a Yolo HCP/NCCP website.[5] The website provides the following information:

- Relevant background information and agreements.
- Draft chapters, appendices, and sections of the Yolo HCP/NCCP during document development.
- Information on landscapes, natural communities, and covered species.
- Maps.
- Schedule of Advisory Committee and Conservancy Board of Director meetings, with agendas, handouts, and meeting summaries.
- Contact information for the Conservancy.
- Links to other relevant websites, including USFWS, CDFW, and other nearby HCPs and NCCPs.

1.3.5 Integration of Science

Use of the best available science is a priority for this HCP/NCCP. In 2006, the Conservancy and Advisory Committee assembled the Independent Science Advisors, a group of experts in conservation ecology and the specific biological resources in the Plan Area. The Conservancy hired a science advisor facilitator to assist in the formation of and coordinate with the Independent Science Advisors.

The Independent Science Advisors (Spencer et al. 2006) submitted a report to the Conservancy and Advisory Committee in May 2006 that summarized its recommendations on the Yolo HCP/NCCP. This NCCPA-required scientific input was provided early in the planning process, before preparation of the draft HCP/NCCP, to ensure that the Yolo HCP/NCCP was developed with use of the best available science.

To ensure objectivity, the advisors operated independent of the Permittees, their consultants, and other entities that are involved in the Yolo HCP/NCCP. The advisors reviewed information prepared by the consultants, attended a workshop, completed subsequent research, and engaged in discussions. The Independent Science Advisors met August 15 and 16, 2005, to review information gathered for the Yolo HCP/NCCP planning process, hear the concerns of the Advisory Committee, tour portions of the Plan Area, and begin formulating recommendations for HCP/NCCP development and implementation. Advisors were also encouraged to seek expert input from other scientists.

Recommendations were provided to the Conservancy in the *Report of Independent Science Advisors for Yolo County Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP)* (Spencer et al. 2006) regarding the scope of this HCP/NCCP, information gaps, the conservation design, the conservation analyses, and the adaptive management and monitoring. Independent Science Advisor recommendations were used to guide subsequent HCP/NCCP planning. Major

[5] www.yolohabitatconservancy.org

recommendations incorporated into this HCP/NCCP included updating and refining HCP/NCCP vegetation mapping as well as refining conservation design principles. In addition, the Local Conservation Plan incorporates a number of recommendations in concept from the Independent Sciences Advisors' report as elements in the conservation of natural ecosystem elements in Yolo County.

1.4 Regulatory Context

The Yolo HCP/NCCP operates within and assists in achieving the requirements of numerous applicable federal and state laws and regulations. This section describes the federal and state laws and regulations with which this HCP/NCCP complies.

1.4.1 Federal and State Endangered Species Laws

1.4.1.1 Federal Endangered Species Act

The FESA, which is administered by USFWS, requires USFWS to maintain lists of threatened and endangered species and affords substantial protection to listed species. USFWS can list species as either *endangered* or *threatened*. An *endangered* species is at risk of extinction throughout all or a significant portion of its range (FESA Section 3[6]). A *threatened* species is likely to become endangered in the near future (FESA Section 3[19]). Section 9 of the FESA prohibits the take of any fish or wildlife species that has been listed under the FESA as endangered or threatened.[6] *Take*, as defined by the FESA, means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." *Harm* is defined as "any act that kills or injures the species, including significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3). Section 9 prohibits the "removal or reduction to possession" of any listed plant species "under federal jurisdiction" (i.e., on federal land, where federal funding is provided, or where federal authorization is required).

The FESA includes mechanisms that provide exceptions to the Section 9 take prohibitions. These are addressed in Section 7 for federal actions and Section 10 for nonfederal actions.

1.4.1.1.1 Section 7

Section 7 of the FESA requires all federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of habitat critical to such species' survival. To ensure that its actions do not result in jeopardy to listed species or in the adverse modification of critical habitat,[7] each federal agency must consult with USFWS regarding federal agency actions that may affect listed species. The issuance of permits for this HCP/NCCP is a federal action that triggers Section 7

[6] The protection of threatened species under Section 9 is discretionary, through a rule issued under Section 4(d) of the FESA. By regulation, USFWS automatically affords Section 9 protections to threatened species at the time of listing. These protections can later be modified by USFWS through a 4(d) rule.

[7] *Critical habitat* is defined as specific geographic areas, whether occupied by listed species or not, that are determined to be essential for the conservation and management of listed species and that have been formally described in the *Federal Register*.

consultation. Consultation begins when the federal agency submits a written request for initiation to USFWS, along with the agency's biological assessment of its proposed action, and when USFWS accepts that biological assessment as complete. If USFWS concludes that the action is not likely to adversely affect a listed species, the action may be conducted without further review under the FESA. Otherwise, USFWS must prepare a written biological opinion that describes how the agency's action will affect the listed species and its critical habitat. For this HCP/NCCP, USFWS will consult internally (with itself) to comply with Section 7 of the FESA.

If the biological opinion concludes that the proposed action would jeopardize the continued existence of a listed species or adversely modify its critical habitat, the opinion will suggest "reasonable and prudent alternatives" that would avoid that result. If the biological opinion concludes that the proposed action would take a listed species but would not jeopardize its continued existence, the biological opinion will include an incidental take statement. *Incidental take* is take that is "incidental to, and not intended as part of, an otherwise lawful activity" (64 CFR 60728). The incidental take statement specifies an amount of take that is allowed to occur because of the action and may require reasonable and prudent measures to minimize the impact of the take.

Unlike state, local, and private entities, federal agencies cannot receive the regulatory assurances available under Section 10 of the FESA. Therefore, any project with a federal lead agency or federal involvement (e.g., a federal permit, federal funding, or a project on federal land) must obtain take authorization through Section 7 rather than Section 10 and an HCP. This means that projects with federal involvement, including some of the covered activities described in Chapter 3, *Covered Activities*, cannot use an approved HCP directly for take authorization. If the applicant complies with the conservation measures in this HCP/NCCP, however, the Section 7 consultation process is expected to be greatly streamlined. Unless otherwise required by law or regulation, USFWS will ensure that a biological opinion for a project with a federal lead agency that is addressed by this HCP/NCCP is consistent with the biological opinion for this HCP/NCCP. USFWS will not impose measures for coverage under this HCP/NCCP in excess of those that have been or will be required by the Implementing Agreement,[8] this HCP/NCCP, and the permits, unless otherwise required by law or regulation.

1.4.1.1.2 Section 10

Until 1982, state, local, and private entities had no means for acquiring incidental take authorization, unlike federal agencies under Section 7. Private landowners and local and state agencies risked direct violation of the FESA no matter how carefully their projects were implemented. This statutory dilemma led Congress to amend Section 10 of the FESA in 1982 to authorize the issuance of an incidental take permit to nonfederal project proponents upon completion of an approved conservation plan. The term *conservation plan* has evolved into *habitat conservation plan* (HCP).

In cases where federal land, funding, or authorization is not required for an action by a nonfederal entity, the take of listed fish and wildlife species can be permitted by USFWS and/or the National Marine Fisheries Service (NMFS) through the Section 10 process, which requires preparation of an HCP. Private landowners, corporations, state agencies, local agencies, and other nonfederal entities

[8] The Implementing Agreement is signed by all parties, and identifies roles and responsibilities of all parties, including the Permittees, USFWS, and CDFW. The agreement typically incorporates actions from the conservation plan that are agreed to by all parties. See Appendix E, *Implementing Agreement.*

must obtain a Section 10(a)(1)(B) incidental take permit for take of federally listed fish and wildlife species "that is incidental to, but not the purpose of, otherwise lawful activities."

The Yolo HCP/NCCP provides the following mandatory elements of an HCP needed for USFWS issuance of a Section 10(a)(1)(B) incidental take permit:

- The impact that will most likely result from the taking of covered species (Chapter 5, *Effects on Covered Species and Natural Communities*).
- The steps the applicant will take to monitor, minimize, and mitigate such impacts to the maximum extent practicable (Section 4.3.4, *Covered Species*; and Chapter 6, *Conservation Strategy*).
- The funding that will be available to implement such steps (Chapter 8, *Costs and Funding*).
- The procedures to be used to deal with unforeseen circumstances (Chapter 7, *Plan Implementation*).[9]
- The alternative actions to such taking the applicant considered and the reasons why such alternatives will not be used (Chapter 9, *Alternatives to Take*).
- Such other measures that the Director [of the Department of Interior or Commerce] may require as being necessary or appropriate for purposes of the plan (50 CFR 17.22(b)).

To receive an incidental take permit, Section 10(a)(2)(B) of the FESA requires that the following criteria be met:

- The taking will be incidental to otherwise lawful activities (Chapter 3, *Covered Activities*).
- The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking (Chapter 5, *Effects on Covered Species and Natural Communities,* and Chapter 6, *Conservation Strategy*).
- The applicant will ensure adequate funding for the HCP and procedures to deal with unforeseen circumstances (Chapter 8, *Costs and Funding*).
- The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild (Chapter 5, *Effects on Covered Species and Natural Communities*).
- The applicant will ensure that other measures that USFWS may require as being necessary or appropriate will be provided.
- USFWS has received such other assurances as may be required that the HCP will be implemented.

Prior to the approval of an HCP, USFWS is required to undertake an internal Section 7 consultation[10] because issuance of an incidental take permit is a federal action (Section 1.4.1.1.1, *Federal Endangered Species Act*). Elements specific to the Section 7 process that are not required under the Section 10 process (e.g., analysis of impacts on designated critical habitat and analysis of cumulative impacts on listed species) are included in this HCP/NCCP to help meet the requirements of Section 7. The Plan Area includes designated critical habitat for only one covered species, the California tiger

[9] *Unforeseen circumstances* are changes in circumstances that affect a covered species or geographic area covered by the HCP that could not have been reasonably anticipated by the plan developers and result in a substantial and adverse change in the status of a covered species.

[10] When USFWS issues a permit, it will consult internally and with NMFS, if necessary.

salamander, and the critical habitat analysis for this species is included in Section 5.9, *Critical Habitat*. Cumulative effects on covered species, consistent with Section 7 of the FESA, are addressed in Section 5.8, *Cumulative Effects*.

The take prohibition for listed plant species is more limited than the prohibition for listed fish and wildlife species. Under Section 9(a)(2)(B) of the FESA, endangered plants are protected from "removal, reduction to possession, and malicious damage or destruction" in areas that are under federal jurisdiction. Section 9(a)(2)(B) of the FESA also provides protection to plants from removal, cutting, digging up, damage, or destruction where the action takes place in violation of any state law or regulation or in violation of a state criminal trespass law. Thus, the FESA does not prohibit the incidental take of federally listed plants on private or other nonfederal lands unless the action requires federal authorization or is in violation of state law. Section 10 incidental take permits are not required for plant species. The Section 7(a)(2) prohibition against jeopardy applies to plants; issuance of a Section 10(a)(1)(B) incidental take permit cannot result in jeopardy to a listed plant species.

1.4.1.1.3 Five-Point Policy

In June 2000, USFWS adopted the Five-Point Policy to clarify elements of the HCP program as they relate to biological goals, adaptive management, monitoring, permit duration, and public participation (U.S. Fish and Wildlife Service 2000a). The Five-Point Policy directs that the following elements be addressed in the development of HCPs:

- **Biological Goals and Objectives**. HCPs are required to define the biological goals and objectives that the plan is intended to achieve and clarify the purpose and direction of the plan's conservation program.

  This HCP/NCCP sets out extensive biological goals and objectives, including the specific measurable targets this HCP/NCCP is designed to meet. These targets were based on the best available scientific information and have been used as parameters and benchmarks to guide the conservation strategies for the covered species and natural communities. The biological goals and objectives of this HCP/NCCP are described in Chapter 6, Section 6.3, *Biological Goals and Objectives*. Chapter 7, *Plan Implementation,* describes how the Conservancy will demonstrate at regular intervals that it is meeting the conservation commitments.

- **Adaptive Management.** The Five-Point Policy encourages the inclusion of adaptive management strategies in HCPs in appropriate circumstances to address uncertainty related to the species that are covered by a plan. The agencies describe adaptive management as a "method for examining alternative strategies for meeting measurable biological goals and objectives and then, if necessary, adjusting future conservation management actions according to what is learned" (U.S. Fish and Wildlife Service 2000a).

  This HCP/NCCP incorporates an adaptive management process that is designed to facilitate and improve decision-making during implementation of this HCP/NCCP and identify adjustments and modifications, as defined in this HCP/NCCP, to the conservation strategy as new information becomes available over time. The framework for the adaptive management program is set out in Chapter 6, Section 6.5, *Monitoring and Adaptive Management*.

- **Monitoring.** HCPs are required to include provisions for monitoring to gauge the effectiveness of the plan in meeting the biological goals and objectives and verify that the terms and conditions of the plan are being properly implemented.

The biological and compliance monitoring provisions of this HCP/NCCP are found in Chapter 6, Section 6.5, *Monitoring and Adaptive Management*.

- **Permit Duration.** Consistent with the Five-Point Policy, USFWS considers several factors in determining the term of an incidental take permit. The agency, for instance, takes into account the expected duration of the activities that are proposed for coverage and the anticipated positive and negative effects on covered species that will most likely occur during the course of the plan. The agency also factors in the level of scientific and commercial data underlying the proposed conservation strategy, the length of time necessary to implement and achieve the benefits of the operating conservation program, and the extent to which the program incorporates adaptive management strategies.

  The Conservancy evaluated factors associated with permit duration. The outcomes of this evaluation resulted in a proposed duration of 50 years for the permits to be issued pursuant to this HCP/NCCP (Section 1.2.4, *Permit Term*).

- **Public Participation.** The Five-Point Policy increases public participation in the HCP process by including greater opportunities for the public to assess, review, and analyze HCPs and associated NEPA documentation. As part of this effort, the agencies have encouraged greater engagement of the public for most HCPs, particularly those with regional scopes.

  As described in Section 1.3.4, *Public Participation and Engagement*, the planning process afforded extensive opportunities for public involvement and input throughout development of this HCP/NCCP.

The USFWS' 2016 handbook for developing habitat conservation plans incorporates the 2000 Five-Point Policy (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016).

1.4.1.2 California Endangered Species Act

The CESA prohibits take of wildlife and plants that have been listed as threatened or endangered or designated a candidate for listing by the California Fish and Game Commission. *Take* is defined under the Fish & Game Code (more narrowly than under the FESA) as any action or attempt to "hunt, pursue, catch, capture, or kill." Therefore, take under the CESA does not include "the taking of habitat alone or the impacts of the taking." Rather, the courts have affirmed that under the CESA, "taking involves mortality." [11]

Similar to the FESA, the CESA allows exceptions to the prohibition for take that occurs during otherwise lawful activities. The requirements of an application for incidental take under the CESA are described in Section 2081 of the Fish & Game Code. Incidental take of state-listed species may be authorized if an applicant submits an approved plan that minimizes and "fully mitigates" the impacts of this take. The Permittees are not seeking incidental take authorizations under the CESA but are instead seeking state take authorization through the NCCPA, as described below.

1.4.1.3 Natural Community Conservation Planning Act

In 1991, California's NCCPA (Fish & Game Code Section 2800 *et seq*.) was enacted to implement broad-based planning that balances appropriate development and growth with conservation of wildlife and habitat. Pursuant to the NCCPA, local, state, and federal agencies are encouraged to

[11] *Environmental Council of Sacramento* v. *City of Sacramento*, 142 Cal. App. 4th 1018 (2006).

prepare NCCPs to provide comprehensive management and conservation of multiple species and their habitats under a single plan, rather than through preparation of numerous individual plans on a project-by-project basis. The NCCPA is broader in its orientation and objectives than are the FESA and CESA. Preparation of an NCCP is voluntary. To be approved by CDFW, an NCCP must provide for the conservation of species and protection and management of natural communities in perpetuity within the area covered by permits. *Conservation* is defined by the NCCPA and the Fish & Game Code as actions that result in the delisting of state-listed species. Thus, NCCPs must provide for the conservation of covered species, rather than just mitigate the effects of covered activities. This conservation standard is one of the major differences between an NCCP and an HCP that has been prepared to satisfy the FESA or CESA.

The 1991 NCCPA was replaced with a substantially revised and expanded NCCPA in 2002. The revised NCCPA established new standards and guidance on many facets of the program, including scientific information, public participation, biological goals, interim project review, and approval criteria. The new NCCPA took effect on January 1, 2003.

To approve an NCCP under the new NCCPA, CDFW must make a series of findings.

- The plan must be consistent with the Planning Agreement.
- The plan must provide for the conservation and management of the covered species in the Plan Area.
- The plan must protect habitat, natural communities, and species diversity[12] on the landscape level.
- The plan must conserve the ecological integrity of large habitat blocks, ecosystem function, and biodiversity.
- The plan must support sustainable populations of covered species.
- The plan must provide a range of environmental gradients and habitat diversity to support shifting species distributions.
- The plan must sustain movement of species among reserves.
- Mitigation and conservation must be roughly proportional to impacts in timing and extent.
- Funding for conservation, monitoring, and adaptive management must be adequately assured.

Table 1-2 provides a checklist of the NCCPA findings that CDFW must make to issue its NCCP permit, the USFWS' issuance criteria, along with the locations in the Yolo HCP/NCCP where those findings are supported.

[12] Definitions of these and other NCCP terms are provided in Appendix D, *Glossary of Terms.*

Table 1-2. Checklist for Natural Community Conservation Planning Act and Federal Endangered Species Act Requirements

Natural Community Conservation Planning Act Requirement (California Fish and Game Code Section)	Applicable HCP/NCCP Chapter/Section[a]
The plan was developed in accordance with the process identified in the Planning Agreement per Section 2810. (2820(a)(1))	Chapter 1,Section 1.2.1, *Geographic Scope of the Plan Area and Planning Units* Chapter 1, Section 1.3, *Overview of the Planning Process* Chapter 8, *Costs and Funding*
The plan integrates adaptive management strategies that are periodically evaluated and modified based on information from monitoring programs and other sources; these strategies assist conservation of covered species and ecosystems within the Plan Area. (2820(a)(2))	Chapter 6, Section 6.5, *Monitoring and Adaptive Management*
[The plan] Protects habitat, natural communities, and species diversity on a landscape or ecosystem basis through the creation and long-term management of habitat reserves or other measures that provide equivalent conservation of covered species appropriate for land, aquatic, and marine habitats within the Plan Area. (2820(a)(3))	Chapter 6, *Conservation Strategy*
[The plan] Conserves, restores, and manages representative natural and seminatural landscapes to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity. (2820(a)(4)(A))	Chapter 6, *Conservation Strategy*
[The plan] Establishes one or more reserves or proposes other measures that provide equivalent conservation of covered species within the Plan Area and linkages between them and adjacent habitat areas outside of the Plan Area. (2820(a)(4)(B))	Chapter 6, *Conservation Strategy*
[The plan] Protects and maintains habitat areas that are large enough to support sustainable populations of covered species. (2820(a)(4)(C))	Chapter 6, *Conservation Strategy*
[The plan] Sustains the effective movement and interchange of organisms between habitat areas to maintain ecological integrity of habitat within the Plan Area. (2820(a)(4)(E))	Chapter 6, Section 6.3.2, *Landscape-Level Biological Goals and Objectives*
The plan incorporates a range of environmental gradients (such as slope, elevation, aspect, and coastal or inland characteristics) and high habitat diversity; this provides for shifting distributions of species due to changed circumstances. (2820(a)(4)(D))	Chapter 6, Section 6.3.2, *Landscape-Level Biological Goals and Objectives*
The plan identifies allowable activities and restrictions within reserve areas compatible with conservation of species, habitats, natural communities, and associated ecological functions. (2820(a)(5))	Chapter 4, *Application Process and Conditions on Covered Activities*
The plan contains specific conservation measures that meet the biological needs of covered species and are based on the best available scientific information about the status of covered species and the impacts of permitted activities on those species. (2820(a)(6))	Chapter 6, Section 6.4, *Conservation Measures* and Chapter 7, Section 7.7.1, *Changed and Unforeseen Circumstances*

Natural Community Conservation Planning Act Requirement (California Fish and Game Code Section)	Applicable HCP/NCCP Chapter/Section[a]
The plan contains a monitoring program. (2820(a)(7))	Chapter 6, Section 6.5, *Monitoring and Adaptive Management*
The plan contains an adaptive management program. (2820(a)(8))	Chapter 6, Section 6.5, *Monitoring and Adaptive Management*
The plan includes an estimated timeframe and process for implementing reserves or other conservation measures, including obligations of landowners and plan signatories and consequences for failure to acquire lands in a timely manner. (2820(a)(9))	Chapter 6, Section 6.3, *Biological Goals and Objectives* Chapter 7, *Plan Implementation*
The plan ensures that mitigation and conservation measures are roughly proportional in time and extent to the impact on habitat or covered species authorized under the plan. These provisions identify (a) the conservation measures—including assembly of reserves where appropriate and implementation of monitoring and management activities—that the landowner will maintain or carry out in rough proportion to the impact on habitat or covered species and (b) the measurements that will be used to determine if this occurs. (2820(b)(3)(D)(9))	Chapter 6, *Conservation Strategy*
The plan ensures adequate funding to carry out the conservation measures identified in the plan. (2820(a)(10))	Chapter 8, *Costs and Funding*
The plan defines species coverage, including any conditions of coverage (2820(b)(1)) The plan establishes long-term protection of habitat reserves or provides equivalent conservation of covered species (2820(b)(2))	Chapter 4, *Application Process and Conditions on Covered Activities* Chapter 6, *Conservation Strategy*
The plan defines specific terms and conditions, which, if violated, would result in the suspension or revocation of the permit in whole or in part. CDFW will include a provision requiring notification to the plan participant of a specified period of time to cure any default prior to suspension or revocation of the permit in whole or in part. These terms and conditions will address, but are not limited to, provisions specifying the actions CDFW will take under all of the following circumstances (2820(b)(3)): • The plan participant fails to provide adequate funding. • The plan participant fails to maintain rough proportionality between impacts on habitat or covered species and conservation measures. • The plan participant adopts, amends, or approves any plan or project without the concurrence of the wildlife agencies that is inconsistent with the objectives and requirements of the approved plan. • The level of take exceeds that authorized by the permit.	Chapter 7, *Plan Implementation*
The plan specifies procedures for amendment of the plan and the implementation agreement (2820(b)(4))	Chapter 7, *Plan Implementation*
The plan ensures implementation of a monitoring program and adaptive management program. (2820(b)(5))	Chapter 6, Section 6.5, *Monitoring and Adaptive Management*

Natural Community Conservation Planning Act Requirement (California Fish and Game Code Section)	**Applicable HCP/NCCP Chapter/Section[a]**
The plan provides for oversight of plan implementation to assess mitigation performance, funding, and habitat protection measures. (2820(b)(6))	Chapter 7, *Plan Implementation*
The plan provides for periodic reporting to the wildlife agencies and the public for purposes of information and evaluation of plan progress. (2820(b)(7))	Chapter 7, *Plan Implementation*
The plan provides mechanisms to ensure adequate funding to carry out the conservation actions identified in the plan. (2820(b)(8))	Chapter 8, *Costs and Funding*
The plan stipulates that if a participant does not maintain proportionality between take and the conservation measures specified in the implementation agreement and does not either (a) cure the default within 45 days or (b) enter into an agreement with CDFW within 45 days to expeditiously cure the default, CDFW will suspend or revoke the permit in whole or in part. (2820(c))	Chapter 7, *Plan Implementation*
The plan requires that data and reports associated with monitoring programs be available for public review; the landowner must also conduct public workshops on an annual basis to provide information and evaluate progress toward attaining the conservation objectives of the plan. (2820(d))	Chapter 6, Section 6.5 *Monitoring and Adaptive Management* Chapter 7 *Plan Implementation*
Habitat Conservation Plan Requirement (Section 10 of Federal Endangered Act)	**Applicable HCP/NCCP Chapter/Section[a]**
The plan specifies the impact which will likely result from take of covered species (Section 10(a)(2)(A)(i)). The taking must be incidental (Section 10(a)(2)(B)(i)) and must not appreciably reduce the likelihood of the survival and recovery of the species in the wild (Section 10(a)(2)(B)(iv)	Chapter 5, *Effects of Covered Activities*
The plan specifies what steps the applicant will take to minimize and mitigate the impacts (Section 10(a)(2)(A)(ii)). The applicant must minimize and mitigate impacts to the maximum extent practicable (Section 10(a)(2)(B)(ii).	Chapter 6, *Conservation Strategy*
The plan specifies the funding that will be available to implement the minimization and mitigation actions (Section 10(a)(2)(A)(ii))	Chapter 8, *Cost and Funding*
The Plan specifies alternative actions to take of covered species the applicant considered and the reasons why such alternatives are not being considered.	Chapter 9, *Alternatives*

[a] Only the primary applicable sections of this HCP/NCCP are listed. Other sections may apply or be cross-referenced by the sections listed in this table.

1.4.2 Other Federal and State Wildlife Laws and Regulations

This section describes the relationships between this HCP/NCCP and other federal and state wildlife laws and environmental regulations. This HCP/NCCP provides take authorization under the CESA, FESA, and NCCPA, but a covered activity may require other permits for implementation under the laws and regulations discussed below.

1.4.2.1 Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act of 1918 (MBTA) (16 United States Code [USC] 703 *et seq*.) implements various treaties and conventions between the United States and Canada, Japan, Mexico, and countries of the former Soviet Union for the protection of migratory birds. Under the MBTA, taking, killing, or possessing migratory birds is unlawful, as is taking of any parts, nests, or eggs of such birds (16 USC 703). *Taking* is defined more narrowly under the MBTA than under the FESA and includes only the death or injury of individuals of a migratory bird species or their eggs. Taking under the MBTA does not include the concepts of harm and harassment, as defined by the FESA. The MBTA defines migratory birds broadly, and all covered birds in this HCP/NCCP are listed as migratory birds under the MBTA.

USFWS has developed policy guidance and implementing regulations regarding the incidental take of bird species that are listed as threatened or endangered under the FESA but also protected under the MBTA (U.S. Fish and Wildlife Service 2000a, Appendix 5). According to these regulations, an incidental take permit can function as a special purpose permit under the MBTA (50 CFR 21.27) for the take of all FESA-listed covered species that are subject to the terms and conditions specified in an HCP. Any such take will not be in violation of the MBTA.

Least Bell's vireo and western yellow-billed cuckoo are the only bird species covered by this HCP/NCCP that are currently listed under the FESA. Measures set forth in the conservation strategy to minimize and mitigate effects on covered species will provide a significant "benefit to the migratory bird resource," as required by the MBTA regulations to obtain a special purpose permit.[13] Therefore, the FESA permit will also constitute an MBTA special purpose permit for the federally listed bird species for a three-year term (50 CFR 21.27), subject to renewal according to the authorities of the MBTA and provided that the FESA permit remains valid. If any of the covered bird species become listed under the FESA during the permit term, that species will also be covered by the MBTA special purpose permit. Until a covered bird species is listed under the FESA, however, it will be the responsibility of individual project applicants to comply fully with the MBTA. Project applicants, however, will be required to implement the applicable conditions described in Section 4.3, *Avoidance and Minimization Measures.* These conditions are expected to result in compliance with the MBTA for the covered bird species.

1.4.2.2 Bald and Golden Eagle Protection Act

The federal Bald and Golden Eagle Protection Act (Eagle Act) (16 USC 668 *et seq*.) prohibits take or possession of bald and golden eagles, as well as related commerce, with limited exceptions. Under the Eagle Act, it is a violation to "take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or

[13] Likewise, migratory birds that are not specifically covered by this HCP/NCCP will benefit from its seasonal restrictions on construction and other conservation measures.

golden eagle, alive or dead, or any part, nest, or egg, thereof." *Take* is defined to include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, and disturb. *Disturb* is further defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3).

Recent revisions to the Eagle Act authorize take of bald eagles and golden eagles if all of the following conditions are met:

- The take is compatible with the preservation of the bald eagle and golden eagle.
- The take is necessary to protect a property interest in a particular locality.
- The take is associated with, but not the purpose of, an otherwise lawful activity.
- The take cannot be avoided (applies to individual instances of take).

Programmatic take is also permissible if the take is unavoidable, even though advanced conservation practices are being implemented (50 CFR 22.26). Permits issued under this regulation usually authorize disturbance only; however, in limited cases, a permit may authorize lethal take that results from, but is not the purpose of, an otherwise lawful activity.

Bald and golden eagles are not covered species in this HCP/NCCP.

1.4.2.3 California Fully Protected Species

In the 1960s, before the CESA was enacted, the California Legislature identified specific species for protection under the Fish & Game Code. These *fully protected* species may not be taken or possessed at any time, and no licenses or permits may be issued for their take, except for collecting these species for necessary scientific research and relocating bird species for the protection of livestock. Fully protected species are described in Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the Fish & Game Code. These protections state that "…no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected [bird], [mammal], [reptile or amphibian], [fish]." Recent legislation allows NCCPs to provide take authorization for fully protected species that are covered by an NCCP.

White-tailed kite is the only fully protected species that is covered by this HCP/NCCP; therefore, take of other fully protected species must be avoided. This HCP/NCCP includes conservation measures to avoid taking fully protected species, as defined by the Fish & Game Code. Fully protected species expected to occur in the Plan Area include, but are not restricted to, those listed below.

- Golden eagle
- American peregrine falcon
- Bald eagle
- White-tailed kite
- Western snowy plover
- Ring-tailed cat

Of these species, only white-tailed kite is proposed as a covered species in this HCP/NCCP.

1.4.2.4 Section 3503 of the Fish & Game Code (Bird Nests)

Section 3503 of the Fish & Game Code makes it "unlawful to take, possess, or needlessly destroy the nests or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto." Therefore, CDFW may issue permits for authorizing take. Although this HCP/NCCP contains conservation measures to avoid and minimize such take to the maximum extent practicable, in compliance with Section 3503, some take of covered birds may still occur. The NCCP permit will serve as the authorization to take nests or eggs of covered birds pursuant to Section 3503.

1.4.2.5 Section 3503.5 of the Fish & Game Code (Birds of Prey)

Section 3503.5 of the Fish & Game Code prohibits the take, possession, or destruction of any birds of prey or their nests or eggs, "except as otherwise provided by this code or any regulation adopted pursuant thereto." CDFW may issue permits authorizing take of birds of prey or their nests or eggs pursuant to the CESA or the NCCPA. Two birds of prey are covered by this HCP/NCCP: Swainson's hawk and western burrowing owl. This HCP/NCCP contains conservation measures to avoid and minimize take of Swainson's hawk and western burrowing owl to comply with Section 3503.5. The NCCP permit will serve as the authorization for take of birds, eggs, or nests of Swainson's hawk, white-tailed kite, and western burrowing owl that cannot be avoided pursuant to Section 3503.5.

1.4.3 National Environmental Policy Act

NEPA requires federal agencies to include in their decision-making process appropriate and careful consideration of all environmental effects of a proposed action as well as possible alternatives. Documentation of the environmental effects analysis and efforts to avoid or minimize the adverse effects of proposed actions must be made available for public notice and review. This analysis is documented in either an environmental assessment or an environmental impact statement (EIS). Project proponents must disclose in these documents whether their proposed action will adversely affect the human or natural environment. NEPA's requirements are primarily procedural rather than substantive in that NEPA requires disclosure of environmental effects and mitigation possibilities but includes no requirement to mitigate.

The issuance by USFWS of an incidental take permit under Section 10 of the FESA constitutes a federal action. Therefore, USFWS must comply with NEPA. To satisfy NEPA requirements, USFWS released a draft EIS/EIR on June 1, 2017, for a 90-day comment period that closed on August 30, 2017. The final EIS/EIR accompanies this final HCP/NCCP.

1.4.4 California Environmental Quality Act

CEQA is similar to but more extensive than NEPA in that it requires significant environmental impacts of proposed projects to be reduced to a less-than-significant level through the adoption of feasible avoidance, minimization, or mitigation measures unless unavoidable adverse impacts are overridden by specific economic, social, or other stated benefits (i.e., overriding considerations). CEQA applies to certain activities in California that are undertaken by either a public agency or a private entity that must receive some discretionary approval from a California government agency. In issuing the NCCP permit, CDFW must comply with CEQA. Similarly, the action of Yolo County and the four incorporated cities that are adopting this HCP/NCCP is subject to CEQA compliance. The Conservancy is serving as the lead agency under CEQA. To comply with CEQA, the

Conservancy released a draft joint environmental impact statement/environmental impact statement (EIS/EIR) on June 1, 2017.The public comment period on the EIS/EIR closed on August 30, 2017, and the final EIS/EIR will be considered for certification by the Conservancy on May 7, 2018.

An EIS/EIR will provide programmatic compliance with CEQA for all activities that are covered by this HCP/NCCP. Future projects that receive take coverage under this HCP/NCCP must also comply with CEQA at the project level through their local jurisdiction. The conservation strategy was designed to meet all CEQA mitigation standards for impacts on the special-status species and natural communities that are covered in this HCP/NCCP. Project-specific CEQA documents will still be necessary, however, for covered activities. Barring major changes, it is expected that future CEQA documents for Yolo HCP/NCCP covered activities will incorporate the conservation measures in this HCP/NCCP by reference to comply with CEQA with respect to the covered species and natural communities addressed in this HCP/NCCP. Many of the conservation measures in this HCP/NCCP will benefit noncovered special-status species as well and may be adequate with respect to meeting the CEQA standards for these species. This will be determined on a project-by-project basis through the CEQA process.

1.4.5 Federal and State Wetland Laws and Regulations

1.4.5.1 Section 404 of the Clean Water Act

In 1972, Congress passed the federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA), with the goal of "restor[ing] and maintain[ing] the chemical, physical, and biological integrity of the nation's waters" (33 USC 1251(a)). In furtherance of this goal, the CWA prohibits the discharge of any pollutants into navigable waters, except as allowed by permit issued under certain sections of the CWA (33 USC 1311, 1342, and 1344). Specifically, Section 404 authorizes the U.S. Army Corps of Engineers (USACE) to issue permits to regulate the discharge of dredged or fill materials into wetlands or other waters of the United States. Under the CWA and its implementing regulations, *waters of the United States* are broadly defined as rivers, creeks, streams, and lakes, extending to their headwaters and including adjacent wetlands (33 CFR 328.3(a)(3)).

Some covered activities will result in the discharge of dredged or fill materials into waters of the United States and will need to be authorized by USACE. These HCP/NCCP actions will receive such authorizations through both General Permits and Individual Permits that are separate from the HCP/NCCP Permits. Typically, General Permits apply to specific classes of activities that have been determined to cause no more than a minimal impact to the aquatic environment (e.g., construction of road crossings, installation of utility lines, and operations and maintenance activities) (33 CFR 325.5(c)). Individual Permits are designed for activities that have the potential to have more than a minimal effect on jurisdictional waters or that otherwise do not qualify under the conditions of a General Permit. USACE must evaluate applications for Individual Permits to determine their consistency with the requirements of the Section 404(b)(1) guidelines (40 CFR 230) and USACE regulations (33 CFR 325). Federal agency actions are subject to NEPA, and USACE will follow NEPA requirements for required actions. It is the intent of the Conservancy that the EIS/EIS prepared for this HCP/NCCP could address some NEPA issues that may arise from federal agency reviews for General Permits or Individual Permits.

1.4.5.2 Clean Water Act Section 401 and the Porter-Cologne Water Quality Control Act

Under Section 401 of the CWA, states have the authority to certify federal permits for discharges to waters under state jurisdiction. States may review proposed federal permits (e.g., Section 404 permits) for compliance with state water quality standards. The permit cannot be issued if the state denies certification. In California, the State Water Resources Control Board (State Board) and the Regional Water Quality Control Boards (usually referred to as the Regional Boards) are responsible for the issuance of Section 401 certifications.

The Porter-Cologne Water Quality Control Act is the primary state law concerning water quality. It authorizes the State Board and Regional Boards to prepare management plans, such as regional water quality plans, to address the quality of groundwater and surface water. The Porter-Cologne Water Quality Control Act also authorizes the Regional Boards to issue waste discharge requirements that define limitations for allowable discharge to waters of the state. In addition to issuing Section 401 certifications on Section 404 applications to fill waters, the Regional Boards may issue waste discharge requirements for such activities. Waste discharge requirements may apply to a broader range of aquatic resources than do Section 404 permits and Section 401 water quality certifications because the authority for waste discharge requirements is derived from the Porter-Cologne Water Quality Control Act and not the CWA. Applicants that obtain a permit from USACE under Section 404 must also obtain certification of that permit from the Regional Board with jurisdiction over the project site. Even if no Section 404 approvals are required, waste discharge requirements may be required for actions that affect waters of the state. In the Plan Area, the Central Valley Regional Board has jurisdiction. This HCP/NCCP does not include certifications under Section 401 or waste discharge requirements under the Porter-Cologne Water Quality Control Act. These authorizations, if required, must be obtained separately.

1.4.5.3 Lake or Streambed Alteration Agreement

California has adopted regulations to address impacts on many of the resources that are subject to Section 404 of the CWA. Although not entirely overlapping, these programs frequently intersect. Project proponents are required to obtain separate authorizations from USACE and CDFW.

Section 1602 of the Fish & Game Code requires any person, state, or local government agency to provide advance written notification to CDFW prior to initiating any activity that would divert or obstruct the natural flow, or substantially change or remove material from the bed, channel, or bank, of any river, stream, or lake or result in the disposal or deposition of debris, waste, or other material into any river, stream, or lake.

Certain covered activities will require streambed alteration agreements under Section 1602. As part of that process, CDFW will review notifications submitted by the Permittees or third-party participants to determine if the proposed project would affect existing fish and wildlife resources that are directly dependent on a lake, river, or stream. If CDFW determines that the proposed activity will not substantially adversely affect an existing fish and wildlife resource, it will notify the applicant that no streambed alteration agreement is required, and the project may proceed (Fish & Game Code Section 1602(a)(4)(A)(i)). If CDFW determines that the project may substantially adversely affect an existing fish and wildlife resource, it will require, as part of a streambed alteration agreement, reasonable measures necessary to protect the fish and wildlife resource (Fish & Game Code Section 1603(a)).

1.4.6 National Historic Preservation Act

The National Historic Preservation Act of 1996, as amended (16 USC 470 *et seq*.), requires federal agencies to take into account the effects of federal undertakings on historic properties that are listed or eligible for listing on the National Register of Historic Places (National Register). Historic property means any prehistoric or historic district, site, building, structure, and object that is included on or eligible for inclusion on the National Register. *Federal undertaking* is defined to include the issuance of permits, such as permits under Section 10 of the FESA, including the Yolo HCP/NCCP's Section 10 permit. In undertaking its review under Section 106, the federal agency must confer with the State Historic Preservation Officer and the Advisory Council on Historic Preservation.

1.4.7 Delta Reform Act

In November 2009, California enacted comprehensive legislation to address the range of challenges facing the Sacramento–San Joaquin Delta, including those involving water supply reliability and ecosystem health. The Delta legislation includes the Sacramento–San Joaquin Delta Reform Act of 2009 (California Water Code 35), which provides for the establishment of an independent state agency, the Delta Stewardship Council, to further the goals of ecosystem restoration and a reliable water supply. The Council, which became operational on February 3, 2010, is charged with the development and implementation of the comprehensive Delta Plan, and is vested with the authority to review actions of state and local agencies and advise on their consistency with the Delta Plan.

The legislation enacting the Delta Plan advances several broad goals with regard to the Delta and specifies a range of actions to meet those goals. Among the several goals stated in the legislation is the following:

> Achieve the two co-equal goals of providing for a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem. The co-equal goals shall be achieved in a manner that protects and enhances the unique cultural, recreational, natural resource, and agricultural values of the Delta as an evolving place.

According to the Delta Reform Act, state or local agencies approving, funding, or carrying out projects, plans, or programs in the Delta, upon determining their project is a "covered action" subject to regulations of the Delta Plan, must certify consistency of the project with the Delta Plan policies (Water Code Section 85225).

1.5 Organization of This Document

This section provides a brief overview of the contents of the chapters and appendices. The document consists of 11 chapters.

- Chapter 1, *Introduction*, sets the context for development of the Yolo HCP/NCCP, including the background, purpose, regulatory context, and scope; describes the process that guided development of this HCP/NCCP; and provides an overview of the document's contents and organization.

- Chapter 2, *Existing Ecological Conditions*, describes the existing environmental conditions within the Plan Area, providing the context in which this HCP/NCCP and its various elements have been developed.
- Chapter 3, *Covered Activities*, describes the activities identified for regulatory coverage in the Plan Area, including activities within conservation lands.
- Chapter 4, *Application Process and Conditions on Covered Activities*, describes the conditions that project applicants must meet to be covered under this HCP/NCCP, including avoidance and minimization measures, and the process through which applicants are covered.
- Chapter 5, *Effects on Covered Species and Natural Communities*, includes an analysis of the adverse and beneficial effects of the covered activities and conservation strategy on natural communities and covered species in the Plan Area. It also describes cumulative effects resulting from other future state or private activities (i.e., not involving federal activities) that are reasonably certain to occur in the Plan Area.
- Chapter 6, *Conservation Strategy*, describes the conservation strategy, including the biological goals and objectives, approach to conservation, conservation measures for species and habitats, and avoidance and minimization measures. It also describes the adaptive management decision-making process and monitoring requirements.
- Chapter 7, *Plan Implementation*, addresses implementation of this HCP/NCCP and includes a description of the Conservancy, the structure, and the decision-making process; the schedule for implementation of actions; the monitoring and reporting process for ensuring compliance; the regulatory assurances anticipated by the Permittees; a discussion of changed circumstances and the approach with respect to unforeseen circumstances; and a discussion regarding the duration, amendment, renewal, and enforcement of permits.
- Chapter 8, *Costs and Funding*, provides estimates of the costs of implementation and identifies the sources of funding on which the Permittees will rely.
- Chapter 9, *Alternatives to Take*, describes the alternatives to take of covered species that were developed and considered and the reasons why they were not adopted.
- Chapter 10, *List of Preparers*, lists the preparers of this HCP/NCCP.
- Chapter 11, *References*, lists the printed references and personal communications cited in this HCP/NCCP.

The document also includes the following 16 appendices:

- Appendix A, *Covered Species Accounts*, provides information on the status, distribution, life history, habitat needs, and threats to each covered species. It also describes the habitat models that the HCP/NCCP uses for each covered species.
- Appendix B, *Common and Scientific Names of Species Mentioned in the Text*, provides the scientific names of all species mentioned in this document. Scientific names are not included in the chapter text.
- Appendix C, *Evaluation of Species Considered for Coverage*, lists all species the Conservancy considered for coverage under the HCP/NCCP and describes the factors evaluated to determine whether or not to cover species in the HCP/NCCP.
- Appendix D, *Glossary of Terms*, provides definitions of key terms used in the HCP/NCCP.

- Appendix E, *Implementing Agreement* (IA), is an agreement signed by all parties that identifies roles and responsibilities of the Permittees, USFWS, and CDFW.
- Appendix F, *STAC Evaluation Criteria,* provides the worksheet that the Scientific and Technical Advisory Committee (STAC) will use to evaluate sites for inclusion in the reserve system.
- Appendix G, *Pollinator Conservation Strategy,* provides a pollinator strategy prepared by the Xerces Society for Yolo County.
- Appendix H, *Cost Estimates and Assumptions*, provides the cost model and material the Conservancy used to estimate HCP/NCCP implementation costs described in Chapter 8.
- Appendix I, *Funding Plan*, provides supporting material for the funding plan described in Chapter 8.
- Appendix J, *State and Federal Funding*, describes the estimated state and federal funding for the first 10 years of HCP/NCCP implementation.
- Appendix K, *Conservation Easement Template*, provides a draft template for conservation easements to be established for the reserve system.
- Appendix L, *Staff Report on Burrowing Owl Mitigation,* provides CDFW's standard burrowing owl mitigation guidelines from 2012.
- Appendix M, *Yolo County Agricultural Practices*, lists typical agricultural practices conducted in Yolo County by season and crop type, as related separately to Reserve System Lands and the Neighboring Landowner Protection Program.
- Appendix N, *Fragmentation Effects,* provided Ascent Environmental's methodology for estimating potential indirect effects on covered species resulting from habitat fragmentation.
- Appendix O, *Giant Garter Snake Take Analysis*, provides the methodology for estimating the number of individual giant garter snakes that could be harassed, injured or killed as a result of the covered activities.
- Appendix P, *Site-Specific Management Plan Template*, provides a template for use in developing site-specific management plans.

Chapter 2
Existing Ecological Conditions

2.1 Introduction

This chapter describes the existing and historical physical and biological conditions in the Plan Area, including conditions related to the agricultural landscape, local ecological communities, and covered species. Information on the current environmental conditions and other data presented in this chapter address specific requirements of the Federal Endangered Species Act (FESA) and the Natural Community Conservation Planning Act (NCCPA). The Yolo Habitat Conservancy (Conservancy) used the ecological information presented in this chapter to identify the potential effects of covered activities on covered species and natural communities and develop measures to address effects on and conservation of covered species and natural communities.[1]

Section 2.2, *Physical Characteristics*, describes the climatic, hydrologic, topographic, and edaphic characteristics of the Plan Area; Section 2.3, *Land Cover Mapping*, describes the methods, data sources, and classification system for mapping natural communities and covered species' habitats; Section 2.4, *Natural Communities and Associated Plant and Wildlife Species*, describes the composition and extent of natural communities in the Plan Area; Section 2.5, *Other Land Cover Types*, describes the composition and extent of other land covers that provide habitat for covered species; and Section 2.6, *Covered Species,* describes the process used to select species for coverage under this HCP/NCCP. This chapter is supported by Appendix A, *Covered Species Accounts*, which provides summaries of the status and attributes of the covered species, and Appendix C, *Evaluation of Species Considered for Coverage,* which provides more detail on the selection process for covered species. Appendix B, *Common and Scientific Names of Species Mentioned in the Text,* provides the scientific names for each species mentioned in this HCP/NCCP.

2.2 Physical Characteristics

Climate, topography, hydrology, geology, and soils determine the conditions that support plant and wildlife species and the potential for protection, restoration, and enhancement of habitat for covered species.

2.2.1 Data Sources

The following data sources were used to describe the physical environment of the Plan Area:

- Soil Survey of Yolo County, California (U.S. Department of Agriculture, Natural Resources Conservation Service [USDA-NRCS] 2007).
- PRISM climate data (PRISM Climate Group 2004).

[1] This chapter uses the term *natural community* to include both natural and seminatural (cultivated lands) land cover types.

- State Soil Geographic (STATSGO) database for California (U.S. Department of Agriculture Soil Conservation Service [USDA-SCS] 1994).
- National Hydrographic Dataset (U.S. Geological Survey [USGS] 2011).
- Other relevant technical reports and literature.

2.2.2 Climate

The Plan Area has a Mediterranean-type climate, with cool, wet winters and warm, dry summers. Cyclical climatic events can cause large annual fluctuations in precipitation levels (Minnich 2007; Reever-Morghan et al. 2007). Precipitation occurs primarily in the form of rain from October through April, with very little precipitation during the hot, dry summers. Figure 2-1 shows average annual distribution of precipitation for the Plan Area.

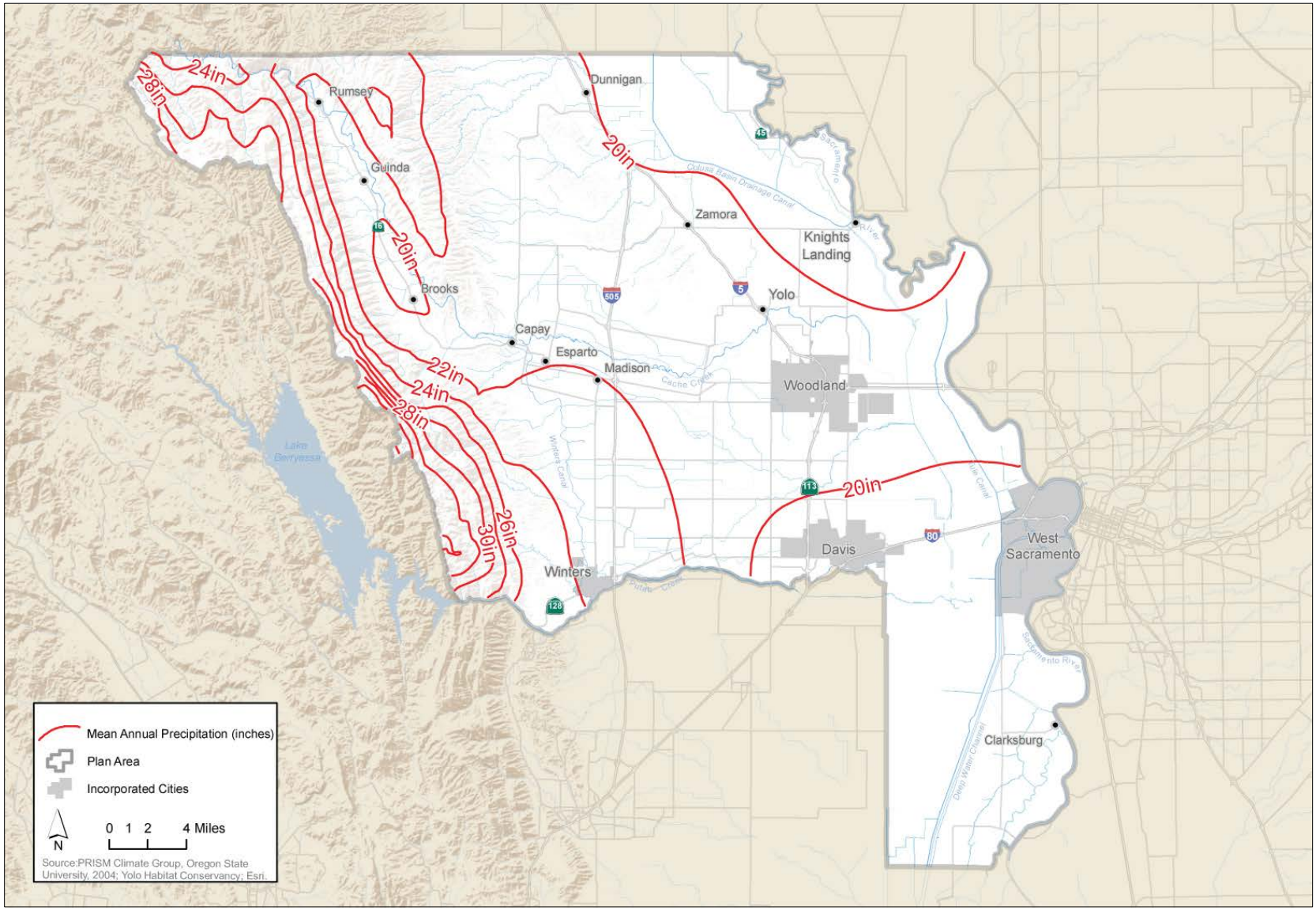
Average annual precipitation is lowest in areas near the Sacramento River (18 inches annually) and greatest in the Little Blue Ridge and Blue Ridge mountains (21 to 30 inches annually) (Rantz 1969). These mountains are in the inner Coast Range, which, elsewhere in California, is in a rain shadow; consequently, the amount of rainfall is quite low. The inner Coast Range in Solano and Yolo Counties, however, is exposed to storms that move through a gap in the Coast Range provided by the San Francisco Bay estuary. Consequently, the inner Coast Range in these counties has ecological conditions that are found elsewhere only in the outer Coast Range. Average daily temperatures in the Plan Area range from a high and low of 59 degrees Fahrenheit (°F) and 35°F in January to a high and low of 96°F and 59°F in July.

2.2.3 Topography

The Plan Area lies within the California's Great Central Valley and Coast Ranges geomorphic provinces (Norris and Webb 1990), and its topography is characterized by valley, foothill, and mountain range components. The Little Blue Ridge and Blue Ridge occupy the west side of the Plan Area, with the highest elevations in the county (approximately 3,100 feet above mean sea level) in the northwestern corner of the Plan Area. The eastern side of the Plan Area is located on the valley floor, with elevations typically less than 100 feet above mean sea level. The Capay Hills, a parallel satellite range of the Coast Range, lie east of the northern half of the Blue Ridge and are separated from it by the Capay Valley. The Capay Hills connect with the Blue Ridge at the Capay Valley's closed northern end. East of the Capay Hills, a much lower and more subdued Coast Range satellite, the Dunnigan Hills/Plainfield Ridge, connects to the Capay Hills at its northern end.

The uplifting of the Coast Ranges by tectonic processes created north/northwest-trending faults, such as those that underlie the eastern edge of Capay Valley, and folds such as the Dunnigan Hills/Plainfield Ridge anticline that runs from the Capay Hills to Putah Creek. Tectonic processes also created the companion Madison syncline, forming the Hungry Hollow Basin between the Capay Hills and the Dunnigan Hills north of Cache Creek and the Cache/Putah Basin at the base of the Blue Ridge between Cache and Putah Creeks (State of California 1987; Jones & Stokes 1996; Graymer et al. 2002; Luhdorff and Scalmanini 2004; WRIME 2006). The low-lying areas of the Plan Area consist of a broad, flat alluvial plain on the Central Valley floor that slopes downward from the Coast Range east to the Colusa and Yolo Basins, which parallel the Sacramento River (WRIME 2006). The elevations in the southern end of the Yolo Basin are slightly below sea level.

Figure 2-1. Mean Annual Precipitation



2.2.4 Hydrology

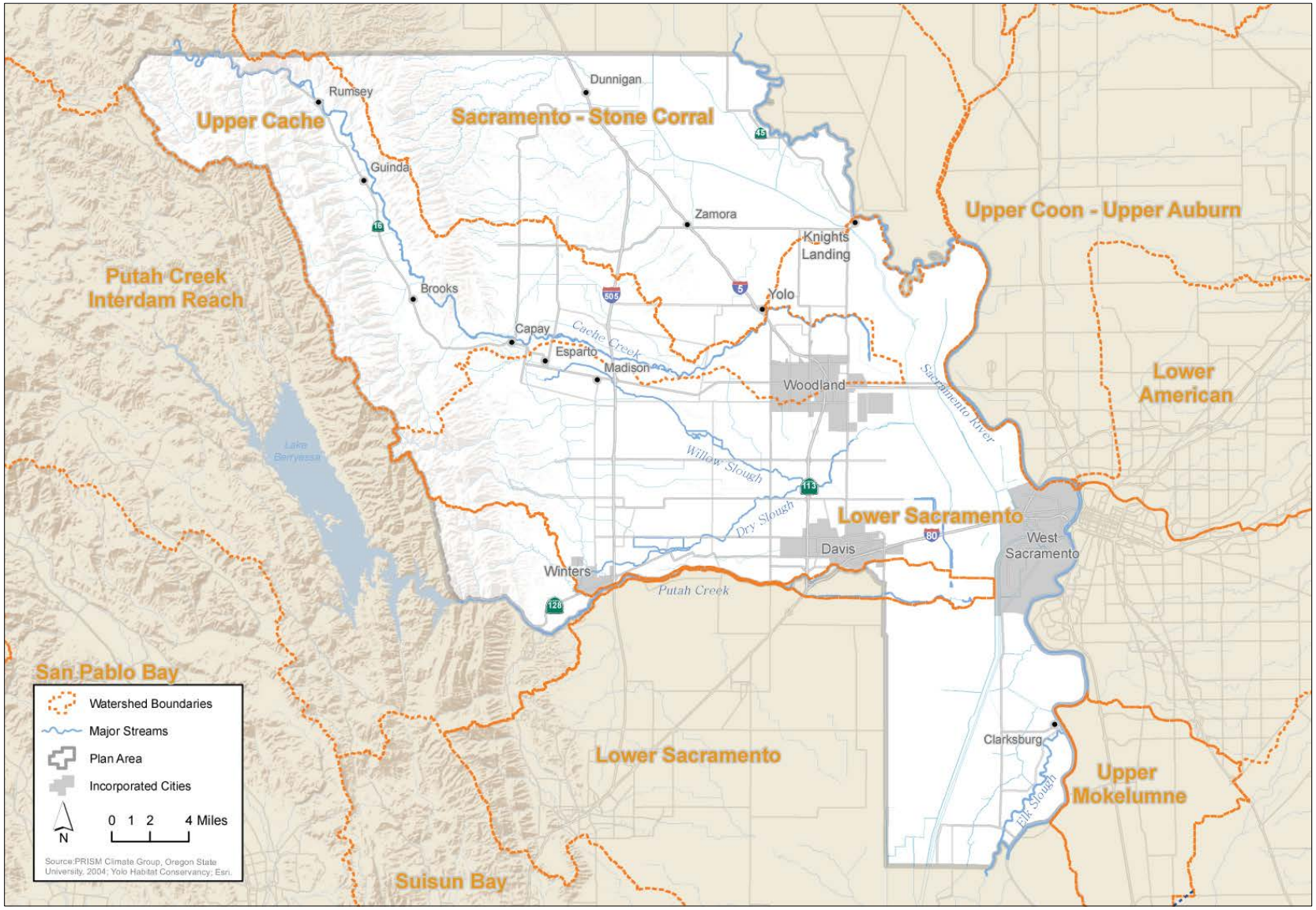
The surface hydrologic features in the Plan Area are dominated by the Sacramento River and Cache and Putah Creeks (Figure 2-2), which originate upstream of Yolo County (WRIME 2006). Both Cache Creek and Putah Creek are antecedent streams that are older than the Coast Range and have maintained a relatively constant elevation as the Coast Range was tectonically uplifted about 1 million years ago. Consequently, both streams have eroded deep canyons through Blue Ridge. Other surface waters, originating from local precipitation, springs, and irrigation tailwater, contribute to the numerous small creeks that drain the Blue Ridge, Capay Hills, Dunnigan Hills/Plainfield Ridge, and the Central Valley floor. Irrigation water is distributed through a network of natural and modified sloughs and constructed drainages that ultimately drain to the Colusa and Yolo Basins, which run along the west bank of the Sacramento River. Figure 2-2 shows the watersheds in the Plan Area.

Cache Creek flows are regulated in Lake County by the Cache Creek Dam at the outlet of Clear Lake and the Indian Valley Dam on the North Fork of Cache Creek. In Yolo County, flows are regulated by the Capay Diversion Dam. Flows in Putah Creek are regulated by the Monticello Dam, situated on Blue Ridge at the western edge of Yolo County, and by the Putah Diversion Dam, located west of the city of Winters (WRIME 2006). The flows in the Sacramento River and in the adjacent Colusa and Yolo Basins are controlled by the State Water Project and Central Valley Project and contained by levees constructed by the Sacramento River Flood Control Project. As part of the Sacramento River Flood Control Project, high flows that pass over the Fremont and Sacramento Weirs are diverted through the Yolo Bypass located in the Yolo Basin. The four main drainages in the Plan Area are described below.

2.2.4.1 Cache Creek

Cache Creek enters northwestern Yolo County through deep gorges in the Coast Range and then flows southeastward down the narrow Capay Valley. Near that valley's southern end, it flows through the Capay Hills in another deep gorge and then eastward across the Central Valley floor to the Yolo Bypass. Flows are diverted at the Capay Diversion Dam, just west of Capay, to the Winters and West Adams irrigation canals. The reach below this dam, known as Lower Cache Creek, historically flowed between raised natural levees. Overflows would drain away from the creek into the Hungry Hollow and Cache/Putah Basin. Lower Cache Creek between the Capay Hills and Dunnigan Hills/Plainfield Ridge is characterized as a "losing reach" because it loses a substantial amount of its flow to groundwater recharge where it flows across coarse sediments that have been deposited in the Madison syncline basin (WRIME 2006). This reach cannot support typical riparian vegetation because it loses so much water; instead, it supports distinctive riparian chaparral (Holstein 2013). The section of Lower Cache Creek, however, is a "gaining reach" where it crosses the Dunnigan Hills/Plainfield Ridge anticline, causing flows to increase due to groundwater contributions. Cache Creek terminates at the Cache Creek Settling Basin, an artificial basin that was constructed to trap sediment that otherwise would flow into the Yolo Bypass. The Cache Creek Settling Basin is separated from the Yolo Bypass by an outlet weir that overtops during high flows, sending Cache Creek waters through the Yolo Bypass to the Sacramento-San Joaquin River Delta.

Figure 2-2. Watershed and Major Streams of the Plan Area



2.2.4.2 Putah Creek

Putah Creek enters Yolo County at the base of Monticello Dam and runs eastward through a narrow canyon to the Putah Creek Diversion Dam, which supplies the Putah South Canal. Lake Solano is upstream of, and created by, the Putah Creek Diversion Dam. Below the dam, Putah Creek flows across its alluvial fan, creating a groundwater basin. Between Monticello Dam and the beginning of Yolo County's southeastern panhandle, the creek is the southern boundary of Yolo County and the Plan Area. Lower Putah Creek historically flowed between raised natural levees. Overflows would drain away from the creek and northward into the Cache/Putah Basin and southward through minor channels into Solano County.

The lower section of Putah Creek is a losing reach until it crosses the Dunnigan Hills/Plainfield Ridge anticline where it briefly becomes a gaining reach (Thomasson et al. 1960; California Division of Water Resources 1955). The creek continues eastward until it reaches Davis and eventually drains into the Yolo Basin. Beginning in 1870, a series of flood control projects deepened a minor fork of Putah Creek that ran south of Davis. A levee system was constructed across the North Fork of Putah Creek that directed most flows into the South Fork and dewatered the North Fork downstream of the levees (Anonymous 1870). Putah Creek terminates at the Putah Sinks within the Yolo Bypass. Drainage modifications and agricultural conversion in the sinks, beginning in the late 1800s, have completely modified the Putah Sinks from historical conditions (Vaught 2006).

2.2.4.3 Willow Slough

Willow Slough drains a 164-square-mile watershed between Cache Creek and Putah Creek (Water Resources Association of Yolo County 2005). The Willow Slough watershed, which includes numerous small drainages that flow into Willow Slough, is divided into five major landform units: the eastern slope of the inner Coast Range, the low hills at the foot of the range, the alluvial plains of the Madison syncline, a band of undulating hills known as the Plainfield Ridge, and the low-lying basin east of the ridge (Jones and Stokes 1996). Historically, after floodwaters receded each year, several large alkaline playa-type pools would remain on the edges of alluvial deposits in the plains around Willow Slough.

In the late 1800s, Willow Slough was generally perennial (Schuyler 1879, in Jones and Stokes 1996). Decreases in base flows may have resulted from cattle grazing in the foothills (which tends to increase direct runoff and decrease infiltration and base flow) and groundwater pumping (which tends to lower groundwater levels and shorten or eliminate reaches where groundwater seeps into slough channels) (Jones and Stokes 1996). Downcutting of the nearby Cache Creek channel at Dunnigan Hills/Plainfield Ridge most likely captured groundwater that formerly fed springs that kept Willow Slough perennial.

In the 1960s, the U.S. Army Corps of Engineers constructed the Willow Slough Bypass, approximately one-quarter mile east of Highway 113, north of the city of Davis. The bypass diverts all floodflows in downstream Willow Slough to a lower elevation of the Yolo Bypass. Creation of the bypass increased the draining velocity of floodflows through improved gravity flow (Water Resources Association of Yolo County 2005).

Willow Slough has been ditched and modified from its natural conditions, creating a dense rectilinear network that supplies irrigation water and drains floodwaters (Jones & Stokes 1996) (Figure 2-2). In some localized areas, these ditches are lined with narrow bands of riparian

vegetation. In other areas, they abut cultivated agricultural fields, and their banks are maintained as bare soil. Portions of Willow Slough, however, still retain their natural sinuosity and are lined with dense riparian forests (Holstein 2013). The original remnant of Willow Slough continues northeast and enters the Yolo Bypass at Conaway Ranch (Water Resources Association of Yolo County 2005).

2.2.4.4 Sacramento River, Bypasses, and Basins

The Sacramento River forms the eastern edge of the Plan Area. Prior to 1850, the Sacramento River periodically overflowed its natural levees, filling the adjacent lowland Colusa and Yolo Basins (Kelley 1985; Mount 1995). These two major lowlands were separated by a large deposit of alluvium known as the Knights Landing Ridge. Overflows in both basins eventually drained back into the Sacramento River at the southern end of the Plan Area. Gold mining in the Sierra Nevada significantly altered the hydrologic function of the Sacramento River during the hydraulic mining period (1850 to 1884), producing large amounts of sediment that choked the channels of the Sacramento River. This sediment influx raised portions of the riverbed that ran along the Yolo County boundary. The sediments were flushed into the Yolo and Colusa Basins during flood events. The sediments were gradually purged from the lower sections of the Sacramento River in the early 1900s, by the time the Sacramento River Flood Control Project began (Kelley 1985). The lower Sacramento River is now largely sediment-starved as a result of sediment retention behind dams and the leveeing of the historical Sacramento River floodplain.

The Yolo Bypass was constructed in the 1930s as part of the Sacramento River Flood Control Project to shunt floodwaters out of the Sacramento River and reduce the potential for large-scale flooding. Under normal conditions, water flows from the Colusa Bypass into the Yolo Bypass through a cut in the Knights Landing Ridge, known as the Knights Landing Ridge Cut Canal. During flood conditions, flows from the Sacramento River enter the 57,000-acre Yolo Bypass over the fixed Fremont Weir at its northern end. Floodflows also enter the Yolo Bypass through the gated Sacramento Weir, which is just upstream of the confluence with the American River. The Yolo Bypass can convey up to 80 percent of the system's floodwaters, which drain back into the Sacramento River a few miles upstream of Rio Vista in Solano County. During summer, the Toe Drain/Tule Canal on the east side of the Yolo Bypass carries perennial flows southward (Schemel et al. 2002). Numerous tidal sloughs dominate the southern end of the Yolo Basin. The Sacramento Deep Water Ship Channel, a navigation canal, was constructed in the early 1960s adjacent to the east side of the lower Yolo Basin to give larger ships access to the Port of Sacramento (now the Port of West Sacramento) in West Sacramento.

2.2.5 Soils and Geology

Most of the Coast Range in Yolo County is underlain by the Great Valley sequence of marine sediments, which were deposited between 70 and 190 million years ago on a shallow sea floor when the coastline of the Pacific Ocean was located where the Sierra Nevada foothills are now found. An exception occurs at Little Blue Ridge, in the county's northwestern corner, where a serpentine deposit was squeezed upward by tectonic forces from deep in the earth's mantle. This occurs in association with a small amount of Franciscan Formation, a melange of seafloor sediments that were scraped off an oceanic plate that was being tectonically subducted into a marine trench at about the same time the Great Valley sequence was forming. Uplift eventually caused Great Valley sequence deposition to end and the ocean to withdraw from what are now the Coast Range and Central Valley. About 1 million years ago, the Coast Range achieved its present elevation in an uplift that turned beds of the Great Valley sequence sediments on their edge. Putah and Cache Creeks are older than

this uplift, however, because they were able to maintain their location and elevation by eroding deep canyons in the Coast Range and Capay Hills as they uplifted.

Meanwhile, as the Coast Range was uplifting, the area that is now the Central Valley was continually subsiding into a vast basin in which sediments that eroded from surrounding mountains were deposited. Consequently, early marine sediments and even vast volcanic plains were buried beneath thousands of feet of non-marine sediments, which are youngest at the surface and progressively older at depth. The volcanic plain outcrops, known as Lovejoy basalt, reside along the base of the Coast Range. The Capay Hills have a Great Valley sequence core but are largely mantled by uplifted, more-recent non- marine sediments, while Dunnigan Hills/Plainfield Ridge consists entirely of uplifted and eroded non-marine sediments, similar to those on the Central Valley floor. The majority of these non-marine sediments were laid down as the 2- to 5-million-year-old Tehama Formation.

Soils form when parent material (Figure 2-3), either bedrock or alluvium, is altered by physical and chemical processes. In Yolo County's Coast Range, soils closely mirror the underlying bedrock of the Great Valley sequence and serpentine, while more-recent non-marine sediments, such as the Tehama and Red Bluff Formations, mantle the base of Blue Ridge, most of the Capay Hills, and all of the Dunnigan Hills/Plainfield Ridge. In the lowlands of the Central Valley floor, the diversity of soil types reflects ongoing exposure to the forces of streamflow, persistent drainage overflows, the deposition of salts, and uneven the rates of particle settling. In many cases, vegetation patterns are closely associated with particular soil types.

Soil associations of the Plan Area are shown in Figure 2-4. A soil association is a landscape-level classification system, which is based on the distinctive spatial distributions of combinations of soil series. Soils in each series have similar physical and chemical characteristics. As a result of their broad geographical extent, soil associations represent a relatively persistent historical record of landscape-level physical and chemical processes. In Yolo County, the processes have resulted in 12 soil associations, consisting of an uplands group, a lowland alluvial fan group, and a lowland Colusa/Yolo Basin group, as described below.

2.2.5.1 Uplands Soils Group

The uplands soils group consists of five soils associations: Rock Land, Dibble-Millsholm, Positas, Sehorn-Balcorn, and Corning-Hillgate (Figure 2-4). The Rock Land association is located on sandstone of Franciscan complex and Great Valley sequence materials along the highest ridges of Little Blue Ridge and Blue Ridge (Andrews 1970). Serpentine ultramafic parent material (Figure 2-3) is the source of soils that cause the unique natural communities and endemic plants in the northwestern corner of the Plan Area. Typically, 50 to 90 percent of the land surface of Rock Land is exposed sandstone, shale, or serpentinized bedrock; the remainder is covered by a thin layer of sandy loam (Andrews 1970). The most typical vegetation on Rock Land is chaparral. Immediately below the Rock Land association on Blue Ridge and along the flanks of the Capay Hills is the Dibble-Millsholm association, which formed from Great Valley sequence materials (Andrews 1970). Exposed bedrock covers less than 10 percent of the surface of the Dibble-Millsholm association, which consequently has more soil development. The most typical vegetation of this association is woodland dominated by blue oaks, interior live oaks, and foothill pine. Although it lacks similar parent material, an outlier of this association has been mapped on the highest areas of the northern Dunnigan Hills.

The patchy Positas association formed on terraces over the Red Bluff Formation in the southern end of the Blue Ridge and along the western and northern slopes of the Capay Hills. Its soils are gravelly loams. The Sehorn-Balcom association formed over the Tehama Formation, along the eastern toes of the Blue Ridge and Capay Hills, and along most of the Dunnigan Hills. The soils of this association consist of silty clays and clays. Adjacent terraces of the Red Bluff and Tehama Formations support the Corning-Hillgate association, which also extends along the Plainfield Ridge. The soils of this association are gravelly loams or loams. One outlier of this association has been mapped across the entire Cache Creek Settling Basin. Vegetation in the settling basin is riparian, but vegetation of the Positas, Sehorn-Balcom, and Corning-Hillgate associations is typically prairie/grassland, with some blue oak woodland.

2.2.5.2 Lowland Alluvial Fan Group

The lowland alluvial fan group consists of four soils associations: Yolo-Brentwood, Capay-Clear Lake, Rincon-Marvin-Tehama, and Willows-Pescadero (Figure 2-4). The Yolo-Brentwood association is most closely associated with alluvial floodplains and fans of Cache and Putah Creeks. In the Cache/Putah Basin, it forms the highest proportions of the basin rim at the mouths of the streams from the Blue Ridge and along the natural levee of Putah Creek. Its soils are deep and well drained, and their textures range from silty loams to silty clay loams. Its historic vegetation was valley oak forest and woodland. The soils of the Capay-Clear Lake association line the bottoms of the Hungry Hollow and Cache/Putah Basin in the Madison syncline. These soils are generally poorly drained silty clays to clays. Their historic vegetation was primarily prairie/grassland, with some localized seasonal freshwater marsh. The Rincon-Marvin-Tehama association is found on the rim of the Cache/Putah Basin between the Yolo-Brentwood association and the Capay-Clear Lake association. Its historic vegetation was also prairie/grassland. On the eastern side of the Cache/Putah basin is a patch of the Willows-Pescadero association that formed where groundwater was forced to the surface by the Dunnigan Hills/Plainfield anticline. The soils of this association are saline-alkaline silty clay loams to clays. These soil associations are also found east of the Dunnigan Hills/Plainfield Ridge anticline where salts that were transported eastward across the Putah/Cache alluvial fans accumulated at the basin rim interface between the alluvial fans and the Yolo and Colusa Basins. The historic vegetation on Willows-Pescadero soils was alkaline prairie.

2.2.5.3 Lowland Colusa/Yolo Basin and Sacramento River Natural Levee Group

The lowland Colusa/Yolo Basin and Sacramento River natural levee group consists of three soil associations: Sycamore-Tyndall, Sacramento, and Capay-Sacramento (Figure 2-4). The Sycamore-Tyndall association is found on the natural levees of the Sacramento River. Its soils are somewhat poorly drained very fine sandy loams to clay loams. Their historic vegetation was valley oak woodland, with some riparian vegetation along the Sacramento River. Below the Sycamore-Tyndall association, in the rice lands of the Colusa Basin, is the Sacramento association. Its soils are poorly drained silty clay loams and clays. Finally, because of their artificial drainage systems, the Yolo Bypass and parts of the Colusa Basin contain the Capay-Sacramento association, with its moderately well-drained to poorly drained silty clay loams to clays. The historic vegetation of the Sacramento and Capay-Sacramento associations was perennial freshwater marsh dominated by tules.

Figure 2-3. Figure Soil Parent Material in the Plan Area

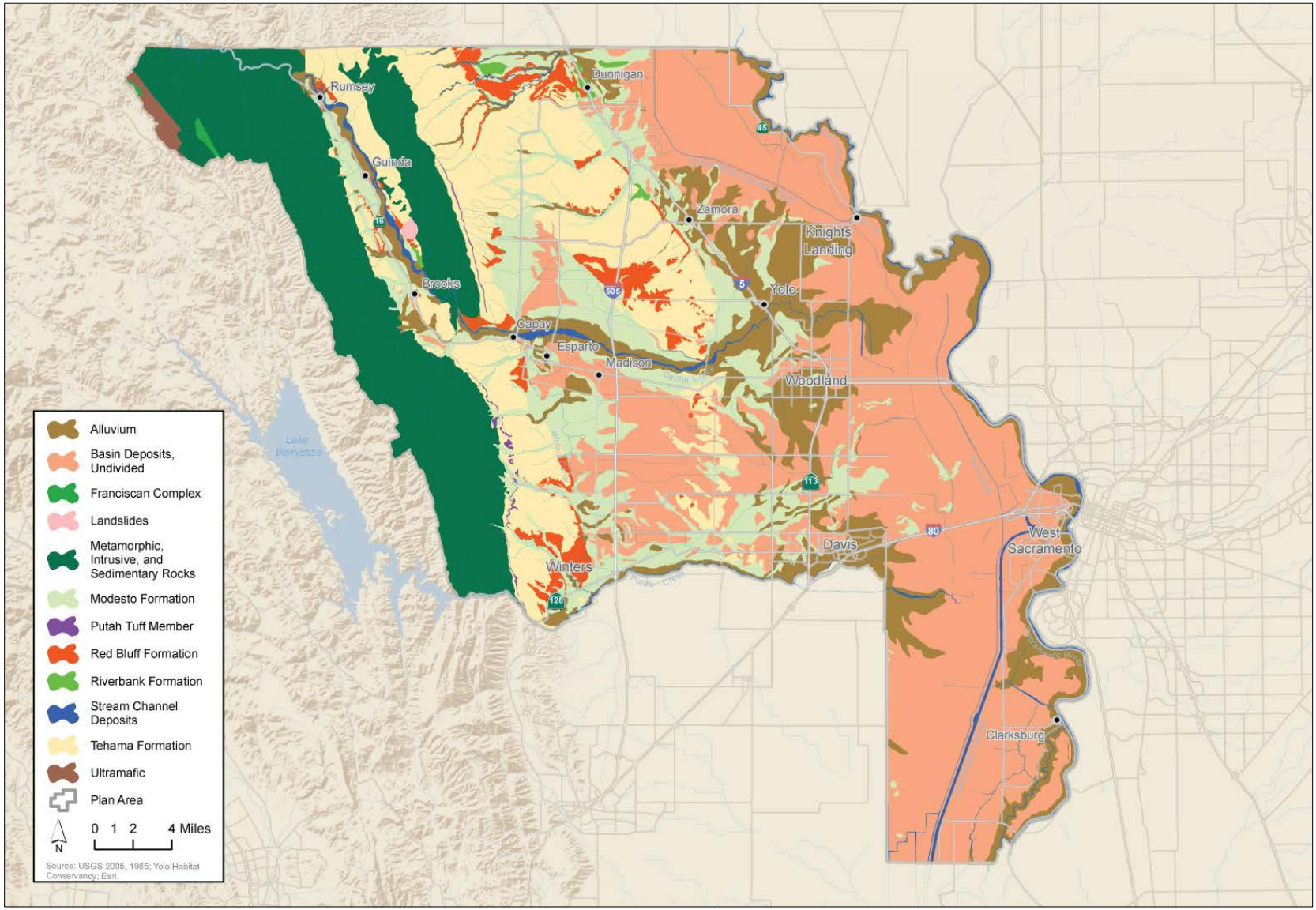
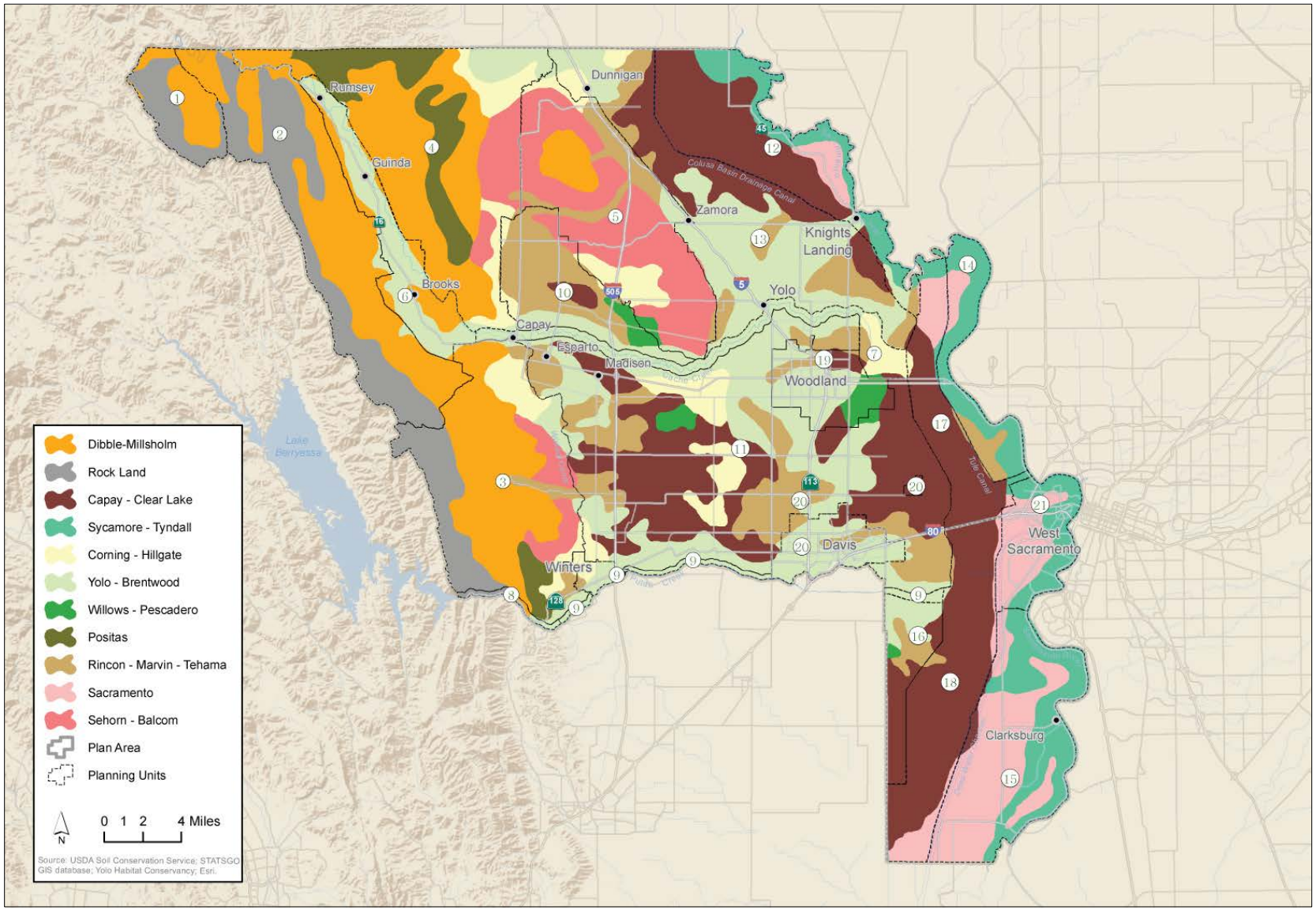


Figure 2-4. Soil Associations in the Plan Area



2.3 Land Cover Mapping

A land cover dataset was created for use in assessing effects of covered activities and developing the conservation strategy (Chapter 5, *Effects on Covered Species and Natural Communities;* Chapter 6, *Conservation Strategy*). Land cover consists of naturally occurring and anthropogenic vegetation, human-made structures, and other unvegetated land cover types (e.g., barren lands, other lands incidental to agriculture).

This section describes the land cover classification system and the methods used to map the land cover types in the Plan Area. The land cover dataset was generated at a scale and level of resolution appropriate for regional resources planning; it was not developed for use in project-level planning. That is, land cover will be verified at the project-level during implementation for tracking and compliance purposes. Although updates to this dataset have been made at a much finer scale to reflect the smaller areas of essential land covers, much of the data set was digitized at a more coarse scale, reflecting an alliance level of vegetation types. A total of 79 land cover types were identified and mapped. As described in the following subsections, the land cover type map represents point-in-time data and was developed at a resolution that is adequate for HCP/NCCP planning and development (Section 2.3.2, *Data Sources,* provides a description of baseline data dates). The land cover type mapping will be periodically updated during implementation (Section 6.5, *Monitoring and Adaptive Management*) and will continue to be used as a planning tool (e.g., during preparation of annual work plans, initial identification of candidate conservation lands).

2.3.1 Natural Community, Vegetation, and Other Land Cover Classification

A comprehensive, multilevel land cover classification and mapping system has been developed for the HCP/NCCP planning process. The land cover classification system achieves the following goals:

- Integrates existing, commonly used and emerging vegetation classification systems.
- Represents the natural and anthropogenic communities, vegetation types, and other land cover types in the Plan Area under existing conditions.
- Provides the basis for characterizing current and future wildlife habitat uses through wildlife habitat relationships models (Section 2.6.3, *Covered Species Habitat Models,* and Chapter 6, *Conservation Strategy*).
- Provides a foundation for future mapping efforts where more detailed site-specific mapping could be integrated.

The classification system uses a two-level hierarchy that establishes 15 natural communities and 79 floristic-based vegetation types and other unvegetated land cover types (Table 2-1, *Natural Communities and Other Land Cover Types*). The vegetation types were derived primarily from the hierarchical structure of *A Manual of California Vegetation* (MCV) (Sawyer and Keeler-Wolf 1995), as adopted and modified by the California Vegetation Classification and Mapping Program and the Napa County Vegetation Map (NCVM) (Thorne et al. 2004). Modifications to the MCV vegetation types were applied from the NCVM to describe the relatively unique vegetation in the western part of the Plan Area. This HCP/NCCP uses the terms *alliances* and *super alliance*s as they were used in

the NCVM program. *Super alliances* are general designations that have been applied to areas that include vegetation that supports alliances or groups of related alliances that could not be identified from aerial photograph interpretation to the alliance level.

Fifteen natural communities were classified in a manner consistent with the California Wildlife Habitat Relationship classification system (Mayer and Laudenslayer 1988). These include land cover categories for characterizing cultivated lands; non-natural areas, including vacant or urban parcels; and open water (see natural community descriptions below). The natural communities and corresponding land cover designations from other classification systems are presented in Table 2-2, *Other Classification Systems*.

Vegetation and other land cover types were used to describe in detail the known and potential distribution of covered species under existing conditions and under future conditions with HCP/NCCP implementation, as described in Section 2.6.3, *Covered Species Habitat Models.*

Neither the MCV nor the NCVM classification systems provide a structure for classifying different types of agricultural cropping systems, which, while not natural vegetation types, provide vital habitat for wildlife. To address this limitation, the California Department of Water Resources (DWR) land use classification was used to draw these distinctions among cultivated land uses (called *seminatural* vegetation).

2.3.2 Data Sources

HCP/NCCP land cover mapping represents several baseline dates and was developed using the following sources:

- Mapping of the Blue Ridge and Little Blue Ridge regions of the Plan Area (Figure 1-2) on 1993 USGS digital orthophotographs prepared by the University of California, Davis (UC Davis), California Department of Fish and Wildlife (CDFW), and Aerial Information Systems (AIS).
- Riparian land cover mapping prepared by Jones & Stokes (1989, 1990).
- Riparian land cover mapping of the Sacramento River (1996), Cache Creek (1996), and Putah Creek (1998) prepared by California State University, Chico, as adjusted in 2004.
- CDFW Bay-Delta vegetation mapping dataset (2005 data).
- DWR 2008 land cover data set.
- National Agriculture Imagery Program (NAIP) 2012 aerial imagery.
- U.S. Fish and Wildlife Service (USFWS) wetland easements data.
- 2013 Google Earth imagery.
- i-cubed Aerial Imagery Service.
- Yolo County Agricultural Commissioner's Field Level Pesticide data (2011, 2013).

Table 2-1. Natural Communities and Other Land Cover Types

Natural Community	Vegetation/Land Cover Detail	Crop Type	Total Extent in Plan Area (acres)[a]
Natural Communities			
Cultivated Land Category			
Cultivated Lands Seminatural Community[b]	Alfalfa	**Alfalfa**	**48,897**
	Rice	**Rice**	**35,724**
	Field Crops	Corn	8,017
		Dry Beans	229
		Grain Sorghum	163
		Safflower	15,512
		Sudan	1,536
		Sugar Beets	10
		Sunflowers	11,114
		Undifferentiated Field Crops	5,496
		Field crops subtotal	**42,077**
	Truck/Berry Crops	Asparagus	128
		Melons/Squash/Cucumbers	3,049
		Onions/Garlic	815
		Peppers	956
		Strawberries	18
		Tomatoes	36,666
		Undifferentiated Truck and Berry Crops	1,832
		Truck/berry crops subtotal	**43,464**
	Grain/Hay Crops	**Grain and Hay Crops**	**65,303**
	Pasture	Miscellaneous Grasses (grown for seed)	3,855

Natural Community	Vegetation/Land Cover Detail	Crop Type		Total Extent in Plan Area (acres)[a]
		Mixed Pasture		11,383
		Native Pasture		138
			Pasture subtotal	**15,376**
			Total Cultivated Lands	**250,841**
Grassland Category				
Grassland	California Annual Grasslands Alliance			70,942
	Lotus scoparius Alliance (post-burn)			172
	Sparse Bush Lupine/Annual Grasses/Rock Outcrop NFD[c] Alliance			39
	Upland Annual Grasslands and Forbs Formation			8,169
	Urban Ruderal			1,589
			Total	**80,911**
Serpentine	Serpentine Barren			10
	Serpentine Grasslands NFD Super Alliance			237
			Total	**247**
Shrubland and Scrub Category				
Chamise	Chamise-Wedgeleaf Ceanothus Alliance			9,257
	Chamise Alliance			20,930
			Total	**30,187**
Mixed Chaparral	California Bay-Leather Oak-(*Rhamnus* spp.) Mesic Serpentine NFD Super Alliance			173
	Evergreen Shrubland			404
	Leather Oak Chaparral Alliance			1,733
	Mixed Manzanita-(Interior Live Oak-California Bay-Chamise) NFD Alliance			4
	Scrub Oak Chaparral Alliance			11,415

Natural Community	Vegetation/Land Cover Detail	Crop Type	Total Extent in Plan Area (acres)[a]
	Toyon-(Foothill Pine/Chamise)/ Annual Grasses Savanna NFD Alliance		530
	White Leaf Manzanita-Leather Oak-(Chamise-*Ceanothus* spp.) Xeric Serpentine NFD Super Alliance		167
	Whiteleaf Manzanita Alliance		92
		Total	**14,518**
Woodland and Forest Category			
Oak-Foothill Pine	Blue Oak Alliance		33
	Foothill Pine Alliance		3,760
	Interior Live Oak-Blue Oak-(Foothill Pine) NFD Association		26,797
	Interior Live Oak Alliance		13,182
		Total	**43,772**
Blue Oak Woodland	Blue Oak Alliance	**Total**	**35,891**
Closed-Cone Pine-Cypress	Knobcone Pine Alliance		201
	MacNab Cypress Alliance		11
		Total	**212**
Montane Hardwood	Black Oak Alliance		98
	Canyon Live Oak Alliance		485
	Mixed Oak Alliance		2,442
	Sparse California Juniper-Canyon Live Oak-California Bay-California Buckeye/Steep Rock Outcrop NFD Alliance		62
		Total	**3,087**
Valley Oak Woodland	Valley Oak Alliance	**Total**	**181**
Riparian and Wetland Category			
Alkali prairie	Alkali Prairie	**Total**	**312**
Vernal pool complex	Vernal Pool Complex	**Total**	**299**

Natural Community	Vegetation/Land Cover Detail	Crop Type	Total Extent in Plan Area (acres)[a]
Fresh Emergent Wetland	Alkali Bulrush-Bulrush Brackish Marsh NFD Super Alliance		9
	Bullrush-Cattail Wetland Alliance		722
	Bulrush-Cattail Freshwater Marsh NFD Super Alliance		3,708
	Carex spp.-*Juncus* spp.-Wet Meadow Grasses NFD Super Alliance		522
	Crypsis spp.-Wetland Grasses-Wetland Forbs NFD Super Alliance		16,579
	Perennial Pepperweed (*Lepidium latifolium*) Alliance		216
	Saltgrass Alliance		3,987
	Undetermined Alliance-Managed		371
		Total	**26,114**
Valley Foothill Riparian	Blackberry NFD Super Alliance		226
	Coyote Brush		208
	Fremont Cottonwood-Valley Oak-Willow (Ash-Sycamore) Riparian Forest NFD Association		3,101
	Giant Reed Series		101
	Great Valley Oak Riparian Association		75
	Mixed Fremont Cottonwood-*Willow* spp. NFD Alliance		1,732
	Mixed Willow Super Alliance		2,988
	Tamarisk Alliance		507
	Undifferentiated Riparian Bramble and Other		17
	Undifferentiated Riparian Scrub		135
	Undifferentiated Riparian Woodland/Forest		278
	Valley Oak Alliance-Riparian		3,139

Natural Community	Vegetation/Land Cover Detail	Crop Type		Total Extent in Plan Area (acres)[a]
	White Alder (Mixed Willow) Riparian Forest NFD Association			57
			Total	**12,564**
Lacustrine and Riverine	Open Water		**Total**	**13,493**
Total Natural and Seminatural Communities				**512,629**
Other Land Cover Types				
Other Agriculture	Citrus/Subtropical	Dates		6
		Lemon		0
		Miscellaneous Subtropical Fruits		16
		Olives		948
		Oranges		189
			Citrus/subtropical subtotal	**1,159**
	Deciduous Fruits/Nuts	Almonds		22,619
		Apples		409
		Apricots		210
		Figs		41
		Peaches/Nectarines		150
		Pears		215
		Pistachios		731
		Prunes		2,071
		Undifferentiated Deciduous Fruits and Nuts		1,335
		Walnuts		15,810
			Deciduous fruits/nuts subtotal	**43,591**
	Vineyards	Vineyards		17,151
	Pasture	Turf Farm		141

Natural Community	Vegetation/Land Cover Detail	Crop Type		Total Extent in Plan Area (acres)[a]
	Truck/Nursery/Berry Crops	Flowers/Nursery/Tree Farms		122
			Other Agriculture Total	**62,164**
Semiagricultural/Incidental to Agriculture	Semiagricultural/Incidental to Agriculture		**Total**	**30,510**
Eucalyptus	Eucalyptus Alliance		**Total**	**369**
Barren	Barren-Anthropogenic (levees)			414
	Barren-Gravel and Sand Bars			1,373
	Rock Outcrop			335
			Barren subtotal	**2,122**
Developed	Urban or Built Up			40,683
	Urban Ruderal			7
	Vegetated Corridor			5,010
			Developed Subtotal	**45,700**
			Total Barren and Developed	**47,822**
Total Other Land Cover Types				**140,865**
Total Natural and Seminatural Communities and Other Land Cover Types				**653,494**[d]

a. Numbers may not precisely sum because of rounding. This table does not include the 1,174-acre expanded Plan Area for Putah Creek Conservation (Figure 1-1).

b. Cultivated land cover types typically change with changes in demand, price, and other factors related to the wide variety of food and fiber crops grown in Yolo County; therefore, the acreage estimates provided for cultivated land crop types in this table are based on the existing conditions at the time of data capture (i.e., 2008, with updates provided by member agencies' planning staff, as described in Section 2.3.3, *Mapping Methods*) for the land cover geographic information system (GIS) database.

c. NFD = not formally defined.

This acre amount differs from the total Plan Area acre amount due to small gaps in the land cover mapping, amounting to approximately 55 acres of unmapped land.

Table 2-2. Other Classification Systems

Yolo HCP/NCCP Natural Communities	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation	Napa County Vegetation Map[a]	Department of Water Resources Map
Grassland	Annual Grassland	California Annual Grasslands Alliance	California Annual Grasslands Alliance	Not mapped
		Lotus Scoparius Alliance (Post-Burn)	Lotus Scoparius Alliance (Post-Burn)	Not mapped
		Sparse Bush Lupine/Annual Grasses/Rock Outcrop NFD Alliance	Sparse Bush Lupine/Annual Grasses/Rock Outcrop NFD Alliance	Not mapped
		Upland Annual Grasslands and Forbs Formation	Upland Annual Grasslands and Forbs Formation	Not mapped
		Urban Ruderal	Not mapped	Urban, Urban Landscape, Industrial, Commercial, Residential, Semiagricultural, and Incidental to Agriculture
Serpentine	Not applicable	Serpentine Barren	Serpentine Barren	Not mapped
		Serpentine Grasslands NFD Super Alliance	Serpentine Grasslands NFD Super Alliance	Not mapped
Chamise	Chamise-Redshank Chaparral	Chamise-Wedgeleaf Ceanothus Alliance	Chamise-Wedgeleaf Ceanothus Alliance	Not mapped
		Chamise Alliance	Chamise Alliance	Not mapped
Mixed Chaparral	Mixed Chaparral	California Bay-Leather Oak (*Rhamnus* spp.)-Mesic Serpentine NFD Super Alliance	California Bay-Leather Oak (*Rhamnus* spp.)-Mesic Serpentine NFD Super Alliance	Not mapped
		Evergreen Shrubland	Evergreen Shrubland	Not mapped
		Leather Oak Chaparral Alliance	Leather Oak-California Bay (*Rhamnus* spp.)-Mesic Serpentine NFD Alliance; Leather Oak-Whiteleaf Manzanita-Chamise Xeric Serpentine NFD Super Alliance	Not mapped

Yolo HCP/NCCP Natural Communities	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation	Napa County Vegetation Map[a]	Department of Water Resources Map
Mixed Chaparral (Continued)	Mixed Chaparral (Continued)	Mixed Manzanita (Interior Live Oak-California Bay-Chamise) NFD Alliance	Mixed Manzanita (Interior Live Oak – California Bay-Chamise) NFD Alliance	Not mapped
		Scrub Oak Chaparral Alliance	Scrub Interior Live Oak-Scrub Oak (California Bay-Flowering Ash)	Not mapped
		Toyon-(Foothill Pine/Chamise)/ Annual Grasses Savanna NFD Alliance	Toyon-(Foothill Pine/Chamise)/ Annual Grasses Savanna NFD Alliance	Not mapped
		Whiteleaf Manzanita-Leather Oak (*Chamise-Ceanothus* spp.)-Xeric Serpentine NFD Super Alliance	Whiteleaf Manzanita-Leather Oak (*Chamise-Ceanothus* spp.)-Xeric Serpentine NFD Super Alliance	Not mapped
		Whiteleaf Manzanita Alliance	Whiteleaf Manzanita Alliance	Not mapped
Oak-Foothill Pine	Blue Oak-Foothill Pine	Foothill Pine Alliance	Foothill Pine Alliance; Foothill Pine/Mesic Non-serpentine Chaparral NFD Association	Not mapped
		Interior Live Oak-Blue Oak-(Foothill Pine) NFD Association	Interior Live Oak-Blue Oak-(Foothill Pine) NFD Association	Not mapped
		Interior Live Oak Alliance	Interior Live Oak Alliance	Not mapped
Blue Oak Woodland		Blue Oak Alliance	Blue Oak Alliance	Not mapped
Closed-Cone Pine-Cypress	Closed-Cone Pine-Cypress	Knobcone Pine Alliance	Knobcone Pine Alliance	Not mapped
		MacNab Cypress Alliance	MacNab Cypress Alliance	Not mapped
Eucalyptus	Eucalyptus	Eucalyptus Alliance	Eucalyptus Alliance	Not mapped
Montane Hardwood	Montane Hardwood	Black Oak Alliance	Black Oak Alliance	Not mapped
		Canyon Live Oak Alliance	Canyon Live Oak Alliance	Not mapped
		Mixed Oak Alliance	Mixed Oak Alliance	Not mapped

Yolo HCP/NCCP Natural Communities	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation	Napa County Vegetation Map[a]	Department of Water Resources Map
		Sparse California Juniper-Canyon Live Oak-California Bay-California Buckeye/Steep Rock Outcrop NFD Alliance	Sparse California Juniper-Canyon Live Oak-California Bay-California Buckeye/Steep Rock Outcrop NFD Alliance	Not mapped
Valley Oak Woodland	Valley Oak Woodland	Valley Oak Alliance (Dry)	Valley Oak Alliance	Not mapped
Alkali prairie	Saline Emergent Wetland	Alkali prairie	Not mapped	Not mapped
Fresh Emergent Wetland	Fresh Emergent Wetland	(Alkali Bulrush-Bulrush) Brackish Marsh NFD Super Alliance	(Alkali Bulrush-Bulrush) Brackish Marsh NFD Super Alliance	Not mapped
		Bulrush-Cattail Wetland Alliance	(Bulrush-Cattail) Freshwater Marsh NFD Super Alliance	Not mapped
		(Bulrush-Cattail) Freshwater Marsh NFD Super Alliance	(Bulrush-Cattail) Freshwater Marsh NFD Super Alliance	Not mapped
		(*Carex* spp.-*Juncus* spp.-Wet Meadow Grasses) NFD Super Alliance	(*Carex* spp.-*Juncus* spp.-Wet Meadow Grasses) NFD Super Alliance	Not mapped
		Crypsis spp.-Wetland Grasses-Wetland Forbs NFD Super Alliance	Not mapped	Not mapped
		Perennial Pepperweed (*Lepidium latifolium*) Alliance	Not mapped	Not mapped
		Saltgrass Alliance	Saltgrass-Pickleweed NFD-Super Alliance	Not mapped
		Undetermined alliance-Managed	(Alkali Bulrush-Bulrush) Brackish Marsh NFD Super Alliance, Bulrush-Cattail) Freshwater Marsh NFD Super Alliance, (*Carex* spp.-*Juncus* spp.-Wet Meadow Grasses) NFD Super Alliance	Not mapped
		Giant Reed Series	Not mapped	Not mapped

Yolo HCP/NCCP Natural Communities	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation	Napa County Vegetation Map[a]	Department of Water Resources Map
Valley Foothill Riparian (Continued)	Valley Foothill Riparian	Blackberry NFD Super Alliance	Valley Oak-Fremont Cottonwood-(Coast Live Oak) Riparian Forest NFD Association	Not mapped
		Coyote Brush	Not mapped	Riparian Vegetation
		Mixed Fremont Cottonwood-*Willow* spp. NFD Alliance	Mixed Fremont Cottonwood-*Willow* spp. NFD Alliance	Riparian Vegetation
		Mixed Willow Super Alliance	Mixed Willow Super Alliance	Riparian Vegetation
		Tamarisk Alliance	Tamarisk Alliance	Not mapped
	Valley Foothill Riparian (Continued)	Undifferentiated Riparian Bramble and Other	Valley Oak-Fremont Cottonwood-(Coast Live Oak) Riparian Forest NFD Association, Mixed Fremont Cottonwood-*Willow* spp. NFD Alliance, Mixed Willow Super Alliance	Riparian Vegetation
		Undifferentiated Riparian Scrub	Valley Oak-Fremont Cottonwood-(Coast Live Oak) Riparian Forest NFD Association, Mixed Fremont Cottonwood-*Willow* spp. NFD Alliance, Mixed Willow Super Alliance	Riparian Vegetation
		Undifferentiated Riparian Woodland/Forest	Valley Oak-Fremont Cottonwood-(Coast Live Oak) Riparian Forest NFD Association, Mixed Fremont Cottonwood-*Willow* spp. NFD Alliance, Mixed Willow Super Alliance	Riparian Vegetation
		White Alder (Mixed Willow) Riparian Forest NFD Association	White Alder Riparian Forest NFD-Association (Mixed Willow-California-Big Leaf Maple)	Not mapped
Vernal Pool Complex	Annual grassland	Vernal Pool Complex	Not mapped	Not mapped
Open Water	Riverine	Open Water	Water	Water Surface
Agricultural (Seminatural Community)	Irrigated Row and Field Crops	Field Crops	Agriculture	Field Crops, Truck, and Berry Crops
	Dryland Grain Crops	Grain and Hay, Alfalfa	Agriculture	Grain and Hay Crops

Yolo HCP/NCCP Natural Communities	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation	Napa County Vegetation Map[a]	Department of Water Resources Map
	Pasture	Pasture	Agriculture	Pasture
	Rice	Rice	Agriculture	Rice
	Irrigated Row and Field Crops	Truck, Nursery, and Berry Crops	Agriculture	Field Crops, Truck, and Berry Crops
Land Cover Types that Are Not Natural or Seminatural Communities				
Yolo HCP/NCCP Land Cover Type	California Wildlife Habitat Relationship Classification System	Yolo HCP/NCCP Vegetation	Napa County Vegetation Map[1]	Department of Water Resources Map
Other Agriculture (not habitat for covered species)	Evergreen orchard	Citrus/Subtropical	Agriculture	Citrus and Subtropical
	Deciduous Orchard	Deciduous Fruits and Nuts	Agriculture	Deciduous Fruits and Nuts
	Vineyard	Vineyard	Agriculture	Vineyard
Barren and Developed	Urban	Semiagricultural/Incidental to Agriculture	Urban	Urban, Urban Landscape, Industrial, Commercial, Residential, Semiagricultural, and Incidental to Agriculture
	Barren	Barren-Anthropogenic	Not mapped	Barren and Wasteland
	Barren	Barren-Gravel and Sand Bars	Not mapped	Barren and Wasteland
	Barren	Rocky Outcrop	Rock Outcrop	Not mapped
	Urban	Urban or Built Up	Urban	Urban, Urban Landscape, Industrial, Commercial, Residential, Semiagricultural, and Incidental to Agriculture
	Urban, Annual Grassland	Vegetated Corridor	Urban, California Annual Grasslands Alliance	Urban, Urban Landscape, Industrial, Commercial, Residential, Semiagricultural, Barren and Wasteland, and Incidental to Agriculture

a. The acreage estimates provided for cultivated land crop types in this table are based on the existing conditions at the time of data capture (i.e., 2008, with updates provided by the member agencies' planning staff),

2.3.3 Mapping Methods

This section describes the methods used to develop the land cover dataset from existing datasets, which were developed for portions of the Plan Area at different points in time using differing land classification systems and mapping methods. These varying datasets were combined to develop a seamless land cover geographic information system (GIS) data layer.

To prepare the land cover database, multiple land cover and vegetation sources (Section 2.3.2, *Data Sources*) were obtained and assessed. Certain important characteristics, such as mapping scale, mapping methods, and land cover/vegetation classification, varied among these data sources. To minimize mapping inconsistencies that can result from using multiple data sources and classification systems, a crosswalk was developed for the various classification systems used in the mapping efforts, and a single, standardized classification system was developed for the Yolo HCP/NCCP, as described in Section 2.3.1, *Natural Community, Vegetation, and Other Land Cover Classification*, and Table 2-2, *Other Classification Systems*. Supplemental mapping was conducted to minimize inconsistencies as they were identified during the mapping process. This process involved spatial changes and attribute editing where necessary. The mapping units from the various sources were thus combined into a seamless GIS layer covering the extent of the Plan Area. Although some inconsistencies remain in the dataset, this process reduced remaining anomalies to a level that provides a reliable basis for developing the conservation strategy and analyzing the effects of the covered activities on the natural communities and covered species (Chapter 5, *Effects on Natural Communities and Covered Species,* and Chapter 6, *Conservation Strategy*).

Land cover in the Blue Ridge and Little Blue Ridge planning units (Figure 1-2) was identified using mapping data developed jointly by UC Davis, CDFW, and AIS: the data were developed for Napa County but extended into this portion of the Plan Area. The Napa County map was created using the MCV classification system, aerial photo interpretation, and limited field verification. Land cover that could be formally assigned to a defined type in the MCV classification system was classified at the alliance level (floristic-based), although a few associations, comprising several vegetation types, were also included. All grass types, many shrub types, and low-density stands of foothill pine were not identifiable in the aerial photos; these vegetation types were therefore aggregated into a super alliance. Vegetation types that could not be formally assigned because the type had not been formally defined, or because the type could not be distinguished in the aerial photographs, were assigned a provisional classification consistent with MCV and were identified as not formally defined (NFD). The minimum mapping unit of most land cover types was 2.5 acres, although units as small as 0.63 acre were delineated around important features such as agricultural ponds.

The Yolo County Community Planning and Public Work Works Department originally mapped riparian features within the Plan Area in 1989 and 1990, augmented the mapping in 1996 (Sacramento mainstem) and 1998 (Cache Creek and Putah Creek), and reviewed and adjusted the mapping in 2004, with some areas updated in 2011. The Yolo County Community Planning and Public Work Works Department's Riparian Zone Mapping Dataset includes mapping of the valley bottoms and lower slopes of Yolo County that occurred during the winter of 1989 and spring of 1990. Portions of the Sacramento River and major tributaries were mapped by California State University, Chico to inventory and map riparian lands along these hydrologic features (the Sacramento River and Major Tributaries Riparian Zone Mapping dataset). California State University, Chico mapped the Sacramento River mainstem in 1996, Cache Creek in 1998, and Putah

Creek in 1998; the study area was confined to streams in the Sacramento Valley, and mapping ended in the foothill canyons on both sides of the valley. All mapped areas were conducted at a 1:12,000 mapping scale. These data were incorporated into the initial land cover dataset to provide greater resolution of riparian land cover types. The 1989 and 1990 Yolo County Planning and Public Works Department's Riparian Zone Mapping dataset, consisting of printed maps but no digital data layers, was reviewed and compared with the 2004 digital orthophotographs. New polygons were digitized on the 2004 aerial photos to correspond to the printed mapped polygons, and the vegetation classification assigned on the printed maps was correlated with these newly digitized polygons. In the Davis, West Sacramento, Woodland, and Winters planning units, riparian vegetation was remapped in June 2011. Riparian features existing in the DWR 2008 land cover dataset that fell beyond the riparian features mapped in 1990, 1996, 1998, 2004, and 2011 were also included in the riparian mapping.

The alkali prairie and fresh emergent wetland features in the western portion of the Plan Area were mapped in February 2013 using 2012 NAIP and i-cubed imagery, in conjunction with CDFW biologists' interpretations. This land cover was initially mapped by aerial photo interpretation using 1993 USGS digital orthophotography.

The 2005 Bay-Delta vegetation mapping dataset was created by AIS for CDFW using CDFW's vegetation classification and mapping program to assess existing vegetation and land use conditions in the Delta region. The CDFW Bay-Delta vegetation cover dataset was used to augment vegetation mapping of areas of overlap between the Plan Area and the region surveyed by CDFW. The map classification is based on field data collected during the summer and fall of 2005. Vegetation was mapped from the suballiance to super alliance level using the National Vegetation Classification Standard. Maps were at 1:12,000 scale, vegetation was mapped at a two-acre minimum mapping unit, and critical vegetation types such as wetlands were mapped at a one-acre minimum mapping unit. Features that were distinct or deemed important were mapped below the minimum mapping unit size.

In the spring of 2008, 2004 orthophotography was used to update the land cover data layer for ponds and new development. The orthophotography was reviewed in detail to identify any ponds, which are a component of some covered species habitat models (Section 2.6.3, *Covered Species Habitat Models*), that were not captured by the previous mapping efforts. At the same time, areas that were seen as developed on the orthophotography were updated. Orthophotography was used to update further the developed lands layer in 2014.

Cultivated lands and natural land cover types not addressed in other data sources at greater resolution were identified using the DWR Land Use Map 2008 dataset. Where necessary, the classifications of DWR polygons were adjusted to conform to HCP/NCCP land cover dataset classification hierarchy. NAIP 2012 aerial imagery was reviewed to assign the appropriate land cover classification where the DWR classification of nonagricultural land cover types could not be directly aligned to HCP/NCCP classification. In the case of agriculture polygons that lacked detail, the Yolo County Agricultural Commissioner's field data were used to assign the appropriate polygon classification. Additionally, the Yolo Agricultural Commissioner's data were used, in the spring of 2014, to identify and update the conversion of field crops to orchards and vineyards. DWR crops are classified as nine types of structurally similar crop types or groups and three land use designations. This agricultural land cover component of the data set represents a point-in-time characterization of the agricultural landscape of the Plan Area. The distribution, acreage, and types of crops grown in the Plan Area, however, change annually and at larger timescales. As previously described, the

implementation process provides for decision-making (e.g., acquisition of lands that support covered species' habitats) based on the actual land cover types present at the time such decisions are made.

2.4 Natural Communities and Associated Plant and Wildlife Species

The 15 classified natural communities and associated plant and wildlife species are described in this section. The natural communities are grouped into five categories: cultivated lands, grassland, shrublands and scrub, woodlands and forest, and riparian and wetlands. The natural community categories provide a primary system for describing biological communities in this HCP/NCCP and assigning conservation measures that apply to multiple species. The natural communities are described in the order in which they are listed in Table 2-1, *Natural Communities and Other Land Cover Types,* and follow the framework of the California Wildlife Habitat Relationship classification system. The natural community descriptions provide information regarding use by covered species and by wildlife species in general. The descriptions focus mainly on primary uses of the habitats by species (i.e., regular use for certain key activities or periods by wildlife or areas of typical occurrence and highest density of plants). The acreage of each natural community for the Plan Area is presented in Table 2-1, *Natural Communities and Other Land Cover Types*.

2.4.1 Cultivated Land

The cultivated land seminatural community consists of nonrangeland agricultural crops that provide habitat for covered species.[2] Crop types that do not provide habitat for covered species are not included in the cultivated lands seminatural community, as described in Section 2.5, *Other Land Cover Types*. The cultivated lands seminatural community consists of 250, 842 acres and makes up 38 percent of the Plan Area. This seminatural community is prevalent in the eastern portion of the Plan Area.

Yolo County and the four cities within the county have a longstanding commitment to the preservation of agricultural lands, encapsulated in both county and city planning documents. These plans control sprawl by concentrating growth in the urban areas and maintaining large areas of cultivated land and open space between the cities and towns. This cultivated land provides important habitat value in Yolo County for many covered species and species of local concern, including Swainson's hawk, white-tailed kite, tricolored blackbird, and giant garter snake. Many species depend on or benefit from agricultural operations on some croplands in Yolo County (e.g., tilling, harvesting, crop rotations). As natural habitat is lost, agricultural lands provide cover, forage, reproduction, and dispersal functions. In many locations, growers have enhanced field edges with hedgerows that provide habitat and refugia for common species and rodents (prey for Swainson's hawk and white-tailed kite).

Crop types on cultivated lands change over time with changes in demand, price, and other factors related to the wide variety of food and fiber crops grown in Yolo County; therefore, the acreage estimates provided for cultivated land crop types in this section and other chapters of the Yolo

[2] The cultivated lands natural community type does not include rangelands, which typically include grassland, oak woodlands, and other natural communities that are not cultivated.

HCP/NCCP are based on the existing conditions at the time of data capture (i.e., 2008, with updates provided by the member agencies' planning staff, as described in Section 2.3.3, *Mapping Methods*) for the land cover GIS database.[3] Crop types that constitute the cultivated lands seminatural community are described below.

2.4.1.1 Alfalfa

Alfalfa is a relatively low-growing perennial herbaceous legume species that is periodically irrigated and cut for hay, often five times during the growing season. Alfalfa is often used as a "green manure" fertilizer because it fixes nitrogen and is incorporated into the soil as part of many crop rotations. Alfalfa accounts for 48,897 acres, or approximately seven percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-5).

The high protein content of its leaves makes alfalfa highly palatable for rodents such as ground squirrels, gophers, and voles, which are often present in high numbers in the fields. As a result of the large rodent populations, alfalfa fields support particularly high-value foraging habitat for covered species such as the Swainson's hawk and white-tailed kite.

2.4.1.2 Rice

Rice is a flood-irrigated crop that is a seed-producing annual grass. It is generally grown in leveled fields that are flooded for most of the spring/summer growing period and then dried to mature and facilitate harvesting. Commercial rice generally grows to about two feet tall and has 100 percent canopy closure when it matures. Rice is generally planted in the spring and harvested in the fall. Rice accounts for 35,724 acres, or approximately five percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-5).

Rice fields provide valuable habitat that varies seasonally for a range of wetland and upland wildlife species. Rice is a particularly important food source for wintering migratory waterfowl. Rice fields support a number of common wildlife species, both seasonally and year-round, including the great blue heron, great egret, snowy egret, black-crowned night heron, tundra swan, greater white-fronted goose, snow goose, mallard, gadwall, northern pintail, black-necked stilt, long-billed dowitcher, dunlin, least sandpiper, mourning dove, red-winged blackbird, and various rodents. The black tern, bald eagle, northern harrier, purple martin, and yellow-headed blackbird are local concern species that use rice fields.

Rice fields provide habitat for covered wildlife species, including the giant garter snake, western pond turtle, bank swallow, tricolored blackbird, and wintering white-tailed kites. Irrigation and drainage facilities are of particular importance for the giant garter snake and western pond turtle because they have more structural permanence and hold water for longer periods. These features also serve as habitat corridors that allow them to disperse and move among habitat areas.

In Yolo County, rice is grown in two areas: (1) the Colusa and Yolo Basins where the historic vegetation was perennial freshwater marsh and (2) the Madison syncline where the historic vegetation was prairie/grassland and seasonal freshwater marsh. Madison syncline rice fields are isolated from the historic range of giant garter snake in the Colusa and Yolo Basins by the Dunnigan

[3] Annual crop reports published by the Yolo County Department of Agriculture and Weights & Measures provide a good indication of the changes in acreage and yields of crops in the county over the past 80 years (http://www.yolocounty.org/Index.aspx?page=486).

Hills/Plainfield Ridge. The basins continue to provide good giant garter snake habitat because water is present in the canals permanently, but rice in the syncline provides this snake with no habitat because the water is present only during irrigation.

2.4.1.3 Field Crops

Field crops vary in structure, irrigation requirements, and crop rotation. In general, field crops produce a dense canopy with variable openings, depending on the planting layout and time of season. Irrigation may be a single event at the beginning of the growing season, or crops may be periodically irrigated until harvest time. Crop types in this category include corn, dry beans, grain sorghum, safflower, sudan, sugar beets, and sunflowers. Field crops are irrigated row crops and are one of the most abundant agricultural types within Yolo County, accounting for approximately 42,131 acres, or six percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-5).

Herons, egrets, ibis, and hawks often congregate in large numbers to forage on insects, voles, and other prey flushed during harvesting or flood irrigating. Other common wildlife species found in field crops include the American kestrel, horned lark, American pipit, western meadowlark, red-winged blackbird, house finch, California meadow vole, house mouse, brown rat, and black-tailed jackrabbit.

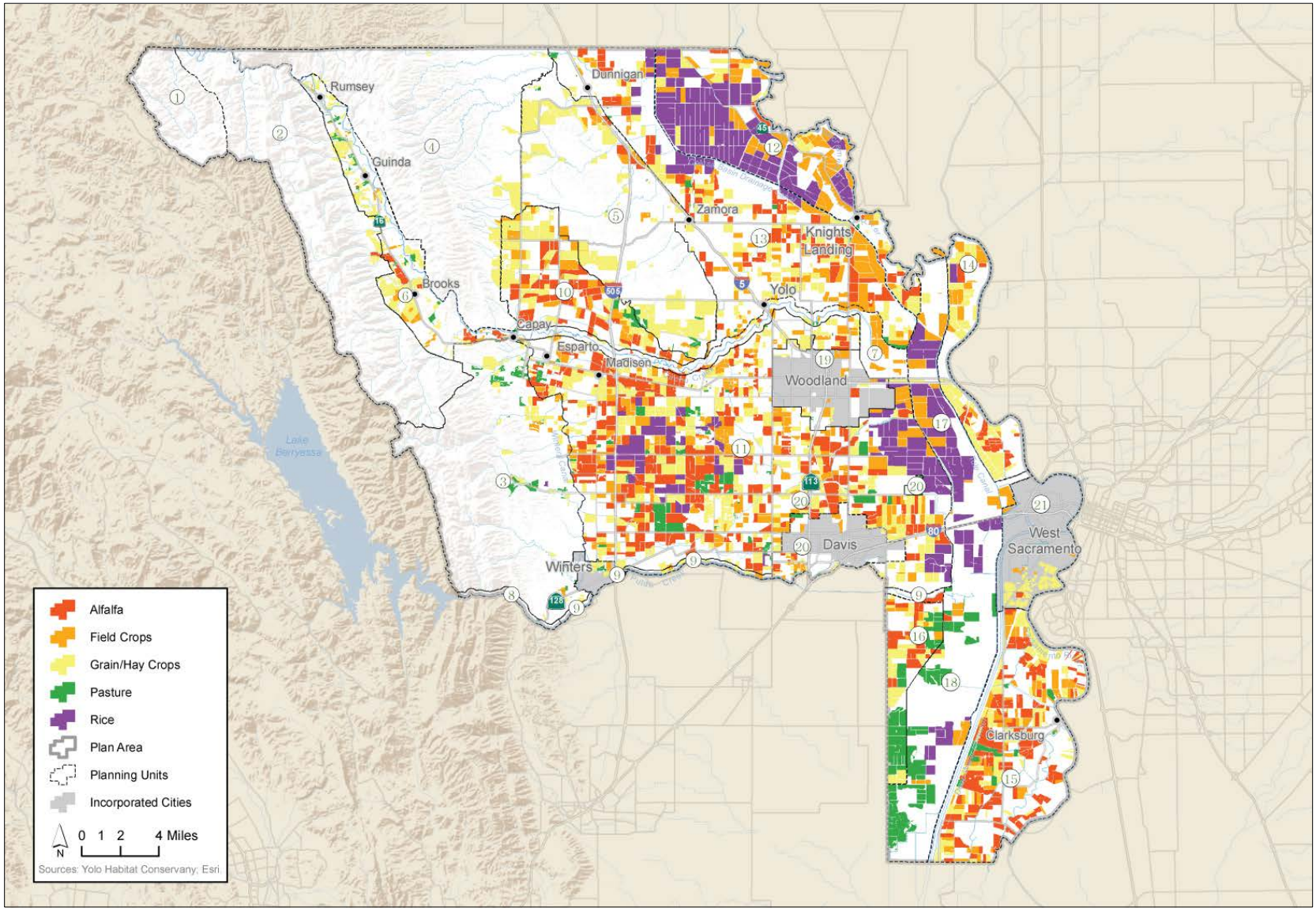
Field crops provide foraging habitat for the white-tailed kite and the Swainson's hawk. The taller, denser crops such as corn, safflower, and sunflower, however, provide low-value foraging habitat for these species because prey accessibility is low (Estep 2014).

Freshly cultivated fields, before crop development, provide habitat for mountain plover, horned lark, and Swainson's hawk. Local barren areas around irrigation facilities can also provide habitat for burrowing owls.

2.4.1.4 Truck and Berry Crops

Truck and berry crops involve intensive agricultural operations to produce food and landscaping plants that are typically transported for sale elsewhere. Truck farming is the cultivation of fruit or vegetable crops on a relatively large scale for transport to distant markets and includes the production of tomatoes (the dominant crop), asparagus, melons, squash, cucumbers, onions, strawberries, and peppers. Nurseries produce flowering plants, shrubs, and trees for local and distant retail sales. Farming practices associated with these crops generally suppress the growth of other vegetation. These crop types support the yellow-billed magpie, a local concern species, and provide foraging habitat for covered wildlife species such as the white-tailed kite and Swainson's hawk. Truck and berry crops account for 43,464 acres, or seven percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*).

Figure 2-5. Distribution of Cultivated Land Seminatural Community in the Plan Area



2.4.1.5 Grain and Hay Crops

Grain and hay crops include irrigated and dryland grain and hay production operations. In dryland farming, wheat is the dominant grain crop, with smaller acreages of barley and rye. Oat hay is the dominant dryland hay crop. The abundance of this vegetation type may expand and contract rapidly with market conditions and crop rotations. In some years, dryland grain and hay production occurs on poorer soils, such as those in the Dunnigan Hills and along the base of the Blue Ridge. Overall, dryland grain and hay crops are unique because many crops are harvested in early summer, which leaves the fields fallow until fall. Summer annuals, including the nonnative invasive yellow star-thistle, dominate some of these fallow fields. Grain and hay crops account for 65,303 acres, or 10 percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types,* and Figure 2-5).

Grain and hay crops (dryland grain crops) support common wildlife species, including the mourning dove, northern harrier, western meadowlark, Brewer's blackbird, red-winged blackbird, coyote, California ground squirrel, and black-tailed jackrabbit. Grain and hay crops also provide important habitat for covered wildlife species such as the Swainson's hawk, white-tailed kite, and tricolored blackbird.

2.4.1.6 Pastures

Pastures are typically planted with nonnative grasses or leguminous plant species and irrigated for livestock grazing. Pastures that have been irrigated for decades may resemble meadows or seasonal wetlands as fresh emergent wetland species become established. They are usually located on landscapes with flat to gently rolling terrain to facilitate border or sprinkler irrigation. In the Plan Area, most of the pastures are located on valley floors and concentrated in the south-central and southeastern sections of the Plan Area. Pastures account for 15,376 acres, or two percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types,* and Figure 2-5).

Common wildlife species found in pastures include the mallard, killdeer, western kingbird, western meadowlark, and red-winged blackbird. Local concern species that use pastures are the short-eared owl, yellow-billed magpie, yellow-headed blackbird, loggerhead shrike, and Townsend's big-eared bat. Depending on type, pastures support a number of covered wildlife species, including the California tiger salamander (using existing rodent burrows), Swainson's hawk (for foraging), burrowing owl (including for breeding if ground squirrel burrows are present), and tricolored blackbird.

2.4.2 Grassland

2.4.2.1 Grassland Natural Community

The grassland natural community is composed of five vegetation types that support grasses and associated annual and perennial forbs: California grasslands alliance, *Lotus scoparius* alliance, sparse bush lupine/annual grasses/rock outcrop alliance, upland grasslands and forbs formation, and urban ruderal. In many cases, grassland is dominated by native and exotic forbs in certain seasons or during different periods within a season (D'Antonio et al. 2007). Many of the species that occupy this natural community also occur as understory plants in other natural communities such as blue oak woodland (Allen-Diaz et al. 2007). The grassland natural community accounts for 80,911 acres,

or 12 percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-6).

The grassland natural community is found in areas where trees account for less than 10 percent of the cover and the topography consists of flat plains or gently rolling foothills. Plants are typically less than three feet tall. Seed germination of annual grasses and forbs occurs in fall after the rains begin (D'Antonio et al. 2007). Winter is a period of slow growth, followed by rapid growth in spring and senescence during the summer (Reever-Morghan et al. 2007). The composition and structure of grassland species are influenced by factors, such as climate (e.g., annual precipitation), soil conditions, light intensity (which may be affected by shading from other plants and microtopography), farming history, and livestock grazing (Bartolome et al. 2007; D'Antonio et al. 2007). In many areas, nonnative species are dominant, but in some areas, native species are dominant at certain times of the year.

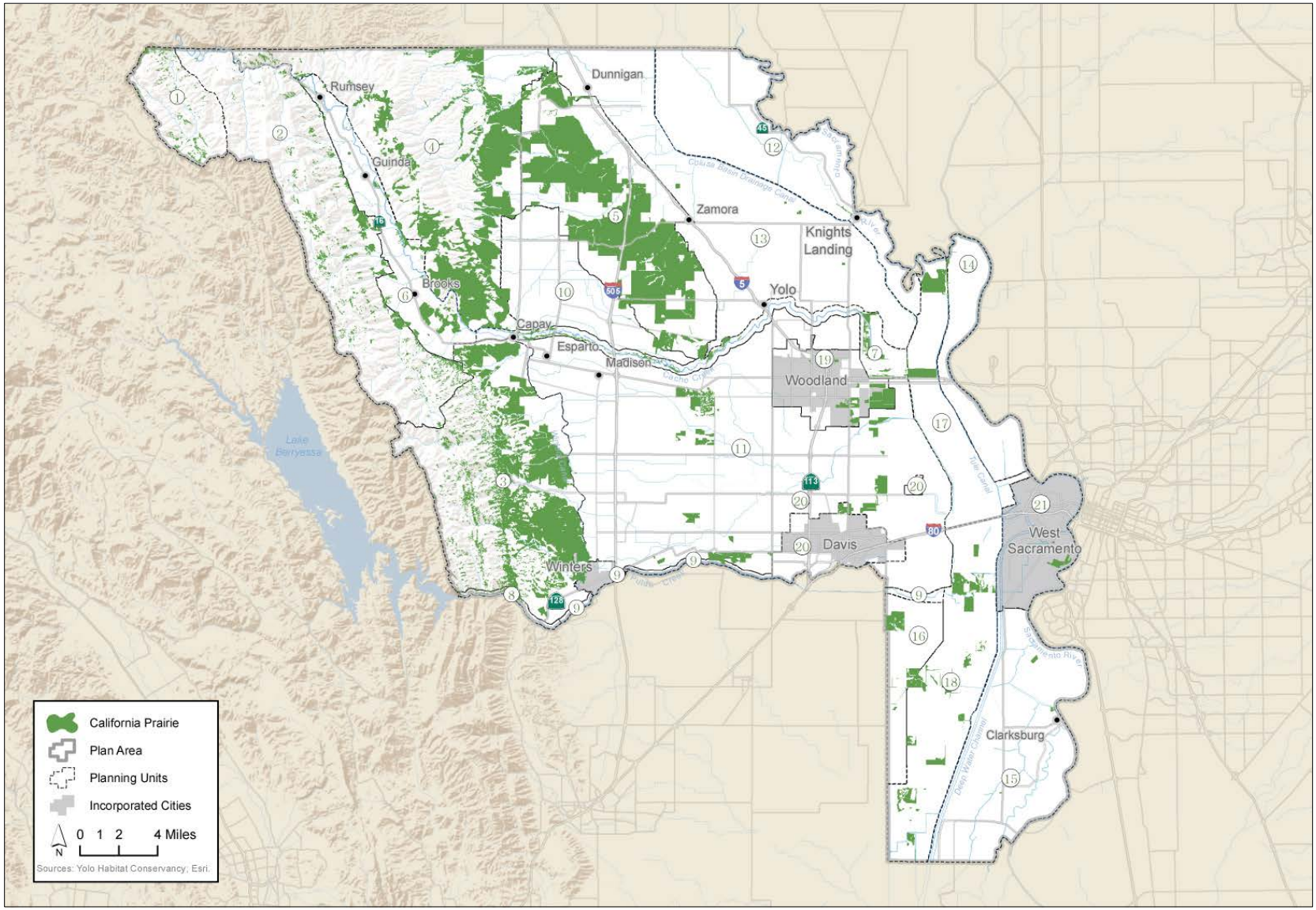
Although this natural community is commonly categorized as *California annual grassland*, it was historically categorized as *California prairie*. The *grassland* name is based on a theory that these lands were once dominated by native perennial bunchgrass, which was destroyed by grazing and supplanted by nonnative grasses. Historical evidence strongly suggests, however, that in the Central Valley, particularly in low precipitation areas and infertile old terrace soils, these areas were dominated by forbs and supported relatively few grasses (Holstein 2001, 2011).

Grasslands are a common feature of the Blue Ridge and Capay Hills planning units (Figure 1-2). In other areas, such as the Dunnigan Hills, it is difficult to distinguish grassland from weedy fallow grain fields or old fields on the basis of aerial photograph interpretation. In most cases, the dominant plants in heavily disturbed areas (i.e., areas where vegetation removal, soil disking, tilling, and scraping have occurred) are Eurasian annual grasses and forbs. Many of the disturbed areas along the lower slopes of the Blue Ridge were also cultivated and are currently dominated by nonnative medusahead and barbed goatgrass in the spring and yellow star-thistle in the summer.

Common nonnative species associated with grassland natural communities are barbed goatgrass, slender oats, wild oats, soft chess, ripgut brome, yellow star-thistle, broadleaf filaree, cutleaf filaree, Italian ryegrass, medusahead, various introduced clovers, and Zorro fescue. Native herbaceous species associated with grassland include rancher's fireweed, miner's lettuce, blue dicks, dove weed, California poppy, miniature lupine, baby blue-eyes, California plantain, vinegar weed, tomcat clover, butter-and-eggs, Ithuriel's spear, and small fescue.

Grasslands, along with the herbaceous understory component of other land cover types (e.g., blue oak woodland) in the Plan Area, have been managed primarily for livestock grazing for more than 150 years and could have been categorized as agricultural rangelands. The Yolo HCP/NCCP uses the term *grassland* to focus on the wildlife habitat function because that is the focus of this HCP/NCCP. The current and future management of these rangelands, however, is a key component of the conservation strategy (Chapter 6, *Conservation Strategy*) because this working landscape provides valuable wildlife habitat functions.

Figure 2-6. Distribution of Grasslands Natural Communities in the Plan Area



Most of the grassland mapped in the Plan Area consist of annual grassland, dominated by nonnative species. Although perennial grassland may be present in the Plan Area, they do not occur in amounts that allow mapping and quantification through aerial imagery, and no mapping data currently exist for perennial grasslands in the Plan Area. Restoration efforts have sought to reestablish native perennial grass–dominated natural communities in areas supporting grassland. Perennial grassland consists of various mixtures of native grasses and, to a lesser extent, wildflowers. Covered plant and wildlife species that occur in annual grasslands may also use perennial grassland.

Grasslands serve as foraging habitat for several species of local concern, including the pallid bat, badger, golden eagle, prairie falcon, short-eared owl, long-eared owl, purple martin, yellow-headed blackbird, northern harrier, loggerhead shrike, grasshopper sparrow, San Joaquin pocket mouse, and western spadefoot. Covered species that use grasslands include the western burrowing owl, Swainson's hawk, white-tailed kite, tricolored blackbird, and California tiger salamander. Historically this community was grazed by tule elk and pronghorn. Barren areas created by these grazers were almost certainly the primary historical habitat of burrowing owls.

2.4.2.2 Serpentine Natural Community

The serpentine natural community includes the serpentine chaparral and serpentine grasslands vegetation types as well as serpentine barrens, all of which are rare in the Plan Area. The serpentine chaparral and grassland natural communities occur on soils derived from serpentine outcrops on Little Blue Ridge in the northwestern corner of the Plan Area (Bailey et al. 1964). The vegetation types of this natural community vary in species composition and density, but most frequently they are dominated by leather oak chaparral with an overstory of foothill pines. These vegetation types include open stands of trees, mesic and arid chaparral, and mesic meadow-like serpentine grassland with a mixture of grasses and forbs. In some cases, the land may be almost entirely devoid of vegetation (Kruckeberg 2002; Harrison and Viers 2007; O'Geen et al. 2007) and is classified as serpentine barrens. The serpentine grassland natural community has been subject to considerable disturbance from prescribed fire and fire suppression actions, grazing, and mining. The serpentine grassland natural community accounts for 247 acres, or less than one percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*), but this may not include non-grassland serpentine communities.

As a result of unique soil conditions (i.e., high in magnesium and heavy metals and low in calcium), the serpentine natural community has generally not been diminished in value by invasions from exotic plant species. The heavier serpentine soils in flatlands, however, have been extensively invaded by the nonnative barbed goatgrass. Small patches of serpentine soil tend to be more heavily invaded by exotic annual grasses than larger patches (Harrison and Viers 2007).

The climatic, physical, and geographical characteristics of Little Blue Ridge provide conditions that support a rich array of serpentine endemic plant species. This natural community supports several local concern plant species, including drymaria-like western flax, Colusa layia, Hall's harmonia, and Morrison's jewelflower. No covered species are specifically associated with the serpentine natural community.

2.4.3 Shrubland and Scrub

2.4.3.1 Chamise Natural Community

The chamise natural community contains stands in which the shrub component is dominated by chamise, either in nearly pure stands or in mixed stands of chamise and other scrub species. The chamise natural community is usually found on south-facing or west-facing slopes that receive the greatest solar exposure, drain very rapidly, and have little soil development. In Yolo County, it is found almost exclusively on Great Valley sequence substrates. Shrub canopies in this fire-adapted vegetation type are often densely overlapping, with a general lack of herbaceous understory, except in the few years following a fire (Keeley and Davis 2007). Some of the species commonly found in these natural communities after a fire include California yerba santa, pitcher sage, and deerweed. The chamise natural community is commonly found on hills at middle and higher elevations relative to the Plan Area. It accounts for 30,187 acres, or five percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-7).

The chamise natural community may support the local concern plant species Colusa layia and drymaria-like western flax. This natural community also supports the western scrub-jay, wrentit, California thrasher, Bell's sparrow, and California towhee, which are all common wildlife species. No covered species use this natural community in the Plan Area as their primary habitat.

2.4.3.2 Mixed Chaparral Natural Community

The mixed chaparral natural community consists of dense stands of drought-adapted *sclerophyllous* (hard-leaved) shrubs (Keeley and Davis 2007). It generally occurs as a mosaic on exposed sites in the Blue Ridge and Capay Hills on Great Valley sequence substrates. The mixed chaparral natural community accounts for 14,518 acres, or two percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-7).

Nine vegetation types make up the mixed chaparral natural community. The most common vegetation type in mixed chaparral is an association of scrub oak, toyon, common manzanita, and birch-leaf mountain mahogany. This mesic community (i.e., occurring in moister sites) intergrades with the interior live oak association extensively on Blue Ridge.

Other dominant nonserpentine mixed chaparral plant species include California bay and buckbrush. This association is found primarily in the northern portion of the Blue Ridge but can also be found along the higher areas of the central and southern Blue Ridge. All other nonserpentine shrub associations have small distributions in the Plan Area.

The serpentine super alliance shrub vegetation type, located in the northwestern portion of the Plan Area, is dominated by California bay and leather oak on more mesic sites and by whiteleaf manzanita on drier sites. Leather oak can form an intermittent canopy and intergrade with the mixed chaparral alliance. Both leather oak and the serpentine super alliance support a number of rare and endemic plant species.

The mixed chaparral natural community supports several common wildlife species, including year-round residents such as the western fence lizard, western skink, gopher snake, common kingsnake, western rattlesnake, mule deer, coyote, gray fox, mountain quail, California quail, mourning dove, Anna's hummingbird, western scrub-jay, bushtit, Bewick's wren, California thrasher, wrentit, California towhee, spotted towhee, rufous-crowned sparrow, Bell's sparrow, and lesser goldfinch.

Summer residents include blue-gray gnatcatcher, orange-crowned warbler, and lazuli bunting. Winter residents include the hermit thrush, fox sparrow, golden-crowned sparrow, white-crowned sparrow, and dark-eyed junco.

Similar to the chamise, the mixed chaparral natural community may support the local concern plant species Colusa layia and drymaria-like western flax. No covered plant species are known to occur in mixed chaparral. The mixed chaparral natural community does not provide important habitat for any of the covered species.

2.4.4 Woodland and Forest

2.4.4.1 Oak-Foothill Pine Natural Community

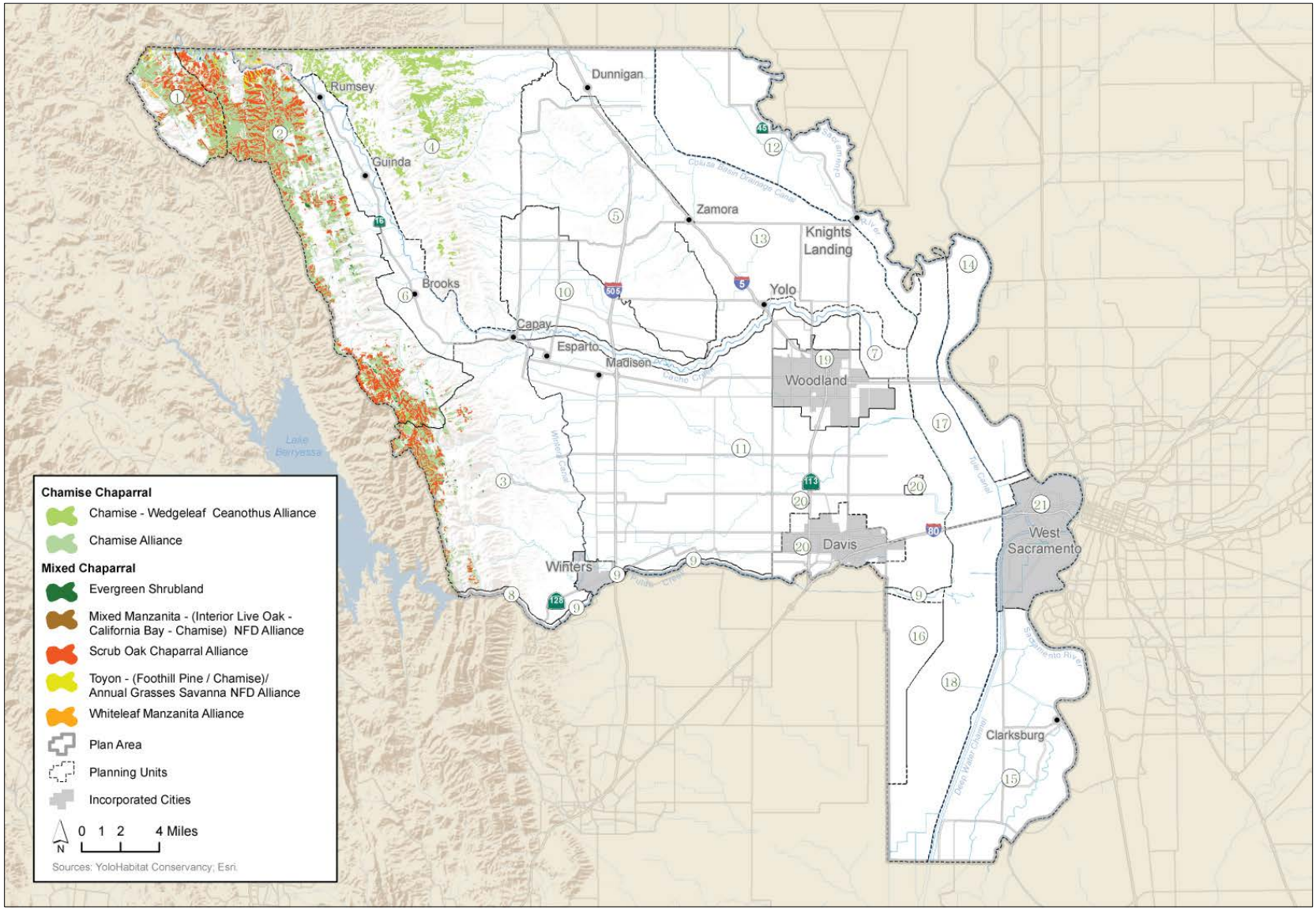
The oak-foothill pine natural community is found in the foothills of the Plan Area. Areas mapped as oak-foothill pine also include large areas dominated by interior live oak and foothill pine.[4] Tree density can range from open savanna with scattered trees to a closed-canopy forest. Other associated tree species include interior live oak, California buckeye, and valley oak. The understory consists primarily of annual grasses and forbs, sometimes with a shrub component. The shrub understory may include buckbrush, redberry, poison oak, silver bush lupine, and blue elderberry. The oak-foothill pine natural community is represented by three vegetation types: interior live oak-blue oak (foothill pine) association, interior live oak alliance, and foothill pine alliance. The oak-foothill pine natural community accounts for 43,772 acres, or seven percent, of the landscape (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-8).

The oak-foothill pine natural community supports many common wildlife species, including the band-tailed pigeon, hairy woodpecker, pileated woodpecker, acorn woodpecker, western scrub-jay, oak titmouse, Hutton's vireo, mule deer, bobcat, and striped skunk.

Local concern species that may occur in the oak-foothill pine natural community are the Colusa layia, purple martin, mule deer, and Townsend's big-eared bat. No covered species are known to be dependent upon this natural community.

[4] Personal communication, Glen Holstein. Botanist. 2014.

Figure 2-7. Distribution of Shrublands and Scrub Natural Communities in the Plan Area



2.4.4.2 Blue Oak Woodland Natural Community

Blue oak accounts for 85 to 100 percent of the trees in the blue oak woodland natural community. Generally, these woodlands have an overstory of scattered trees, although the canopy can be nearly closed on some sites (Pillsbury and De Lasaux 1983). Associated shrub species include poison oak, California coffeeberry, buckbrush, and common manzanita. The ground cover is composed mainly of species such as brome grass, wild oats, needlegrass, filaree, and fiddleneck. The blue oak woodland natural community accounts for 35,891 acres, or five percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types, and* Figure 2-8).

Blue oak woodland provides habitat for local concern species, including the Townsend's big-eared bat. The only covered species known to occur in blue oak woodland is the white-tailed kite, but it is uncommon there.

2.4.4.3 Closed-Cone Pine-Cypress Natural Community

The closed-cone pine-cypress natural community is composed of the knobcone pine alliance and MacNab cypress alliance vegetation types. Closed-cone pine-cypress is scarce in the Plan Area but more common in adjacent Napa County. This natural community is commonly found on serpentine soils; in Yolo County, it often includes leather oak and foothill pine. The closed-cone pine-cypress natural community accounts for 212 acres, or less than one percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-8).

There are localized patches of knobcone pine alliance vegetation on the north-facing slope of the Blue Ridge and at Yolo County's northern boundary immediately above Cache Creek. Little is known about this stand. The University of California McLaughlin Reserve at Little Blue Ridge, at the intersection of Yolo, Napa, and Lake Counties, on both sides of Rayhouse Road, supports the MacNab cypress alliance vegetation. This vegetation is almost entirely confined to serpentine soils. It shares many species with the serpentine grassland natural community (Holstein 2013).

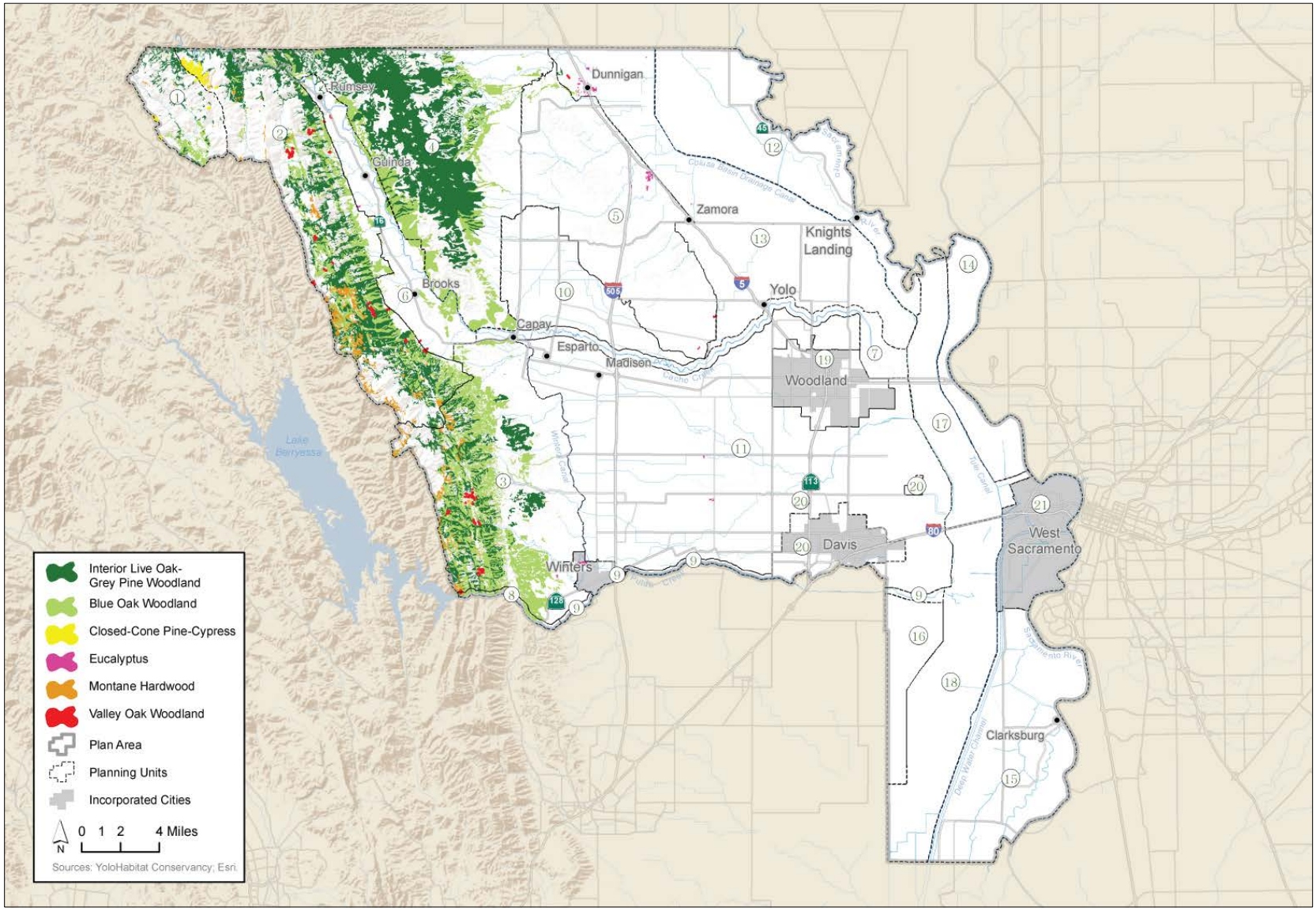
Both vegetation types contain relatively small trees that require periodic fires to stimulate the recruitment of new trees. Fire clears the overstory and causes cones to open and release their seeds, resulting in a pulse of seedling recruitment. Stands mature rapidly and typically last between 35 and 100 years, depending on local fire-return intervals (Barbour 2007). MacNab cypress trees may occur in stands of mixed serpentine chaparral or may form nearly pure stands.

The closed-cone pine-cypress natural community in the Plan Area supports the common-to-rare plant and animal species of adjacent natural communities but is not known to support any covered species.

2.4.4.4 Montane Hardwood Natural Community

The montane hardwood natural community typically consists of a dominant hardwood tree component with a poorly developed shrub understory and little herbaceous vegetation. Tree spacing ranges from 10 to more than 30 feet apart. The montane hardwood natural community is composed of black oak alliance, canyon live oak alliance, and mixed oak alliance. Some areas that have been mapped as montane hardwood natural community in the Plan Area might be better

Figure 2-8. Distribution of Woodlands and Forest Natural Communities in the Plan Area



characterized as live oak-foothill pine.[5] These woodlands are found on a wide range of slopes and particularly on moderate to steep slopes. Soil depth may be shallow or deep. The montane hardwood natural community accounts for 3,087 acres, or less than one percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-8).

The montane hardwood natural community supports a number of common wildlife species, including the western skink, northern alligator lizard, common kingsnake, gopher snake, western rattlesnake, red-tailed hawk, American kestrel, California quail, mourning dove, great horned owl, western screech-owl, northern pygmy-owl, Anna's hummingbird, acorn woodpecker, Nuttall's woodpecker, ash-throated flycatcher, western scrub-jay, oak titmouse, white-breasted nuthatch, Bewick's wren, house wren, blue-gray gnatcatcher, western bluebird, American robin, orange-crowned warbler, black-headed grosbeak, lazuli bunting, spotted towhee, California towhee, lark sparrow, Bullock's oriole, house finch, lesser goldfinch, dark-eyed junco, deer mouse, western gray squirrel, striped skunk, raccoon, bobcat, and mule deer. This natural community supports several local concern species: Colusa layia, drymaria-like western flax, purple martin, and Townsend's big-eared bat. This natural community does not support any covered species.

2.4.4.5 Valley Oak Woodland Natural Community

The valley oak woodland natural community consists of tree stands that are dominated by valley oak located outside of riparian zones. The valley foothill riparian natural community, described in Section 2.4.5.4, *Valley Foothill Riparian Natural Community*, can be dominated by valley oak but encompasses streamside communities that have a higher abundance of typical riparian species, such as cottonwoods, ash, and willows. The valley oak woodland natural community is usually located below 5,000 feet and on sites that support deep, well-drained alluvial soils, most often on valley floors. The valley oak woodland natural community was once much more abundant in lowland areas, but removal over the years through agricultural conversion and development has reduced the natural community to a few scattered dense groves and, more commonly, small groves of scattered trees or isolated individual trees around farmsteads, agricultural work areas, roadsides, and agricultural fields.

Most of the remaining stands of valley oak woodland in Yolo County lack the diverse understory that was present under historical conditions. Existing valley oak woodland stands outside the Plan Area, in and around the Cosumnes Reserve in Sacramento County, provide an example of historical conditions in the Plan Area. There, valley oaks are the overstory, while the intermediate canopy consists of blue elderberry and other large shrubs; beardless wild rye and other graminoids form the ground cover (Holstein 2001, 2003).

Mapping this natural community is challenging because of its scattered, low-density condition. Valley oak woodland was mapped in upland locations where valley oak was the prominent species. The valley oak woodland natural community accounts for 181 acres, or less than one percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-8). Additional sites that support small, sparse groves were not mapped and quantified because of their small areal extent.

The valley oak woodland natural community supports common wildlife species, such as the Nuttall's woodpecker, western scrub-jay, oak titmouse, white-breasted nuthatch, and western bluebird. This

[5] Personal communication, Glen Holstein. Botanist. 2014.

natural community supports suitable habitat for two local concern species: the bent-flowered fiddleneck and loggerhead shrike. The valley oak woodland natural community provides nesting habitat for the covered wildlife species white-tailed kite and Swainson's hawk.

2.4.5 Riparian and Wetland

2.4.5.1 Alkali Prairie Natural Community

The alkali prairie natural community is generally located at elevations below Cache and Putah Creeks. Its hydrology is determined by a mixture of rainfall, runoff, and flooding from adjacent drainages that vary annually, depending on both local and upper watershed precipitation patterns. The soils are composed of saline-alkaline clay with salts that include sodium, magnesium, and boron. The alkali prairie natural community accounts for 312 acres, or less than one percent, of the Plan Area, most of which is southeast of the city of Woodland (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-9).

Historically, the alkali prairie natural community occurred in the Hungry Hollow, Cache/Putah, Colusa, and Yolo Basins (U.S. Bureau of Soils 1909b; Mann et al. 1911; Bryan 1923; Thomasson et al. 1960; Olmsted and Davis 1961). The clays and salts in this natural community originated primarily in drainages of the California Coast Ranges that periodically flooded the western edges of the basins. Flooding is a much less significant source of water, clays, and salts than it was before the 1950s because dams have been constructed in the upper watersheds of Cache and Putah Creeks (Gerlach 2009). Most of the historical extent of the alkali prairie natural community in the Plan Area has been developed, intensively farmed, excavated for stormwater detention ponds, or maintained as flooded habitat for waterfowl.

Vegetation of the alkali prairie natural community is generally dominated by saltgrass. Some areas also include flat-face downingia, curly dock, gumplant, alkali coyote thistle, and alkali heath. Very small patches of alkali-adapted species are present in the natural community and include pickleweed, bush seepweed, alkali heath, common spikeweed, and annual hairgrass. The alkali prairie natural community in the Plan Area also supports several common wildlife species, including the great blue heron, killdeer, American pipit, and savannah sparrow.

The alkali prairie natural community provides primary habitat in the Plan Area for several local concern plant species, including alkali milk-vetch, brittlescale, San Joaquin spearscale, Heckard's peppergrass, and Ferris' milk-vetch. This natural community also provides habitat for vernal pool crustaceans that are federally listed but not covered under this HCP/NCCP: the Conservancy fairy shrimp, midvalley fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp. This natural community provides the last remaining habitat in the Plan Area for the one covered plant species: palmate-bracted bird's beak. The upland portions of the alkali prairie natural community also provide foraging habitat for two covered wildlife species: the Swainson's hawk and the white-tailed kite.

2.4.5.2 Vernal Pool Complex Natural Community

The vernal pool complex natural community consists of complexes of seasonal pools within a grassland matrix. In the Plan Area, these seasonal pools form in shallow depressions that hold water due to the slow infiltration rate of the underlying clay alluvium soil. The vernal pools on the clay alluvium soils of the floodplains contain a mixture of two general types in basins between seasonal drainages: smaller vernal pools connected by swales and larger playa-type vernal pools (Bryan

1923; Thomasson et al. 1960; Olmsted and Davis 1961). Both types of clay alluvium vernal pools are located at elevations slightly above the local drainages and filled primarily by rainfall. The vernal pool complex natural community accounts for 299 acres, or less than one percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-9).

Historically, the vernal pool complex natural community in the Plan Area occurred in the flood plains of Cache and Putah Creeks and Willow Slough (Gerlach 2009, 2011). Clay alluvium vernal pools historically occurred in a very limited area; much of that area has since been developed or is intensively farmed.

As a result of their close physical association, intergrading formations and geomorphology, and similar native vegetation, it is often difficult to distinguish between vernal pool complex natural community and alkali prairie natural community. Remnant patches of a vernal pool complex natural community occur at Woodland Regional Park, Grasslands Regional Park, and the Tule Ranch Unit of the CDFW Yolo Bypass Wildlife Area.

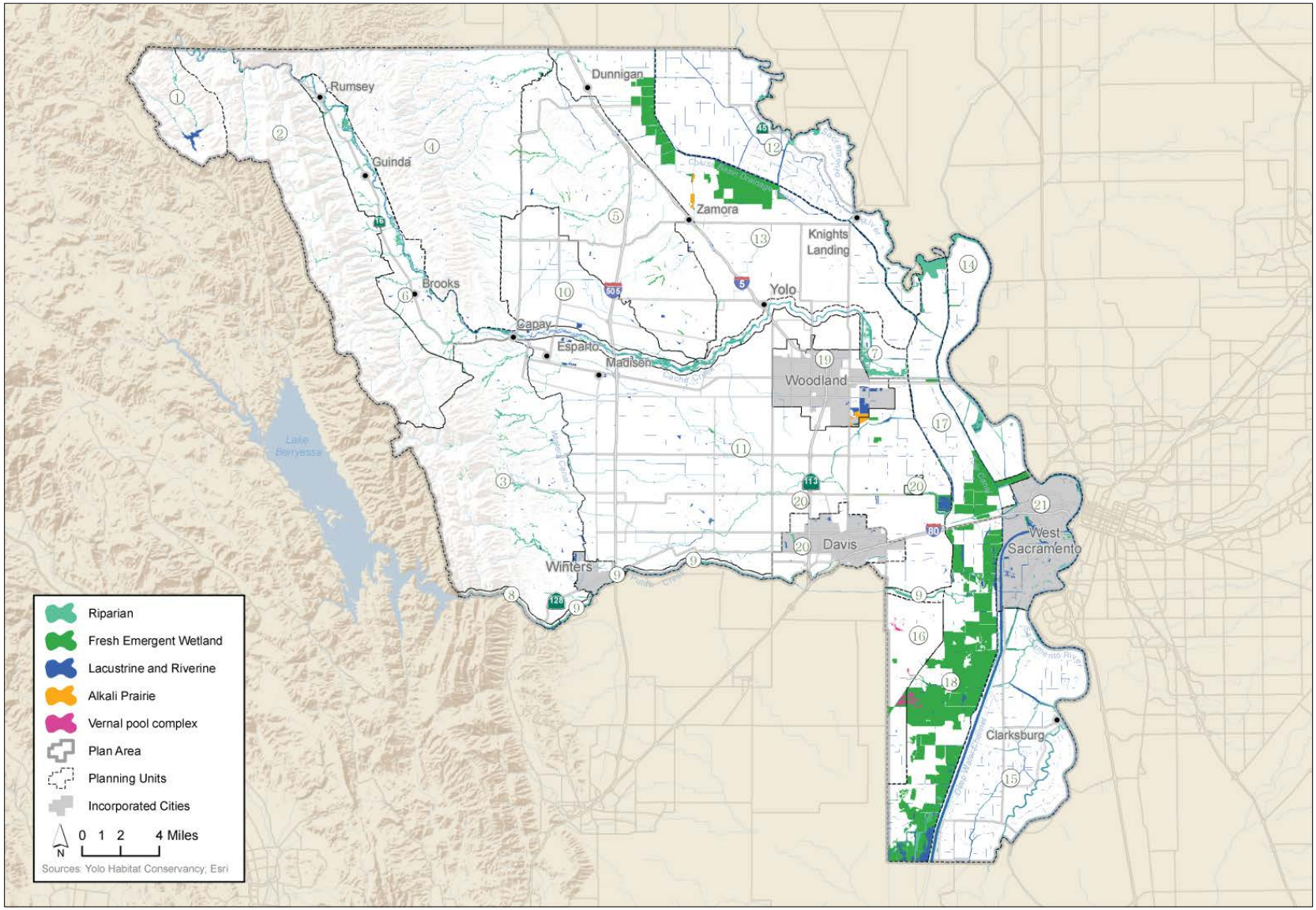
The vernal pool complex natural community supports a number of characteristic plant species, including downingia, vernal pool goldfields, popcorn flower, and woolly marbles. Local concern plant species that occur in the vernal pool complex natural community include Ferris' milk vetch, alkali milk-vetch, brittlescale, San Joaquin spearscale, Heckard's peppergrass, Colusa grass, Solano grass, and Baker's navarretia. The vernal pool complex also provides primary habitat for listed vernal pool crustaceans that are not covered under this HCP/NCCP: the Conservancy fairy shrimp, vernal pool fairy shrimp, midvalley fairy shrimp, vernal pool tadpole shrimp, and California linderiella. Covered wildlife species, including the Swainson's hawk, white-tailed kite, and western burrowing owl, may use the upland portions of vernal pool complex natural community.

2.4.5.3 Fresh Emergent Wetland Natural Community

The fresh emergent wetland natural community includes aquatic and semiaquatic vegetation types listed in Table 2-1, *Natural Communities and Other Land Cover Types*. The fresh emergent wetland natural community is most commonly found on level to gently rolling landscapes along rivers, lakes, and creeks but can be found anywhere the topography allows perennial or seasonal soil saturation or flooding by fresh water. Perennially flooded areas are typically dominated by cattails, tule, and California bulrush that can reach up to 12 feet in height. Seasonally saturated or inundated areas contain much shorter vegetation and are more variable in the composition of their plant species. Dominant species in many lower elevation seasonal wetlands include swamp timothy, Baltic rush, iris-leaved rush, and spikerushes. The fresh emergent wetland natural community accounts for 26,113 acres, or four percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-9).

Fresh emergent wetlands east of the Dunnigan Hills and the Cache/Putah Basin are found predominately in managed waterfowl habitat that is flooded during the winter and dry during the summer. A much smaller extent with the same winter-flooded hydrologic regime is associated with the lower Willow Slough Bypass and abandoned agricultural land in the lower Yolo Bypass. This natural community also includes small areas of unmanaged vegetation and areas that are inundated during the summer. Sedges and rushes dominate the emergent wetlands within the drainages located between the Blue Ridge and State Route 16, between Rocky Ridge and Interstate 5, and in the Dunnigan Hills. There are bulrush and cattail emergent wetlands in the Willow Slough Bypass just east of the city of Davis and alkali bulrush emergent wetlands in the lowlands just west of the Sacramento River Deep Water Ship Channel in southeast Yolo County.

Figure 2-9. Distribution of Riparian and Wetland Natural Communities in the Plan Area



The fresh emergent wetland natural community supports a number of common wildlife species, including the great blue heron, American bittern, great egret, snowy egret, black-crowned night-heron, Virginia rail, sora, common gallinule, American coot, marsh wren, song sparrow, red-winged blackbird, and many species of wintering waterfowl in large numbers. Local concern plant species that use small, specialized habitats in the fresh emergent wetland natural community include the rose mallow, Mason's lilaeopsis, and delta tule pea. The fresh emergent wetland natural community provides habitat for four local concern wildlife species: the black tern, northern harrier, California black rail, and least bittern. This natural community also provides primary habitat for three covered species: the tricolored blackbird, giant garter snake, and western pond turtle.

2.4.5.4 Valley Foothill Riparian Natural Community

The valley foothill riparian natural community consists of a multilayered woodland plant community with a tree overstory and diverse shrub layer. Canopy species include mature valley oak, Fremont cottonwood, ash, and willows. In a mature riparian forest, canopy heights reach approximately 100 feet, and canopy cover ranges from 20 to 80 percent. Blue elderberry, California rose, poison oak, and California blackberry may form dense thickets in the understory of mature riparian forests. California grape creates a dense network of vines in the canopy. In areas that are disturbed by frequent flooding, fire, or human activity, this natural community often consists of smaller trees, more shrubs, and more invasive nonnative species. The valley foothill riparian natural community is usually associated with streams and creeks with low-velocity flows, floodplains, and low topography. The valley foothill riparian natural community accounts for 12,656 acres, or two percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-9)[6].

The valley foothill riparian natural community is composed of 13 vegetation types (Table 2-1), reflecting the diversity of riparian conditions. These types represent recognizably different abundances of the main constituent tree and shrub species (i.e., cottonwood, ash, valley oak, willow, and alder) and several shrub types, including those dominated by the highly invasive nonnative giant reed and salt cedar.

The valley foothill riparian natural community occurs most extensively along Cache Creek, Putah Creek, Willow Slough, Union School Slough, Dry Slough, Chickahominy Slough, the Colusa Basin Drain, the Sacramento River, and Sacramento River delta sloughs including Babel Slough, and Winchester Lake, Elk Slough. Many other streams, sloughs, and canals, as well as some lowland areas with shallow groundwater away from watercourses, support less developed riparian vegetation. Some of the riparian vegetation types occur in characteristic types of watercourses. For example, the Fremont cottonwood-valley oak-willow (ash-sycamore) riparian association occurs along major watercourses, the mixed-willow super alliance occurs along both natural and artificial watercourses, and the mixed Fremont cottonwood-willow NFD alliance occurs along less active streambanks. The tamarisk alliance is currently found only in Cache Creek, and efforts are under way to reduce or eliminate the nonnative invasive tamarisk species that defines it. Coyote brush–dominated riparian vegetation occurs along Buckeye Creek in the northern Dunnigan Hills.

The riparian natural community supports a diversity of plant and animal species and a variety of specialized plant and animal species that are restricted to this natural community for all or

[6] The City of Davis has asked the Conservancy to verify the "fresh emergent wetland" land cover type assigned to the City's Wastewater Treatment Plant Overflow area, which totals approximately 60 acres. This will be addressed in the final Yolo HCP/NCCP.

important parts of their life cycle. It provides nesting habitat and cover for many wildlife species. It also provides continuous corridors and isolated matrix stopover habitat that facilitates movement between habitat areas for many wildlife species. Riparian natural communities are the most productive among California's natural communities because they receive abundant water during the hot, dry summers of California's Mediterranean climate. The riparian communities produce an abundance of insects, which in turn support an abundance of insectivorous migratory birds (Holstein 2003).

Common wildlife species found in the valley foothill riparian natural community include the red-shouldered hawk, great horned owl, black-chinned hummingbird, western scrub-jay, Nuttall's woodpecker, downy woodpecker, American crow, bushtit, oak titmouse, white-breasted nuthatch, black-headed grosbeak, blue grosbeak, lazuli bunting, Bullock's oriole, house finch, American goldfinch, striped skunk, raccoon, and various rodents. Local concern species that use valley foothill riparian include the rose mallow, pallid bat, yellow-breasted chat, yellow-billed magpie, and Townsend's big-eared bat. The California red-legged frog is a listed but noncovered species that has potential to occur in the valley foothill riparian natural community, although there are no known occurrences of the California red-legged frog in this natural community in the Plan Area.

The valley foothill riparian natural community supports habitat for the following covered wildlife species: the valley elderberry longhorn beetle, western pond turtle, bank swallow, Swainson's hawk, western yellow-billed cuckoo, white-tailed kite, and least Bell's vireo.

An atypical riparian community that may be included is riparian chaparral along Cache Creek's losing reach in the Madison syncline where rapid drainage through coarse sediments causes the depth to groundwater to increase so much that few riparian trees can survive. Instead, the sparse vegetation of this area is dominated by California yerba santa, mule fat, and rayless golden aster. This community provides habitat for bank swallow and lesser nighthawk.

2.4.5.5 Lacustrine and Riverine Natural Community

The lacustrine and riverine natural community includes a variety of lakes, reservoirs, and ponds (lacustrine); rivers and streams (riverine); and other open-water land cover types, such as stock ponds, stormwater detention ponds, and wastewater treatment ponds. The lacustrine and riverine natural community is designated as open water in the land cover database (Table 2-1, *Natural Communities and Other Land Cover Types*). The lacustrine and riverine natural community accounts for 13,493 acres, or two percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-9).

Perennially aquatic natural communities usually support fish, which may affect suitability for invertebrates, amphibians, and some reptiles, while seasonal riverine natural communities may contain unique assemblages of fish (Moyle 1983, 2002). Lacustrine and riverine natural communities support algae, mosses, and aquatic plants such as duckweed.

Turbidity, water temperature, and oxygen content affect the quality of habitat for many plant and animal species, including covered species. The concentration and characteristics of the particles that cause turbidity within the water column affect the quantity and quality of light penetration, which affects plant and algal growth rates. Water temperature varies by season and depth within the water column.

The lacustrine and riverine natural community supports a number of common wildlife species, including the eared grebe, pied-billed grebe, double-crested cormorant, common goldeneye, bufflehead, ruddy duck, American coot, osprey, and California gull. Local concern species that use the lacustrine and riverine natural community include the foothill yellow-legged frog, redhead, and bald eagle. This natural community provides breeding and foraging habitat for several covered wildlife species: the western pond turtle, giant garter snake, and California tiger salamander. Artificial ponds in or adjacent to urban areas often support nonnative species, such as red-eared sliders and American bullfrogs, that out-compete or are predators of native species such as western pond turtle.

2.5 Other Land Cover Types

The land cover types described below are not classified as natural communities under this HCP/NCCP. Some of these land cover types may provide species habitat values, as described below.

2.5.1 Other Agricultural Land

The following agricultural land cover types do not provide habitat for covered species and are not included in the cultivated lands natural community for the purpose of this HCP/NCCP. However, these lands can provide buffers between natural communities and nearby development. Furthermore, these lands have the potential to rotate into crop types that have value for covered species.

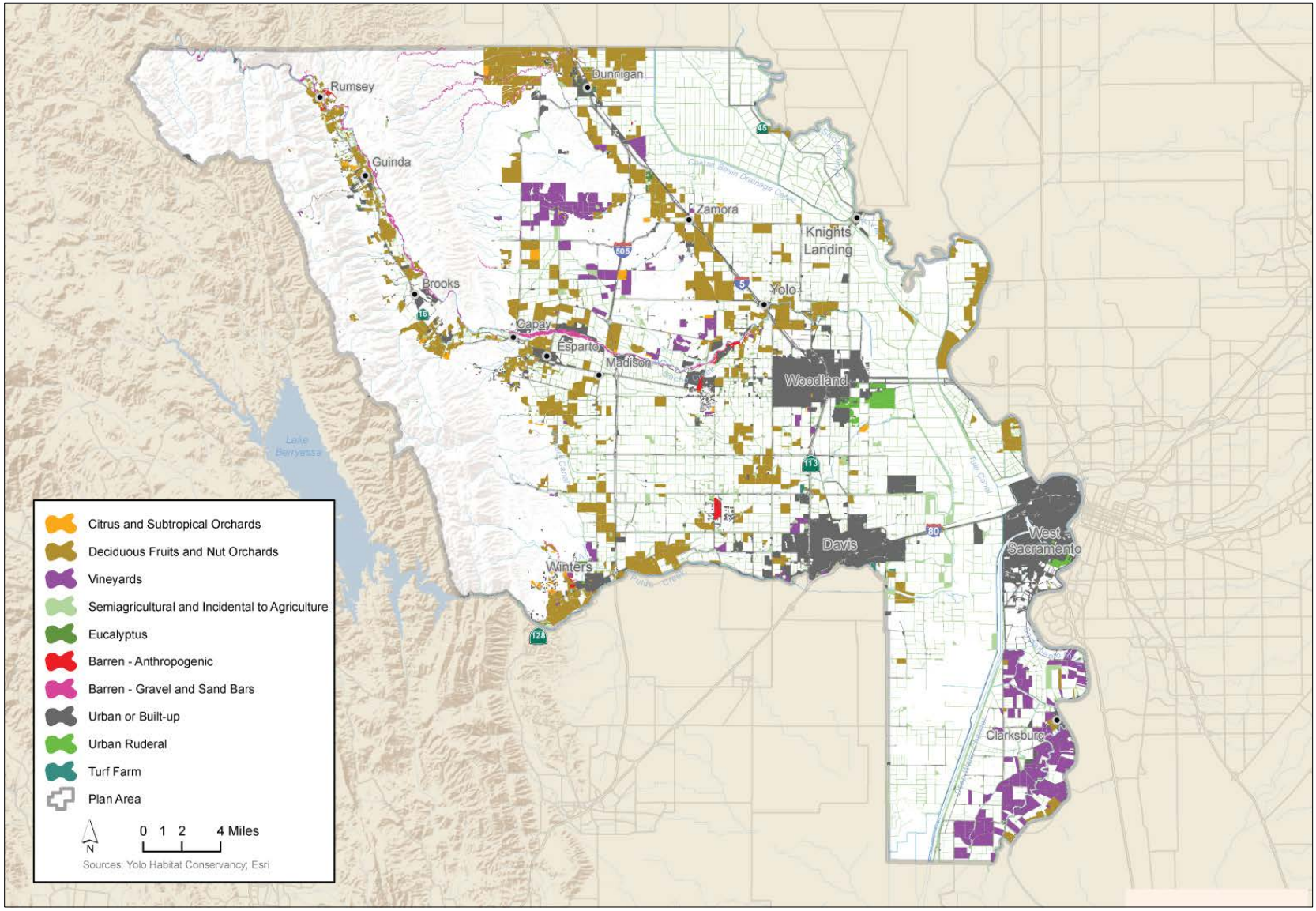
2.5.1.1 Citrus and Subtropical Orchards

Citrus and subtropical orchards in the Plan Area are typically single-species, tree-dominated agricultural lands and do not support any covered or local concern species. In the Plan Area, this land use category includes olives, oranges, and kiwis. Citrus and subtropical orchards account for 1,159 acres, or less than one percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-10).

2.5.1.2 Deciduous Fruit and Nut Orchards

Deciduous fruit and nut orchards are typically planted with a single-tree species. In the Plan Area, this land use category includes various small trees that produce almonds, apples, apricots, figs, mixed deciduous fruits and nuts, nectarines, peaches, pears, pistachios, plums, and walnuts. Deciduous fruit and nut orchards support a number of common wildlife species, including the American crow, American robin, and house finch. Mule deer, jack rabbits and cottontail rabbits may browse on foliage, while California ground squirrels may consume fruits and nuts. Deciduous fruit and nut orchards do not support any covered species but do support two local concern species: the pallid bat and yellow-billed magpie. Deciduous fruit and nut orchards account for 43,591 acres, or seven percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-10).

Figure 2-10. Distribution of Other Land Cover Types in the Plan Area



2.5.1.3 Vineyards

Vineyards comprise single species planted in rows, usually supported on wood and wire trellises. Vineyards are usually treated with herbicides to prevent the growth of herbaceous plants. Vineyards are predominant in the north-central portion of Yolo County, near the Interstate 5 corridor, and along the Sacramento River, near the county's southern boundary. Vineyards support a number of common wildlife species, including the American crow, western scrub-jay, American robin, European starling, mourning dove, and house finch. Vineyards do not support any covered species but do support the yellow-billed magpie and pallid bat, which are local concern species. Vineyards account for 17,151 acres, or three percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-10).

2.5.1.4 Turf

Turf consists of sod farms that are heavily maintained to eliminate pests. There are an estimated 141 acres of this land cover type in the Plan Area. This crop undergoes frequent fertilization, watering, mowing, and vacuuming to remove grass clippings. Because of the heavy maintenance required for this crop and lack of prey base, turf has little to no habitat value for wildlife, although it may provide buffers between developed areas and covered species habitat, and some species may disperse through these areas to favorable habitat areas.

2.5.1.5 Flowers/Nursery/Tree Farm

There are an estimated 122 acres of this land cover type in the Plan Area. This type consists of nurseries, flower fields, and tree farms. This land cover type may provide buffers and connectivity for some wildlife species, but the covered species are not expected to inhabit these lands.

2.5.2 Semiagricultural and Incidental to Agriculture

Semiagricultural areas include livestock feedlots, farm steads, and miscellaneous semiagricultural features such as small roads, ditches, and unplanted areas of cropped fields (e.g., field edges). Feedlots are confined livestock feeding operations that are used for preparing livestock, mainly cattle, for slaughter. They may contain thousands of animals in an array of pens and support virtually no vegetation. Poultry farms raise chickens, turkeys, ducks, and geese for meat or egg production. Egg-producing farms house birds in rows of cages or batteries. Meat chickens, commonly called broilers, are floor-raised on litter such as wood shavings or rice hulls in climate-controlled housing. Similar to feedlots, chicken farms generally do not support any vegetation. The tricolored blackbird, a covered wildlife species, may congregate in large numbers to feed on grain from feedlots and poultry operations. Semiagricultural areas account for 30,510 acres, or five percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-10). Most of the acreage in this land cover type consists of farmsteads and field edges, which provide habitat for covered Swainson's hawk, white-tailed kite, and western burrowing owl.

2.5.3 Eucalyptus

Eucalyptus consists of monotypic eucalyptus stands that have been generally planted for wood production or as wind breaks for fields and buildings. This land cover type has a dense canopy and groundcover that consists of a thick layer of leaf litter and bark. Sparsely planted trees may have a dense herbaceous and shrub understory. Tree spacing and species composition influence the size of mature eucalyptus groves. Eucalyptus species have invaded the riparian natural community in some areas and are most likely increasing in number but are a more localized threat than some other invasive species (e.g., tamarisk and giant reed). Eucalyptus stands account for 369 acres, or less than one percent, of the Plan Area, with most stands located in the town of Dunnigan and on a few isolated parcels that were planted as woodlots in agricultural lands (Table 2-1, *Natural Communities and Other Land Cover Types*, and Figure 2-8).

Eucalyptus supports several common wildlife species, including the barn owl, red-shouldered hawk, American crow, and Anna's hummingbird. One eucalyptus grove north of Davis supports a large nesting colony (rookery) of egrets and herons. Eucalyptus stands in Yolo County do not support covered wildlife or plant species, except that some Swainson's hawks regularly nest in eucalyptus trees.

2.5.4 Barren

Barren lands are areas that are devoid of vegetation. Barren, rock outcrop, levee (tops and riprapped areas), and gravel/sand bars land cover types (Table 2-1, *Natural Communities and Other Land Cover Types*) fall within this general definition. . As opposed to the urban land cover type, which is dominated by structures and pavement, barren lands include areas that have been cleared of vegetation and are not closely associated with a human structure. These include mined areas along Cache Creek. Rock outcrops are natural formations that support sparse vegetation and limited or no soil. Gravel/sand bars are sparsely vegetated areas that are associated with active erosion and depositional processes along streamcourses, such as floodplain areas along Cache Creek. Some of these areas contain herbaceous riparian vegetation and might also be characterized as riparian scrub.[7] Barren areas on serpentine rock and soils are included under the serpentine grassland natural community, rather than barren land cover. Barren land cover accounts for 2,122 acres, or less than one percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*).

Barren land supports common wildlife species, including the killdeer, California gull, mourning dove, horned lark, and house sparrow. The rock outcrop component of this land cover also may support Morrison's jewelflower, a local concern plant species. Barren land cover in Yolo County's lowlands may also provide habitat for the western burrowing owl and mountain plover.

2.5.5 Developed

Developed areas are dominated by pavement and building structures. Vegetation in developed areas generally consists of vegetated corridors (e.g., vegetation maintained adjacent to highways) and patches of mostly ornamental vegetation, such as tree groves, street strips, shade trees, lawns, and shrubs that are typically supported by irrigation. Urban lands cover 45,700 acres, or seven percent, of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*). This area includes urban

[7] Personal communication, Glen Holstein. Botanist. 2014.

vegetation and all areas with structures, graded lots, road and highway medians, anthropogenic drainage canal vegetation, rail rights-of-way, and sewage treatment ponds that do not provide habitat.

Depending on their specific conditions, developed areas can support a number of common wildlife species, including the Nuttall's woodpecker, barn swallow, western scrub-jay, ruby-crowned kinglet, northern mockingbird, American robin, cedar waxwing, yellow-rumped warbler, white-crowned sparrow, dark-eyed junco, house finch, raccoon, and numerous nonnative species, including the European starling, house sparrow, Virginia opossum, eastern fox squirrel, house mouse, and black rat.

Large trees in urban lands support roosting and nesting of the white-tailed kite and Swainson's hawk, and the western burrowing owl may be found in remnant fields within urban lands. All are covered species.

2.6 Covered Species

Covered species are those species for which take authorization would be provided by the permits issued for the approved HCP/NCCP. This HCP/NCCP provides for the conservation and management of these species in the Plan Area to offset the effects of implementing the covered activities on these species.

2.6.1 Development of the Covered Species List

Approximately 175 species were evaluated for inclusion as covered species (Appendix C, *Evaluation of Species Considered for Coverage*). The evaluation list was based on the species' legal status, conservation status, and potential for occurrence in the Plan Area. This initial list was inclusive to ensure that as many potential covered species as possible could be evaluated for coverage. Fish species that are listed, proposed for listing, or candidates for listing under the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA) and are found in the Plan Area are not proposed for coverage under this HCP/NCCP. This HCP/NCCP does not cover in-water activities that typically affect these fish species (Chapter 3, *Covered Activities*). Any activities in the Plan Area that may affect fish species that are listed under the FESA or CESA would require project proponents to complete regulatory compliance actions separate from this HCP/NCCP.

The screening criteria below were used to evaluate the initial list of special-status plant and wildlife species to determine whether to include them as covered species. Species were recommended for coverage if they met all five criteria.

- **Geographic Range.** The species is currently known to occur or is expected to occur in the Plan Area based on knowledge of the species' geographic range and the presence of suitable habitat.
- **Listing Status.** The species is either currently listed under the FESA or CESA, is likely to become listed during the term of the permits, or is fully protected under the California Fish and Game Code.
- **Effects of Covered Activities.** The species could be adversely affected by covered activities that are currently occurring within the Plan Area or are likely to occur over the permit term.

- **Adequacy of Existing Data on the Species.** Sufficient data is available regarding the species' life history, habitat requirements, and presence in the Plan Area to evaluate effects on the species adequately and develop appropriate conservation measures.
- **Cost and Funding.** Funding will be available to provide sufficient monitoring and conservation over the 50-year permit term and meet NCCPA standards for the species.

These criteria were applied iteratively through reviews conducted by the planning team, which were based on a variety of published and unpublished information sources and input from the Advisory Committee, CDFW, USFWS, the Independent Science Advisors, independent species experts, and the public.

Appendix C, *Evaluation of Species Considered for Coverage*, summarizes the results of the evaluation of species for coverage under this HCP/NCCP using the four covered species' criteria. As a result of this evaluation, 12 species were identified as meeting the criteria for inclusion as covered species in this HCP/NCCP (Table 1-1, *Covered Species*).

2.6.2 Covered Species Accounts

Information on the status, life history, distribution, population trends, and habitat use of each of the covered species is included in the species accounts provided in Appendix A, *Covered Species Accounts*. The species accounts summarize the main elements of each species' life history, including habitat and species associations (e.g., vegetation communities, interspecific relationships), key habitat requirements (e.g., soils, cliffs, burrows, nest trees, flow regimes, disturbance), area requirements, dispersal abilities, reproductive requirements and abilities, forage and cover needs, temporal requirements of various needs, and relevant behavioral ecology. The species accounts are not intended to include all biological information that is known about a species. Rather, each account summarizes the scientific information that is relevant to this HCP/NCCP. The biological data presented in these accounts provide the basis for the effects analysis and conservation strategy of this HCP/NCCP. The accounts summarize each species' overall distribution and describe where in the Plan Area the species is known to occur based on available GIS data, published and unpublished literature, and expert knowledge. The species accounts also identify the status and population trend for each species and known or potential threats and other limiting factors throughout its range and specifically in the Plan Area.

Information in the species accounts was used to develop species habitat models for evaluating the distribution of potentially suitable habitat in the Plan Area for each species. Information in the species accounts was also used to assess the level of adverse effects from covered activities, develop species goals and objectives as well as conservation measures to implement the conservation strategy, and inform the adaptive management and monitoring program.

2.6.3 Covered Species Habitat Models

The information in the species accounts was used to develop predictive models to quantify and display the known or potential distribution of suitable habitat for each species in the Plan Area. These models provide a basis for assessing the effects of covered activities, establishing conservation goals, and determining the level of conservation that could be achieved under the proposed conservation strategy. For each species model, one or more of the vegetation types or soil types that are commonly associated with the species were used to predict the distribution of potentially suitable habitat. Some species required a more complex species habitat model that

considered many factors and habitat associations (e.g., elevation, slope, distance to water, or other factors, in addition to vegetation community or soil type). The processes for developing the species habitat models are described in Appendix A, *Covered Species Accounts*. Central elements of the model development process and its outcome are summarized here.

Known locations of occurrences of covered species, derived mostly from the California Natural Diversity Database (CNDDB), were incorporated into the GIS data and used both to formulate habitat models (e.g., identifying the mapped land cover type in which the species typically occurs) and test the habitat models (e.g., determining if all known occurrences fall within the modeled habitat). Evaluations of habitat extent were made using aerial imagery to delineate occupied, rather than modeled, habitat of covered species for which information was available. The date of baseline occurrence data was September 2015 for the CNDDB; individual surveys are listed in Appendix A, *Covered Species Accounts,* in the occurrence sources (e.g., Estep 2007, 2008 for the Swainson's hawk). Further refinement was made to the models by using known ranges of species, as found in the extent maps of the California Wildlife Habitat Relationships Systems. This was done in coordination with CDFW staff members. Expert input from CDFW was also used to filter model outputs to known locations of suitable habitat by planning units. Additionally, Eric Hansen and species experts from USFWS and USGS validated the giant garter snake model.

Comprehensive survey information across the entire Plan Area on known species locations was not available for the covered species; therefore, the species habitat models were especially useful tools for estimating the potential distribution of each species. To supplement the available species location data, the species habitat models provided the following:

- Allowed reasonably reliable prediction and extrapolation of species occurrences for areas where adequate survey data were lacking.
- Provided a basis for synthesizing and analyzing multiple data sources across the entire Plan Area.
- Provided a means for identifying and comparing biological values throughout the Plan Area (i.e., which areas are most important for species and habitat conservation, and what are their priorities for conservation).
- Provided a basis for comparing the conservation value of existing conditions and the merits of alternate preserve designs.

GIS data layers were collected and integrated into the GIS database to support species modeling. Most models include more than one habitat category type for a given species to represent its distribution accurately. For example, the model for the Swainson's hawk incorporates known breeding locations, characterizes suitable nesting habitat, and identifies natural and agricultural foraging habitat area. Together, these data sources and modeling outcomes predict the distribution and quality of habitat for the hawk.

The species habitat models were developed with consideration of error rates for identifying actual suitable habitat. Habitat model errors include both false-negative habitat (those areas that are actually suitable habitat but are not included within the modeled habitat area) and false-positive habitat (those areas that are not actually suitable habitat but are included within the modeled habitat area). The general rule used in developing the species habitat models was to reduce false-negatives for habitat to the greatest extent possible within the resolution of the GIS data available but not to increase false-positives for habitat to such an extent that the model provides no valuable

information for conservation planning or impact assessment. The models generally overestimate the amount of actual habitat in the Plan Area because the approach for minimizing false-negatives was used. As described in Chapter 4, Section 4.2.2.3, *Item 3, Land Cover Mapping and Planning-Level Surveys,* during HCP/NCCP implementation each project proponent will retain a qualified biologist to conduct surveys of project sites and identify natural communities and covered species habitat at the site-specific level. [8]

[8] The HCP/NCCP species habitat models were developed for the purpose of preparing the conservation strategy and effects analysis (Chapters 5 and 6). Implementation of this HCP/NCCP will be based on the habitat that is present on parcels affected by the covered activities and lands protected under this HCP/NCCP (Chapter 5, Section 4.2, *Receiving Take Authorization under the Yolo HCP/NCCP,* and Chapter 7, Section 7.9, *Data Tracking and Reporting*).

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Chapter 3
Covered Activities

3.1 Introduction

This chapter describes existing land use conditions and land use plans in the Plan Area and projects and activities the incidental take permits (permits) will cover. Section 3.2, *Land Use and Jurisdiction,* the land use component of this chapter, provides the necessary context for the covered activities upon which the effects analysis (Chapter 5, *Effects on Covered Species and Natural Communities*) is based. Section 3.3, *Methods for Identifying Covered Activities*, describes the methods used for identifying covered activities; Section 3.4, *Screening Criteria and Criteria for Coverage,* describes the criteria for determining whether activities are covered under the *Yolo Habitat Conservation Plan/Natural Communities Conservation Plan* (Yolo HCP/NCCP); and Section 3.5, *Covered Activities Description,* describes the covered activities.

The covered activities described in this chapter include both projects and activities. *Projects* are well-defined actions that occur once in a discrete location, unless otherwise noted. *Activities* are actions that occur repeatedly in one location or throughout the permit area. Together, these activities and projects are the *covered activities* for which the Permittees will obtain incidental take authorization from the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW) and for which this HCP/NCCP will provide avoidance, minimization, and compensation for adverse effects on covered species and natural communities. All covered activities described in this chapter have been analyzed in Chapter 5, *Effects on Covered Species and Natural Communities.*

The projects and activities described in this chapter may be implemented by Permittees, applicants under the jurisdiction of one of the Permittees, or by Special Participating Entities covered through a Certificate of Inclusion. All parties seeking coverage for projects or activities under this HCP/NCCP must obtain approval from the Permittee with jurisdiction over the activity or project. All covered activities must incorporate the relevant conditions on covered activities described in Chapter 4, *Application Process and Conditions on Covered Activities*, to avoid and minimize adverse effects on covered species and natural communities. Part of the approval process for parties seeking coverage is demonstration that the conditions have been incorporated or will be incorporated properly into proposed activities and projects. The descriptions of covered activities in this chapter have been written to be as consistent as possible with the conditions in Chapter 4. If any inconsistencies exist, the conditions described in Chapter 4 take precedence over the description in this chapter to ensure adequate avoidance and minimization measures.

3.2 Land Use and Jurisdiction

The Plan Area, 653,549 acres (1,021 square miles) in size[1], includes the incorporated areas of Davis, West Sacramento, Winters, and Woodland and unincorporated areas of Yolo County. Yolo County has a rural character, consisting almost entirely of undeveloped land, with both existing and planned development clustered primarily in the incorporated cities. Additionally, the 1,130-acre expanded Plan Area for Putah Creek conservation includes riparian vegetation along the south end of Putah Creek in Solano County.

This section includes information on the land use conditions and plans for each city and unincorporated areas of Yolo County. Its population, housing, and employment conditions and projections provide an overview of existing and planned development for each city and unincorporated Yolo County. This section also describes the conservation and open space policies in the general plans for each city and unincorporated Yolo County to provide context for the effects analysis (Chapter 5, *Effects on Covered Species and Natural Communities*).

3.2.1 City of Davis

Davis is located 11 miles west of Sacramento, along Interstate 80 and the Union Pacific railroad line. Putah Creek runs along the southern boundary of Davis, while Yolo Bypass is to the east and Willow Slough is to the northeast of Davis. The Davis Planning Unit (#20) includes the incorporated boundary of Davis (6,357 acres) and the city's Local Agency Formation Commission (LAFCO) Sphere of Influence (SOI; 4,719 acres), a total of 11,076 acres. This includes the following unincorporated areas: North Davis Meadows golf course, Davis wastewater treatment plant, northwest quadrant (including Binning Farms), Covell/Pole Line Road, Mace curve, El Macero, Royal Oak Mobile Home Park, Willow Bank, UC Davis, Nishi, and Patwin Road.

The City of Davis adopted its most recent general plan in January 2007, with amendments in December 2013 for the Transportation Element and February 2014 for the Housing Element. The horizon year for the *City of Davis General Plan* is 2021 for the Housing Element and 2015 for the other elements of the general plan. This document reflects community values and policies, which serve as the basis for land use decision-making. The general plan emphasizes development that maintains Davis's small-town character and a healthy community, surrounded by farmland, a greenbelt, and natural habitat areas, and preserves.

3.2.1.1 Population, Housing, and Employment

The population of Davis was 65,622 in 2010. It is projected to reach 76,665 in 2035, an increase of 17 percent compared with 2010 levels (Sacramento Area Council of Governments 2005a). Assuming a consistent growth rate beyond 2035 (the last year from which Sacramento Area Council of Governments [SACOG] projections are available), the population of Davis will reach 98,327 in 2065, an increase of 50 percent compared with 2010 levels.

The number of housing units in Davis totaled 26,440 in 2012. The number of housing units is projected to reach 28,351 in 2036, an increase of seven percent (Sacramento Area Council of Governments 2014). Assuming a consistent growth rate beyond 2036 (the last year from which

[1] This acreage does not include the 1,174-acre expanded Plan Area for conservation of riparian located in Solano County, along the southern bank of Putah Creek.

SACOG projections are available), the number of housing units in Davis will reach 30,845 in 2065, an increase of 17 percent compared with 2012 levels.

The number of jobs in Davis totaled 15,430, or 16.6 percent of the total number of jobs county-wide, in 2012. The number of jobs is projected to reach 21,298 in 2036, or 14.6 percent of the projected number of jobs county-wide (Sacramento Area Council of Governments 2005b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of jobs in Davis will reach 25,700 in 2065, or 10.8 percent of the projected number of jobs.

3.2.1.2 Conservation and Open Space Policies

The *City of Davis General Plan* contains many goals, policies, and actions that support habitat conservation and open space preservation. A selection of these goals, policies, and actions from the *Habitat and Natural Areas* and the *Parks and Open Space* chapters of the 2007 *City of Davis General Plan*, as amended, are listed below.

Goal HAB 1. Identify, protect, restore, enhance, and create natural habitats. Protect and improve biodiversity consistent with the natural biodiversity of the region.

- **Policy HAB 1.1** Protect existing natural habitat areas, including designated Natural Habitat Areas.
- **Policy HAB 1.2** Enhance and restore natural areas and create new wildlife habitat areas.
- **Policy HAB 1.3** Commit adequate City resources and staff time so as to protect habitat and other natural resources.
- **Policy HAB 1.4** Preserve and protect scenic resources.

Goal HAB 2. Increase public awareness of habitat, wildlife, and sensitive species.

- **Policy HAB 2.1** Develop environmental educational programs and public access areas and programs to allow viewing of wildlife and habitat through controlled interactions of people with natural areas.

Goal POS 1. Provide ample, diverse, safe, affordable, and accessible parks, open spaces, and recreation facilities and programs to meet the current and future needs of Davis' various age and interest groups and to promote a sense of community, pride, family, and cross-age interaction.

- **Policy POS 1.2** Provide informal areas for people of all ages to interact with natural landscapes, and preserve open space between urban and agricultural uses to provide a physical and visual edge to the City.
- **Policy POS 1.8** Support regional and state-wide efforts that encourage open space preservation.
    - Seek coordination of open space goals in the *Davis General Plan* with UC Davis; neighboring cities, including Woodland, Winters, Dixon and West Sacramento; and Yolo, Sacramento, and Solano Counties and the Yolo County Habitat Conservation Program.

3.2.2 City of West Sacramento

West Sacramento is located across the Sacramento River from the state capitol, in the eastern part of Yolo County, in California's Sacramento Valley. The city is bounded by the Sacramento River on its northern and eastern borders and the Sacramento Deep Water Ship Channel and Yolo Bypass to the west. The West Sacramento Planning Unit (#21) includes the incorporated boundary of the city (14,723 acres), which is coterminous with the city's LAFCO SOI.

West Sacramento adopted a comprehensive update to the *City of West Sacramento General Plan 2035* in November 2016. The plan envisions that West Sacramento will become a premier city in the Sacramento Valley and a vital urban core along the Sacramento River, with a population of more than 130,000 people by 2050. Population growth will be accommodated through greenfield development, which will include new developments in conjunction with parks and open space areas (City of West Sacramento 2016).

3.2.2.1 Population, Housing, and Employment

The population of West Sacramento was 48,744 in 2010. It is projected to reach 87,402 in 2035, an increase of 79 percent compared with 2010 levels (Sacramento Area Council of Governments 2005a). Assuming a consistent growth rate beyond 2035 (the last year from which SACOG projections are available), the population of West Sacramento will reach 222,475 in 2065, an increase of 356 percent compared with 2010 levels.

The number of housing units in West Sacramento totaled 18,879 in 2012. The number of housing units is projected to reach 32,039 in 2036, an increase of 70 percent (Sacramento Area Council of Governments 2014). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in West Sacramento will reach 60,706 in 2065, an increase of 222 percent compared with 2012 levels.

The number of jobs in West Sacramento totaled 25,860, or 27.8 percent of the total number of jobs county-wide, in 2012. The number of jobs is projected to reach 50,599 in 2036 (Sacramento Area Council of Governments 2005b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of jobs in West Sacramento will reach 113,864 in 2065, or 48.1 percent of the projected number of jobs.

3.2.2.2 Conservation and Open Space Policies

The *City of West Sacramento General Plan 2035*(City of West Sacramento 2016) contains several policies that support habitat conservation and preservation. A selection of these policies from the *Natural and Cultural Resources Element* is provided below.

Goal NRC-2: To protect sensitive native vegetation and wildlife communities and habitat in West Sacramento.

- **NRC-2.1 Public Awareness**. The City shall encourage and support development project and programs that enhance public appreciation and awareness of the natural environment.
- **NCR-2.2 Yolo Habitat Conservancy Program**. The City shall continue to work cooperatively with other jurisdictions in the county, and with the State and Federal governments to incorporating, as deemed appropriate, the findings and recommendations of the California

Department of Fish and Wildlife and the U.S. Fish and Wildlife Service into site-specific development proposals.

- **NCR-2.3 Habitat Connectivity**. The City shall preserve, enhance, and create interconnected open space and natural areas to provide for wildlife movement and protect biodiversity.
- **NCR-2.4 Habitat Surveys.** The City shall require site-specific surveys for discretionary development proposals that could potentially impact biological resources to determine if any significant wildlife habitat and vegetation resources will be adversely affected and, if so, to identify appropriate measures to avoid or mitigate such impacts.
- **NCR-2.5 Habitat Buffers**. The City shall require the provision and maintenance of an adequate setback between significant habitats and adjacent development. The buffer shall be landscaped with native vegetation and may be used for passive recreation purposes.
- **NCR-2.7 Rare, Threatened, & Endangered Species Protection**. The City shall preserve rare, threatened, and endangered species by ensuring that development does not adversely affect such species or by fully mitigating adverse effects. For developments where adverse impacts cannot be mitigated, the City shall not approve the project.
- **NCR-2.8 Habitat Preservation.** The City shall support State and Federal policies for preservation and enhancement of riparian and wetland habitats by incorporating, as deemed appropriate, the findings and recommendations of the California Department of Fish and Wildlife and the U.S. Fish and Wildlife Service into site-specific development proposals.
- **NCR-2.9 No Net Loss.** The City shall require new development to ensure no net loss of State and Federally regulated wetlands, other waters of the United States (including creeks, rivers, ponds, marshes, vernal pools, and other seasonal wetlands), and associated functions andn values by regulating development in and near these habitats and promoting projects that avoid sensitive areas. Where habitat loss is unavoidable, the City shall require replacement consistent with State and Federal regulations protecting wetland resources.
- **NCR-2.10 Wetland and Riparian Habitat Protection.** The City shall seek to minimize the loss or degradation of wetland and riparian habitats at the following sites: Lake Washington and associated wetlands, Bee's Lake and associated riparian woodlands, riparian woodlands along the Sacramento River north of the I Street Bridge and south of the barge canal, and riparian woodlands along the Deep Water Ship Channel and the Yolo Bypass.
- **NCR-2.11 Riparian Vegetation Maintenance**. The City shall encourage the maintenance of marsh and riparian vegetation along irrigation/ drainage canals and along the Deep Water Ship Channel through routine maintenance and clearing and by disturbing only one bank per year.
- **NCR-2.12 Floodway Design.** The City shall encourage floodway design and flood control facilities to foster riparian habitat enhancement, improved water quality, and groundwater recharge.
- **NCR-2.13 Fisheries.** The City shall implement measures to ensure that development in the city does not adversely affect fishery resources in the Sacramento River, Deep Water Ship Channel, and Lake Washington.
- **NCR-2.14 Public Areas**. The City shall ensure that public access and recreation facilities do not eliminate or degrade riparian habitat values. Trails, picnic areas, and other improvements shall be sited to minimize impacts on sensitive wildlife habitat or riparian vegetation.

- **NCR-2.15 Landscaping and Native Plants.** The City shall promote the use of native plants, especially valley oaks, for landscaping roadsides, medians, parks, and private properties. In particular, native plants should be used along the Sacramento River, in areas adjacent to riparian and wetland habitats, and in other open space and natural areas.
- **NCR-2.16 Golf Courses.** The City shall encourage any future golf courses to incorporate and maintain, to the maximum extent possible, areas of native vegetation and wildlife habitat.

3.2.3 City of Winters

Winters is located in the southwestern corner of Yolo County, approximately 14 miles west of Davis and just east of the Vaca Mountains. The city is bordered by Dry Creek and Putah Creek on the south and southwest. Interstate 505 and State Route 128 are located in and near the city, serving as key links to Interstate 80, approximately 10 miles to the south, and Interstate 5, 23 miles to the north. State Route 128 intersects the city and serves as a major access route to Lake Berryessa. The Winters Planning Unit (#22) includes the incorporated boundary of Winters (1,627 acres) and a portion of the city's LAFCO SOI (352 acres of 496 total acres in the SOI), for a total of 1,994 acres.

The City of Winters adopted its most recent general plan in 1992. There have been minor amendments since that time; the Housing Element was revised in October 2013. The horizon year for the *City of Winters General Plan* is 2021 for the Housing Element and 2018 for the other elements of the general plan. The *General Plan Policy Document* includes a land use diagram that outlines the standards of population density and building density for land designations within the Urban Limit Line. The plan seeks to maintain the traditional small-town qualities and agricultural heritage of Winters while focusing on contained development (City of Winters 1992).

3.2.3.1 Population, Housing, and Employment

The population of Winters was 6,624 in 2010. It is projected to reach 12,360 in 2035, an increase of 87 percent compared with 2010 levels (Sacramento Area Council of Governments 2005a). Assuming a consistent growth rate beyond 2035 (the last year from which SACOG projections are available), the population of Winters will reach 33,532 in 2065, an increase of 406 percent compared with 2010 levels.

The number of housing units in Winters totaled 2,372 in 2012. The number of housing units is projected to reach 3,126 in 2036, an increase of 32 percent (Sacramento Area Council of Governments 2014). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in Winters will reach 4,364 in 2065, an increase of 84 percent compared with 2012 levels.

The number of jobs in Winters totaled 1,921, or 2.1 percent of the total number of jobs county-wide, in 2012. The number of jobs is projected to reach 2,824 in 2036 (Sacramento Area Council of Governments 2005b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of jobs in Winters will reach 4,498 in 2065, or 1.9 percent of the projected number of jobs.

3.2.3.2 Conservation and Open Space Policies

The *City of Winters General Plan* (City of Winters 1992) contains several policies that support habitat conservation and open space preservation. A selection of these policies is provided below.

Goal VI.C: To protect sensitive native vegetation and wildlife communities and habitat.

- Prior to approving private or public development projects, the City shall require the project area to be field surveyed for the presence of special-status species. If encountered, appropriate measures will be taken to minimize disturbance and protect identified populations where feasible.
- The City shall ensure that there is no net loss of riparian or wetland habitat acreage. Where habitat loss is unavoidable, the City shall require replacement on at least a 1:1 basis.
- The City shall work with surrounding jurisdictions and state and federal agencies to develop a regional *Habitat Management Plan.*
- The City shall undertake a feasibility study for the establishment of an Open Space Preserve between the Urban Limit Line and Grant Avenue west of I-505. The preserve will be designed for a combination of uses including agriculture, habitat protection, groundwater recharge, and educational and recreational activities. It would also function as a flood control system.

Goal VI.D: To promote the protection and enhancement of wetlands and the riparian and aquatic ecosystems of Putah Creek and Dry Creek.

- The City shall require that all new development along Putah Creek and Dry Creek be set back at least 50 or 100 feet from the top of the creek bank.
- Putah Creek and Dry Creek in the downtown area should be preserved as much as possible in their natural state. Public access and recreational facilities shall not eliminate or degrade riparian habitat values.

3.2.4 City of Woodland

Woodland, nicknamed "City of Trees," is the county seat of Yolo County, located 20 miles northwest of Sacramento at the intersection of Interstate 5 and State Route 113. The Yolo Bypass lies approximately three miles east of the city, Willow Slough is one mile southeast, and Cache Creek is two miles north. The Woodland Planning Unit (#19) includes the incorporated boundary of Woodland (9,624 acres), its LAFCO SOI (2,639 acres), and an additional 503 acres outside of the SOI and the city limits that corresponds to a voter-approved Urban Limit Line adopted in 2006. The total amount of acreage for the Woodland Planning Unit is 12,766 acres.

The City of Woodland completed a comprehensive update of its general plan in May 2017. The general plan update envisions Woodland maintaining its small-town atmosphere, rich historical buildings, and commitment to the protection of agricultural soils. The new plan has a horizon year of 2035 (City of Woodland 2016).

3.2.4.1 Population, Housing, and Employment

The population of Woodland was 55,468 in 2010. It is projected to reach 76,132 in 2035, an increase of 37 percent compared with 2010 levels (Sacramento Area Council of Governments 2005a). Assuming a consistent growth rate beyond 2035 (the last year from which SACOG projections are

available), the population of Woodland will reach 126,359 in 2065, an increase of 128 percent compared with 2010 levels.

The number of housing units in Woodland totaled 20,036 in 2012. The number of housing units is projected to reach 23,571 in 2036, an increase of 18 percent (Sacramento Area Council of Governments 2014). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in Woodland will reach 28,684 in 2065, an increase of 43 percent.

The number of jobs in Woodland totaled 21,302, or 22.9 percent of the total number of jobs county-wide, in 2012. The number of jobs is projected to reach 32,004 in 2036 (Sacramento Area Council of Governments 2005b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of jobs in Woodland will reach 52,338 in 2065, or 22.1 percent of the projected number of jobs.

3.2.4.2 Conservation and Open Space Policies

The *City of Woodland General Plan 2035* explicitly states that the city shall participate in the county-wide HCP/NCCP and incorporate the goals of the habitat plan, as outlined below (City of Woodland 2017).

Policy 7.B.1 Habitat Conservation Plan/Natural Community Conservation Plan. Continue to participate in the planning process for the countywide Habitat Conservation Plan/Natural Community Conservation Plan. Once adopted, fully implement the Plan to mitigate the impacts of growth projected under the General Plan on plant and wildlife habitats in the Woodland area. Evaluate the opportunity for adoption and implementation of a Local Conservation Plan to provide additional clearance under the California Environmental Quality Act (CEQA) for general biological resource impacts. The general plan (City of Woodland 2017) also contains policies that support habitat conservation and open space preservation. A selection of these policies from the Sustainability, Conservation, and Open Space Element (Chapter 7) is provided below.

Policy 7.B.2 Sensitive Habitat Types. Support and cooperate with efforts of other local, State, and Federal agencies and private entities engaged in the preservation and protection of sensitive habitat types from incompatible land uses and development. Sensitive habitat types include alkali sink, freshwater wetlands, freshwater marsh, riparian forest, drainages, riverine habitat, and lakes.

Policy 7.B.3 Special-Status Species. Support preservation of the habitats of Federally- or State-listed rare, threatened, endangered, and/or other special status species. Encourage Federal and State agencies, as well as other resource conservation organizations, to acquire and manage endangered species' habitats.

Policy 7.B.4 Fish and Wildlife. Support the management efforts of the California Department of Fish and Wildlife to maintain and enhance the productivity of important wildlife species by protecting identified critical habitat for these species from incompatible suburban, rural residential, or recreational development.

Policy 7.B.5 Open Space for Conservation. Where appropriate, permanently protect as open space areas of natural resource value, including sensitive habitat types (e.g. alkali sink and prairie, freshwater wetlands, freshwater marsh, riparian forest, drainages). Maintain connectivity between open space areas designated for habitat conservation values within the Planning Area as well as

linkages to adjacent habitats outside the Planning Area, such as Willow Slough, Cache Creek, and habitat preserves to the east. (EIR Mitigation Measure 4.4-1b)

Policy 7.B.6 Open Space Buffer. Continue to work with Yolo County and the City of Davis to maintain the permanent open space buffer between County Roads 27 and 29 and its existing wildlife habitat values. (EIR Mitigation Measure 4.4-2a).

Policy 7.B.7 Woodland Regional Park. Protect and maintain Woodland Regional Park as an important wildlife preserve and habitat for special-status plants and allow for public access that is compatible with and promotes public education of the site's habitat value. (EIR Mitigation Measure 4.4-1b)

Policy 7.B.8 Native and Compatible Non-Native Plant Species. Require developers to use native and compatible non-native species, especially drought-resistant species, to the extent possible in order to preserve the visual integrity of the landscape, provide benefits for native wildlife, and ensure that a variety of plants suited to the region are maintained. (EIR Mitigation Measure 4.4-2a).

3.2.5 County of Yolo

Yolo County is located in the agricultural region of the Central Valley and the Sacramento River Delta. The county line is directly west of Sacramento, northeast of the Bay Area counties of Solano and Napa, south of Colusa County, and west of Sutter County. The unincorporated area of Yolo County encompasses 95 percent of the land area, or 621,218 acres. Approximately half of Yolo County's unincorporated population and housing units are located within existing unincorporated communities. The University of California, Davis; the Yoche Dehe Wintun Nation; and several special districts are located within Yolo County's unincorporated area but have land use and related authority that are distinct from the *Yolo County General Plan*.

The *Yolo County General Plan* was adopted in November 2009. There have been minor amendments since that time; the Housing Element was revised in 2013. The horizon year for the general plan is 2021 for the Housing Element and 2030 for the other elements.

Yolo County has led the state in agriculture preservation practices and is committed to sustainability, community identity, and rural service standards. The general plan seeks to continue to preserve agriculture by focusing development on existing communities. It aims to discourage sprawl and encourage density, infill, and compact community design.

Existing urban development makes up approximately 20,000 acres, or approximately three percent, of the 621,224 acres in the unincorporated area. Buildout of the 2030 *Yolo County General Plan* would result in the conversion of approximately 4,807 acres to urban development (including roadways), bringing the urbanized total to 24,860 acres, or approximately four percent.[2] The unincorporated county is divided into the 18 non-urban planning units (1 through 18) of this HCP/NCCP.

[2] Yolo County Board of Supervisors Staff Report, Certification of the General Plan EIR, Final Adoption of the *Yolo County 2030 Countywide General Plan*, and Associated Actions, November 10, 2009.

3.2.5.1 Population, Housing, and Employment

The total population of the unincorporated areas of Yolo County was 29,293 (out of 209,035 total in Yolo County) in 2010. The total countywide population is projected to reach 290,558 in 2035, an increase of 39 percent (Sacramento Area Council of Governments 2005a). Assuming a consistent growth rate beyond 2035 (the last year from which SACOG projections are available), the population of Yolo County as a whole will reach 471,100 in 2065, an increase of 135% compared with 2010 levels.

The *Yolo County General Plan* indicates that growth in the unincorporated county through 2035 will be concentrated within the adopted community growth boundaries of Clarksburg, Knights Landing, and Dunnigan.

The number of housing units in unincorporated Yolo County totaled 7,825 (approximately 70,000 total in Yolo County) in 2012. The number of housing units is projected to reach 10,258 in 2036, an increase of 31 percent (Sacramento Area Council of Governments 2014). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of housing units in Yolo County will reach 14,228 in 2065, an increase of 82 percent.

The number of jobs in total Yolo County (incorporated and unincorporated) totaled 25,429, or 30.6 percent of the total number of jobs county-wide, in 2012. The number of jobs is projected to reach 33,366 in 2036 (Sacramento Area Council of Governments 2005b). Assuming a consistent growth rate beyond 2036 (the last year from which SACOG projections are available), the number of jobs in Yolo County will reach 40,489 in 2065, or 17.1 percent of the projected number of jobs.

3.2.5.2 Conservation and Open Space Policies

The *Yolo County 2030 Countywide General Plan* (Yolo County 2009) contains numerous policies that support habitat conservation and open space preservation. They are found in all elements of the general plan and work together as a framework for extraordinary landscape protections.

Yolo County puts great stock in the preservation of its long-term vision. Since its creation as an original county of the state in 1850, Yolo County has updated its general plan only three times. This is a testament to the fact that Yolo County has stayed focused on the same basic goals and values since its inception more than 100 years ago.

Yolo County has an adopted overarching Vision Statement, which is composed of nine principles that guide the general plan and all land use actions. The number one principle within Yolo County's adopted Vision Statement is "The success of Yolo County depends upon the success of agriculture." The number two principle is "The benefits of open space and natural areas are essential to our quality of life."

The Land Use and Community Character Element of the *Yolo County General Plan* states the following with regard to Yolo County's purposefully limited and focused approach to urban development:

This element seeks to preserve and foster the rural character of the County. The County has challenged itself to determine how small its communities can remain and yet still be sustainable in terms of infrastructure, balanced in terms of housing and jobs, and healthy in terms of quality of life and community services. Each existing rural town was examined in this manner and a modest amount of growth has been proposed for some areas. This element also establishes goals for

regional collaboration and equity, green building standards, sustainable community design and net community benefits from new growth. Growth boundaries have been established for every community and each of the four cities.

The following policies are among the more innovative and/or relevant for an understanding of the significance of Yolo County's commitment to agriculture and natural resource preservation:

Policy LU-1.1 This policy identifies and defines the County's land use designations. There are two key aspects of the County's land use designations relevant to the HCP/NCCP: 1) the only residential uses allowed in the Agricultural (AG) designation are farm dwellings and farmworker housing. Rural residential is not an allowed use; and 2) the Residential High (RH) designation allows densities of 20 dwelling units per acre and above with no upper maximum. This is as high or higher than any other jurisdiction (city or county) in the SACOG region.

Policy LU-2.1 Urban development shall bear the primary burden of this policy. Ensure that development will not have a significant adverse effect on the economic viability or constrain the lawful practices of adjoining or nearby agricultural operations, except for land within the Sphere (SOI) around a city of within the growth boundary of an unincorporated community. New urban (non-agricultural) development should be setback a minimum of 300 feet from adjoining agricultural land where possible, but special circumstances can be considered by the decision-making body. Except as noted below where no buffer is required, in no case shall the buffer be reduced to less than 100 feet.

Policy LU-2.3 Prohibit the division of land in an agricultural area if the division is for non-agricultural purposes and/or if the result of the division will be parcels that are infeasible for farming. Projects related to clustering and/or transfers of development rights are considered to be compatible with agriculture.

Policy LU-3.1 Direct all of the County's residential growth to designated areas within the cities and within the growth boundaries of existing unincorporated communities, as depicted on the Land Use Diagram in Figure LU-1, with the exception of individual farm dwellings (houses allowed on agricultural land), other allowed units (e.g., second units, ancillary dwellings, houses allowed in mixed-use commercial areas, etc.) and housing allowed on existing residentially designated land.

Policy LU-3.8 The intent of allowing residences in the agricultural areas is to provide dwellings for those directly involved in on-site farming activity, including farm employees, the landowners and their immediate families. All such dwellings shall be encouraged to locate on lands least suited for agricultural use and/or in "clustered" configurations to minimize the conversion of agricultural lands to any other uses.

Policy LU-3.9 Prohibit the creation of a ring of rural residential development around existing growth boundaries.

Policy LU-3.10 Conservation easements located within community growth boundaries will not be accepted for mitigation purposes.

Policy LU-7.1 Seek recognition, reimbursement and reward for foregone revenues and opportunities associated with the active preservation of agriculture, open space and important natural resources.

Policy LU-7.5 Support efforts to adopt a regional tax measure that would fund agricultural and open space acquisition, protection and maintenance.

Policy CC-1.7 Reinforce the growth boundaries for each community through appropriate mechanisms including greenbelts, buffers, conservation easements and other community separators.

Policy CC-2.1 Require planned growth to pay the full cost of new development, as well as, to the greatest feasible extent, benefit residents in each existing community through efforts that, among other things, result in basic urban services and community sustainability.

Policy CC-2.10 Strive to achieve a minimum jobs/housing balance of 1.2 jobs for every dwelling unit on average within each unincorporated community, to the greatest extent feasible.

Policy CC-2.11 Strive to achieve a match between the prices of dwelling units and the salaries of the jobs provided within each unincorporated community, to the greatest extent feasible.

Policy CC-2.12 Strive to create an average yield community-wide of 16 jobs per acre for industrial, commercial and other job-generating land uses.

Policy CC-2.15 Develop all services, parks, buffers and infrastructure within identified community growth boundaries. Mitigation lands for the loss of agricultural land and wildlife habitat are the only component of community development that are allowed to be located outside of the growth boundaries.

Policy CC-4.31 Encourage clustering of allowed residential units to protect resources and/or improve efficiency of services.

The Circulation Element contains similarly innovative policies (some the first of their kind in the state) that support the land use vision. Two in particular that are relevant are:

Policy CI-3 This policy establishes transportation levels of service of LOS C as a limit on rural roads to maintain farm-to-market capacity and generally LOS E within other specified growth areas to maximum development efficiency. Improvements to rural roads to regain LOS C are not allowed – the threshold is a planning limit.

The goals and policies of the Agriculture and Economic Development Element emphasize wildlife-friendly farming, local food preference, community revitalization, creation of jobs and economic health, among other values. As stated in this element, the defining characteristic of Yolo County is its agriculture and open spaces. Though agriculture is a business, the fields, orchards, and rangeland that comprise most of the agricultural land base are generally open and pastoral and create valued views and vistas. The term "working landscape" is sometimes used to refer to the de facto open space provided by the vast land mass of designated Agricultural (AG) land in Yolo County, even though this land is not designated Open Space (OS).

Ninety-two percent of the land surface of Yolo County is off-limits to residential, commercial, and industrial development uses that are not consistent with the agricultural or open space designations. Instead, these lands are set aside for farming, grazing, and open space. Over 85 percent of county land is used for agriculture. Sixty-seven percent of the unincorporated area of Yolo County is protected under Williamson Act contracts to provide further long-term protection of these lands.

Yolo County's historic commitment to honor its "roots" by preserving agriculture—dating back several decades and reaffirmed in the prior comprehensive update of the general plan in 1983 and the most recent update —has produced an enviable quality of life, significant open space preservation, and long-standing development agreements between Yolo County and its four

incorporated cities that largely concentrate housing and commercial development within the SOI of existing urbanized areas, which correlate to the four urban planning units (19–22) identified for this plan.

Yolo County has long maintained a growth strategy that focuses urban development within the four cities and the unincorporated communities. The general plan establishes growth boundaries for each unincorporated community in Yolo County and relies upon the city SOI as the growth boundaries for the cities, clearly defining the agricultural-community interface. In addition, Yolo County has agreed with Davis and Woodland to maintain a permanent agricultural and open space buffer between the two cities. The Agriculture and Economic Development Element contains a policy to maintain this 11,000-acre buffer and an action to work with the cities to make it more specific and binding.

Redevelopment pass-through agreements and annexation revenue-sharing agreements are key components of the County's farmland preservation framework, providing revenues to the County that allow it to forego revenue-generating urban development on unincorporated agricultural land. Through the general plan, the County has committed to continued collaboration with the cities to strengthen such agreements, ensure sufficient revenues, cover county revenue losses and service costs and enable the continued preservation of agricultural land that would otherwise be subject to intense development pressure.

The following policies from the Agricultural Element are particularly relevant:

Policy AG-1.2 Maintain parcel sizes outside of the community growth boundaries large enough to sustain viable agriculture and discourage conversion to non-agricultural home sites.

Policy AG-1.3 Prohibit the division of agricultural land for non-agricultural uses.

Policy AG-1.4 Prohibit land use activities that are not compatible within agriculturally designated areas.

Policy AG-1.5 Strongly discourage the conversion of agricultural land for other uses. No lands shall be considered for redesignation from Agricultural or Open Space to another land use designation unless all of the following findings can be made:

A. There is a public need or net community benefit derived from the conversion of the land that outweighs the need to protect the land for long-term agricultural use.
B. There are no feasible alternative locations for the proposed project that are either designated for non-agricultural land uses or are less productive agricultural lands.
C. The use would not have a significant adverse effect on existing or potential agricultural activities on surrounding lands designated Agriculture.

Policy AG-1.6 Continue to mitigate at a ratio of no less than 1:1 the conversion of farm land and/or the conversion of land designated or zoned for agriculture, to other uses.

Policy AG-1.7 Locate farm dwellings in a manner that protects both on-site and off-site agricultural practices. All dwellings in agriculturally zoned areas shall be encouraged to be located on portions of the parcel less suitable for agricultural use and in "clustered" configurations.

Policy AG-1.9 Regulate and encourage removal of incompatible land uses and facilities from agriculturally designated lands.

Policy AG-1.13 Prohibit new residential or suburban subdivisions in areas designated for agricultural use.

Policy AG-1.17 Encourage the coordinated acquisition of agricultural conservation easements by local, State and federal agencies and private conservation organizations with established records of responsible stewardship to protect agriculture, from willing sellers or donors.

Policy AG-1.18 Encourage the coordinated placement of agricultural conservation easements on land most threatened by development, particularly those lands located close to cities and unincorporated communities.

Policy AG-1.22 Within conservation easements, preclude the practice of fallowing fields for the purpose of water export. Fallowing as a part of normal crop rotation is not subject to this policy.

Policy AG-1.24 Oppose the creation of any conservation easements within growth boundaries. Conservation easements within growth boundaries shall not be accepted for mitigation purposes.

Policy AG-2.2 Preserve water resources for agriculture, both in quantity and quality, from competition with development, mitigation banks and/or interests from outside of the County.

Policy AG-2.8 Facilitate partnerships between agricultural operations and habitat conservation efforts to create mutually beneficial outcomes.

Policy AG-2.9 Support the use of effective mechanisms to protect farmers potentially impacted by adjoining habitat enhancement programs, such as "safe harbor" programs and providing buffers within the habitat area.

Policy AG-2.10 Encourage habitat protection and management that does not preclude or unreasonably restrict on-site agricultural production.

Policy AG-2.13 Promote wildlife-friendly farm practices, such as tailwater ponds, native species/grasslands restoration in field margins, hedgerows, ditch management for riparian habitat, restoration of riparian areas in a manner consistent with ongoing water delivery systems, reduction of pesticides, incorporating winter stubble and summer fallow, etc.

Policy AG-2.15 Encourage the establishment of agricultural mitigation banks in appropriate locations that provide strategic protection of high value farmland.

Policy AG-3.11 Adopt land use regulations for small farms that recognize the potential role such farms play in education and agricultural tourism and provide for the inclusion of such activities, while discouraging the use of small farms as non-agricultural home sites.

The Conservation and Open Space Element focuses on balanced management of Yolo County's multiple natural and cultural resources. The goals and policies speak to a connected and accessible open space system, with communities separated by agriculture and natural spaces, which are linked by a network of trails, where open spaces complement other land areas in a way that benefits both natural resources and the community. Among other important items, this element anticipates full integration of the Yolo HCP/NCCP as a tool for multi-species protection.

Further in the element, under the discussion of biological resources, there is a discussion of how each of the communities and habitats in Yolo County provide important biological value, support numerous plant and wildlife species, and are all part of an interrelated ecological landscape. The element states that an effective conservation approach considers the interrelatedness of this system

as a whole and strives to preserve and restore the functioning of ecologic processes by maintaining the necessary connectivity across the landscape.

The element contains descriptions of cultivated and natural lands throughout Yolo County and relevant programs, including this HCP/NCCP, the *Yolo County Oak Woodland Conservation and Enhancement Plan*, and the *Programmatic Safe Harbor Agreement for the Restoration of Riparian and Wetland Habitat*, as administered by the Audubon California Landowner Stewardship Program.

Key goals, policies, and actions in this element include the following:

GOAL CO-1 Natural Open Space. Provide a diverse, connected and accessible network of open space, to enhance natural resources and their appropriate use.

- Expand and enhance an integrated network of open space to support recreation, natural resources, historic and tribal resources, habitat, water management, aesthetics, and other beneficial uses.
- Develop a connected system of recreational trails to link communities and parks throughout the county.
- Create opportunities for ecotourism.
- Encourage responsible stewardship of private lands. Promote increased opportunities for public access to waterways and other natural areas.

Action CO-A2 Establish permanent areas of agriculture and open space between cities and unincorporated towns to ensure the continued distinctiveness of each community.

Action CO-A3 Seek to acquire voluntary easements to ensure connectivity with the conservation areas established through the Blue Ridge Berryessa Natural Area Conservation Partnership.

Action CO-A6 Connect the future Bay Delta Trail system, the future trail system in the lower Yolo Bypass, and the future Cache Creek Parkway system, and link those trails to the American River Bikeway system in Sacramento County.

Policy CO-1.14 Support the preservation of open space consistent with this general plan, via acquisition of fee title or easement interest by land trusts, government agencies, and conservancies from willing landowners.

Policy CO-1.15 Support efforts to acquire either fee title or easements on additional open space areas adjoining existing protected natural resource areas to increase the size, connectivity, and buffering of existing habitat.

Policy CO-1.16 Coordinate open space acquisition with habitat acquisition that occurs pursuant to the Yolo Natural Heritage Program.

Policy CO-1.25 Allow for specified areas of resource parks to be preserved, enhanced and/or restored as mitigation sites for public agencies only, consistent with the requirements of appropriate regulatory and funding agencies, provided that adequate compensation, including funding for operations and maintenance of the mitigation, is provided.

GOAL CO-2 Biological Resources. Protect and enhance biological resources through the conservation, maintenance, and restoration of key habitat areas and corresponding connections that

represent the diverse geography, topography, biological communities, and ecological integrity of the landscape.

Policy CO-2.1 Consider and maintain the ecological function of landscapes, connecting features, watersheds, and wildlife movement corridors.

Policy CO-2.2 Focus conservation efforts on high priority conservation areas (core reserves) that consider and promote the protection and enhancement of species diversity and habitat values, and that contribute to sustainable landscapes connected to each other and to regional resources.

Policy CO-2.3 Preserve and enhance those biological communities that contribute to the county's rich biodiversity including blue oak and mixed oak woodlands, native grassland prairies, wetlands, riparian areas, aquatic habitat, agricultural lands, heritage valley oak trees, remnant valley oak groves, and roadside tree rows.

Policy CO-2.4 Coordinate with other regional efforts (e.g., Yolo County HCP/NCCP) to sustain or recover special-status species populations by preserving and enhancing habitats for special-status species.

Policy CO-2.9 Protect riparian areas to maintain and balance wildlife values.

Policy CO-2.10 Encourage the restoration of native habitat.

Policy CO-2.11 Ensure that open space buffers are provided between sensitive habitat and planned development.

Policy CO-2.12 Support the use of controlled fire management where feasible and appropriate as a natural ecosystem process, to reduce the threat of catastrophic wildfire, to encourage oak recruitment, and to meet other resources management objectives in higher elevation woodland and chaparral communities.

Policy CO-2.13 Promote the use of oak woodlands conservation banks to mitigate for losses due to development impacts and to provide carbon sequestration for greenhouse gas emissions under applicable State programs.

Policy CO-2.14 Ensure no net loss of oak woodlands, alkali sinks, rare soils, vernal pools or geological substrates that support rare endemic species, with the following exception. The limited loss of blue oak woodland and grasslands may be acceptable, where the fragmentation of large forests exceeding 10 acres is avoided, and where losses are mitigated.

Policy CO-2.15 Encourage the use of mosquito abatement methods that are compatible with protecting fish and wildlife, including native insect pollinators.

Policy CO-2.16 Existing native vegetation shall be conserved where possible and integrated into new development if appropriate.

Policy CO-2.17 Emphasize and encourage the use of wildlife-friendly farming practices within the County's Agricultural Districts and with private landowners, including:

- Establishing native shrub hedgerows and/or tree rows along field borders.
- Protecting remnant valley oak trees.
- Planting tree rows along roadsides, field borders, and rural driveways.

- Creating and/or maintaining berms.
- Winter flooding of fields.
- Restoring field margins (filter strips), ponds, and woodlands in non-farmed areas.
- Using native species and grassland restoration in marginal areas.
- Managing and maintaining irrigation and drainage canals to provide habitat, support native species, and serve as wildlife movement corridors.
- Managing winter stubble to provide foraging habitat.
- Discouraging the conversion of open ditches to underground pipes, which could adversely affect giant garter snakes and other wildlife that rely on open waters.
- Widening watercourses, including the use of setback levees.

Policy CO-2.18 Coordinate with the Yolo County Resource Conservation District, Natural Resource Conservation Service, UC Cooperative Extension, and other farm organizations to encourage farming practices and the management of private agricultural land that is supportive of wildlife habitat values.

Policy CO-2.19 Support the use of sustainable farming methods that minimize the use of products such as pesticides, fuels and petroleum-based fertilizers.

Policy CO-2.20 Encourage the use of wildlife-friendly Best Management Practices to minimize unintentional killing of wildlife, such as restricting mowing during nesting season for ground-nesting birds or draining of flooded fields before fledging of wetland species.

Policy CO-2.21 Promote wildlife-friendly farming through mechanisms such as farmland trusts, conservation easements and safe harbor-type agreements.

Policy CO-2.22 Prohibit development within a minimum of 100 feet from the top of banks for all lakes, perennial ponds, rivers, creeks, sloughs, and perennial streams. A larger setback is preferred.

Policy CO-2.23 Support efforts to coordinate the removal of non-native, invasive vegetation within watersheds and replacement with native plants.

Policy CO-2.24 Promote floodplain management techniques that increase the area of naturally inundated floodplains and the frequency of inundated floodplain habitat, restore some natural flooding processes, river meanders, and widen riparian vegetation, where feasible.

Policy CO-2.26 Coordinate with local watershed stewardship groups to identify opportunities for restoring or enhancing watershed, instream, and riparian biodiversity.

Policy CO-2.27 Evaluate the need for additional water to support future riparian enhancement efforts, including the benefits of conjunctive management of groundwater and surface water resources.

Policy CO-2.28 Balance the needs of aquatic and riparian ecosystem enhancement efforts with flood management objectives.

Policy CO-2.29 Promote native perennial grass habitat restoration and controlled fire management in grazing lands to reduce invasive species cover and enhance rangeland forage.

Policy CO-2.30 Protect and enhance streams, channels, seasonal and permanent marshland, wetlands, sloughs, riparian habitat and vernal pools in land planning and community design.

Policy CO-2.31 Protect wetland ecosystems by minimizing erosion and pollution from grading, especially during grading and construction projects.

Policy CO-2.33 Create partnerships with landowners, non-government organizations, and other public agencies to implement the *Yolo County Oak Woodland Conservation and Enhancement Plan.*

Policy CO-2.34 Recognize, protect and enhance the habitat value and role of wildlife migration corridors for the Sacramento River, Putah Creek, Willow Slough, the Blue Ridge, the Capay Hills, the Dunnigan Hills and Cache Creek.

Policy CO-2.35 Consider potential effects of climate change on the locations and connections between wildlife migration routes.

Policy CO-2.36 Habitat preserved as a part of any mitigation requirements shall be preserved in perpetuity through deed restrictions, conservation easement restrictions, or other method to ensure that the habitat remains protected. All habitat mitigation must have a secure, ongoing funding source for operation and maintenance.

Policy CO-2.37 Where applicable in riparian areas, ensure that required state and federal permits/approvals are secured prior to development of approved projects.

Policy CO-2.38 Avoid adverse impacts to wildlife movement corridors and nursery sites (e.g., nest sites, dens, spawning areas, breeding ponds). Preserve the functional value of movement corridors to ensure that essential habitat areas do not become isolated from one another due to the placement of either temporary or permanent barriers within the corridors. Encourage avoidance of nursery sites (e.g., nest sites, dens, spawning areas, breeding ponds) during periods when the sites are actively used and that nursery sites which are used repeatedly over time are preserved to the greatest feasible extent or fully mitigated if they cannot be avoided.

Policy CO-2.39 Require new or retrofitted bridges, and new or expanded roads to incorporate design and construction measures to maintain the functional value of wildlife movement corridors.

Policy CO-2.40 Preserve grassland habitat within 2,100 feet of documented California tiger salamander breeding ponds or implement required mitigation (equivalent or more stringent) as imposed by appropriate agencies or through the County HCP/NCCP, to fully mitigate impacts consistent with local, State, and federal requirements. Implementation and funding of mitigation measures for projects that will be developed in phases over time may also be phased, with the applicable mitigation being implemented and funded prior to the final approval of each phase or sub-phase.

Policy CO-2.41 Require that impacts to species listed under the State or federal Endangered Species Acts, or species identified as special-status by the resource agencies, be avoided to the greatest feasible extent. If avoidance is not possible, fully mitigate impacts consistent with applicable local, State, and Federal requirements.

Policy CO-2.42 Projects that would impact Swainson's hawk foraging habitat shall participate in the Agreement Regarding Mitigation for Impacts to Swainson's Hawk Foraging Habitat in Yolo County entered into by the CDFG and the Yolo County HCP/NCCP Joint Powers Agency, or satisfy other

subsequent adopted mitigation requirements consistent with applicable local, State, and federal requirements.

Policy CO-2.43 Projects that have the potential to impact California tiger salamander breeding or terrestrial habitat in the Dunnigan Hills area, shall conduct a project-level biological assessment to determine the potential to impact California tiger salamander upland or breeding habitat (if such assessment has not already been done as part of an approved HCP/NCCP). Such an assessment will be required for all projects located within 1.3 miles of a known or potential breeding site. Development activities that would result in isolation of the breeding or upland habitat will be required to mitigate for such impacts. Mitigation shall consist of two components: 1) habitat preservation and enhancement of suitable upland habitat, and 2) preservation and construction of new breeding habitat. CTS upland habitat must be mitigated at a ratio of 3:1 (preserved:impacted), located within 2,100 feet of an occupied habitat, and include at least one suitable breeding pond. Equivalent or more stringent mitigation may be implemented as determined by trustee and responsible agencies. Mitigation must be coordinated with the HCP/NCCP program if adopted.

Action CO-A2 Establish permanent areas of agriculture and open space between cities and unincorporated towns to ensure the continued distinctiveness of each community.

Action CO-A3 Seek to acquire voluntary easements to ensure connectivity with the conservation areas established through the Blue Ridge Berryessa Natural Area Conservation Partnership.

Action CO-A6 Connect the future Bay Delta Trail system, the future trail system in the lower Yolo Bypass, and the future Cache Creek Parkway system, and link those trails to the American River Bikeway system in Sacramento County.

Action CO-A25 Develop a conservation strategy that considers the preservation and protection of intact functioning landscapes, watersheds, and landscape corridors. The approach should be based on the initial identification of high value habitat areas (core areas) and how these areas could be physically linked across the landscape. Coordinate to ensure that the basic landscape-level conservation concepts are incorporated into the HCP/NCCP. (Policy CO-2.1 through 2.4, Policy CO-2.14, Policy CO-2.19 through CO-2.24, Policy CO-2.27, Policy CO-2.29, Policy CO-2.29, Policy CO-2.30, Policy CO-2.32, Policy CO-2.33)

Action CO-A26 Adopt and implement the *Habitat Conservation Plan/Natural Communities Conservation Plan* developed through the Yolo Natural Heritage Program. Integrate the HCP/NCCP (Natural Heritage Program) into the general plan as appropriate. Direct habitat mitigation to strategic areas that implement the Yolo Natural Heritage Program and are consistent with the County's conservation strategy. Avoid the conversion of agricultural areas and focus on lands where wildlife values and farming practices are complementary. (Policy CO-2.1 through CO-2.4, Policy CO-2.14)

Action CO-A27 Protect the habitat value and biological function of oak woodlands, grasslands, riparian areas, and wetland habitats. Avoid activities that remove or degrade these habitats and establish buffers to avoid encroachment into sensitive areas. (Policy CO-2.4, Policy CO-2.14, Policy CO-2.15, Policy CO-2.18, Policy CO-2.19, Policy CO-2.20 through CO-2.24)

Action CO-A28 Create a program to encourage the planting of new oak seedlings in appropriate locations and the protection of plantings from damage by animals, insects, and people until seedlings are of sufficient size. (Policy CO-2.13, Policy CO-2.16, Policy CO-2.17)

Action CO-A29 Adopt a heritage tree preservation ordinance. (Policy CO-2.17, Policy CO-2.36)

Action CO-A30 Encourage landowners to participate in programs that restore degraded creek resources by:

- Removing exotic species and establishing native riparian vegetation.
- Managing the upland areas of watersheds to control erosion and overgrazing.
- Adding exclusionary fencing to keep livestock out of streams and stream bank areas.

(Policy CO-2.12, Policy CO-2.20 through CO-2.24, Policy CO-2.25)

Action CO-A31 Establish criteria for the preservation of vernal pools that include the following:

- Unusual features;
- Habitat quality;
- Watershed integrity;
- Defensibility and buffering;
- Size;
- Plant and animal species variety; and
- Presence of special status species.

(Policy CO-2.20 through CO-2.24)

Action CO-A32 Prepare a complete inventory of identified streams, channels, seasonal and permanent marshland, wetlands, sloughs, riparian habitat and vernal pools for use in community plans, area plans and specific plans. (Policy CO-2.25, Policy CO-2.33, Policy CO-2.34)

Action CO-A34 Identify stream sections with important fish and riparian habitat restoration needs. Seek funding and participate in programs to address needs. (Policy CO-2.5 through Policy CO-2.11, Policy CO-2.25, Policy CO-2.26, Policy CO-2.28)

Action CO-A35 Integrate biological and habitat conditions and constraints into the County Geographical Information System. (Policy CO-2.1 through CO-2.4)

Action CO-A36 Acquire fee title or easements from willing landowners to promote wildlife migration routes focusing on Cache Creek, Putah Creek, Dunnigan Hills, Willow Slough, the Sacramento River, and the Capay Hills. (Policy CO-2.37, Policy CO-2.38)

3.3 Methods for Identifying Covered Activities

To begin the process of determining covered activities, the Yolo Habitat Conservancy (Conservancy) developed comprehensive lists of activities and projects under the direct control or jurisdiction of the Permittees that might have a need for take coverage for one of more of the covered species. The Conservancy based these lists primarily on the activities and projects described in each Permittee's general plan or other planning document. The Conservancy reviewed general plans, specific plans, master plans, parkway plans, bicycle plans, area plans, infrastructure plans, and similar adopted plans that were consistent with the permittees' general plans. The Conservancy worked with the Permittees to include activities described in these plans in the comprehensive list as appropriate. The relevant plans used to develop the list are referenced in this chapter. Figure 3-1 depicts

simplified general plan land use designations for Yolo County and the cities of Woodland, Winters, Davis, and West Sacramento in the Plan Area as they relate to trends in future growth and development. After this initial work to identify covered activities the Conservancy worked iteratively with the Permittees to verify, refine, and constrain this layer to be more reflective of actual likely future conditions and also to ensure plan affordability. Finally, Conservancy staff members reviewed the data layer of covered activities with the planning staff of each Permittee multiple times to solidify the covered activity descriptions. The resulting covered activities layer is summarized in Table 3-1.

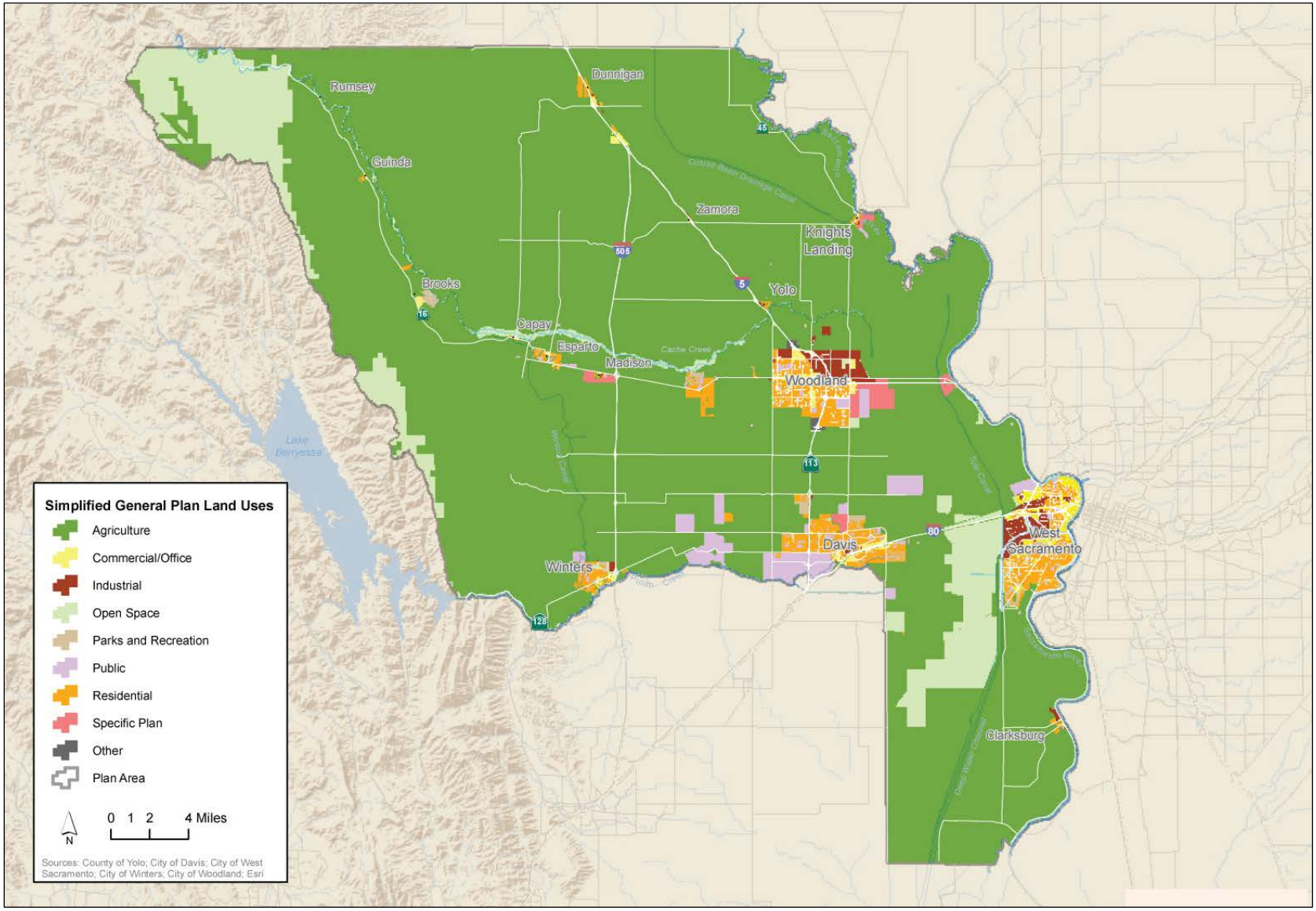
3.4 Screening Criteria and Criteria for Coverage

3.4.1 Screening Criteria

The Conservancy used the following five criteria to screen the lists of activities and projects identified from the general plans for inclusion in this chapter. Candidate covered activities needed to meet all five criteria to be considered covered activities under this HCP/NCCP.

- **Location:** The activity or project will occur within the Plan Area boundaries.
- **Timing:** Except for ongoing operations and maintenance activities, implementation of activities or construction of the project is scheduled to begin after this HCP/NCCP is approved and the project is completed within the expected term of the permit.
- **Effect:** The activity or project has a reasonable potential or likelihood to affect a covered species adversely. Highly unlikely or speculative effects did not meet this criterion.
- **Definition:** The location, size, and other relevant aspects of the activity or project could be defined well enough such that direct and indirect effects on covered species could be evaluated and conservation measures developed to mitigate those effects.
- **Feasibility:** Inclusion of the activity or project as a covered activity would not result in undue delays or substantial additional cost to HCP/NCCP development and the permitting process relative to the benefit of including the activity/project as a covered activity. In other words, it would not be more cost-effective to permit the activity/project separately. Examples of impractical covered activities are ones that, on their own, would add additional covered species, generate substantial controversy, or significantly complicate the effects analysis.

Figure 3-1. General Plan Land Use in the Plan Area



3.4.2 Criteria for Coverage

The HCP/NCCP permits will cover an activity or project if all of the following criteria are met:

- The activity or project does not preclude achieving the biological goals and objectives of this HCP/NCCP (Chapter 6, *Conservation Strategy*), as determined by the Conservancy at the time the covered activity is proposed. The Conservancy will make this determination upon agreement with the wildlife agencies for projects for which there is some question whether the biological goals and objectives of this HCP/NCCP may be precluded.
- The activity will be directly implemented by a Permittee, requires a discretionary permit from a Permittee, or may result in take of covered species and the applicant desires to obtain take coverage under this HCP/NCCP as a Special Participating Entity (see Section 4.2.1.3, *Projects Proposed by Special Participating Entities*).
- The activity or project causes a type of effect (adverse or beneficial) evaluated in Chapter 5, *Effects on Covered Species and Natural Communities.*
- Adequate take coverage[3] under the permits remains available for other covered activities.

The Conservancy based identification of the covered activities in this chapter on the types of projects and activities allowed by the Permittees' respective general plans and other planning documents described above. The Permittees will develop additional activities and projects over the course of the permit term (e.g., through the update of existing planning documents or development of new planning documents). To the extent these additional activities and projects are generally and qualitatively described below, meet the screening criteria, and are not expressly limited by this chapter, these future activities and projects may also be covered by this HCP/NCCP.

To maintain flexibility in implementation, this chapter broadly defines all of the different types of activities and projects covered by this HCP/NCCP. Therefore, some interpretation is expected during implementation as to whether this HCP/NCCP covers some activities or projects. The Permittee with jurisdiction will evaluate activities or projects that do not fall clearly within the descriptions provided in this chapter on a case-by-case basis. If the Permittee with jurisdiction over a proposed activity or project determines that a specific type of activity or project is not included within the descriptions in this chapter, then it will not receive coverage under this HCP/NCCP. The Conservancy will resolve any uncertainties regarding whether an activity or project can receive coverage under this HCP/NCCP. The Conservancy has the authority to determine that an activity cannot receive take coverage under this HCP/NCCP.

Project-specific identification as a covered activity, either in this chapter or through a future Conservancy determination, does not imply or grant entitlement for implementation. Project applicants are required to gain other project approvals from local jurisdictions and other local, state, and federal regulatory agencies as necessary.

[3] Take coverage is defined in this HCP/NCCP in terms of natural community and covered species habitat loss and sometimes in terms of covered species occurrences. Take limits are summarized in Table 5-2(a) and 5-2(b).

3.5 Covered Activities Description

For the purpose of this HCP/NCCP, covered activities are organized into the following categories and subcategories.

- Urban projects and activities.
    - General urban development.
    - Urban public services, infrastructure, and utilities.
    - Urban projects in rural areas.
- Rural projects and activities.
    - General rural development.
    - Rural public services, infrastructure, and utilities.
    - Agricultural economic development.
    - Open space.
    - Aggregate mining.
- Public and private operations and maintenance.
- Conservation strategy implementation and covered activities on reserve lands.
- Neighboring landowner protection program.

The Conservancy defined these categories to be consistent with local planning processes and group similar types of activities together, which facilitates description and minimizes redundancy. The covered activities described below are those projects and activities that will have direct or indirect effects on the covered species and natural communities and for which the Permittees will request incidental take authorization. As such, covered activity descriptions focus on those projects and activities that will have ground-disturbing effects, require vegetation management, or may have indirect effects on listed species (e.g., erosion associated with a culvert that degrades water quality at the site and downstream). Descriptions of covered activities in this chapter are mostly qualitative. Additional quantitative assumptions of covered activity footprints are described in Chapter 5, *Effects on Covered Species and Natural Communities*.

The Yolo HCP/NCCP may cover projects or activities that do not require a discretionary permit from the Permittees under a Certificate of Inclusion if the project proponent qualifies as a Special Participating Entity (Section 4.2.1.3, *Projects Proposed by Special Participating Entities*).

Table 3-1, *Spatially Defined Urban and Rural Development, Methods and Assumptions*, provides the methods and assumptions for developing the spatially defined covered activities footprint, and includes the acreage of each type of covered activity assumed. Table 3-2, *Spatially Undefined Activities, Methods and Assumptions*, describes the methods and assumptions for determining the general location, acreage, and affected land cover types for the spatially undefined covered activities.

Table 3-1. Spatially Defined Urban and Rural Development, Methods and Assumptions

Covered Activity Category	Covered Activity Type	GIS Detail	Covered Activity Amount Assumed (acres)[g]
Urban Projects and Activities			
	General Urban Development and Urban Public Services, Infrastructure, and Utilities	Planning Unit 19 (Woodland)	3,397[a]
		Planning Unit 20 (Davis)	1,251
		Planning Unit 21 (West Sacramento)	3,559[b]
		Planning Unit 22 (Winters)	718
		Summary	**8,925**
	Urban Projects in Rural Areas	Davis Mace Ranch Innovation Center	223[c]
		West Sacramento Levee Improvement Program	496
		Summary	**719**
Rural Projects and Activities			
	General Rural Development	Capay	7
		Clarksburg	99
		Dunnigan	2,720[d]
		Elkhorn	383
		Esparto	215
		Guinda	7
		I 505/ CR 14	10
		Knights Landing	249
		Madison	429
		Monument Hills	170
		North Davis Meadows	7
		Rumsey	0[e]
		Willow Oak	13
		Yolo	53
		Yolo Fruit Stand/I 80	3
		Zamora	22
		General Rural Development Summary	**4,387**
	Rural Public Service, Infrastructure and Utilities		
		Woodland-Davis Alternative Transportation Corridor	19
		Bike paths/trails in unincorporated area	113
	Bridges	Repair, replace, rehab construct bridges (permanent impacts)	3
		Temporary impacts	18
	Roads	SR 16	34
		CR 102	18
		CR 99W	7
		CR 89	19
		CR 85B	3
		CR 21A	5

Covered Activity Category	Covered Activity Type	GIS Detail	Covered Activity Amount Assumed (acres)[g]
		CR 6	0[f]
	Bike lanes and multi-use trails	Additional planned intra-county bike lanes	377
	Airport	County airport	256
		Public Services, Infrastructure, and Utilities Summary	**872**
	Agricultural Economic Development		
	Ag Industrial and Ag Commercial	SE corner I-505/SR-128	65
		Zamora	16
		Clarksburg	54
		Other possible	197
		Agric. Economic Dev. Summary	**332**
	Open Space		
	Parks/Open Space	Six 10-acre nodes to represent developed areas within 4,103 acres of planned county open space park. These nodes are randomly spaced and do not represent defined locations.	60
		Additional trails	5
		Open Space Summary	**65**
	Aggregate Mining		
	Aggregate mining	Planned aggregate mining	1,282
		Additional future mining	968
		Aggregate Mining Summary	**2,250**
Grand Total			**17,550**

Notes

a. Includes Woodland Regional Park.

b. Includes planned future development in legally incorporated City boundary and LAFCO approved sphere of influence, as refined by city planning staff. Also includes the portion of West Sacramento Levee Improvement Program within planning unit 21.

c. 229-acre site excluding six acres already developed (Ikedas, City water tank, City park and ride lot, abandoned CR 32A ROW)

d. The Public Draft HCP/NCCP included the projected impacts of the Dunnigan Specific Plan within Planning Units 5 and 13. Since then, Yolo County has removed the Dunnigan Specific Plan from the County General Plan to allow for more incremental development of the Plan area. While the Dunnigan Specific Plan is no longer a covered activity, the area remains a possible location for future development in Yolo County within the 50-year permit term because of its proximity to I-5 and the existing Dunnigan community, and its location outside of the floodplain, among other reasons. The Final HCP/NCCP maintains the location and amount of impact in the analysis in the event similar development is approved in the future.

e. Less than one acre included.

f. Dunnigan area acreage per footnote d above.

g. Acreage assumptions are for the purposes of analysis only. These amounts do not represent take limits for each planning unit or project. Take limits apply to the Yolo HCP/NCCP as a whole and are defined in Chapter 5, Effects Analysis.

Table 3-2. Spatially Undefined Activities, Methods and Assumptions

Covered Activity Type	Amount Assumed (acres)[a]	Methods, Assumptions
Road maintenance	246	4,880 acres of road rights-of-way are spatially defined in GIS. Assumed 5% (**246 acres**) will be permanently removed as a result of ongoing operations and maintenance activities. These 246 acres were distributed proportionately among the land use types occurring within the road rights-of-way.
Reclamation Districts and County Service Areas	100	Assumed up to **100 acres** will be permanently removed as a result of ongoing operations and maintenance activities. These 100 acres were distributed proportionately among the land use types occurring within the reclamation districts.
Yolo County Flood Control and Water Conservation District and County Service Areas	50	1,000 acres of levees within the district are spatially defined in GIS. Assumed 5% (**50 acres**) will be permanently removed as a result of ongoing operations and maintenance activities. These 50 acres were distributed proportionately among the land use types occurring within the 1,000 acres of spatially defined area along the levees.
Cache Creek Resources Management Plan	110	The Cache Creek Resources Management Plan is spatially defined in GIS from CCAP and County General Plan Cache Creek Open Space area and consists of 2,235 acres. Assumed **110 acres** will be removed through operations and maintenance activities, including 17 acres grasslands, 37 acres barren, 16 acres riverine, and 41 acres of valley foothill riparian. Most removal will be temporary. The removal of 41 acres of valley foothill riparian is treated as permanent because this natural community will take more than one year to recover from disturbance.
Cultivated lands, temporary effects	200	Covered activities will temporarily affect up to 200 acres of non-rice cultivated lands. Each disturbance will last no more than one year. Temporary activities will include activities such as temporary trenching and construction staging areas. These activities will avoid take of individuals through the avoidance and minimization measures described in Chapter 4. The Conservancy expects individual disturbance areas to typically be less than ten acres in size.
TOTAL	**706**	

Note:

[a] Acreage assumptions are for the purposes of the analysis only; these amounts do not represent take limits for each project or category of activity. Take limits apply to the Yolo HCP/NCCP as a whole and are defined in Chapter 5, *Effects Analysis*.

3.5.1 Urban Projects and Activities

Urban projects and activities will be implemented by Permittees or by private and public non-Permittee applicants who seek take coverage through one of the Permittees. Urban development will occur within the city planning units listed below, summarized in Table 3-1, and depicted in Figure 3-2.

- Planning Unit 19 (which includes the City of Woodland), including 3,397 acres of urban projects and activities.
- Planning Unit 20 (which includes the City of Davis), including 1,251 acres of urban projects and activities.
- Planning Unit 21 (which includes the City of West Sacramento), including 3,559 acres of urban projects and activities.
- Planning Unit 22 (which includes the City of Winters), including 718 acres of urban projects and activities.

Urban projects and activities include planned land uses within the four urban planning units that are consistent with Permittee general plans, including specific plans, master plans, parkway plans, bicycle plans, area plans, infrastructure plans, and similar adopted plans that are consistent with and implement local general plans. With the exception of avoided riparian and wetland areas, covered activities in the urban planning units are assumed to result in the removal of all remaining natural and agricultural land cover types.

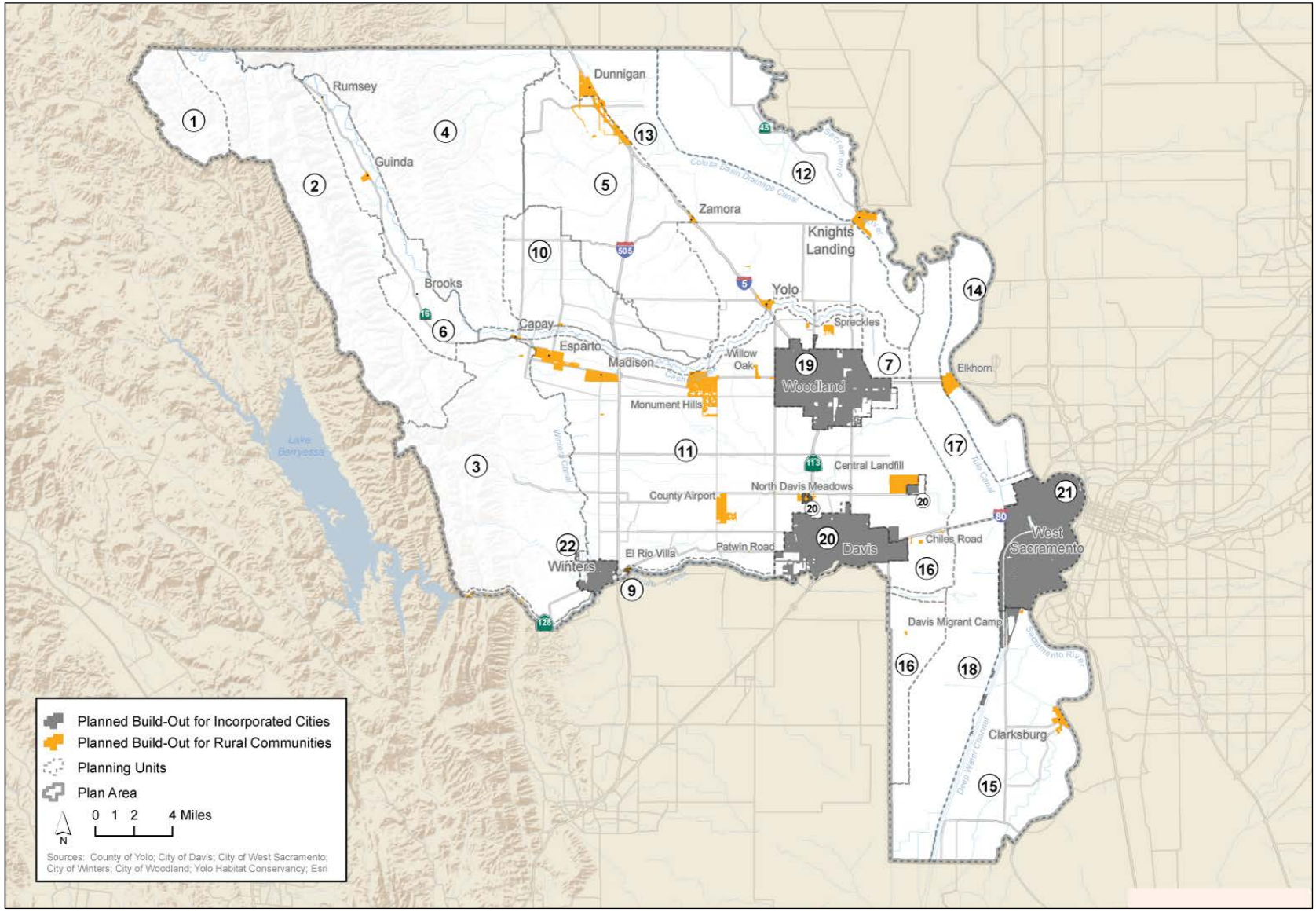
The urban projects and activities category is divided into three secondary categories: general urban development; urban public service, infrastructure, and utilities; and urban projects in rural areas. The covered activities included under each of these sub-categories are described below under the applicable heading. These urban projects and activities may be implemented by Permittees, private applicants under the jurisdiction of one of the Permittees, or by Special Participating Entities covered through a Certificate of Inclusion.

3.5.1.1 General Urban Development

This HCP/NCCP provides coverage to support the implementation of planned residential, industrial, commercial, mixed-use, recreational and open space, and public/quasi-public land uses, including associated infrastructure, consistent with local general plans, including the following:

- Residential uses (single-family homes, multi-family homes [e.g., duplexes, triplexes, apartment buildings, condominiums]).
- Commercial uses (retail centers, grocery stores, restaurants, stores and shops, offices).
- Industrial uses (warehouse and distribution centers).
- Public and quasi-public buildings and facilities, including governmental offices, schools, and places of worship.
- Recreational and open space facilities such as neighborhood parks, dog parks, soccer fields, golf courses, indoor and outdoor sports centers, and trails.

Figure 3-2. General Plan Build Out within Plan Area



3.5.1.2 Urban Public Services, Infrastructure, and Utilities

Associated urban services, infrastructure, and utilities, including landscaping, sewer connections, streets, driveways, lighting, parking areas, roadways, and bridges; bikeways and pathways; water supply, treatment, storage, and distribution facilities; wastewater collection, treatment, and disposal facilities; energy generation (excluding wind power) and distribution facilities; municipal services and facilities; landfills, collection facilities, and transfer stations; stormwater and drainage collection, treatment, and retention/detention facilities; flood control facilities; levees; airport; and other services, infrastructure, and utilities that serve planned land uses consistent with local general plans. This includes the West Sacramento Levee Improvement Program and Woodland Water Pollution Control Facility expansion.

- Development and operation of new stormwater and drainage collection, treatment, and retention/detention facilities.[4]
- Expansion and improvements to, and maintenance of, existing stormwater and drainage collection, treatment, and retention/detention facilities.
- Development and operation of new flood control facilities, including levees.
- Expansion and improvements to existing flood control facilities, including levees.
- Development and operation of new wastewater, water collection, storage treatment, and conveyance structures and facilities.
- Development and operation of new water supply treatment, storage, and distribution facilities (e.g., pipelines and pump stations).
- Expansion and improvements to existing water supply treatment, storage, and distribution facilities (e.g., pipelines and pump stations).
- Development and operation of solid waste management facilities, including landfills, collection facilities, recycling plants, and composting facilities.
- Expansion and improvements to existing solid waste management facilities, including landfills, collection facilities, recycling plants, and composting facilities.
- Development, expansion, and improvements to transportation facilities, including sidewalks, bike paths, paved and unpaved roads, public bridges, culverts, and transit facilities.
- Development, expansion, and improvements to public service facilities, including new fire stations, police stations, communications facilities, public administration centers, theatres, museums, community centers, community gardens, and concession buildings.
- Development, expansion, improvements, and operation of public and private utilities such as energy generation and distribution facilities (excluding wind farms and solar), including underground and aerial electric transmission and distribution lines, telecommunications lines, and gas pipelines and wells. The HCP/NCCP does not cover wind farms.
- Development, expansion, and operation of parks, open space, and trails.
- Construction and replacement of underground and aerial utility infrastructure, including telecommunication lines, cell phone and wireless communication facilities, lighting, cable

[4] This includes, but is not limited to, the Woodland drainage channel south of CR25.

television lines, electric power transmission lines (bulk transfer of electrical energy, from generating power plants to electrical substations), electric power distribution lines (local electric power distribution lines), natural gas pipelines, aviation and other fuel lines, water supply pipelines, and wastewater pipelines.

For urban development, the HCP/NCCP assumes that these lines will fall within the urban planning units; therefore, the acreage of urban utility development is subsumed within the acreage of covered activities in these planning units

3.5.1.2.1 Woodland Water Pollution Control Facility Expansion

This HCP/NCCP also provides coverage to the Woodland Water Pollution Control Facility Expansion project. The Water Pollution Control Facility (WPCF) is a 10.4-million-gallon-per-day wastewater treatment plant that serves the city of Woodland. The City of Woodland owns and operates the WPCF, which treats wastewater from the City's residential, commercial, and industrial users. The facility uses a tertiary (advanced) treatment system, with the treated effluent discharged into the Tule Canal within the Yolo Bypass. The treatment system consists of activated sludge oxidation ditches, secondary clarifiers, and a chlorination/dechlorination process. Approximately 315 acres of ponds are used for the treatment of sludge and storage of excess wastewater during periods of peak flow. The WPCF is designated as a class V facility, the highest treatment rating in California, and holds all required federal and state permits (National Pollutant Discharge Elimination System [NPDES] Permit No. CA0077950, WDR Order No. R5-209-0010).

The WPCF includes the following physical improvements:

- Modification of the four existing oxidation ditches into anoxic and aerated zones.
- Installation of submersible mixers and fine bubble diffusers to replace the older and less-efficient surface brush aerators.
- Construction of a blower building on a 0.26-acre pad south of the oxidation ditches, outside of the existing fence line.
- Additional improvements at two of the 12 existing approximate 4,800-square-foot settling ponds (the two central ponds on the east side) to improve sludge removal. These improvements would entail adding lime and Portland cement to the existing soil.
- Construction of approximately 2,700 linear feet of new pipe between the existing ponds.
- Installation of eight new manholes.

These improvements are expected to reduce secondary power usage by 30 percent and reduce indirect air emissions, including greenhouse gases related to energy usage. Additional benefits include improved sludge settleability and process stability. The process would also remove additional nitrogen from the water, which would improve the quality of the effluent.

3.5.1.3 Urban Projects in Rural Areas

3.5.1.3.1 Davis Mace Ranch Innovation Center

The Yolo HCP/NCCP provides coverage for adverse terrestrial effects associated with development of the Davis Mace Ranch Innovation Center, a business park covering 223 acres, by the City of Davis in Planning Unit 11.

3.5.1.3.2 West Sacramento Levee Improvement Program

This HCP/NCCP provides coverage to the West Sacramento Area Flood Control Agency for the West Sacramento Levee Improvement Program to improve the levees in Yolo County that protect the city of West Sacramento. The HCP/NCCP covered activities footprint includes 496 acres outside the West Sacramento planning unit, and additional acres within the West Sacramento planning unit, for this project. The West Sacramento Area Flood Control Agency is teaming with the U.S. Army Corps of Engineers and the California Department of Water Resources to implement the program. The purpose of the West Sacramento Levee Improvement Program is to achieve a minimum of 200-year flood protection[5] for the entire city by improving the approximately 50 miles of levees that protect West Sacramento. The West Sacramento Flood Control Agency expects to implement these levee improvements within the first 10 to 20 years of HCP/NCCP implementation.

The goals of the West Sacramento Levee Improvement Program are as follows:

- Construct levee improvements as soon as possible to reduce flood risk as quickly as possible.
- Construct improvements that are politically, socially, economically, and environmentally acceptable.
- Provide recreation and open space elements for the city that are compatible with flood improvement actions.
- Ensure continuing federal assistance for levee repairs and maintenance.

Levee improvement and stabilization activities may include repair or rehabilitation of levees as well as full reconstruction of levees.

Flood control design components that may be utilized include those listed below.

- Regrading of bank slopes.
- Installation of hardscape.
- Temporary stream diversion during construction.
- Planting. This includes vegetative slope and soil stabilization. All planting will be implemented to allow proper flood conveyance and may include hydroseeding on all earthen surfaces above the channel bed.
- Reconstruction or improvement of floodwalls and/or levees. Work may result in a raised or expanded levee.
- Maintenance road construction.
- Installation or repair of culverts or outfall structures.
- Structural improvements, including expanding the levee footprint, increasing the height of the levee, or adding new material to support the levee.

West Sacramento levees will generally be reconstructed with in-kind materials and within the footprint of existing levees. This may include adding new hardscape to the channel banks. The West Sacramento Area Flood Control Agency has identified specific geographic locations where levees will

[5] A 200-year flood is a flood that has a 0.5 percent chance of occurring in any given year or annual exceedance probability.

be modified and borrow sites will be located, and the Conservancy has spatially defined these locations in the geographic information system (GIS) data. These are south of urban Planning Unit 21 and in Planning Unit 15. The Yolo HCP/NCCP covers components of the West Sacramento Levee Improvement Program that are included in the covered activities layer, which was developed based on information provided by the City of West Sacramento.[6]

3.5.2 Rural Projects and Activities

This category of covered activities includes planned land uses within the 18 rural planning units (1 through 18), including specific plans, master plans, parkway plans, bicycle plans, area plans, infrastructure plans, and similar adopted plans that are consistent with and implement the *Yolo County General Plan* and other local general plans if applicable. This category also includes roads and bridges, bike lanes and multi-use trails, airports, agricultural economic development and open space, habitat conservation projects, parks and recreation, and aggregate mining. These rural projects and activities may be implemented by Permittees, private applicants under the jurisdiction of one of the Permittees, or by Special Participating Entities covered through a Certificate of Inclusion.

3.5.2.1 General Rural Development

This category includes 4,391 acres of planned residential, industrial, commercial, mixed-use, park and open space, and public/quasi-public land uses that are consistent with the *Yolo County General Plan* and other local general plans if applicable. It includes planned growth within the adopted growth boundaries for unincorporated communities/places identified in the *Yolo County General Plan*.

The *Yolo County General Plan* identifies unincorporated (rural) towns and places with land uses other than agriculture. These towns/places are geographically discrete and individually and collectively small in scale. For the purposes of discussing these towns/places in this HCP/NCCP, these areas are called *unincorporated communities/places*. General rural development covered activities could occur within the boundaries of the following unincorporated communities/places (Figure 3-2):

- Capay (seven acres)
- Clarksburg (99 acres)
- Dunnigan (2,720 acres)
- Elkhorn (383 acres)
- El Rio Villa (five acres)
- Esparto (215 acres)
- Guinda (seven acres)
- Interstate 505/County Road 14 (10 acres)
- Knights Landing (249 acres)

[6] Personal communication, email from Paul Dirksen, City of West Sacramento, September 25, 2014. The actual locations and total acreage are subject to modification by the Conservancy within the terms of the Permits.

- Madison (429 acres)
- Monument Hills (170 acres)
- North Davis Meadows (seven acres)
- Rumsey (less than 0.5 acre)
- Willow Oak (13 acres)
- Yolo (53 acres)
- Yolo Fruit Stand/Interstate 80 (three acres)
- Zamora (22 acres)

The types of future development that could occur in these areas are the same as those described under Section 3.5.1, *Urban Projects and Activities,* because the land uses in these areas are non-agricultural. In general, the unincorporated communities are not expected to experience significant growth beyond existing conditions. Most of the unincorporated community development that is planned to occur will be focused in the following six unincorporated communities: Elkhorn, Madison, Clarksburg, Dunnigan, Esparto, and Knights Landing.

Similar to urban projects and activities, this category of covered activities includes, but is not limited to, construction occurring within the unincorporated community boundaries defined above. With the exception of some riparian and wetland avoidance, covered activities in the unincorporated communities are assumed to result in the removal of all remaining natural and agricultural land cover types. As such, coverage for operation and maintenance of covered activities in the unincorporated communities is included in this subcategory and is not described in Section 3.5.3, *Public and Private Operations and Maintenance*.

This category also includes the following, to the extent that each activity is under the discretionary authority of a Permittee:

- Vegetation management, including fuel reduction (e.g., hand and mechanized removal and controlled burns), tree removal and pruning, grazing activities, invasive vegetation control/removal, hazardous tree removal, weed abatement, algae control in ponds, and revegetation to prevent re-invasion of invasive plants.
- Implementation of integrated pest management programs. (See below for limitations on this activity as a covered activity by the USFWS permit.)

This HCP/NCCP provides coverage for construction and replacement of underground and aerial utility infrastructure, including telecommunications lines, cell phone and wireless communication facilities, lighting, cable television lines, electric power transmission lines (bulk transfer of electrical energy, from generating power plants to electrical substations), electric power distribution lines (local electric power distribution lines), natural gas pipelines, aviation and other fuel lines, water supply pipelines, and wastewater pipelines. The HCP/NCCP assumes that these lines will fall within the urban planning units described in Section 3.5.1, *Urban Projects and Activities*, and general development areas described in Section 3.5.2, *Rural Projects and Activities;* therefore, the acreage of utility development is subsumed within the acreage of the covered activities footprints for urban and rural projects.

3.5.2.2 Rural Public Services, Infrastructure, and Utilities

This category includes both public and private roadways and bridges; bikeways and pathways; water supply, treatment, storage, and distribution facilities; wastewater collection, treatment, and disposal facilities; energy generation and distribution facilities; municipal services and facilities; landfills, collection facilities, and transfer stations; stormwater and drainage collection, treatment, and retention/detention facilities; flood control facilities; levees; airport; and other services, infrastructure, and utilities that serve planned land uses that are consistent with local general plans.

3.5.2.2.1 Roads and Bridges

The *Yolo County General Plan* identifies several road and bridge projects. This HCP/NCCP provides coverage for the following future roadway network improvements (Figure 3-4):

- CR 21A: Upgrade to a major two-lane county road standard between CR 85B and State Route (SR) 16. (5 acres)
- CR 85B: Upgrade to a major two-lane county road standard between SR 16 and CR 21A. (3 acres)
- CR 99W: Widen to a four-lane arterial between CR 2 and CR 8. (7 acres)
- SR 16: Widen to a four-lane arterial between CR 21A and Interstate 505. (34 acres)
- CR 6: This road improvement acreage is included within the 2,720 acres of covered activities within the Dunnigan area described in Section 3.5.2.1, *General Rural Development.*

The HCP/NCCP provides coverage for the following roadway improvements, which include, but are not limited to, intersection control and lane configuration improvements, passing lanes, and/or wider travel lanes and shoulders:

- CR 89 between SR 16 and CR 29A. (19 acres)
- CR 102 between CR 13 and Woodland city limits and between Woodland city limits and Davis city limits. (18 acres)

This HCP/NCCP will cover the replacement/rehabilitation of up to 26 bridges and construction of three new bridges (total of 3 acres permanent, 18 acres temporary):

- Bridge 22C-0095 on CR 49 over Hamilton Creek.
- Bridge 22C-0126 on CR 96 over Union School Slough.
- Bridge 22C-0127 on CR 96 over Dry Slough.
- Bridge 22C-0085 on CR 32D over a branch of Putah Creek.
- Bridge 22C-0102 on CR 25 over Cottonwood Slough.
- Bridge 22C-131 on CR 12 over Willow Spring Creek.
- Bridge 22C-0144 on CR 19 over Slough S3.
- Bridge 22C-0112 on CR 29 over Winters Canal.
- Bridge 22C-0082 on CR 85 over Goodnow Slough.
- Bridge 22C-0110 on CR 88 over Winters Canal.
- Bridge 22C-109 on CR 88 over Union School Slough.
- Bridge 22C-0108 on CR 27 over Union School Slough.

- Bridge 22C-0133 on CR 12A over Oat Creek.
- Bridge 22C-0138on CR 97 over Slough S7.
- Bridge 22C-0105 on CR 20 over Chickahominy Slough.
- Bridge 22C-0055 on CR 26 over Winters Canal.
- Bridge 22C-0004 on CR 94B over Cache Creek.
- Bridge 22C-0045 on CR 31 over Chickahominy Slough.
- Bridge 22C-0075 on CR 25 over Cottonwood Slough.
- Bridge 22C-0116 on CR 25 over the north fork of Willow Slough.
- Bridge 22C-0111 on CR 28 over Union School Slough.
- Bridge 22C-0136 on CR 91B over Oat Creek.
- Bridge 22C-0094 on CR 40A over Pine Creek.
- Bridge 22C-0096 on CR 82 over Salt Creek.
- Bridge 22C-0121 on CR 91A over Dry Slough.
- Bridge 22C-0059 on CR 23 over a tributary of Lamb Valley Slough.

3.5.2.2.2 Bike Lanes and Multi-Use Trails

Several bike lanes and multi-use trails are identified in the general plans for Yolo County and the city of Woodland and are proposed for coverage under this HCP/NCCP. Projects may be constructed along existing roads, levees, or railways or may require new alignments independent of existing or proposed infrastructure. The addition of bike lanes along existing roads would include expansion of existing roadways to accommodate four- to six-foot-wide bike lanes on either side of the road. Multi-use trails along levees or railways are expected to be between 10 and 40 feet. Bike lanes and multi-use trails identified in the *Yolo County General Plan* will cover an estimated 113 acres, while bike lanes and multi-use trails identified in the Circulation Element for the *City of Woodland General Plan* cover an estimated eight acres in four locations. Trails will also be constructed on the Woodland Regional Park site (Figure 3-3) and within the CCRMP boundaries. The location of trails on the Woodland Regional Park site will be subject to wildlife agency approval. Total acreage for bike lanes and trails is identified in Table 3-1.

The Woodland-Davis Alternative Transportation Corridor project (Figure 3-4) includes 19 acres on the covered activities layer (Table 3-1) and will provide an off-road path between the cities of Davis and Woodland. The path will be paved and 10 feet wide. It is expected to be used mainly by bicycles, but low-speed electric vehicles and pedestrians could also use the path. The project will tie into the regional bikeway system along the Interstate 80 corridor through connections in Davis, providing bicycle access to Capital Corridor rail service; the cities of Sacramento, West Sacramento, and Winters; and the Bay Area to Lake Tahoe Cross-State Bicycle Route.

Figure 3-3. Woodland Regional Park

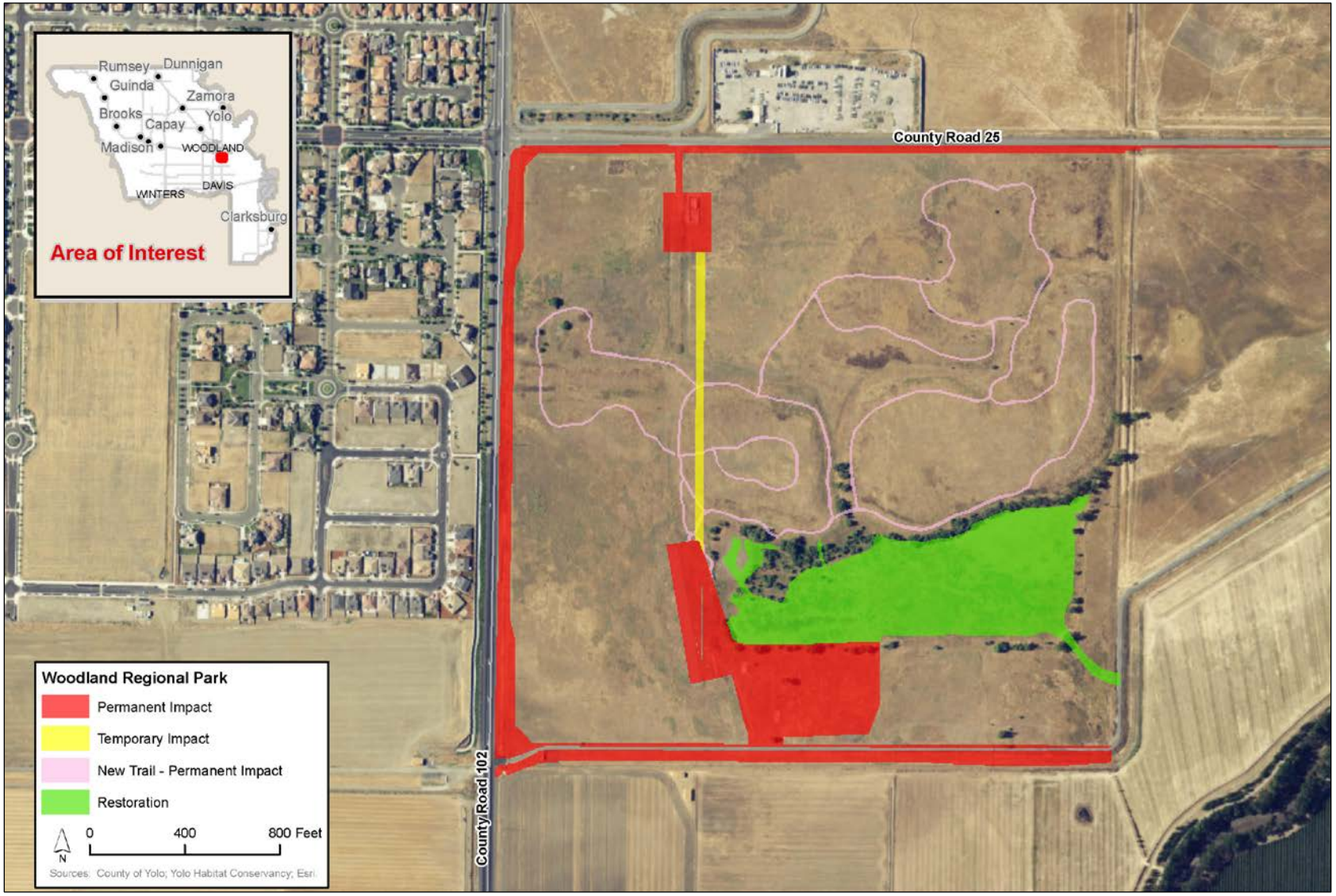
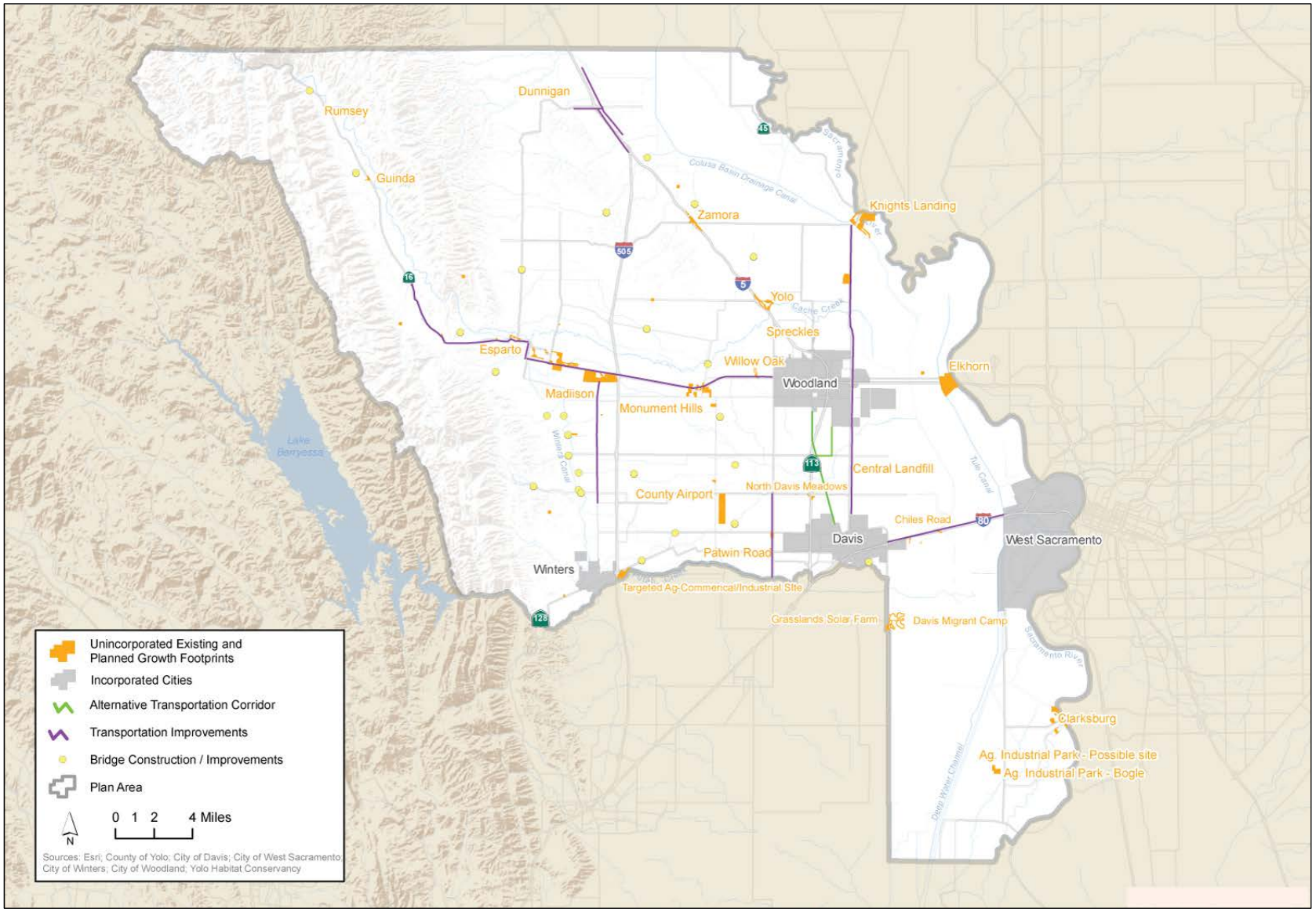


Figure 3-4. Planned Public Services, Infrastructure, and Utilities in the Plan Area



3.5.2.2.3 Airports

This HCP/NCCP will provide coverage for future development at the Yolo County Airport. This will include construction of new hangars and other airport-related uses, and runaway improvements, over the next twenty years. The expansion will occur on agricultural lands owned by the County and is adjacent to the existing airport runway and hangars. This future development is assumed to affect up to 256 acres of land for the development of detention basins and drainage improvements, new hanger facilities, other aviation facilities, non-aviation facilities, airfield areas that will be graded and reseeded, new airfield pavement, and pavement to be removed (Yolo County Planning, Public Works and Environmental Services Department 2015).

3.5.2.3 Agricultural Economic Development

This category includes agricultural economic development activities that occur outside of approved growth boundaries for unincorporated communities/places in the rural planning units (1 through 18). This category is limited to agricultural industrial and agricultural commercial land uses that are consistent with the *Yolo County General Plan*. It does not include general agricultural land uses and activities. General agricultural land uses and activities may be covered under a Certificate of Inclusion if the project proponent qualifies as a Special Participating Entity (Section 4.2.1.3, *Projects Proposed by Special Participating Entities*).

This HCP/NCCP provides coverage for 332 acres of activities associated with agricultural commercial and agricultural industrial development pursuant to the *Yolo County General Plan* that are under the discretionary authority of Yolo County. The acres for each of these activities are provided in Table 3-1. Agricultural industrial uses include agricultural research, processing, and storage; supply; service; crop dusting; agricultural chemical and equipment sales; and surface mining. Agricultural commercial uses include roadside stands, wineries, farm-based tourism (e.g., u-pick, dude ranches, lodging), horseshows, rodeos, crop-based seasonal events, and ancillary restaurants and/or stores.

3.5.2.4 Open Space

This HCP/NCCP provides coverage for the expansion of existing and development of new planned park and open space uses and activities that are consistent with the *Yolo County General Plan* and the *Yolo County Parks and Open Space Master Plan* (Figure 3-6), and recreational activities within the CCRMP boundaries and consistent with the Yolo County Cache Creek Area Plan. This includes 4,103 acres of parks, as described in the *Yolo County General Plan,* and includes recreational activities associated within the Cache Creek Area Plan. Such facilities include areas for campsites, picnic areas, swimming, water skiing, fishing, rafting, archery, model airplane use, dog park, horseshoes, beach access, inner-tubing, nature study, general natural enjoyment, habitat preservation and educational tours, multi-use trails (horse, bicycle, pedestrian, dog walking with leash, running/jogging), barbeque areas, mooring docks, fishing piers, off-highway vehicle park, nature centers, signs, overlooks/view platforms, restrooms, shade structures, hunting, fishing, birdwatching and other wildlife viewing, photography, gold panning, swimming, historic or archaeological exploration (provided no ground disturbance), camp host facilities, ATVs or other off-road vehicles for management purposes only, drones, model airplanes, and general open space and passive recreational uses. Coverage also includes infrastructure and amenities associated with these facilities, such as access roads, utilities, signage, landscaping, parking lots, launch ramps, trash receptacles, lighting, and drinking fountains. Park facilities and active recreational areas will include

60 acres of parks as described in the *Yolo County General Plan,* and five acres of additional trails (not including Woodland Regional Park trails, which are accounted for in the covered activities footprint for the Woodland planning unit).

3.5.2.5 Aggregate Mining

This HCP/NCCP covers aggregate mining within the *Cache Creek Area Plan* (CCAP) boundary (Figure 3-5), consistent with the *Off-Channel Mining Plan* (OCMP) (Yolo County 1996). The OCMP and relevant implementing ordinances (i.e., the Off-Channel Surface Mining Ordinance and the Surface Mining Reclamation Ordinance) currently authorize seven off-channel mining operations (Teichert-Schwarzgruber, Syar, CEMEX, Teichert-Woodland, Teichert-Esparto, Granite-Capay, and Granite-Esparto) along Cache Creek. This includes 968 acres of planned aggregate mining and 1,282 acres of additional future mining.

Development of a mining site typically follows a phased plan, which entails clearing of surface vegetation, removal and stockpiling of topsoil for future use in reclamation activities, mining of sand and gravel (i.e., construction aggregate), processing of mined aggregate at rock processing plants in the mine area, and reclamation of the mined lands to such uses as agricultural, lake, habitat, and open space uses. Facilities that will be constructed in the mine area to support aggregate mining activities include sand and gravel processing plants, asphalt-concrete hot mix plants, concrete batch plants, material stockpiles, settling ponds, water wells, stationary and mobile equipment, and haul roads. Other activities include prospecting and exploration within the OCMP planning area, use of conveyor systems, dust control, equipment maintenance, site maintenance, and paved and unpaved road maintenance.

Site reclamation and restoration activities within approved mine sites are also covered. These activities may include reclamation to agriculture, habitat and open space, and open water lakes with habitat and/or recreational uses. Activities necessary for reclamation may include backfilled excavation improvements (the construction of habitat, trails, roadways, agricultural fields, or recreational/open space facilities proposed for construction in reclaimed mining areas); bank stabilization maintenance (grading, revegetation, and biotechnical/bioengineered stabilization); fencing; grading for field drainage and releveling; resoiling; revegetation; soil compaction; seeding, planting, irrigation, and maintenance of revegetated areas until the desired reclaimed condition is established; and erosion control.

Mining of off-channel aggregate deposits along lower Cache Creek within the OCMP boundary is expected to continue for the life of this HCP/NCCP and beyond. This HCP/NCCP assumes 2,250 acres of new mining beyond those approved for the seven authorized operations listed above. In-channel maintenance, stabilization and restoration are addressed in Section 3.5.2.4, *Open Space*.

Figure 3-5. Planned Aggregate Mining within the HCP/NCCP

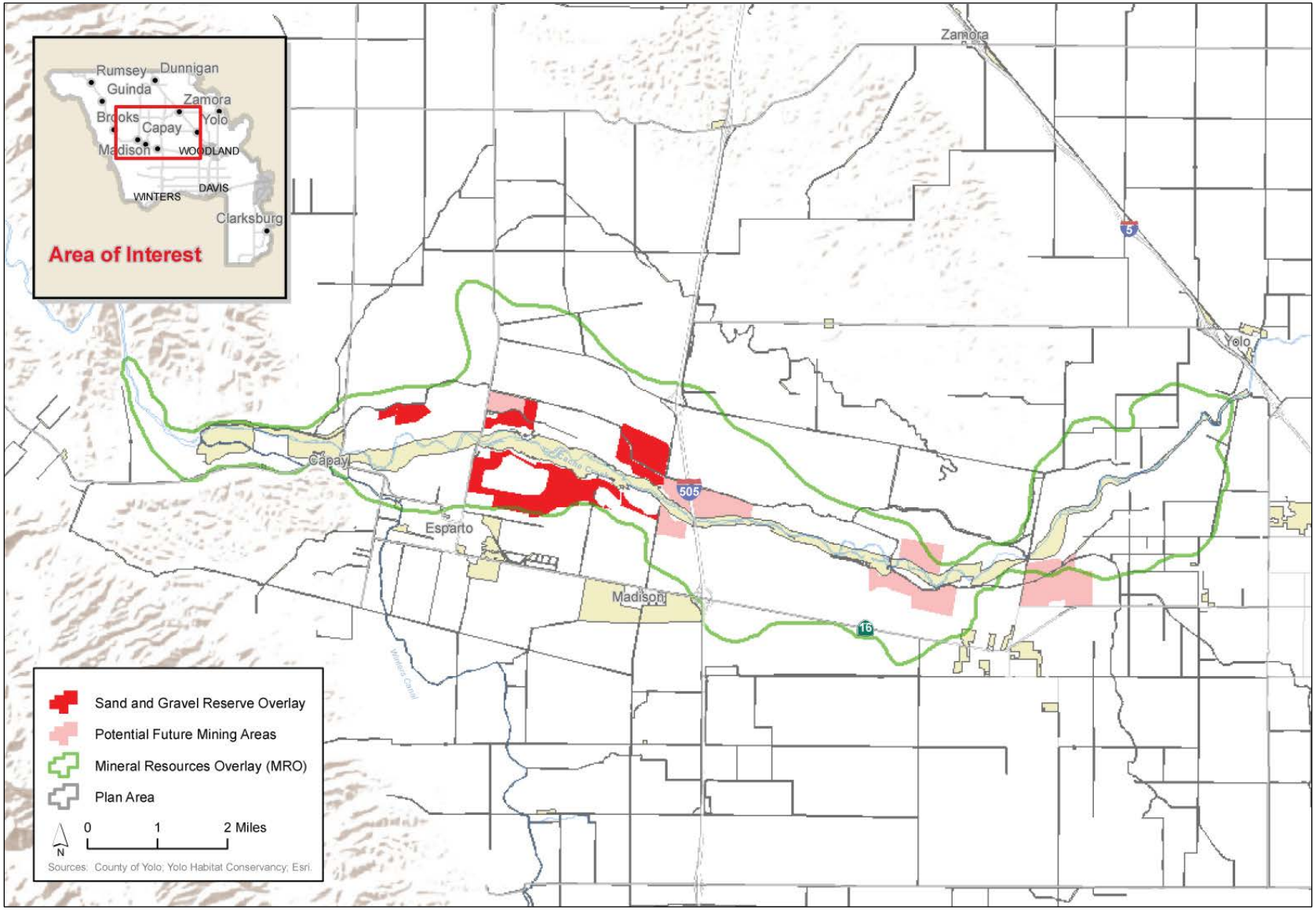
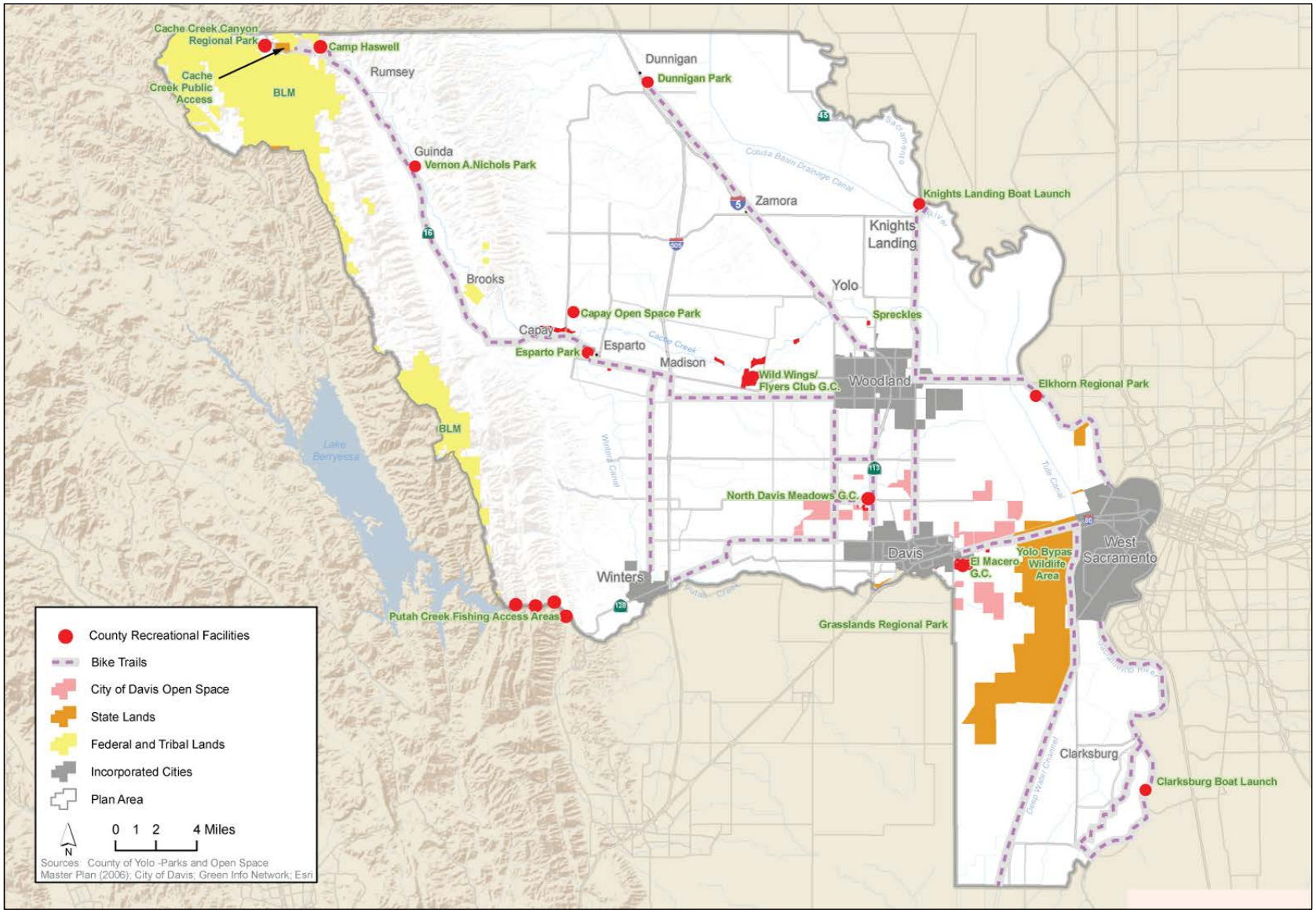


Figure 3-6. Publicly Owned Land



3.5.3 Public and Private Operations and Maintenance

This section describes activities that are necessary for the ongoing operation and maintenance of existing and planned land uses, facilities, and services in both urban and rural planning units throughout the Plan Area. The HCP/NCCP covers 506 acres of operations and maintenance activities as listed in Table 3-2, *Spatially Undefined Activities, Methods and Assumptions*.

Many common activities do not typically require take coverage because the activities occur on existing developed sites and do not have the potential to affect covered species. Nonetheless, situations may arise when operations and maintenance activities do need take coverage. Such coverage will be provided through this HCP/NCCP to the extent that such activities require a discretionary permit from a local jurisdiction or a project proponent requests coverage through a Certificate of Inclusion. Operations and maintenance covered activities are described in the sections below. These public and private operations and maintenance activities may be implemented by Permittees, private applicants under the jurisdiction of one of the Permittees, or by Special Participating Entities covered through a Certificate of Inclusion.

3.5.3.1 General Urban and Rural Development Operations and Maintenance

This HCP/NCCP provides coverage for operations and maintenance activities related to park and open space facilities, including the management, operations, rehabilitation, replacement, repair, and maintenance of park and open space facilities described in Section 3.5.2.4, *Open Space*. The following activities are included in this category:

- Repair, maintenance, and replacement of signage.
- Landscaping.
- Mechanical and manual vegetation management.
- Seeding or planting of disturbed areas.
- Dust management.
- Maintenance of fencing
- Maintenance of lighting.
- Fuel management activities, including the maintenance of fire management zones along existing infrastructure (e.g., roads))
- Placement of trash receptacles, lighting, drinking fountains, and associated infrastructure necessary to support these facilities.
- Removal of infrastructure (e.g., building structures, roads, trails, stock ponds) for public safety, resource protection, and park management.
- Vegetation management, as described in Section 3.5.3.2, *Public Services, Infrastructure, and Utilities Operations and Maintenance.*
- Erosion control.

- Management of natural resources, such as enhancement of freshwater resources, sensitive species management and monitoring outside of the reserve system (restoration and enhancement within the reserve system is described in Section 3.5.4, *Conservation Strategy Implementation and Covered Activities on Reserve Lands,* below), prescribed burns, invasive vegetation management, bullfrog management, feral pig removal, management of other exotic nuisance species, and managed grazing.
- Trail maintenance, including grading, clearing, brushing, erosion control, paving, re-paving, abandonment, and restoration.
- Pest abatement to manage rodents, insects, and disease and weed abatement to manage fire hazards outside the reserve system, including the removal of dead and dying wood, trees, and vegetation in agricultural areas. May include mowing or disking for weed abatement and insect and disease management. Use of pesticides is not covered by this plan; therefore, the plan does not authorize any pesticide use that would result in take of covered species. Any pesticide use must comply with all existing applicable judicial orders related to use of pesticides.
- Surveys and monitoring to support management decisions outside of the reserve system (monitoring within the reserve system is described in Section 3.5.4, *Conservation Strategy Implementation and Covered Activities on Reserve Lands,* below).
- Enhancement and restoration projects outside of the reserve system.
- Maintenance of water delivery systems. This includes maintenance of in-stream structures that have a screened pipe that pulls water from a local stream or channel into the property.
- Activities associated with the maintenance of large facilities, including golf courses, large-event facilities, and sports complexes.
- Equestrian facilities and uses, including equestrian stables, equestrian centers, trails, manure management, equestrian group camping and horse grazing activities.
- Minor remediation projects (less than 1.0 acre) for spills, illegal dumping, fuel/chemical storage, and firing ranges.

Covered activities in the urban planning units (described in Section 3.5.1*, Urban Projects and Activities*) as well as those activities occurring in unincorporated communities (described in Section 3.5.2.3, *Agricultural Economic Development*) are generally assumed to result in the removal of all natural and agricultural land cover types. As such, coverage for operations and maintenance activities in the urban planning units is included in the urban projects and activities category and not described in this category. Similarly, operations and maintenance covered activities occurring in the growth boundaries of unincorporated communities/places are included in the general rural development subcategory and not described in this category.

3.5.3.2 Public Services, Infrastructure, and Utilities Operations and Maintenance

As described in Section 3.5.2.2, *Rural Public Services, Infrastructure and Utilitie*s, there is a variety of different infrastructure that will be constructed or expanded over the permit term. This is in addition to existing infrastructure. Although this infrastructure may be diverse in nature, it may share common operations and maintenance needs. This HCP/NCCP covers the operations and maintenance activities below. Subsections to this section are included to specify any operations and

maintenance activities that may be required for various infrastructure beyond the list of common operations and maintenance activities.

- General maintenance of existing or future facilities, including repair, replacement, and general upkeep.
- Mechanical and manual vegetation management, including mowing, disking, and manual pruning. Equipment used includes, but is not limited to, tractor mowers, tractors and disc trailers, and boom mowers. Manual removal includes using power trimmers, weed eaters, and tools such as pruning loppers, saws, and clippers.
- Vegetation and wetland management for mosquito control purposes.
- Seeding or planting of disturbed areas.
- Dust management.
- Installation or maintenance of fencing.
- Installation and maintenance of lighting.
- Fuel management activities, including the maintenance of fire management zones along existing infrastructure (e.g., roads).
- Site inspections of facilities. Site inspections are made both by vehicular access and on foot. Access, particularly in areas that are frequently maintained, is generally available from paved and dirt maintenance roads. Small-scale repairs (e.g., fence and gate repairs, graffiti removal, trash and small debris removal) may be made as part of regular site inspections.

This HCP/NCCP does not cover pesticide (including herbicide) use. That is, the Permittees are not allowed to cause take of a state or federally listed species as a result of pesticide use. Permittees will use pesticides in accordance with labeling instructions to avoid take of listed species. Any pesticide use must comply with all existing applicable judicial order related to the use of pesticides.

These operations and maintenance activities apply to the following facilities.

- Yolo County Airport and Port of West Sacramento.
- Landfills, collection facilities, and transfer stations.
- Energy generation and distribution facilities.
- Wastewater collection, treatment, and disposal facilities.
- Stormwater and drainage collection, treatment, and retention/detention facilities.[7]

These operations and maintenance activities also apply to the following types of activities that have special operations and maintenance requirements, which are described in more detail below.

- Roadways and bridges, bikeways, and pathways.
- Water supply, treatment, storage, and distribution facilities.
- Municipal services and facilities.
- Flood control facilities and levees.

[7] This includes, but is not limited to, maintenance of the Davis El Macero drainage channel.

3.5.3.2.1 Roads, Bridges, Bike Lanes, and Multi-Use Pathways

This HCP/NCCP provides coverage for 246 acres of operations and maintenance activities at transportation facilities or infrastructure, including rehabilitation of and improvements to existing and future bridges; transit facilities, highways, freeways, interstates, public and private roadways, bicycle lanes, roadside parking and viewing facilities; and ancillary drainage systems. These activities will occur within the rights-of-way of new and existing roadways and facilities.

Covered operations and maintenance activities include curbing, grading, and resurfacing of roadways; repair, replacement and maintenance of guardrails, lighting fixtures, fences, and signage; installation of safety devices/safety barriers; road sweeping; drainage measures associated with roads; and other maintenance, repair, and rehabilitation activities, including necessary modification of ditches/conveyance facilities, back-slopes, and shoulders.

This HCP/NCCP provides coverage for bridge and culvert repair. Operation and maintenance of bridges and associated drainage structures includes in-channel operation of equipment to repair and prevent scour of the streambed beneath and adjacent to bridge structures, dewatering activities to support in-channel work, natural debris and trash removal from bridge piers and pilings or from streambeds, vegetation management beneath and adjacent to bridge structures, and erosion/sediment control for bridges and drainage infrastructure beneath and adjacent to bridge structures. Additional activities include patching bike paths and roadways; grading and mowing paths, roadways, and shoulders; and erosion and dust control.

3.5.3.2.2 Flood Control Facilities

This HCP/NCCP provides coverage for maintenance of up to 150 acres of flood control structures and associated water conveyance infrastructure, including sediment removal, bank stabilization, vegetation management, and natural and trash debris removal. Figure 3-7 shows the jurisdictions of local flood control and water districts, and Figure 3-8 shows a number of reclamation districts. These agencies will be the primary project proponents for implementing flood control facility maintenance.

Covered activities include the following:

- Repairing previous erosion control work, including failed rock, gunite, sacked concrete, gabions, or bioengineered vegetated sections.
- Bank and levee stabilization and repair projects. May include use of rock riprap or grouting of holes.
- Installation of water measurement devices, scientific measuring devices, and water quality monitoring stations.
- Sloping, planting vegetation, placing earthen fill, installing rocks and gabions or using other bank stabilization methods, and taking other necessary measures to control erosion on previously unrevetted areas.
- Cleaning, washing, painting, or conducting minor repairs on structures.

Figure 3-7. Flood Control and Water Districts in the Plan Area

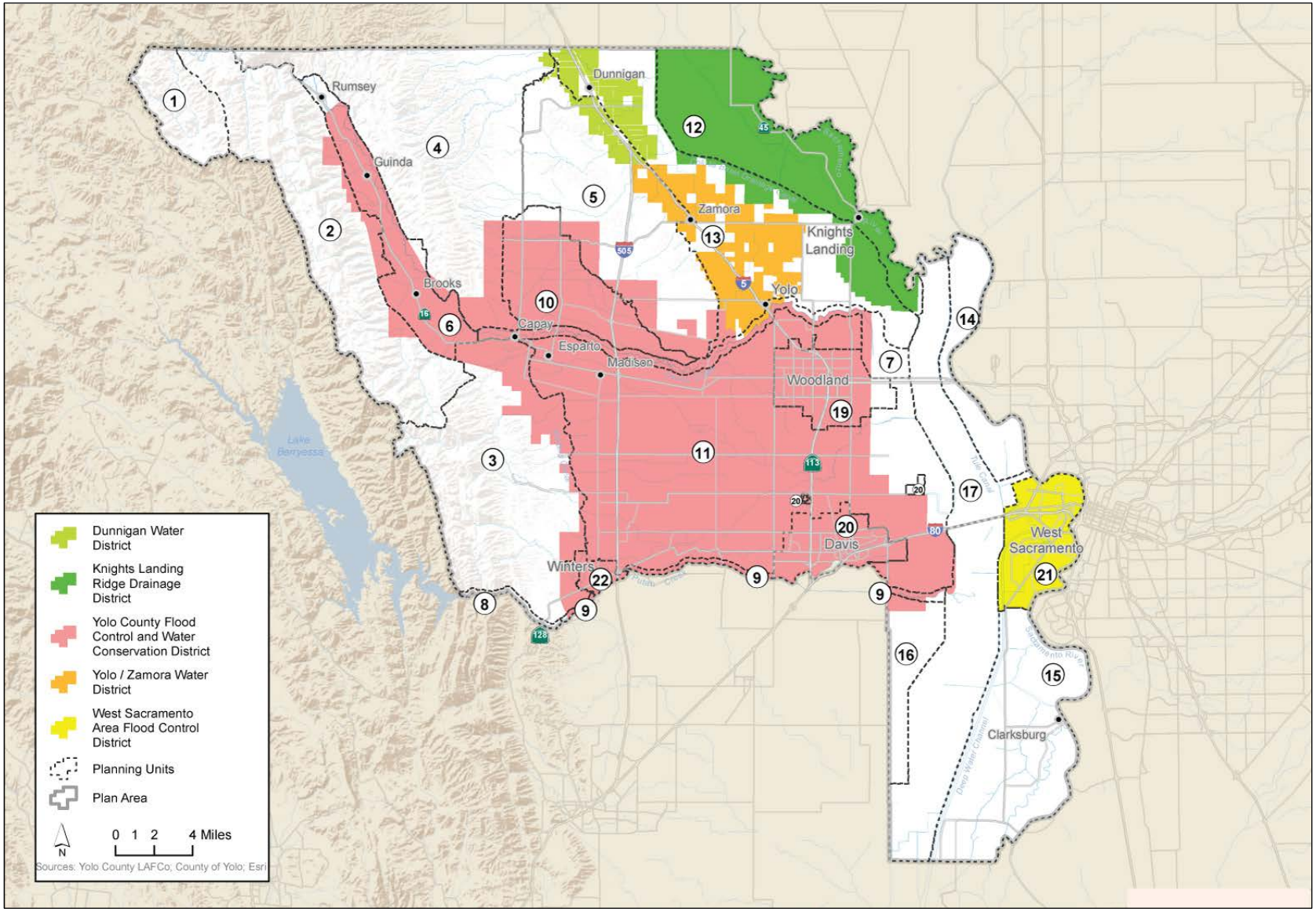
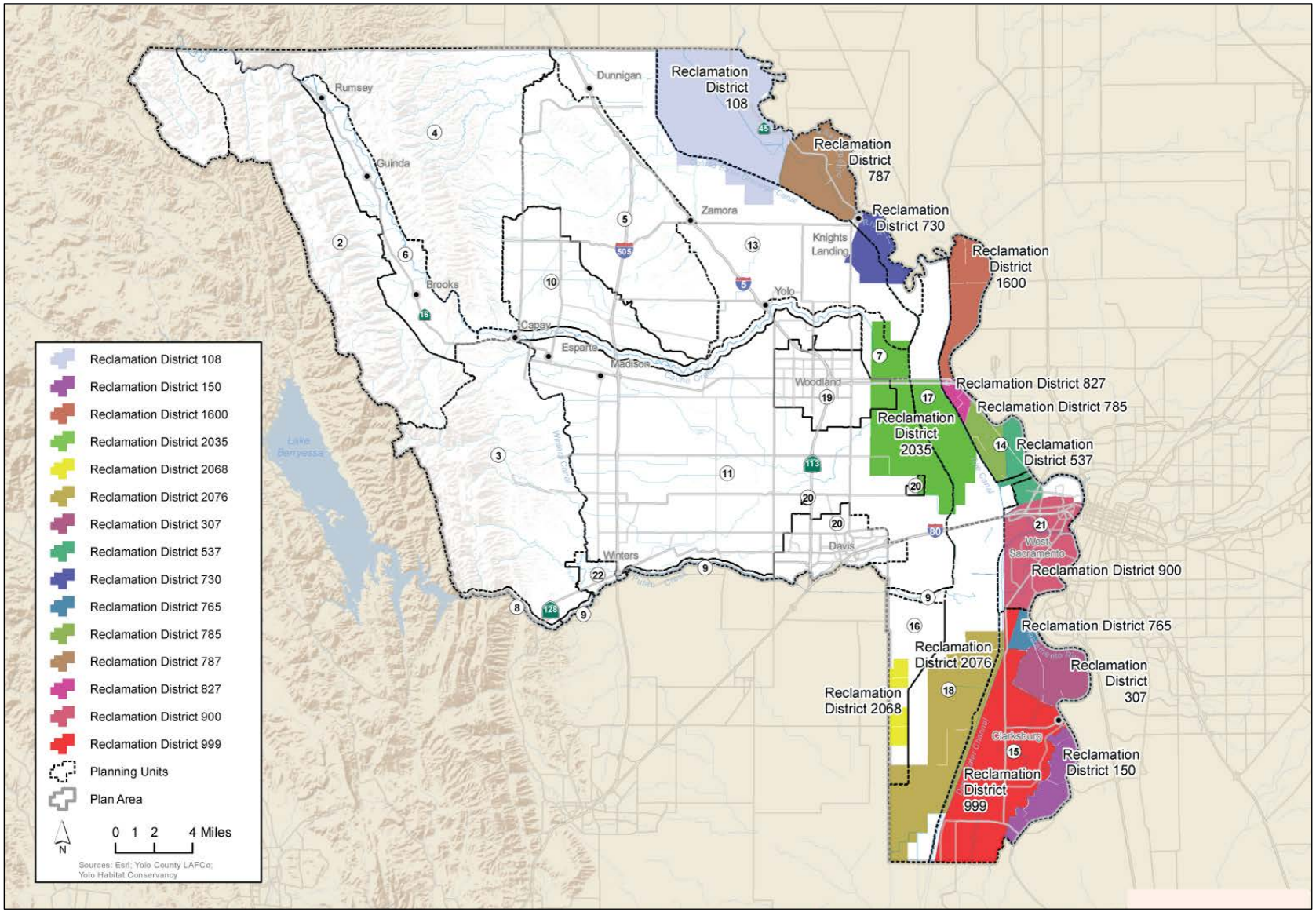


Figure 3-8. Reclamation Districts in the Plan Area



- Vegetation management, including:
  - Cutting, mowing, disking, tilling, ripping, and burning.
  - Grazing (e.g., cattle, goats, or sheep).
  - Cutting, trimming, and removing the lower branches of large trees to facilitate site inspections, maintain channel capacity, and maintain native plant communities.
  - Removing downed trees and dead or live trees that are in clear danger of falling in or across a channel and that would significantly reduce channel capacity, accelerate erosion, or otherwise cause an emergency.
  - Removing dead trees, dying trees, and new trees less than four inches in diameter at breast height to maintain channel capacity, preventing erosion, and maintaining native plant communities.
  - Scraping, scouring, and dredging channels to remove vegetation and/or maintain conveyance capacity and stockpiling removed material on channel banks or access roads.
  - Killing or removing nonnative invasive vegetation by nonchemical means.
  - Activities to restore native habitats, including adjusting land contours, shaping channel banks, tilling, plowing, disking, or otherwise preparing soils of channel banks and adjacent land for planting of native plants; seeding and planting native plants; and placing habitat features such as nest boxes, resting structures (e.g., bat boxes), or breeding structures.
- Planting of channel vegetation using mechanized planters and hand-planting.
- Installation of irrigation systems during periods of plant establishment and application of irrigation water.

3.5.3.2.3 General Utilities

This HCP/NCCP provides coverage for operations and maintenance activities related to up to 150 acres of public and private utility facilities, including natural gas, electric, water, sewer, communications, and other utility infrastructure. The 150 acres are subsumed within the total acreage of development within the covered activities layer. These activities include surveying, excavation, trenching, replacement of above- or below-ground infrastructure, transmission line reconductoring, overburden material storage, and restoration of disturbed ground at maintenance sites. Maintenance of underground utilities often requires trenching around existing pipelines and conducting repairs or replacing segments of pipeline.

Water Supply, Treatment, Storage, and Distribution Facilities

Areas that may be affected by water supply operations and maintenance activities include those around water conveyance systems, such as pipelines, pump stations, blow-offs, turnouts, and vaults. The following activities may be conducted as part of routine pipeline maintenance:

- Leak repair. May require blow-off (i.e., dewatering of pipes; typically includes a point source of high-velocity flow) to local uplands or streams and/or excavation to access pipelines.
- Internal inspection. May require blow-off to local uplands or streams.
- Unscheduled releases of water due to a pressure surge in a pipeline that could damage the pipeline. Under such conditions, an automatic turnout valve will open and release the water to prevent the pipe from bursting. Flows from the pipeline may be reduced following such an

event. This is a relatively self-contained process, with the valves opening for less than one minute and shutting as soon as system pressure drops.

- Rehabilitation and/or replacement of pipeline components, including, but not limited to, air release valves, piping sections or connections, joints, and appurtenances. Activities may include excavation to access pipelines.
- Bank stabilization and erosion control within a creek related to pipeline maintenance. Discharges either come out of pipes within a streambank and flow down the bank into the channel or are pumped down or across a streambank. Bank protection work would occur prior to a planned discharge in areas where banks within 50 feet of the discharge point show signs of erosion or instability. May require excavation.
- Replacement/repair of buried service valves (including valves within creek embankments that may require excavation and minor bank stabilization activities).
- Maintenance of pipeline turnouts, including access to pipelines.
- Replacement/repair of appurtenances, fittings, manholes, and meters.
- Vault maintenance. Vaults occur along segments of pipeline. Pipeline components are located within vaults. There are different types of vaults, and all are considered confined spaces. Structures other than the pipeline contained within the vaults include valves, electrical stations, turnout piping, etc. Telemetry pull boxes, corrosion monitoring stations, and some air release valves are not located within vaults. Vaults are typically made of concrete and may be located immediately below grade (i.e., below ground level) or partially or fully above grade.
- Telemetry cable/system inspections and repairs. Telemetry systems allow communication of data from the pipeline to the pipeline operator so that the operator can track the operations of the pipeline. Telemetry cables are often sited in the center of roads. May require excavation to access system components.
- Meter inspections and repairs. Flow meters measure the rate of flow through a pipeline. Some meters are located in vaults, while others are not.
- Maintenance of pump stations, operation yards, utility yards, and corporation yards.

3.5.3.2.4 Cache Creek Resources Management Plan

The *Cache Creek Resources Management Plan* (CCRMP) addresses management of 2,324 acres of in-channel activities along a 14.5-mile reach of lower Cache Creek (Figure 3-5). The Cache Creek Improvement Program (CCIP) was developed to implement the goals, objectives, actions, and performance standards of the CCRMP as it relates to the maintenance, stabilization, and restoration of lower Cache Creek.

The actions described in the CCRMP/CCIP are undertaken for the sole and/or primary purpose of the five activities listed below. With the exception of pesticide application, the Yolo HCP/NCCP covers 110 acres of activities associated with the CCRMP/CCIP. Some activities described in the CCRMP/CCIP will be integrated with the conservation strategy of this HCP/NCCP and are described in Chapter 6, *Conservation Strategy*. However, other activities may occur independent of the conservation strategy of this HCP/NCCP.

As part of the CCRMP/CCIP, a technical advisory committee guides stream monitoring and maintenance activities and identifies initial high-priority projects for stream stabilization. The technical advisory committee recommends specific maintenance activities based on annual monitoring information. This includes erosion control, flood control, bank protection, riparian

restoration, and other in-channel activities and/or in-channel modifications consistent with the CCRMP and CCIP to protect structures, infrastructure, and land uses along the creek and downstream from damage from natural creek forces (e.g., flooding, erosion, deposition, and washout) and restore the creek. The general types of in-channel activities include the following:

- Habitat preservation, enhancement, and restoration
- Aquifer recharge and conjunctive water use.
- Channel stabilization.
- Erosion control and channel maintenance.
- Public open space and recreation, including trail construction.

3.5.4 Conservation Strategy Implementation and Covered Activities on Reserve Lands

In addition to the activities and projects described above, this HCP/NCCP provides take authorization for the actions described in Chapter 6, *Conservation Strategy* (acres quantified in Table 6-1(b)). Habitat management is an integral component of this HCP/NCCP. All habitat modification, management, and monitoring activities undertaken for the purpose of implementing this HCP/NCCP are covered. Covered activities include habitat assessments and population surveys; habitat management activities to maintain suitable habitat conditions, including cultivation of specified crop types; establishing and maintaining fuel management zones at the wildland/urban interface; restoration, enhancement, and creation of habitats; construction and maintenance of facilities necessary for the management, maintenance, and access control of HCP/NCCP conservation lands (e.g., fences, access roads, and outbuildings); control of invasive nonnative species by mechanical means or other means; scientific investigation into species' biological characteristics; and all other management and monitoring activities prescribed in this HCP/NCCP.

3.5.4.1 Management Activities

This category includes all management actions required by this HCP/NCCP or other actions that might be necessary to achieve the specified biological goals and objectives. This category includes construction, maintenance, and use of facilities needed to manage the reserve system, including, but not limited to, maintenance sheds, shade structures, roads, culverts, fences, gates, wells, stock tanks, and stock ponds. All reserve system management structures will be constructed to minimize adverse effects on covered species and natural communities in compliance with the conditions on covered activities described in Chapter 4. Facilities existing at the time of land acquisition will be used whenever feasible.

Management actions that will occur within the reserve system are described in detail in Chapter 6, *Conservation Strategy*. Actions not already described earlier in this chapter may include, but are not limited to, the activities listed below. Many of these activities overlap.

- Vegetation management using livestock grazing, manual labor, prescribed burning, and/or herbicides. Herbicides will be used in accordance with label instructions and in compliance with state and local laws. Any pesticide use must comply with all existing injunctions related to the use of pesticides. For example, a May 2010 injunction disallows the use of certain pesticides within habitat and buffer zones established for California tiger salamander. Pesticide use is not a

covered activity under this HCP/NCCP; therefore, all pesticide use must avoid take of state or federally listed species.

- Seed collection from palmate-bracted bird's beak for depositing in a seed bank on a case-by-case basis, contingent on approval by the wildlife agencies.
- Development of field facilities for workshop space and tool and machinery storage.
- Construction, rehabilitation, and maintenance of facilities (e.g., corrals, fencing, gates, feed storage, water delivery) to support livestock grazing as a covered species management tool.
- Maintenance of existing roads and new roads constructed for the reserve system to protect or enhance the conservation values of the reserve, including grading and relocation of roads to protect sensitive resources.
- Demolition or removal of structures, roads, or human-made livestock ponds to restore habitat.
- Use of motorized vehicles for patrolling, maintenance, and resource management activities in the reserve system.
- Use of mechanized equipment for construction, maintenance, and resource management projects in the reserve system.
- Control of nonnative species (e.g., feral cats and dogs, nonnative pigs, nonnative red fox, nonnative fish, bullfrogs, barred tiger salamanders, and hybrids).
- Stream maintenance for natural community and covered species habitat purposes.
- Installation of wells, the water from which will be used to fill stock ponds or provide water sources for cattle consistent with management plans for California tiger salamander management plans, where this species potentially occurs. Wells will be installed only as necessary for natural resource management purposes and when no alternative surface water supplies are available. Wells will be sited so that they do not degrade surrounding habitat.
- Surveys and monitoring for mitigation and restoration/habitat enhancement projects.
- Fire management, including prescribed burning, mowing, and fuel-break establishment and maintenance.
- Hazardous materials remediation, such as appropriate closure of underground storage tanks, soil remediation, cleanup of illegal dumping.
- Repair or replacement of existing facilities damaged by flood, fire, or earthquake to pre-damage condition.
- Operations related to water delivery for ponds and other aquatic habitat.
- Water delivery for use in operations facilities (e.g., field facilities and the native plant nursery).

3.5.4.2 Public Access and Recreation in the Reserve System

Limited public access and recreational use of reserves is permitted under this HCP/NCCP (see Chapter 6*, Conservation Strategy,* for details). To the extent possible, recreational facilities will use existing infrastructure such as existing trails and fire or ranch roads. The Permits do not cover off-trail recreational activities or any type of activity prohibited by this HCP/NCCP or by state or federal law.

3.5.4.3 Habitat Enhancement, Restoration, and Creation

The conservation strategy (Chapter 6) sets forth requirements for habitat enhancement, restoration, and creation. Enhancement activities generally fall under the reserve management category. Habitat restoration and creation will generally be disruptive only in the short term because these activities may involve soil disturbance, removal of undesirable plants, and limited grading. All habitat restoration and creation is expected to result in a net long-term benefit for covered species and natural communities. However, these activities may have temporary or short-term adverse effects and may result in limited take of covered species (Chapter 5, *Effects on Covered Species and Natural Communities*). The permits cover all habitat enhancement, restoration, and creation activities conducted in reserves that are consistent with HCP/NCCP requirements. Examples of habitat enhancement, restoration, and creation activities include, but are not limited to, the following:

- Creating hedgerows on farm field edges.
- Pond creation.
- Restoration projects in streams, riparian areas, wetlands, and uplands.
- Native vegetation planting.
- Removal of invasive species.

3.5.4.4 Species Surveys, Monitoring, and Research

Biologists will need to conduct surveys for covered species, natural communities, and other resources within the reserves on a regular basis for monitoring, research, and adaptive management purposes. These surveys may require physical capture and inspection of specimens to determine identity, mark individuals, or measure physical features, all of which may be considered take under the FESA or CESA. Surveys for covered species will also be conducted on private land that the Conservancy is considering for acquisition. Although these surveys are not expected to require as much handling of specimens, limited take may still occur. Qualified biologists will conduct surveys for all covered species, as defined in Chapter 6, *Conservation Strategy*. The Permits cover such survey activity that is consistent with this HCP/NCCP.

The permits cover research conducted by biologists on reserves in support of this HCP/NCCP as long as the research projects have negligible effects on populations of covered species and are a component of reserve system monitoring and management. These researchers must be under contract with the Permittee(s) and/or have a Section 10(a)(1)(A) recovery permit to cover incidental take that may occur as a result of research conducted on reserve lands (see Chapter 4 for a more detailed description of a "qualified biologist"). The Conservancy will evaluate research on reserves unrelated to this HCP/NCCP on a case-by-case basis because the nature and effects of future research projects cannot be predicted at this time. If the Conservancy determines such research is consistent with the terms of this HCP/NCCP, coverage may be granted through a Certificate of Inclusion.

3.5.4.5 Agricultural Practices within the Reserve System

Lawful and routine agricultural practices on reserve lands are covered agricultural activities under this HCP/NCCP, provided they are consistent with the conservation easement. Appendix M, *Yolo County Agricultural Practices,* Section M-1, *Agricultural Practices Associated with the Yolo HCP/NCCP Reserve System*, lists routine agricultural practices that qualify as covered agricultural activities. The

seasonal descriptions in Appendix M are provided only as a guide. Some farms conduct these activities outside the typical time periods listed, but the HCP/NCCP still covers their actions provided they are consistent with the conservation easement. If any lawful and routine agricultural practice does not appear in Appendix M, the Conservancy may allow the practice (as a covered agricultural activity) provided it does not result in impacts not analyzed in the HCP/NCCP and the conservation easement (subject to wildlife agency approval) also allows the activity. All such agricultural practices on reserve lands must avoid and minimize effects on covered species as described in Section 4.3.6, *Avoidance and Minimization Measures within the Reserve System.*

3.5.5 Western Burrowing Owl Relocation

As described in Chapter 4, Section 4.3.4, *Covered Species*, AMM17 provides for passive relocation of western burrowing owls from project sites to avoid and minimize adverse effects on this species. It also allows for active relocation upon wildlife agency approval. This relocation is a covered activity under the Yolo HCP/NCCP.

3.5.6 Neighboring Landowner Protection Program

The implementation of conservation measures described in Chapter 6, *Conservation Strategy*, may increase populations of covered species in the reserve system. As a result, some individuals may disperse to neighboring private lands where the presence of listed species could interfere with routine agricultural activities, other activities, or allowed use of the land. Protections for neighboring landowners are described in Chapter 7, *Plan Implementation*; the methods for establishing and estimating take associated with this program are described in Chapter 5, *Effects on Covered Species and Natural Communities*. With certain provisions and restrictions described in these chapters, farmlands in the vicinity of the reserve system boundary are eligible for take coverage during the course of routine agricultural activities, during the permit term, only for take beyond the baseline condition that existed prior to the establishment of the neighboring reserves. Appendix M, *Yolo County Agricultural Practices,* lists the routine agricultural activities that may occur on lands enrolled in the Neighboring Landowner Protection Program.

Take coverage for this program is limited to four covered species: California tiger salamander, valley elderberry longhorn beetle, giant garter snake, and western pond turtle. Take coverage is only available for lands within a certain distance of the reserve system, and this distance varies by the four eligible covered species. Take coverage is voluntary and must be sought by the landowner (i.e., landowners must opt-in) and enacted through a Certificate of Inclusion. Therefore, take coverage for neighboring lands is not automatic and the Conservancy expects to extend it to only a subset of qualifying landowners. The Conservancy estimates that landowners will enroll up to 2,347 acres of land in this program. Details of eligibility and estimated acreage are described in Chapter 5, Section 5.4.4, *Neighboring Landowner Protection Program*. Details of the application process for coverage are described in Chapter 7, Section 7.7.7.1, *Neighboring Landowner Protection Program*.

Chapter 4
Application Process and Conditions on Covered Activities

4.1 Introduction

This chapter describes the process for the City of Woodland, City of Winters, City of Davis, City of West Sacramento, Yolo County, and the Yolo Habitat Conservancy (Conservancy) (collectively referred to as Permittees) to apply for coverage of individual projects and ongoing operations and maintenance activities included as covered activities in the Yolo HCP/NCCP. This chapter also describes the conditions through which covered activities will avoid and minimize take of covered species. These conditions are referred to in this plan as avoidance and minimization measures or AMMs. The application process and discussion of AMMs are included in this chapter together to provide a single location in the document where project proponents can find descriptions of all relevant requirements related to project design and implementation, with the exception of fees. HCP/NCCP fees are described in Chapter 8, *Costs and Funding*. The Conservancy will prepare an implementation handbook to provide additional detail regarding the application process and implementation.

Section 4.2, *Receiving Take Authorization under the Yolo HCP/NCCP*, describes the process for applying to the Permittees for coverage under the Yolo HCP/NCCP. Section 4.2.1, *Authorization Process*, describes the authorization process under each of three categories: public projects proposed by the Permittees, private projects under the discretionary authority of Permittees, and Special Participating Entities. Section 4.2.2, *HCP/NCCP Application Package*, describes the required contents of the application package.

Section 4.3, *Avoidance and Minimization Measures*, describes conditions that project proponents must adopt to receive coverage under the Yolo HCP/NCCP. These avoidance and minimization measures specify how project proponents will avoid and minimize take of covered species during implementation of covered activities and are referred to herein as AMMs. Section 4.3.1, *General Project Design*, describes AMMs that apply to the design of all development projects. Section 4.3.2, *General Construction and Operations and Maintenance*, describes AMMs that apply to all construction and operations and maintenance activities. Section 4.3.3, *Sensitive Natural Communities*, describes AMMs that are specific to rare or sensitive natural communities, such as the rare alkali prairie natural community and other natural communities associated with wetlands, and therefore warrant specific avoidance and minimization measures. Section 4.3.4, *Covered Species*, describes AMMs that are specific to each covered species. Section 4.3.5,*. Avoidance and Minimization Measures within the Reserve System*, describes AMMs that apply to activities that occur in the reserve system. Section 4.4, *Qualified Biologist*, describes the process and conditions for a biologist to obtain approval as a qualified biologist. Section 4.5, *Exemptions from Avoidance and Minimization Measures,* describes the types of covered activities that may be exempt from AMMs. Section 4.6, *Revisions to Avoidance and Minimization Measures,* describes the process for revisions to Yolo HCP/NCCP AMMs.

4.2 Receiving Take Authorization under the Yolo HCP/NCCP

4.2.1 Authorization Process

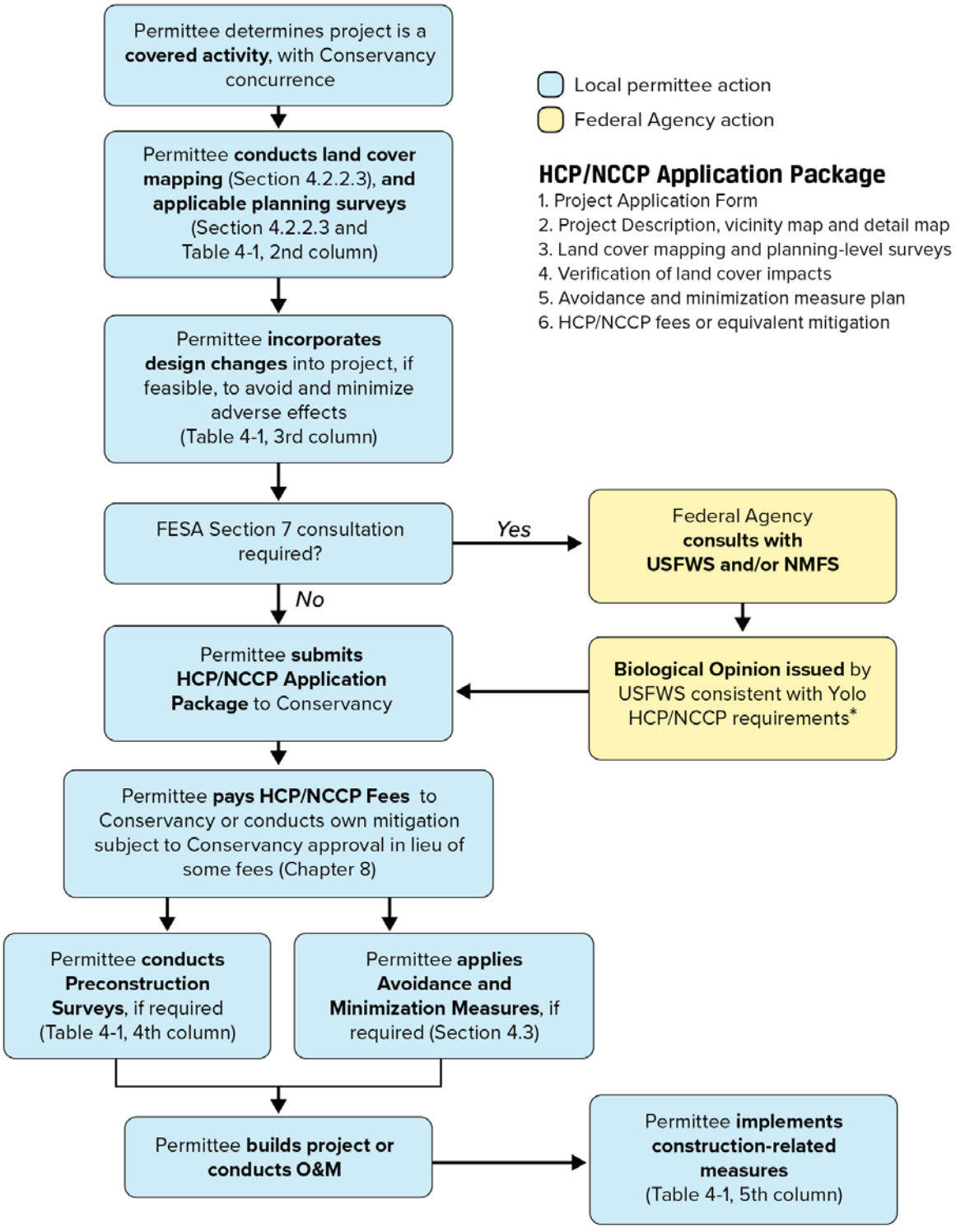
The Yolo HCP/NCCP incidental take permits (Permits) provide the Permittees with take authorization for implementing covered activities and allow the Permittees to extend this take authorization to project proponents when implementing covered activities. Permittees can extend take authorization through the local development approval process as long as the covered activities comply with the applicable AMMs in this chapter. As described in Chapter 3, *Covered Activities*, Permittees will provide take authorization under the Yolo HCP/NCCP for covered activities in the following three categories: public projects proposed by the Permittees (Section 4.2.1.1), private projects under the discretionary authority of the Permittees (Section 4.2.1.2), and projects by non-Permittees in the Plan Area that are approved for inclusion by the Conservancy as Special Participating Entities (Section 4.2.1.3). The incidental take authorization process for each of these situations is explained below.

The Conservancy will develop the process through which applicants apply for permits in coordination with the member agencies, including procedures for interaction between member agencies and the Conservancy to determine coverage. The Conservancy will develop implementation materials, including an implementation handbook. The handbook will describe the process through which applicants apply for permits in coordination with the member agencies and provide examples of how the process works. This process could include review of applications before they are complete and participating in a local Development Review Committee to make the requirements of the Conservancy process known early enough to influence process design.

4.2.1.1 Public Projects Proposed by Permittees

The Permits authorize incidental take associated with public projects proposed by Permittees and covered by the Yolo HCP/NCCP. Permittees must comply with the AMMs described in this chapter for each project and receive Conservancy approval in the form of an email or letter. The Permittees must document compliance and provide a copy of this documentation to the Conservancy for tracking and reporting purposes (e.g., to track the amount of take coverage the Conservancy has granted). Permittees must pay HCP/NCCP fees to the Conservancy or provide in lieu mitigation as described in Chapters 7 and 8, subject to Conservancy approval. The Conservancy will develop a form to assist the Permittees, as well as project proponents, when implementing covered activities with this documentation. Permittees may consult Conservancy staff members for technical assistance to ensure accurate completion of the required documentation. The process through which public projects can receive take authorization under this HCP/NCCP is shown in Figure 4-1.

Figure 4-1. Process for Project Compliance with HCP/NCCP for Public Projects (by Permittees)



* Other permits may require different mitigation than required by the Yolo HCP/NCCP.

4.2.1.2 Private Projects under the Discretionary Authority of Permittees

Project proponents will submit an HCP/NCCP application package (as described in Section 4.2.2, *HCP/NCCP Application Package*) to the relevant Permittee when implementing private projects that require discretionary land use approval from a Permittee. The Permittee will undertake review of take authorization applications concurrent with California Environmental Quality Act (CEQA) environmental review. This review will include consideration of CEQA exemptions and whether a project is covered by a prior programmatic or earlier CEQA document. To facilitate this approach, the Permittee should require project proponents to submit initial HCP/NCCP application package information as part of the land use approval application and CEQA process.

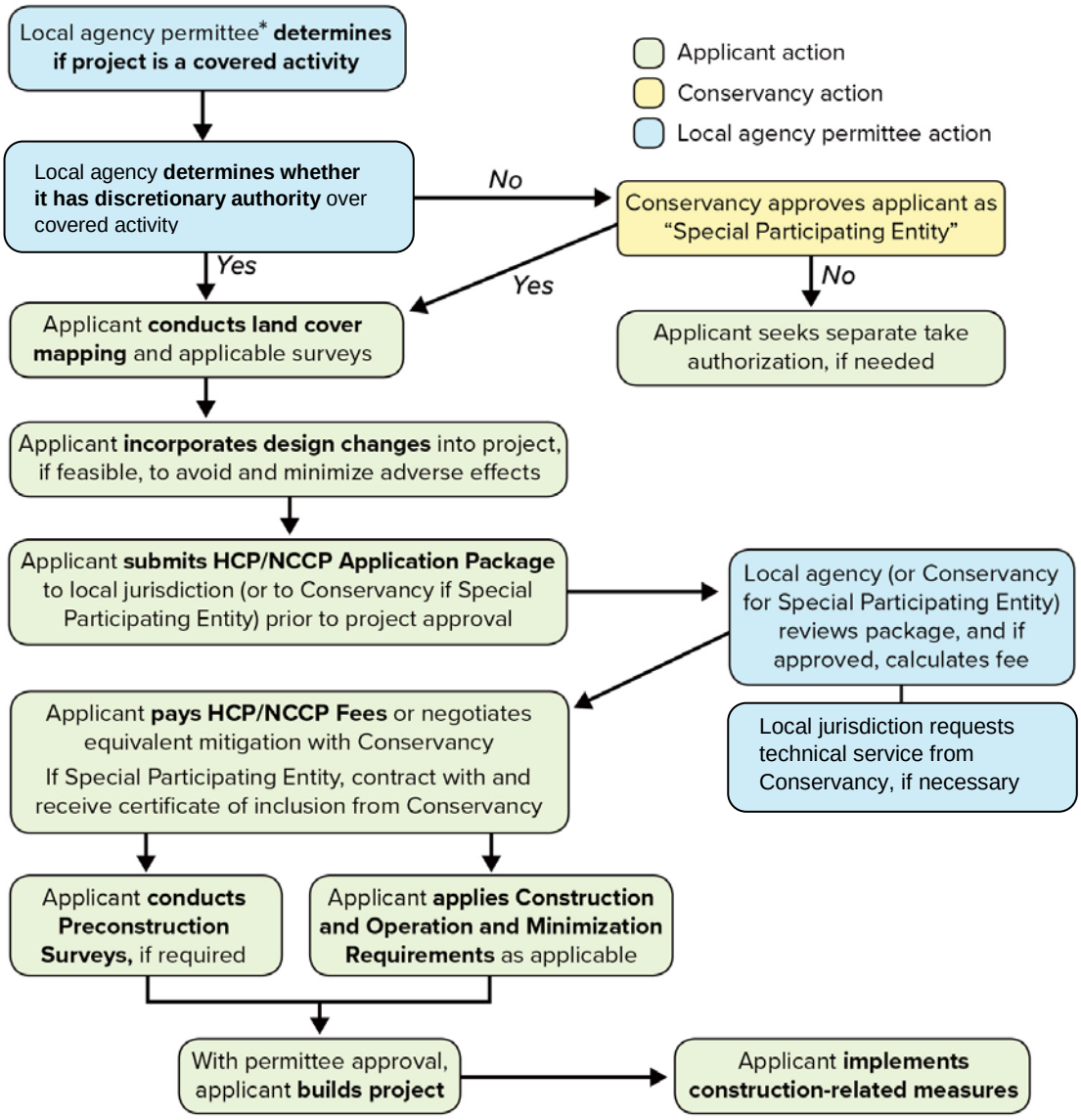
The submittal of the initial HCP/NCCP application package information during the land use approval/CEQA process allows for early identification of the various requirements of the HCP/NCCP that will be applicable to the proposed project. This approach also provides time for the project proponent to consider modifications to the project to minimize biological impacts and identify alternatives for CEQA analysis, if necessary. It also will allow the project analysis and CEQA review to incorporate and consider applicable AMM requirements from the HCP/NCCP. Based on a review of this initial information, the Permittee will develop and apply project conditions of approval that specify the HCP/NCCP AMMs and fee requirements.

The Conservancy will develop a checklist for evaluating HCP/NCCP applications from Permittees before the first ordinance for implementing this HCP/NCCP takes effect. During CEQA review of the project, the Permittee will review the HCP/NCCP application package for completeness, in accordance with the checklist. The determination regarding the completeness of the application package rests with the Permittee. Permittees may request technical assistance from Conservancy staff members. If an application package is not complete, the Permittee will provide the project proponent with a letter that explains why it is incomplete. The project proponent will then provide the missing information to the Permittee. Once the application package is complete, the Permittee will calculate the required fees, as described in Chapter 8, *Costs and Funding*, consistent with the local ordinance for implementing this HCP/NCCP.

The Permittee will specify all AMMs and fees as conditions of project approval, or as specified in the local ordinances for implementing this HCP/NCCP. The project proponent will pay fees prior to any project-related ground disturbance. If the project proponent requests to contribute land in lieu of fees or requests conditions that deviate from the AMMs, such requests must be reviewed and approved by the Conservancy, USFWS, and CDFW, as described in Section 4.2.2.6, *Item 6, HCP/NCCP Fees or Equivalent Mitigation*.

The process for receiving take authorization for private projects is shown in Figure 4-2. The HCP/NCCP review process will be integrated into the established land development permit processes of the member agencies.

Figure 4-2. Process for Project Approval under Yolo HCP/NCCP for Private Projects Covered by Plan and Special Participating Entities



HCP/NCCP Application Package

1. Project Application Form
2. Project Description, vicinity map and detail map
3. Land cover mapping and planning-level surveys
4. Verification of land cover impacts
5. Avoidance and minimization measure plan
6. HCP/NCCP fees or equivalent mitigation

Special Participating Entities

Special Participating Entities are agencies or individuals not subject to the jurisdiction of the local agency permittees that conduct projects within the Plan Area that may affect listed species and require take authorization from U.S. Fish and Wildlife Service or California Department of Fish and Wildlife. Such organizations may include school districts, water districts, transportation agencies, local park districts, other utility districts, or individuals with activities that may result in take but that do not require a discretionary permit.

*Local agency permittees are the County of Yolo and the Cities of Davis, West Sacramento, Winters and Woodland.

4.2.1.3 Projects Proposed by Special Participating Entities

Special Participating Entities (SPEs) are involved with proposed projects or activities that are not subject to the land use authority of the Permittees under the CEQA process and therefore cannot receive coverage under this HCP/NCCP through the process described above. SPEs may include utilities or special districts that own land or provide public services. Proponents of private activities (e.g., ministerial activities, such as single-family building permits and most agricultural activities) that do not require discretionary approval from the Permittees may request coverage as an SPE. This includes activities that involve farm dwellings. These entities may choose to request coverage under this HCP/NCCP as SPEs to obtain take authorization for their projects or activities. If the entity qualifies as an SPE, the Conservancy may issue take coverage through a Certificate of Inclusion at the Conservancy's discretion. The Conservancy will base the determination of eligibility for SPE status on the factors described in Section 7.2.5, *Special Participating Entities*, including whether the SPE can meet HCP/NCCP conditions or whether the amount of take requested (i.e., acres of natural community or covered species habitat loss) is available for the project. The project also must not unduly reduce the take authorization of the Permittees.

To grant take authorization to an SPE, the Conservancy must establish a legally enforceable contractual relationship with the SPE. The SPE will submit a complete application package for the proposed activity directly to the Conservancy, with notification to the jurisdiction in which the project will occur. This application package will contain the components described in Section 4.2.2, *HCP/NCCP Application Package*, and an explanation as to how the proposed activity meets the eligibility requirements for SPE status, as provided in Chapter 7, *Plan Implementation*.

If the SPE meets HCP/NCCP requirements and take allowance is available, the Conservancy will execute a contract with the SPE, binding it to the relevant terms of the Permits, implementing agreement, and HCP/NCCP.[1] Upon approval of the contract by the Conservancy Board, execution of the contract with the SPE, payment of the fee specified in the contract, and completion of any other steps required by the contract, the Conservancy will issue a Certificate of Inclusion to the SPE. The Certificate of Inclusion will include an attached map depicting the area, parcel number, acreage, and owner of lands to which the take authorization(s) would apply.

The Conservancy will provide a template of the Certificate of Inclusion to the wildlife agencies for review and approval during plan implementation before the Conservancy approves the first SPE project. The Conservancy will track the amount of take authorization extended to SPEs against the total allowable take authorized under the Yolo HCP/NCCP. Requirements related to SPEs are further described in Section 7.2.5, *Special Participating Entities.*

4.2.2 HCP/NCCP Application Package

All public and private project proponents covered by the Yolo HCP/NCCP must complete an HCP/NCCP application package. Proponents of private projects under the discretion of Permittees must submit the application to the relevant Permittee for review and approval to receive coverage under this HCP/NCCP. The project proponent is responsible for preparing the application package and conducting any necessary field surveys, if required. SPEs submit their application package to the Conservancy for review and approval to receive coverage under this HCP/NCCP.

[1] In the event of failure to uphold the terms of the Permit, implementing agreement, and HCP/NCCP, the contract shall give the Conservancy the ability to force action by the Special Participating Entity through legal means.

The application package must contain the items listed below, if applicable. Each is described in detail in this section.

- *Item 1:* Project application form.
- *Item 2:* Project description, vicinity map, and detail map.
- *Item 3:* Land cover mapping and planning-level surveys.
- *Item 4:* Verification of land cover impacts.
- *Item 5:* Avoidance and minimization measure plan.
- *Item 6:* HCP/NCCP fees or equivalent mitigation.

The Conservancy will provide templates for all application components to each Permittee prior to the first authorization for coverage under the Yolo HCP/NCCP. The Conservancy also will post these templates on the Conservancy's website for use by Permittees, SPEs, and private project proponents and their consultants. Use of the templates will streamline the Permittee review and approval process. The Permittees may adjust the required components of the application package over time, consistent with the requirements of the Yolo HCP/NCCP. Permittees may charge a fee to recover the costs of accepting, reviewing, and processing these application packages (see Chapter 8, *Costs and Funding*, for details).

4.2.2.1 Item 1: Project Application Form

The project application form[2] will contain basic information about the project. The Conservancy will provide required forms through the websites of the Permittees and the Conservancy.

4.2.2.2 Item 2: Project Description, Vicinity Map, and Detail Map

The application package will include a brief project description, vicinity map, and detail map. The project description will include the location, assessor's parcel number(s), construction activity or maintenance methods, a description of the nature of the impacts (permanent or temporary), and timing (including duration) of the project or activity. The project description will document that the project is a covered activity (Chapter 3, *Covered Activities*). The vicinity map will document that the project site is in the Plan Area and include any streams or water bodies that fall within the project area. The detail map will show the fee area, also known as the *area of impact*. This is the area the Conservancy will use to determine fees, as described in Chapter 8, Section 8.4.1.2, *Land Cover Fee*. The Conservancy will provide further guidance in the implementation handbook for identification of the area of impact. The detailed map must also show any relevant landforms, roads, water bodies, and existing and proposed structures that will be affected by the proposed project.

[2] The Conservancy will develop this form prior to allowing permittees to use the Permits.

4.2.2.3 Item 3: Land Cover Mapping and Planning-Level Surveys

The project proponent will retain a qualified biologist[3] to conduct planning-level surveys and identify natural communities and important elements of covered species habitat in the area of impact. Planning-level surveys provide information on the natural communities and covered species present at a project site to comply with the AMMs (Section 4.3, *Avoidance and Minimization Measures*) and document key resources for tracking and reporting purposes. These surveys are required for all covered activities that result in ground disturbance or other effects that could result in take of covered species or natural communities. The biologist will use survey protocols specified in Section 4.3.

Prior to conducting surveys at the site, the biologist will review existing information, including aerial photographs, the Yolo HCP/NCCP database, the most recent California Natural Diversity Database (CNDDB) records, and any other relevant sources of information. This literature and data review is intended to identify natural communities and covered species habitat or populations that are potentially present on the project site and that require specific project AMMs (Section 4.3, *Avoidance and Minimization Measures*). Based on the results of the initial information review, the biologist will conduct site-specific surveys, as identified in the required AMMs, to inform project design and incorporate site-specific avoidance and minimization actions. The project proponent will produce a land cover map based on these planning-level surveys, as described below.

Project proponents must include planning-level survey reports in the application package. These reports will include the following:

- Maps, description, and acreage of the land cover types present in the area of impact (defined in Section 8.4.1.2, *Land Cover Fee*).
- Maps of locations of suitable habitat and/or habitat features for covered species, as defined in the covered species accounts (Appendix A).
- Maps of covered species occurrences based on the Yolo HCP/NCCP database, the CNDDB database, and other available information.
- Results of required planning-level surveys (Section 4.3, *Avoidance and Minimization Measures*).

Each planning-level survey will be valid for up to three years after the survey is conducted. If more than three years lapse between the planning-level surveys and project authorization under the Yolo HCP/NCCP, the Conservancy will require the project proponent to update the planning-level survey to reflect current project site avoidance and minimization measures. The Conservancy may choose to offer some or all of these services for a fee.

The project proponent will incorporate the required AMMs into the project design. Identification of occupied habitat or rare natural communities (e.g., alkali prairie) may result in the need to modify project design, as described in Section 4.3.

4.2.2.4 Item 4: Verification of Land Cover Impacts

Based on the maps created during planning-level surveys, as described in Section 4.2.2.3, *Item 3: Land Cover Mapping and Planning-Level Surveys*, the project proponent must provide the acres of effect (and linear feet of impacts for stream channels) in the area of impact (defined in Section

[3] Land cover mapping may be conducted by either a qualified biologist or another person familiar with identifying the land cover types in the Plan Area. *Qualified biologist* is defined in Section 4.4, *Qualified Biologists.*

8.4.1.2, *Land Cover Fee*) by land cover type (Table 2-1, *Natural Communities and Other Land Cover Types*). The Conservancy will use these calculations to track natural community and covered species habitat loss under this HCP/NCCP by land cover type. The tracking must be based on actual loss of each land cover type. See Section 7.5.11, *Compliance Tracking*, for appropriate data sources for effect calculations. Permittee planning staff members or the Conservancy will verify that a qualified biologist completed the land cover mapping and calculations. Permittee planning staff members will verify land cover data determinations provided by all project proponents within the Permittee's jurisdiction, and the Conservancy will verify all land cover data determinations provided by SPEs (see Chapter 8, Section 8.4.1.2, *Land Cover Fee*, for a description of area of impact). The Permittee and the Conservancy will verify land cover data determinations at the time applications are submitted because of the potential for land cover to change over time.

4.2.2.4.1 Operations and Maintenance Activities by Permittees

Land cover mapping is not required for operations and maintenance activities conducted by Permittees.[4] Permittees will rely on the most recent land cover map developed by the Conservancy to quantify land cover loss. Permittees must still implement all applicable AMMs. As such, projects with operations and maintenance activities covered by the Yolo HCP/NCCP will require planning-level surveys to determine applicable AMMs, as described in Section 4.3.3, *Sensitive Natural Communities.*

4.2.2.5 Item 5: Avoidance and Minimization Measure Plan

Based on the results of steps 1 and 3, above, the project proponent will identify applicable AMMs and include these in an AMM plan, which will be submitted with the application package. The project proponent will include monitoring requirements in the AMM plan and surveys provided by a qualified biologists, as needed, based on requirements described in Section 4.3, *Avoidance and Minimization Measures*.

4.2.2.6 Item 6: HCP/NCCP Fees or Equivalent Mitigation

The project proponent will estimate fees based on the information provided in the items above, using a fee calculator developed by the Conservancy and the calculation methods described in Section 8.4.1.2, *Land Cover Fee*. If the project proponent proposes to purchase credits at a USFWS- or CDFW-approved mitigation bank, the proponent must indicate this upon project approval. The Conservancy may authorize use of an approved mitigation bank or mitigation receiving site for in-county mitigation if it meets HCP/NCCP requirements, including monitoring and adaptive management requirements, and pays all appropriate fees. Out-of-county mitigation may not rely on the Yolo HCP/NCCP for take authorization. Chapter 8, *Costs and Funding*, describes the fees the Conservancy will apply to the mitigation receiving site process.

4.3 Avoidance and Minimization Measures

This section describes the AMMs (i.e., conditions on covered activities to avoid and minimize take of covered species) required by the Federal Endangered Species Act (FESA) (Section 10[a][2][A][ii])

[4] Land cover mapping is required for these activities for all private project proponents and Special Participating Entity projects.

and Natural Community Conservation Planning Act (NCCPA) (California Fish and Game Code [Fish & Game Code] Sections 2820[a][6] and 2820[f]).

The AMMs described in this chapter are designed to ensure consistency and provide standard and predictable requirements for project proponents. The Permittees will evaluate all projects[5] respective to their authorities to ensure that project proponents incorporate all applicable AMMs described in this chapter into each project prior to a Conservancy decision to extend take coverage under the Yolo HCP/NCCP. Chapter 7, *Plan Implementation*, further describes project proponent responsibilities in the application process.

Section 4.5, *Exemptions from Avoidance and Minimization Measures*, describes the types of projects that are considered exempt from the avoidance and minimization measures. Section 4.6, *Revisions to Avoidance and Minimization Measures*, describes the process for revising AMMs, as needed, based on new scientific information and any problems that might arise during HCP/NCCP implementation related to the ability to carry out successful AMMs.

All projects that discharge dredged or fill material into waters of the United States, including federal jurisdictional wetlands, are required to obtain applicable permits (e.g., Clean Water Act Sections 404 and Section 401) from the U.S. Army Corps of Engineers (USACE) and the Regional Water Quality Control Board (Regional Board). Projects that place fill, alter the bed bank or channel, or divert the flow of streams; alter portions of streams above the ordinary high-water mark; or alter streams that lack a nexus to navigable waters, wetlands, or lakes under the jurisdiction of the state are required to obtain a waste discharge permit from the Regional Board. Additionally, projects that impact the bed, bank, or channel may require a Lake and Streambed Alteration Agreement from CDFW. Any project that requires a permit from the USACE, Regional Board, or CDFW for impacts on streams and other aquatic areas may be subject to avoidance and minimization requirements, which may differ from the AMMs in this HCP/NCCP. The AMMs described in this chapter have been designed to be compatible with state and federal wetland regulation. However, the AMMs do not constitute compliance with avoidance and minimization requirements of other federal, state, and local agencies that arise from legal requirements other than the federal and state endangered species acts.

Avoidance and minimization measures are grouped into six categories. AMMs for General Project Design (Section 4.3.1) and General Construction and Operations and Maintenance (Section 4.3.2) will apply to most covered activities. AMMs for sensitive natural communities (Section 4.3.3) and covered species (Section 4.3.4) will apply only to those covered activities with those natural communities or covered species (or habitat for those covered species) that are present or likely to be present on site. The final category of AMMs apply to activities, including agricultural activities, occurring in the reserve system (Section 4.3.5).

The AMMs described in this chapter are as follows.

<u>General Project Design</u>

- AMM1, *Establish Buffers*
- AMM2, *Design Developments to Minimize Indirect Effects at Urban-Habitat Interfaces*

[5] The term *project* is used here as defined in CEQA: The whole of a discretionary action that has the potential, directly or ultimately, to result in a physical change to the environment (State CEQA Guidelines Section 15378). This includes all phases of a project that are reasonably foreseeable and all related projects that are directly linked to the project.

General Construction and Operations and Maintenance

- AMM3, *Confine and Delineate Work Area*
- AMM4, *Cover Trenches and Holes during Construction and Maintenance*
- AMM5, *Control Fugitive Dust*
- AMM6, *Conduct Worker Training*
- AMM7, *Control Night-Time Lighting of Project Construction Sites*
- AMM8, *Avoid and Minimize Effects of Construction Staging Areas and Temporary Work Areas*

Sensitive Natural Communities

- AMM9, *Establish Buffers Around Sensitive Natural Communities*
- AMM10, *Avoid and Minimize Effects on Wetlands and Waters*

Covered Species

- AMM11, *Minimize Take and Adverse Effects on Palmate-Bracted Bird's Beak*
- AMM12, *Minimize Take and Adverse Effects on Habitat of Valley Elderberry Longhorn Beetle*
- AMM13, *Minimize Take and Adverse Effects on Habitat of California Tiger Salamander*
- AMM14, *Minimize Take and Adverse Effects on Habitat of Western Pond Turtle*
- AMM15, *Minimize Take and Adverse Effects on Habitat of Giant Garter Snake*
- AMM16, *Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite*
- AMM17, *Minimize Take and Adverse Effects on Habitat of Western Yellow-Billed Cuckoo*
- AMM18, *Minimize Take and Adverse Effects on Western Burrowing Owl*
- AMM19, *Minimize Take and Adverse Effects on Least Bell's Vireo*
- AMM20, *Minimize Take and Adverse Effects on Habitat of Bank Swallow*
- AMM21, *Minimize Take and Adverse Effects on Habitat of Tricolored Blackbird*

4.3.1 General Project Design

The measures below apply generally to all covered activities for designated sensitive natural communities and covered species. These measures involve adjusting project footprints or incorporating design measures to avoid and minimize effects on natural communities and covered species.

AMM1, Establish Buffers. Project proponents will design projects to avoid and minimize direct and indirect effects of permanent development on the sensitive natural communities specified in Table 4-1 (herein referred to as *sensitive natural communities*) and covered species habitat specified in Table 4-1 by providing buffers, as stipulated in the relevant sensitive natural community AMMs (Section 4.3.3) and covered species AMMs (Section 4.3.4). On lands owned by the project proponent, the project proponent will establish a conservation easement, consistent with Section 6.4.1.3, *Land Protection Mechanisms,* to protect the buffer permanently if that land is being offered in lieu of development fees, as described in Section 4.2.2.6, *Item 6: HCP/NCCP Fees or Equivalent Mitigation*.

The project proponent will design buffer zones adjacent to permanent residential development projects to control access by humans and pets (*AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interfaces*).

Where existing development is already within the stipulated buffer distance (i.e., existing uses prevent establishment of the full buffer), the development will not encroach farther into the space between the development and the sensitive natural community.

This AMM does not apply to seasonal construction buffers for covered species, which are detailed for each species in Section 4.3.4, *Covered Species*.

A lesser buffer than is stipulated in the AMMs may be approved by the Conservancy, USFWS, and CDFW if they determine that the sensitive natural community or covered species is avoided to an extent that is consistent with the project purpose (e.g., if the purpose of the project is to provide a stream crossing or replace a bridge, the project may encroach into the buffer and the natural community or species habitat to the extent that is necessary to fulfill the project purpose).

AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interfaces. For development projects implemented adjacent to non-agricultural natural communities and covered species habitats, project proponents will incorporate urban-habitat interface elements into project design to minimize the following indirect effects of the development on adjacent habitat areas:

- Noise and visual disturbances that diminish the ability of covered and other native wildlife species to use the habitat.
- Increased numbers of pets (e.g., dogs, cats) that can result in harassment and mortality of covered and other native wildlife species.
- Increased levels of direct habitat disturbances associated with increased human access to habitats (e.g., destruction of vegetation and injury or mortality of wildlife associated with use of off-road vehicles).
- Escape or planting of invasive nonnative plants.

This AMM does not apply to development where it is immediately adjacent to existing developed lands.

The project proponent will implement the following urban-habitat interface design elements and activities, as applicable, to each discretionary project:

- Place roads or other non-residential spaces, such as parks or greenbelts, rather than lots at the urban-natural community interface. The benefits of this may include a reduction in the number of incidences of pets entering the natural communities.
- Design roads, bike paths, and trails to discourage entry of humans and pets into adjacent natural communities and promote citizen policing at the natural community periphery.
- Establish barriers that discourage entry of humans and pets into natural community areas.
- Design fences to prevent pets from escaping yards into adjacent natural communities, control entry and dumping of trash into adjacent natural communities, and when appropriate, shield adjacent natural communities from visual disturbances that may interfere with normal wildlife behavioral patterns.
- Fence new public roads associated with developments to prevent unauthorized public access into habitat areas and effectively direct wildlife to specially designed crossing structures.

- Design development drainage systems and implement appropriate best management practices to avoid changes to overland flow and water quality in natural community areas, including streamcourses.
- Design development lighting to avoid projecting light into adjacent natural community areas. For lights at or near the urban-natural community interface, use low-glare lighting to minimize lighting effects on natural communities.

4.3.2 General Construction and Operations and Maintenance

The measures below apply to covered activities for all natural communities and covered species. The applicants will incorporate these measures into construction or operations and maintenance procedures to avoid and minimize effects on natural communities and covered species.

AMM3, Confine and Delineate Work Area. Where natural communities and covered species habitat are present, workers will confine land clearing to the minimum area necessary to facilitate construction activities. Workers will restrict movement of heavy equipment to and from the project site to established roadways to minimize natural community and covered species habitat disturbance. The project proponent will clearly identify boundaries of work areas using temporary fencing or equivalent and will identify areas designated as environmentally sensitive. All construction vehicles, other equipment, and personnel will avoid these designated areas.

AMM4, Cover Trenches and Holes during Construction and Maintenance. To prevent injury and mortality of giant garter snake, western pond turtle, and California tiger salamander, workers will cover open trenches and holes associated with implementation of covered activities that affect habitat for these species or design the trenches and holes with escape ramps that can be used during non-working hours. The construction contractor will inspect open trenches and holes prior to filling and contact a qualified biologist to remove or release any trapped wildlife found in the trenches or holes.

AMM5, Control Fugitive Dust. Workers will minimize the spread of dust from work sites to natural communities or covered species habitats on adjacent lands.

AMM6, Conduct Worker Training. All construction personnel will participate in a worker environmental training program approved/authorized by the Conservancy and administered by a qualified biologist. The training will provide education regarding sensitive natural communities and covered species and their habitats, the need to avoid adverse effects, state and federal protection, and the legal implications of violating the FESA and NCCPA Permits. A pre-recorded video presentation by a qualified biologist shown to construction personnel may fulfill the training requirement.

AMM7, Control Nighttime Lighting of Project Construction Sites. Workers will direct all lights for nighttime lighting of project construction sites into the project construction area and minimize the lighting of natural habitat areas adjacent to the project construction area.

AMM8, Avoid and Minimize Effects of Construction Staging Areas and Temporary Work Areas. Project proponents should locate construction staging and other temporary work areas for covered activities in areas that will ultimately be a part of the permanent project development footprint. If construction staging and other temporary work areas must be located outside of permanent project footprints, they will be located either in areas that do not support habitat for covered species or are easily restored to prior or improved ecological functions (e.g., grassland and agricultural land).

Construction staging and other temporary work areas located outside of project footprints will be sited in areas that avoid adverse effects on the following:

- Serpentine, valley oak woodland, alkali prairie, vernal pool complex, valley foothill riparian, and fresh emergent wetland land cover types.
- Occupied western burrowing owl burrows.[6]
- Nest sites for covered bird species and all raptors, including noncovered raptors, during the breeding season.

Project proponents will follow specific AMMs for sensitive natural communities (Section 4.3.3, Sensitive *Natural Communities*) and covered species (Section 4.3.4, *Covered Species*) in temporary staging and work areas. For establishment of temporary work areas outside of the project footprint, project proponents will conduct surveys to determine if any of the biological resources listed above are present.

Within one year following removal of land cover, project proponents will restore temporary work and staging areas to a condition equal to or greater than the covered species habitat function of the affected habitat. Restoration of vegetation in temporary work and staging areas will use clean, native seed mixes approved by the Conservancy that are free of noxious plant species seeds.

4.3.3 Sensitive Natural Communities

The following AMMs apply to sensitive natural communities. These AMMs are summarized in Table 4-1, *Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species*. AMMs for the natural communities not included below but providing covered species habitat are described in Section 4.3.4, *Covered Species*.

AMM9, Establish Buffers around Sensitive Natural Communities. The buffers for each sensitive natural community are as follows:

- *Alkali prairie and vernal pools:* The area necessary to provide the hydrologic conditions needed to support the wetlands within these natural communities (250 feet). Covered activities will avoid vernal pools or alkali seasonal wetlands by 250 feet, or other distance based on site specific topography to avoid indirect hydrologic effects.[7] A buffer of less than 250 feet around vernal pools or alkali seasonal wetlands will be subject to wildlife agency concurrence that effects will be avoided. Considerations that may warrant a buffer of less than 250 feet may include topography (i.e., if the surrounding microwatershed extends less than 250 feet from the pool or wetland), intervening hydrologic barriers such as roads or canals, or other factors indicating that the proposed disturbance area does not contribute to the pool's hydrology. Other considerations may include temporary disturbance during the dry season where measures are implemented to avoid disturbance of the underlying claypan or hardpan, and the area is returned to pre-project conditions prior to the following rainy season.

[6] *Occupied* for the purpose of AMM8 means at least one burrowing owl has been observed occupying the burrow within the last three years. Occupancy of a burrow may also be indicated by owl sign at the burrow entrance, including molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance or perch site (California Department of Fish and Game 2012, Appendix L).

[7] Alkali seasonal wetlands are seasonal wetlands within the alkali prairie natural community.

- *Valley foothill riparian:* One hundred feet from canopy drip-line. If avoidance is infeasible, a lesser buffer or encroachment into the sensitive natural community may be allowed if approved by the Conservancy and the wildlife agencies, based on the criteria listed in *AMM1*. Transportation or utility crossings may encroach into this sensitive natural community provided effects are minimized and all other applicable AMMs are followed.
- *Lacustrine and riverine:* Outside urban planning units, 100 feet from the top of banks.[8] Within urban planning units, 25 feet from the top of the banks.
- *Fresh emergent wetland:* Fifty feet from the edge of the natural community.

AMM1, Establish Buffers, provides additional details for buffers around natural communities. Additional buffers may be necessary for covered species, as described below in Section 4.3.4, *Covered Species*.

AMM10, Avoid and Minimize Effects on Wetlands and Waters. Project proponents will comply with stormwater management plans that regulate development as part of compliance with regulations under National Pollutant Discharge Elimination System (NPDES) permit requirements. Covered activities that result in any fill of waters or wetlands will also comply with requirements under Section 404 of the Clean Water Act, State Water Resources Control Board (State Board), Fish and Game Code Section 1602, and Regional Board regulations. Other than requirements for buffers, minimizing project footprint, and species-specific measures for wetland-dependent covered species, this HCP/NCCP does not include specific best management practices for protecting wetlands and waters because they may conflict with measures required by the USACE, State Board, Regional Board, and CDFW.

[8] Defined as the area within which water is contained in a channel.

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Table 4-1. Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species

Covered Species or Sensitive Natural Community	Planning-Level Surveys[a]	Design Requirements[b]	Preconstruction Surveys[c]	Construction and Operations and Maintenance Requirements[d]
Sensitive Natural Communities				
Alkali prairie and vernal pool complex (AMM9 and AMM10)	Map natural community in and within 250 feet of project footprint.	Design project to avoid vernal pools or alkali seasonal wetlands by 250 feet, or other distance based on site specific topography to avoid indirect hydrologic effects.[9] A buffer of less than 250 feet around vernal pools or alkali seasonal wetlands will be subject to wildlife agency concurrence that effects will be avoided. Considerations that may warrant a buffer of less than 250 feet may include topography (i.e., if the surrounding microwatershed extends less than 250 feet from the pool or wetland), intervening hydrologic barriers such as roads or canals, or other factors indicating that the proposed disturbance area does not contribute to the pool's hydrology. Other considerations may include temporary disturbance during the dry season where measures are implemented to avoid disturbance of the underlying claypan or hardpan, and the area is returned to pre-project conditions prior to the following rainy season.	None	See design requirements.
Valley foothill riparian (AMM9 and AMM10)	Map natural community in and within 100 feet of project footprint.	Except for projects expected to remove Valley foothill riparian (transportation, utility crossings, flood control and drainage management improvements), design project to avoid this natural community by including a 100-foot (minimum) permanent buffer zone from the canopy drip-line (the farthest edge on the ground where water will drip from the tree canopy, based on the outer boundary of the tree canopy). A lesser buffer or encroachment into the natural community may be allowed if approved by the Conservancy, USFWS, and CDFW, based on the criteria listed in AMM1, and all covered species AMMs are followed.	None	See design requirements.
Lacustrine and riverine (AMM9 and AMM10)	Identify streams, rivers, lakes, and ponds in and within 25 feet of project footprint inside urban planning units, and within 100 feet of project footprint outside urban planning units.	Within urban planning units, design development (with the exception of projects expected to affect lacustrine and riverine, such as transportation, utility crossings, and flood control projects) to include a 25-foot (minimum) permanent buffer zone (setback easement) from the top of bank along both sides of all natural (i.e., not including manmade ditches and canals) perennial and intermittent (excluding ephemeral) stream corridors. Outside urban planning units, the setback will be 100 feet. Any riparian habitat within this setback buffer will be avoided and protected, consistent with *AMM8 Avoid and Minimize Effects of Construction Staging Areas and Temporary Work Areas*. If an aquatic feature provides habitat for California tiger salamander, setbacks will be consistent with AMM13.	None	See design requirements.
Fresh emergent wetlands (AMM9 and AMM10)	Map natural community in and within 50 feet of project footprint.	Design project to avoid this natural community by including a 50-foot (minimum) buffer zone from the edge of the natural community (including the supporting hydrologic area), unless there is an intervening hydrologic barrier.		

[9] Alkali seasonal wetlands are seasonal wetlands within the alkali prairie natural community.

Covered Species or Sensitive Natural Community	Planning-Level Surveys[a]	Design Requirements[b]	Preconstruction Surveys[c]	Construction and Operations and Maintenance Requirements[d]
Plants				
Palmate-bracted bird's beak (AMM11)	Identify and quantify (in acres) suitable habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 250 feet of project footprint. If suitable habitat is present, conduct survey within this habitat for palmate-bracted bird's beak, consistent with CDFW guidance (California Department of Fish and Game 2009) or most current guidance. Survey period: May 31–September 30	Design project to avoid activity within 250 feet of occupied habitat, or greater distance depending on site specific topography to avoid hydrologic effects, unless a shorter distance is determined to avoid effects and approved by the Conservancy, USFWS, and CDFW.	None	See design requirements. Avoid mortality of individuals, except as needed through management activities that provide an overall benefit to the species.
Invertebrates				
Valley elderberry longhorn beetle (AMM12)	Identify and map all elderberry shrubs in and within 100 feet of project footprint with stems greater than one inch in diameter at ground level. For mapped shrubs that cannot be avoided, quantify the number of stems greater than one inch in diameter at ground level, and identify any such stems with valley elderberry longhorn beetle exit holes, consistent with USFWS (1999a) guidelines. Survey period: Year-round	Design project to avoid mapped elderberry shrubs. To avoid effects on shrubs, a setback of at least 100 feet from any elderberry shrubs with stems measuring one inch or greater in diameter at ground level is required; protective measures are required, consistent with USFWS (1999a) guidelines. All restoration projects will avoid removal of elderberry shrubs.	None	Prior to construction, the project proponent will transplant elderberry shrubs identified within project footprint that cannot be avoided and quantify affected stems, as described in greater detail in AMM12 (Section 4.3.4, *Covered Species*) and in Section 6.4.2.4.1, *Valley Elderberry Longhorn Beetle*). Transplantation will only occur if a shrub cannot be avoided and, if indirectly affected, the indirect effects would otherwise result in the death of stems or the entire shrub.
Amphibians				
California tiger salamander (AMM13)	Identify and quantify (in acres) suitable aquatic and upland habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 500 feet of project footprint, and avoid this buffer area if possible. If a project outside an urban planning unit, as designed, will not avoid aquatic habitat by at least 500 feet, either conduct visual and dip-net surveys, consistent with CDFW protocol (California Department of Fish and Game 2003), or assume presence. Survey period: After rainfall, November 1 to May 15.	Design project to avoid any disturbance in California tiger salamander within designated critical habitat in the Dunnigan Creek Unit (70 FR 49380). If species is present or assumed to be present in aquatic habitat, design the project to avoid adverse effects within 500 feet of habitat outside urban planning units. If the species is present or assumed to be present, the covered activity will not remove aquatic habitat until at least four new occupied breeding pools are discovered or established and protected in the Plan Area. After the four new occupied breeding pools are protected, with concurrence of USFWS and CDFW, up to three occupied breeding pools may be affected.[10]	None.	See design requirements.
Reptiles				
Western pond turtle (AMM14)	Identify species habitat (as defined in Appendix A, *Covered Species Accounts*) within project footprint.	No design requirements are specified for western pond turtle; follow design requirements for the valley foothill riparian and lacustrine and riverine natural communities described above for AMMs 9 and 10. These require 100-foot setbacks.	If modeled upland habitat will be impacted, a qualified biologist will assess the likelihood of western pond turtle nests occurring in the disturbance area (based on sun exposure, soil conditions, and other species habitat requirements).	If a qualified biologist determines that there is a moderate to high likelihood of western pond turtle nests within the disturbance area, the qualified biologist will monitor all initial ground disturbing activity for nests that may be unearthed during the disturbance, and will move out of harm's way any turtles or hatchlings .

[10] See Chapter 6, Section 6.3.4.3.3, *Species-Specific Goals and Objectives, Objective CTS1.3, for additional detail regarding this requirement.*

Covered Species or Sensitive Natural Community	Planning-Level Surveys[a]	Design Requirements[b]	Preconstruction Surveys[c]	Construction and Operations and Maintenance Requirements[d]
Giant garter snake (AMM15)	Identify and quantify (in acres) species habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 200 feet of project footprint.	Avoid development in habitat. For avoidance, there must be no activity in or within 200 feet of aquatic habitat.	For construction, if habitat cannot be avoided, conduct clearance surveys using USFWS (1997) protocol within 24 hours prior to construction activities. If construction activities stop for a period of two weeks or more, conduct another preconstruction survey within 24 hours of resuming activity. No surveys required for operations and maintenance unless material spoils will be placed anywhere other than an existing material spoils site within giant garter snake habitat.	For construction: • Restrict construction to snakes' active season. • Dewater aquatic habitat and allow snakes to leave area prior to construction. • Confine land clearing to minimum area necessary to facilitate construction activities. • Provide environmental awareness training. • Employ best management practices. For operations and maintenance: • When possible, restrict construction to snakes' active season. • Provide environmental awareness training. • Limit channel clearing to one side along at least 80 percent of the linear distance of canals and ditches during each maintenance year. • Confine land clearing to minimum area necessary to facility construction activities. • Place removed material in existing dredged material spoil sites. If no sites exist, place spoils only where preconstruction surveys confirm snakes are not present. • See Section 4.3.4, *Covered Species*, for further details.
Birds				
Swainson's hawk and white-tailed kite (AMM15AMM16)	Identify and quantify (in acres) species habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 1,320 feet of project footprint. Identify suitable nest trees.	Avoid potential nesting trees, with 1,320-foot setbacks from the trees during nesting, to the extent practicable. Up to 20 Swainson's hawk nest trees (documented nesting within the last 5 years) may be removed during the course of the permit term, but not while occupied by Swainson's hawks during the nesting season.	For construction, if activity would occur within 1,320 feet of nesting habitat, conduct preconstruction surveys for active nests, consistent with Swainson's Hawk Technical Advisory Committee (2000). Survey period: March 15–August 30 For operations and maintenance, if activity involves pruning or removal of suitable nest trees, conduct preconstruction surveys for active nests, consistent with Swainson's Hawk Technical Advisory Committee (2000). Survey period: March 15–August 30	For construction, from March 15 to August 30, no activity within 1,320 feet of active nests (as identified through preconstruction surveys), unless a qualified biologist has determined that the young have fledged and the nest is no longer active or the Conservancy, USFWS, and CDFW agree to a lesser buffer distance. For operations and maintenance, if occupied nest sites are present within 1,320 feet, tree pruning and removal will be deferred until the nest is no longer being used by adults and young.

Covered Species or Sensitive Natural Community	Planning-Level Surveys[a]	Design Requirements[b]	Preconstruction Surveys[c]	Construction and Operations and Maintenance Requirements[d]
Western yellow-billed cuckoo (AMM17)	Identify and quantify (in acres) species habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 500 feet of project footprint. If project, as designed, will not avoid habitat by 500 feet (or a lesser distance if approved by the Conservancy) and there are no breeding records for the species within one-quarter mile of the site from the previous three years, conduct planning-level surveys, consistent with USFWS protocol (Appendix L), to determine if an occupied territory is present. Survey period: June 1–August 30	For construction projects, avoid or minimize activities within 500 feet of suitable nesting habitat. If the covered activity would encroach within 500 feet of habitat and an occupied territory is identified during planning-level surveys, or there are records of the species occurring within one-quarter mile of the activity within the last three years, the project must be designed to avoid activities within 500 feet of suitable nesting habitat, unless a shorter distance is approved by the Conservancy, USFWS, and CDFW. For operations and maintenance activities, follow the same requirements as for construction, unless activity does not remove habitat or occur during nesting season (June 1–August 30). If activity does not remove habitat or occur during the nesting season, no design requirements are necessary.	For construction, if activity within 500 feet of nesting habitat (whether or not active nests were discovered during planning-level surveys) must occur between June 1 and August 30, conduct preconstruction surveys, consistent with USFWS protocol (Appendix L), during the same season when the activity will occur. For operations and maintenance, same as above, unless activity does not remove habitat and happens outside the nesting season.	From June 1 to August 30, avoid activity within 500 feet of active nests (as identified through preconstruction surveys).
Western burrowing owl (AMM18)	Identify and quantify (in acres) species habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 500 feet of project footprint. If the activity will occur in western burrowing habitat, a qualified biologist will conduct planning-level surveys for occupied habitat, consistent with CDFW guidelines for Phase II burrow surveys (California Department of Fish and Game 2012). Survey period: February 1–August 31 during the breeding season; December 1–January 31 during nonbreeding season	Design project to minimize activities in the vicinity of occupied burrows, consistent with Table 4-2.	If burrows cannot be avoided, consistent with Table 4-2, a qualified biologist will conduct preconstruction surveys up to 30 days prior to construction to identify active burrows in the area of impact (*area of impact* is defined in Section 8.4.1.2, *Land Cover Fee*).	Avoid all nest sites during the breeding season (February 1 to August 31) with a buffer consistent with Table 4-2, or as otherwise approved by the Conservancy and wildlife agencies. Construction may occur inside the disturbance buffer if the project proponent develops an avoidance, minimization, and monitoring plan, as described in *AMM18, Minimize Take and Adverse Effects on Habitat of Western Burrowing Owl* (Section 4.3.4, *Covered Species*). Avoid all occupied burrows outside the breeding season (February 1 to August 31) with a 250-foot buffer, unless specific criteria are met, as described in Section 4.3.4. A qualified biologist will monitor the site, as described in Section 4.3.4. Passive relocation (or active relocation upon wildlife agency approval) may be implemented, as described in Section 4.3.4.
Least Bell's vireo (AMM19)	Identify and quantify (in acres) species habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 500 feet of project footprint. If project, as designed, will not avoid habitat by 500 feet (or a lesser distance if approved by the Conservancy, USFWS, and CDFW) and there are no breeding season (or nesting) records for the species within one-quarter mile of the site from the previous three years, conduct planning-level surveys, consistent with USFWS (2001), to determine if an occupied territory is present. Survey period: April 1–July 15	For construction projects, avoid or minimize activities within 500 feet of suitable nesting habitat. If the covered activity would encroach within 500 feet of habitat and an occupied nest is identified during planning-level surveys, or there are records of the species occurring within one-quarter mile of the activity within the last three years, the activity must be designed to avoid activities within 500 feet of suitable nesting habitat, unless a shorter distance is approved by the Conservancy, USFWS, and CDFW. For operations and maintenance activities, follow the same requirements as for construction, unless activity does not remove habitat or occur during nesting season (April 1 to July 15). If activity does not remove habitat or occur during the nesting season, no design requirements are necessary.	For construction, if activity within 500 feet of nesting habitat (whether or not active territories were discovered during planning-level surveys) must occur between April 1 and July 15, conduct preconstruction surveys, consistent with USFWS (2012), during the same season when the activity will occur. For operations and maintenance, same as above,	From April 1 to July 15, avoid activity within 500 feet of active nests (as identified through preconstruction surveys), unless a lesser distance is approved by the Conservancy, USFWS, and CDFW.

Covered Species or Sensitive Natural Community	Planning-Level Surveys[a]	Design Requirements[b]	Preconstruction Surveys[c]	Construction and Operations and Maintenance Requirements[d]
			unless activity does not remove habitat and happens outside the nesting season.	
Bank swallow (AMM20)	Identify and quantify (in acres) species habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 500 feet of project footprint. If project cannot avoid nesting habitat by 500 feet, conduct visual surveys to determine if an active colony is present. CDFW will be notified of any active colony located during surveys. Survey period: March 1–August 15 If project, as designed, will not avoid nesting habitat by 500 feet, check records maintained by Conservancy and CDFW to determine if bank swallow nesting colonies have been active within the previous five years. Operations and maintenance activities with temporary effects or other temporary activities that do not remove or modify nesting habitat and do not occur during the nesting season (March 1 to August 15) do not need to conduct nest surveys and do not need to implement additional avoidance measures for this species.	If active colony is present or has been present within the last five years, design project to avoid adverse effects within 500 feet of the colony site(s), unless a shorter distance is approved, based on site-specific conditions, by the Conservancy, USFWS, and CDFW. If colony is not present or has not been present within the last five years, a 500-foot buffer is not necessary.	None	From March 1 to August 15, no activity within 500 feet of nesting colony that has been active within the last five years (as identified through planning-level surveys and record search), unless approved by the Conservancy, USFWS and CDFW. From July 31 to April 14, a buffer distance of less than 200 feet may be applied if approved by the Conservancy, USFWS, and CDFW.
Tricolored blackbird (AMM21)	Identify and quantify (in acres) species habitat (as defined in Appendix A, *Covered Species Accounts*) in and within 1,300 feet of project footprint. If project, as designed, will not avoid nesting habitat by 1,300 feet, conduct planning-level surveys, consistent with Kelsey (2008), to determine if an active colony is present. Survey period: March 1–July 30 If project, as designed, will not avoid nesting habitat by 1,300 feet, check records maintained by Conservancy to determine if there have been active tricolored blackbird nesting colonies within the previous five years.	If active colony is present or has been present within the last five years, design project to avoid adverse effects within 1,300 feet of the colony site(s), unless a shorter distance is approved, based on site-specific conditions, by the Conservancy, USFWS, and CDFW.	None	From March 1 to July 30, no activity within 1,300 feet of nesting colony that has been active within the last five years (as identified through planning-level surveys and record search).

[a] Planning-level surveys are described in Section 4.2.2.3, *Item 3: Land Cover Mapping and Planning-Level Surveys.*

[b] This column includes only sensitive natural community or species-specific design requirements, as summarized from Sections 4.3.3, *Sensitive Natural Communities,* and 4.3.4, *Covered Species*. Additional design requirements are described in Section 4.3.1, *General Project Design.*

[c] Although planning-level surveys are conducted well in advance of initiating the project and used to inform project design, preconstruction surveys are conducted immediately prior to initiating the project, within time windows specified for each relevant covered species, to determine necessary construction-related avoidance and minimization measures (e.g., setbacks from an active Swainson's hawk nest until the young have fledged).

[d] This column includes only sensitive natural community or species-specific design requirements, as summarized from Sections 4.3.3, *Sensitive Natural Communities,* and 4.3.4, *Covered Species*. Additional construction and operations and maintenance requirements are described in Section 4.3.2, *General Construction and Operations and Maintenance.*

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4.3.4 Covered Species

The AMMs described in this section pertain specifically to covered species. These AMMs may change over time, depending on the most current guidelines developed by CDFW and USFWS and based on the best available data. In addition to the avoidance and minimization measures described below, the Conservancy will ensure that take levels do not exceed the take limits described in Table 5-2(a), *Habitat-Based Take Limits, by Covered Species* and Table 5-2(b), *Forms of Take and Take Limits, by Covered Species.*

AMM11, Minimize Take and Adverse Effects on Palmate-Bracted Bird's Beak. Palmate-bracted bird's-beak is covered by the Yolo HCP/NCCP only for the removal of suitable habitat and not for the removal of palmate-bracted bird's beak plants. This AMM ensures compliance with this provision. To determine if palmate-bracted bird's-beak is present and could be affected, the project proponent will conduct a planning-level survey for this species for any covered activities to be conducted within 250 feet of suitable habitat (as defined in Appendix A, *Covered Species Accounts*). The survey will be conducted during the period from May 31 to September 30 and will be consistent with *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (California Department of Fish and Game 2009).

The project proponent will avoid occupied habitat where palmate-bracted bird's beak has been located within any of the last 15 years (seed viability could be as little as three years and as much as six years, as described in Appendix A, Section A.1.2, *Species Description and Life History*). The project proponent also will avoid any new occurrences of this species identified during planning-level surveys. Avoidance will require a 250-foot setback from the occupied habitat, or greater distance depending on site-specific topography to avoid hydrologic effects. A shorter buffer distance may apply if is determined to avoid effects and is approved by the Conservancy, USFWS, and CDFW. Mortality of palmate-bracted bird's beak individuals will be avoided, except as needed through management activities that provide an overall benefit to the species.

AMM12, Minimize Take and Adverse Effects on Habitat of Valley Elderberry Longhorn Beetle. The project proponent will retain a qualified biologist who is familiar with valley elderberry longhorn beetle and evidence of its presence (i.e., exit holes in elderberry shrubs) to map all elderberry shrubs in and within 100 feet of the project footprint with stems that are greater than one inch in diameter at ground level. To avoid take of valley elderberry longhorn beetle fully, the project proponent will maintain a buffer of at least 100 feet from any elderberry shrubs with stems greater than one inch in diameter at ground level. *AMM1, Establish Buffers,* above, describes circumstances in which a lesser buffer may be applied. For elderberry shrubs that cannot be avoided with a designated buffer distance as described above, the qualified biologist will quantify the number of stems one inch or greater in diameter to be affected, and the presence or absence of exit holes. The Conservancy will use this information to determine the number of plants or cuttings to plant on a riparian restoration site to help offset the loss, consistent with Section 6.4.2.4.1, *Valley Elderberry Longhorn Beetle*. Additionally, prior to construction, the project proponent will transplant elderberry shrubs identified within the project footprint that cannot be avoided.

Transplantation will only occur if a shrub cannot be avoided and, if indirectly affected, the indirect effects would otherwise result in the death of stems or the entire shrub. If the project proponent chooses, in coordination with a qualified biologist, not to transplant the shrub because the activity would not likely result in death of stems of the shrub, then the qualified biologist will monitor the

shrub annually for a five-year monitoring period. The monitoring period may be reduced with concurrence from the wildlife agencies if the latest research and best available information at the time indicates that a shorter monitoring period is warranted. If death of stems at least one inch in diameter occurs within the monitoring period, and the qualified biologist determines that the shrub is sufficiently healthy to transplant, the project proponent will transplant the shrub as described in the following paragraph, in coordination with the qualified biologist. If the shrub dies during the monitoring period, or the qualified biologist determines that the shrub is no longer healthy enough to survive transplanting, then the Conservancy will offset the shrub loss consistent with the preceding paragraph.

The project proponent will transplant the shrubs into a location in the HCP/NCCP reserve system that has been approved by the Conservancy. Elderberry shrubs outside the project footprint but within the 100-foot buffer will not be transplanted.

Transplanting will follow the following measures:

1. Monitor: A qualified biologist will be on-site for the duration of the transplanting of the elderberry shrubs to ensure the effects on elderberry shrubs are minimized.
2. Timing: The project proponent will transplant elderberry plants when the plants are dormant, approximately November through the first two weeks of February, after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the plant and increase transplantation success.
3. Transplantation procedure:
    a. Cut the plant back three to six feet from the ground or to 50 percent of its height (whichever is taller) by removing branches and stems above this height. Replant the trunk and stems measuring one inch or greater in diameter. Remove leaves that remain on the plants.
    b. Relocate plant to approved location in the reserve system, and replant as described in Section 6.4.2.4.1, *Valley Elderberry Longhorn Beetle.*

AMM13, Minimize Take and Adverse Effects on Habitat of California Tiger Salamander. The project proponent will retain a qualified biologist to identify any suitable aquatic and upland habitats for California salamander (as defined in Appendix A, *Covered Species Accounts*) present in and within 500 feet of the project footprint during planning-level surveys. The qualified biologist will also assess whether critical habitat could be affected by the covered activity.

Except for habitat management and enhancement, all covered activities will provide a 500-foot setback from aquatic California tiger salamander habitat. If a covered activity is outside the Dunnigan Creek Unit of California tiger salamander critical habitat and, as designed, will not avoid aquatic habitat by at least 500 feet, the project proponent will either conduct visual and dip-net surveys, consistent with CDFW protocol, during the period for November 1 to May 15 (California Department of Fish and Game 2003) or assume presence. If the species is present or assumed to be present, the covered activity will not remove aquatic habitat until at least four new occupied breeding pools are discovered or established in the Plan Area and protected in the Plan Area. After the four new occupied breeding pools are protected, and with concurrence of USFWS and CDFW, up to three breeding pools may be affected. The breeding habitat may not be removed if USFWS and CDFW determine that the covered activity would remove a significant occurrence of this species that could be necessary for maintaining the genetic diversity or regional distribution of the species. This AMM applies to California tiger salamander aquatic habitat and surrounding uplands, as defined by

reference to the setbacks described above; it does not apply to cultivated agricultural lands (i.e., agricultural lands other than grazing lands) or other low-value upland habitat for California tiger salamander.

AMM14, Minimize Take and Adverse Effects on Habitat of Western Pond Turtle. There are no specific design requirements for western pond turtle habitat, however, project proponents must follow design requirements for the valley foothill riparian and lacustrine and riverine natural communities described in AMMs 9 and 10, which require a 100-foot (minimum) permanent buffer zone from the canopy drip-line (the farthest edge on the ground where water will drip from the tree canopy, based on the outer boundary of the tree canopy). If modeled upland habitat will be impacted, a qualified biologist must be present and will assess the likelihood of western pond turtle nests occurring in the disturbance area (based on sun exposure, soil conditions, and other species habitat requirements).

If a qualified biologist determines that there is a moderate to high likelihood of western pond turtle nests within the disturbance area, the qualified biologist will monitor all initial ground disturbing activity for nests that may be unearthed during the disturbance, and will move out of harm's way any turtles or hatchlings found.

AMM15, Minimize Take and Adverse Effects on Habitat of Giant Garter Snake. The project proponent will avoid effects on areas where planning-level surveys indicate the presence of suitable habitat for giant garter snake. To avoid effects on giant garter snake aquatic habitat, the project proponent will conduct no in-water/in-channel activity and maintain a permanent 200-foot non-disturbance buffer from the outer edge of potentially occupied aquatic habitat. If the project proponent cannot avoid effects of construction activities, the project proponent will implement the measures below to minimize effects of construction projects (measures for maintenance activities are described after the following bulleted list).

- Conduct preconstruction clearance surveys using USFWS-approved methods within 24 hours prior to construction activities within identified giant garter snake aquatic and adjacent upland habitat. If construction activities stop for a period of two weeks or more, conduct another preconstruction clearance survey within 24 hours prior to resuming construction activity.
- Restrict all construction activity involving disturbance of giant garter snake habitat to the snake's active season, May 1 through October 1. During this period, the potential for direct mortality is reduced because snakes are expected to move and avoid danger.
- In areas where construction is to take place, encourage giant garter snakes to leave the site on their own by dewatering all irrigation ditches, canals, or other aquatic habitat (i.e., removing giant garter snake aquatic habitat) between April 15 and September 30. Dewatered habitat must remain dry, with no water puddles remaining, for at least 15 consecutive days prior to excavating or filling of the habitat. If a site cannot be completely dewatered, netting and salvage of giant garter snake prey items may be necessary to discourage use by snakes.
- Provide environmental awareness training for construction personnel, as approved by the Conservancy. Training may consist of showing a video prepared by a qualified biologist, or an in-person presentation by a qualified biologist. In addition to the video or in-person presentation, training may be supplemented with the distribution of approved brochures and other materials that describe resources protected under the Yolo HCP/NCCP and methods for avoiding effects.

- A qualified biologist will prepare a giant garter snake relocation plan which must be approved by the Conservancy prior to work in giant garter snake habitat. The qualified biologist will base the relocation plan on criteria provided by CDFW or USFWS, through the Conservancy.
- If a live giant garter snake is encountered during construction activities, immediately notify the project's biological monitor and USFWS and CDFW. The monitor will stop construction in the vicinity of the snake, monitor the snake, and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the work day to ensure the snake is not harmed or, if it leaves the site, does not return. If the giant garter snake does not leave on its own, the qualified biologist will relocate the snake consistent with the relocation plan described above.
- Employ the following management practices to minimize disturbances to habitat:
    - Install temporary fencing to identify and protect adjacent marshes, wetlands, and ditches from encroachment from construction equipment and personnel.
    - Maintain water quality and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted practices. No plastic, monofilament, jute, or similar erosion-control matting that could entangle snakes or other wildlife will be permitted.

Ongoing maintenance covered activities by local water and flood control agencies typically involve removal of vegetation, debris, and sediment from water conveyance canals as well as resloping, rocking, and stabilizing the canals that serve agricultural water users. Maintenance of these conveyance facilities can typically occur only from mid-January through April when conveyance canals and ditches are not in service by the agency, although some drainages are used for storm conveyance during the winter and are wet all year. This timing is during the giant garter snake's inactive period. This is when snakes may be using underground burrows and are most vulnerable to take because they are unable to move out of harm's way. Maintenance activities, therefore, will be limited to the giant garter snake's active season (May 1 to October 1) when possible. All personnel involved in maintenance activities within giant garter snake habitat will first participate in environmental awareness training for giant garter snake, as described above for construction-related activities. To minimize the take of giant garter snake, the local water or flood control agency will limit maintenance of conveyance structures located within modeled giant garter snake habitat (Appendix A, *Covered Species Accounts*) to clearing one side along at least 80 percent of the linear distance of canals and ditches during each maintenance year (e.g., the left bank of a canal is maintained in the first year and the right bank in the second year). To avoid collapses when resloping canal and ditch banks composed of heavy clay soils, clearing will be limited to one side of the channel during each maintenance year.

For channel maintenance activities conducted within modeled habitat for giant garter snake, the project proponent will place removed material in existing dredged sites along channels where prior maintenance dredge disposal has occurred. For portions of channels that do not have previously used spoil disposal sites and where surveys have been conducted to confirm that giant garter snakes are not present, removed materials may be placed along channels in areas that are not occupied by giant garter snake and where materials will not re-enter the canal because of stormwater runoff.

Modifications to this AMM may be made with the approval of the Conservancy, USFWS, and CDFW.

AMM16, Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite. The project proponent will retain a qualified biologist to conduct planning-level surveys and identify any

nesting habitat present within 1,320 feet of the project footprint. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas.

If a construction project cannot avoid potential nest trees (as determined by the qualified biologist) by 1,320 feet, the project proponent will retain a qualified biologist to conduct preconstruction surveys for active nests consistent, with guidelines provided by the Swainson's Hawk Technical Advisory Committee (2000), between March 15 and August 30, within 15 days prior to the beginning of the construction activity. The results of the survey will be submitted to the Conservancy and CDFW. If active nests are found during preconstruction surveys, a 1,320-foot initial temporary nest disturbance buffer shall be established. If project related activities within the temporary nest disturbance buffer are determined to be necessary during the nesting season, then the qualified biologist will monitor the nest and will, along with the project proponent, consult with CDFW to determine the best course of action necessary to avoid nest abandonment or take of individuals. Work may be allowed only to proceed within the temporary nest disturbance buffer if Swainson's hawk or white-tailed kite are not exhibiting agitated behavior, such as defensive flights at intruders, getting up from a brooding position, or flying off the nest, and only with the agreement of CDFW and USFWS. The designated on-site biologist/monitor shall be on-site daily while construction-related activities are taking place within the 1,320-foot buffer and shall have the authority to stop work if raptors are exhibiting agitated behavior. Up to 20 Swainson's hawk nest trees (documented nesting within the last 5 years) may be removed during the permit term, but they must be removed when not occupied by Swainson's hawks.

For covered activities that involve pruning or removal of a potential Swainson's hawk or white-tailed kite nest tree, the project proponent will conduct preconstruction surveys that are consistent with the guidelines provided by the Swainson's Hawk Technical Advisory Committee (2000). If active nests are found during preconstruction surveys, no tree pruning or removal of the nest tree will occur during the period between March 1 and August 30 within 1,320 feet of an active nest, unless a qualified biologist determines that the young have fledged and the nest is no longer active.

AMM17, Minimize Take and Adverse Effects on Habitat of Western Yellow-Billed Cuckoo. The project proponent will retain a qualified biologist to conduct planning-level surveys and assess whether habitat for western yellow-billed cuckoo (as defined in Appendix A, *Covered Species Accounts*) is present within 500 feet of covered activities. If habitat is present, the project proponent will redesign the project to avoid or minimize activities within 500 feet of western yellow-billed cuckoo habitat. If the activity will encroach within 500 feet of habitat and there are no breeding (or nesting) season records for the species within one-quarter mile of the covered activity within the previous three years, a qualified biologist will conduct planning-level surveys for active nests, consistent with USFWS protocol (Appendix N), during the period from June 1 to August 30. Operations and maintenance activities that do not occur during the breeding season (June 1 to August 30) and do not remove western yellow-billed cuckoo habitat are not required to conduct surveys or record searches; no further avoidance or minimization is necessary for such activities.

If an occupied territory is discovered during planning-level surveys, or there is a record of the species occurring within one-quarter mile of the covered activity within the previous three years, the project proponent will design the project to avoid activities within 500 feet of suitable habitat, unless the Conservancy, USFWS, and CDFW approve a shorter distance.

If an activity occurs within 500 feet of suitable habitat during the breeding season, regardless of whether or not a qualified biologist detected the species during planning-level surveys or there are records for the species in the area, a qualified biologist will conduct preconstruction surveys that are consistent with USFWS protocol (Appendix N) during the same season when the activity will occur. If the biologist finds active territories (i.e., presence of a singing male), the project proponent will avoid activity within 500 feet of suitable habitat that is contiguous with the territory from June 1 to August 30. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas.

AMM18, Minimize Take and Adverse Effects on Western Burrowing Owl. The project proponent will retain a qualified biologist to conduct planning-level surveys and identify western burrowing owl habitat (as defined in Appendix A, *Covered Species Accounts*) within or adjacent to (i.e., within 500 feet of) a covered activity. If habitat for this species is present, additional surveys for the species by a qualified biologist are required, consistent with CDFW guidelines (Appendix L).

If burrowing owls are identified during the planning-level survey, the project proponent will minimize activities that will affect occupied habitat as follows. Occupied habitat is considered fully avoided if the project footprint does not impinge on a nondisturbance buffer around the suitable burrow. For occupied burrowing owl nest burrows, this nondisturbance buffer could range from 150 to 1,500 feet (Table 4-2, *Recommended Restricted Activity Dates and Setback Distances by Level of Disturbance for Burrowing Owls*), depending on the time of year and the level of disturbance, based on current guidelines (California Department of Fish and Game 2012). The Yolo HCP/NCCP generally defines low, medium, and high levels of disturbances of burrowing owls as follows.

- Low: Typically 71-80 dB, generally characterized by the presence of passenger vehicles, small gas-powered engines (e.g., lawn mowers, small chain saws, portable generators), and high-tension power lines. Includes electric hand tools (except circular saws, impact wrenches and similar). Management and enhancement activities would typically fall under this category. Human activity in the immediate vicinity of burrowing owls would also constitute a low level of disturbance, regardless of the noise levels.
- Moderate: Typically 81-90 dB, and would include medium- and large-sized construction equipment, such as backhoes, front end loaders, large pumps and generators, road graders, dozers, dump trucks, drill rigs, and other moderate to large diesel engines. Also includes power saws, large chainsaws, pneumatic drills and impact wrenches, and large gasoline-powered tools. Construction activities would normally fall under this category.
- High: Typically 91-100 dB, and is generally characterized by impacting devices, jackhammers, compression ("jake") brakes on large trucks, and trains. This category includes both vibratory and impact pile drivers (smaller steel or wood piles) such as used to install piles and guard rails, and large pneumatic tools such as chipping machines. It may also include large diesel and gasoline engines, especially if in concert with other impacting devices. Felling of large trees (defined as dominant or subdominant trees in mature forests), truck horns, yarding tower whistles, and muffled or underground explosives are also included. Very few covered activities are expected to fall under this category, but some construction activities may result in this level of disturbance.

The project proponent may qualify for a reduced buffer size, based on existing vegetation, human development, and land use, if agreed upon by CDFW and USFWS (California Department of Fish and Game 2012).

Table 4-2. Recommended Restricted Activity Dates and Setback Distances by Level of Disturbance for Burrowing Owls

	Level of Disturbance (feet) from Occupied Burrows		
Time of Year	**Low**	**Medium**	**High**
April 1–August 15	600	1,500	1,500
August 16–October 15	600	600	1,500
October 16–March 31	150	300	1,500

If the project does not fully avoid direct and indirect effects on nesting sites (i.e., if the project cannot adhere to the buffers described above), the project proponent will retain a qualified biologist to conduct preconstruction surveys and document the presence or absence of western burrowing owls that could be affected by the covered activity. Prior to any ground disturbance related to covered activities, the qualified biologist will conduct the preconstruction surveys within three days prior to ground disturbance in areas identified in the planning-level surveys as having suitable burrowing owl burrows, consistent with CDFW preconstruction survey guidelines (Appendix L, *Take Avoidance Surveys*). The qualified biologist will conduct the preconstruction surveys three days prior to ground disturbance. Time lapses between ground disturbing activities will trigger subsequent surveys prior to ground disturbance.

If the biologist finds the site to be occupied[11] by western burrowing owls during the breeding season (February 1 to August 31), the project proponent will avoid all nest sites, based on the buffer distances described above, during the remainder of the breeding season or while the nest is occupied by adults or young (occupation includes individuals or family groups that forage on or near the site following fledging). Construction may occur inside of the disturbance buffer during the breeding season if the nest is not disturbed and the project proponent develops an AMM plan that is approved by the Conservancy, CDFW, and USFWS prior to project construction, based on the following criteria:

- The Conservancy, CDFW, and USFWS approves the AMM plan provided by the project proponent.
- A qualified biologist monitors the owls for at least three days prior to construction to determine baseline nesting and foraging behavior (i.e., behavior without construction).
- The same qualified biologist monitors the owls during construction and finds no change in owl nesting and foraging behavior in response to construction activities.
- If the qualified biologist identifies a change in owl nesting and foraging behavior as a result of construction activities, the qualified biologist will have the authority to stop all construction related activities within the non-disturbance buffers described above. The qualified biologist will report this information to the Conservancy, CDFW, and USFWS within 24 hours, and the Conservancy will require that these activities immediately cease within the non-disturbance buffer. Construction cannot resume within the buffer until the adults and juveniles from the

[11] Occupancy of burrowing owl habitat during preconstruction surveys is confirmed at a site when at least one burrowing owl or sign (fresh whitewash, fresh pellets, feathers, or nest ornamentation) is observed at or near a burrow entrance.

occupied burrows have moved out of the project site, and the Conservancy, CDFW, and USFWS agree.

- If monitoring indicates that the nest is abandoned prior to the end of nesting season and the burrow is no longer in use by owls, the project proponent may remove the nondisturbance buffer, only with concurrence from CDFW and USFWS. If the burrow cannot be avoided by construction activity, the biologist will excavate and collapse the burrow in accordance with CDFW's 2012 guidelines to prevent reoccupation after receiving approval from the wildlife agencies.

If evidence of western burrowing owl is detected outside the breeding season (December 1 to January 31), the project proponent will establish a non-disturbance buffer around occupied burrows, consistent with Table 4-2, as determined by a qualified biologist. Construction activities within the disturbance buffer are allowed if the following criteria are met to prevent owls from abandoning important overwintering sites:

- A qualified biologist monitors the owls for at least three days prior to construction to determine baseline foraging behavior (i.e., behavior without construction).
- The same qualified biologist monitors the owls during construction and finds no change in owl foraging behavior in response to construction activities.
- If there is any change in owl roosting and foraging behavior as a result of construction activities, these activities will cease within the buffer.
- If the owls are gone for at least one week, the project proponent may request approval from the Conservancy, CDFW, and USFWS for a qualified biologist to excavate and collapse usable burrows to prevent owls from reoccupying the site if the burrow cannot be avoided by construction activities. The qualified biologist will install one-way doors for a 48-hour period prior to collapsing any potentially occupied burrows. After all usable burrows are excavated, the buffer will be removed and construction may continue.

Monitoring must continue as described above for the nonbreeding season as long as the burrow remains active.

A qualified biologist will monitor the site, consistent with the requirements described above, to ensure that buffers are enforced and owls are not disturbed. Passive relocation (i.e., exclusion) of owls has been used in the past in the Plan Area to remove and exclude owls from active burrows during the nonbreeding season (Trulio 1995). Exclusion and burrow closure will not be conducted during the breeding season for any occupied burrow. If the Conservancy determines that passive relocation is necessary, the project proponent will develop a burrowing owl exclusion plan in consultation with CDFW biologists. The methods will be designed as described in the species monitoring guidelines (California Department of Fish and Game 2012) and consistent with the most up-to-date checklist of passive relocation techniques[12]. This may include the installation of one-way doors in burrow entrances by a qualified biologist during the nonbreeding season. These doors will be in place for 48 hours and monitored twice daily to ensure that the owls have left the burrow, after which time the biologist will collapse the burrow to prevent reoccupation. Burrows will be excavated using hand tools. During excavation, an escape route will be maintained at all times. This may include inserting an artificial structure, such as piping, into the burrow to prevent collapsing

[12] The Conservancy will maintain a checklist of passive relocation techniques. The wildlife agencies will approve the initial list prepared by the Conservancy, and the Conservancy will update as needed in coordination with the wildlife agencies.

until the entire burrow can be excavated and it can be determined that no owls are trapped inside the burrow. The Conservancy may allow other methods of passive or active relocation, based on best available science, if approved by the wildlife agencies. Artificial burrows will be constructed prior to exclusion and will be created less than 300 feet from the existing burrows on lands that are protected as part of the reserve system.

AMM19, Minimize Take and Adverse Effects on Least Bell's Vireo. The project proponent will retain a qualified biologist to conduct planning-level surveys and determine if habitat for least Bell's vireo (as defined in Appendix A, *Covered Species Accounts*) is present within 500 feet of covered activities. If habitat is present, the project proponent will redesign the project to avoid or minimize activities within 500 feet of least Bell's vireo habitat. If the activity will encroach within 500 feet of habitat and there are no breeding season records for the species within one-quarter mile of the covered activity within the previous three years, the qualified biologist will conduct planning-level surveys for active territories, consistent with USFWS (2001) guidelines, during the breeding season (April 1 to July 15). Operations and maintenance activities that do not occur during the breeding season and do not affect least Bell's vireo habitat are not required to conduct surveys or record searches, and no further avoidance or minimization is necessary for such activities.

- If an occupied territory is discovered during planning-level surveys, or there is a record of the species occurring within one-quarter mile of the covered activity within the previous three years, the project proponent will design the project to avoid activities within 500 feet of suitable habitat, unless the Conservancy, USFWS, and CDFW approve a shorter distance.
- If an activity occurs within 500 feet of suitable habitat during the breeding season, regardless of whether or not the species was detected during planning-level surveys or there are records for the species in the area, a qualified biologist will conduct preconstruction surveys, consistent with USFWS (2001) guidelines, during the same season when the activity will occur. If active territories are found, the project proponent will avoid activity within 500 feet of the habitat from April 1 to July 15. This buffer may be reduced with approval from the Conservancy, USFWS, and CDFW.
- The project proponent will avoid disturbance of previous least Bell's vireo territories (up to three years since known nest activity) during the breeding season, unless the disturbance is to maintain public safety. Least Bell's vireo uses previous territories; disturbance during the breeding season may preclude birds from using existing unoccupied territories.
- The required buffer may be reduced in areas where barriers or topographic relief features are adequate for protecting the nest from excessive noise or other disturbance. Conservancy staff members will coordinate with the wildlife agencies and evaluate exceptions to the minimum nondisturbance buffer distance on a case-by-case basis. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas.
- If occupied territories are identified, a qualified biologist will monitor construction activities in the vicinity of all active territories to ensure that covered activities do not affect nest success.

AMM20, Minimize Take and Adverse Effects on Habitat of Bank Swallow. The project proponent will retain a qualified biologist to identify and quantify (in acres) bank swallow nesting habitat (as defined in Appendix A, *Covered Species Accounts*) within 500 feet of the project footprint. If a 500-foot buffer from nesting habitat cannot be maintained, the qualified biologist will check records maintained by the Conservancy and CDFW to determine if bank swallow nesting colonies have been

active on the site within the previous five years. If there are no records of nesting bank swallows on the site, the qualified biologist will conduct visual surveys during the period from March 1 to August 31 to determine if a nesting colony is present.

For operations and maintenance activities or other temporary activities that do not remove nesting habitat and occur outside the nesting season (September 1 to February 28), it is not necessary to conduct a record search, planning and preconstruction surveys, or any additional avoidance measures. If activities will occur during the nesting season, surveys will be necessary as for other covered activities, but the 500-foot survey distance and buffer distance may be reduced upon Conservancy and wildlife agency approval based on site-specific conditions, such as the level of noise and disturbance generated by the activity, the duration of the activity, and the presence of visual and noise buffers (e.g., vegetation, structures) between the activity and the nesting colony.

If an active bank swallow colony is present or has been present within the last 5 years within the planning-level survey area, the Conservancy, USFWS and CDFW will be notified in writing within 15 working days, and the project proponent will design the project to avoid adverse effects within 500 feet of the colony site(s), unless a shorter distance is approved by the Conservancy, USFWS, and CDFW, based on site-specific conditions such as visual barriers (trees or structures) between the activity and the colony. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas.

The reserve system management plan including bank swallow habitat will provide examples of additional measures that may apply to activities on reserve system lands to avoid and minimize effects on bank swallow.

AMM21, Minimize Take and Adverse Effects on Habitat of Tricolored Blackbird. The project proponent will retain a qualified biologist to identify and quantify (in acres) tricolored blackbird nesting and foraging habitat (as defined in Appendix A, *Covered Species Accounts*) within 1,300 feet of the footprint of the covered activity. If a 1,300-foot buffer from nesting habitat cannot be maintained, the qualified biologist will check records maintained by the Conservancy (which will include CNDDB data, and data from the tricolored blackbird portal) to determine if tricolored blackbird nesting colonies have been active in or within 1,300 feet of the project footprint during the previous five years. If there are no records of nesting tricolored blackbirds on the site, the qualified biologist will conduct visual surveys to determine if an active colony is present, during the period from March 1 to July 30, consistent with protocol described by Kelsey (2008).

Operations and maintenance activities or other temporary activities that do not remove nesting habitat and occur outside the nesting season (March 1 to July 30) do not need to conduct planning or construction surveys or implement any additional avoidance measures.

If an active tricolored blackbird colony is present or has been present within the last five years within the planning-level survey area, the project proponent will design the project to avoid adverse effects within 1,300 feet of the colony site(s), unless a shorter distance is approved by the Conservancy, USFWS, and CDFW. If a shorter distance is approved, the project proponent will still maintain a 1,300-foot buffer around active nesting colonies during the nesting season but may apply the approved lesser distance outside the nesting season. Adjacent parcels under different land ownership will be surveyed only if access is granted or if the parcels are visible from authorized areas.

4.3.5 Avoidance and Minimization Measures within the Reserve System

Reserve system activities, including agricultural activities as described in Appendix M, *Yolo County Agricultural Practices*, have the potential to result in take of covered species. Covered species potentially affected by ongoing reserve system activities, and measures to avoid and minimize these effects, are described below. Prohibited land uses and other restrictions on reserve lands will be stipulated in the conservation easements, as described in Section 7.5.5.3.2, *Minimum Restrictions within a Yolo HCP/NCCP Conservation Easement.* Management practices on reserve lands will be developed with landowners, further described in the management plans, and approved by the wildlife agencies. The species included below are the covered species most likely to be affected by covered activities in the reserve system because they are most likely to occur on cultivated lands. Cultivated lands consist of working landscapes on which agricultural activities take place on a regular basis. The potential scenarios described below for which take could occur are not exhaustive, however, and site-specific conditions could warrant different or additional measures to avoid and minimize take of the covered species found on cultivated lands that will count toward conservation commitments. The Conservancy will describe these avoidance and minimization measures as applicable in site-specific conservation easements or management plans that the wildlife agencies will approve. For bank swallow, agricultural practices on reserve system lands will comply with AMM20, *Bank Swallow,* above.

4.3.5.1 Valley Elderberry Longhorn Beetle

On reserve lands whose primary conservation values include valley elderberry longhorn beetle conservation, agricultural and other activities that would potentially result in take of valley elderberry longhorn beetle will not occur within a 100-foot buffer around elderberry shrubs, thereby avoiding take. Management activities that would not result in take of valley elderberry longhorn beetle (e.g., hand weeding, planting native plants) may occur within the 100-foot buffer. If existing, ongoing activities (e.g., agricultural activities, such as a farming road) encroach within 100 feet of elderberry shrubs on reserve land, the valley elderberry longhorn beetle habitat within 100 feet of such activities will not count toward the habitat protection commitment for this species. The Conservancy will coordinate with the wildlife agencies if elderberry shrubs are present within the reserve system on or near cultivated lands to develop additional protection measures as needed to maintain the conservation values of the easement and comply with the Yolo HCP/NCCP.

4.3.5.2 California Tiger Salamander

Reserve system activities will avoid harming, harassing, injuring, or killing California tiger salamanders. If California tiger salamanders are present in a pond or other water feature on a site enrolled in the reserve system, the management plan for the site will specify water management measures intended to reduce the potential establishment of predatory non-native species and will restrict pond maintenance activities, and limit ground disturbing activities to the dry season to minimize the potential for harming California tiger salamanders that may be actively moving through uplands. In the event that a salamander needs to be moved out of harm's way to avoid injuring or killing individuals, a qualified biologist will relocate the salamander to nearby habitat. The Conservancy will coordinate with the wildlife agencies where California tiger salamanders may be present within the reserve system, to develop additional protection measures as needed to maintain the conservation values of the easement and comply with the Yolo HCP/NCCP.

4.3.5.3 Giant Garter Snake

Canal and ditch maintenance on cultivated lands typically involves removal of vegetation, debris, and sediment from water conveyance channels. To minimize effects on giant garter snake, these activities within giant garter snake habitat will be limited to the giant garter snake's active season (May 1 to October 1) when possible. To minimize the take of giant garter snake, farmers and land managers on lands in the reserve system will limit maintenance of conveyance structures located within giant garter snake habitat to clearing one side along at least 80% of the linear distance of the channels during each maintenance year (e.g., the left bank of a canal is maintained in the first year and the right bank in the second year). In the event that a giant garter snake needs to be moved out of harm's way to avoid injuring or killing individuals, a qualified biologist will relocate the giant garter snake to nearby habitat.

For channel maintenance activities conducted within giant garter snake habitat, farmers on cultivated land within giant garter snake habitat in the reserve system will place removed material at least 200 feet from permanent aquatic habitat. For portions of channels that do not have previously used spoil disposal sites and the area has been checked by a qualified biologist to confirm that giant garter snakes are not in harm's way, removed materials may be placed along channels in areas that are at least 200 feet from permanent aquatic habitat and where materials will not re-enter the canal because of stormwater run-off. The Conservancy will coordinate with the wildlife agencies where giant garter snakes may be present within the reserve system on or near cultivated lands, to develop additional protection measures as needed to maintain the conservation values of the easement and comply with the Yolo HCP/NCCP.

4.3.5.4 Western Pond Turtle

Western pond turtles may occur within canals and ditches in the reserve system. To minimize the take of western pond turtle, farmers and land managers on lands in the reserve system will limit maintenance of conveyance structures located within western pond turtle habitat to clearing one side along at least 80% of the linear distance of the channels during each maintenance year (e.g., the left bank of a canal is maintained in the first year and the right bank in the second year).

For channel maintenance activities conducted within western pond turtle habitat, farmers and land managers within western pond turtle habitat in the reserve system will place removed material at least 200 feet from permanent aquatic habitat. For portions of channels that do not have previously used spoil disposal sites and the area has been checked by a qualified biologist to confirm that western pond turtles are not in harm's way, removed materials may be placed along channels in areas that are at least 200 feet from permanent aquatic habitat and where materials will not re-enter the canal because of stormwater run-off. In the event that a western pond turtle needs to be moved out of harm's way to avoid injuring or killing individuals, a qualified biologist will relocate the western pond turtle to nearby habitat The Conservancy will coordinate with the wildlife agencies where western pond turtles may be present within the reserve system on or near cultivated lands, to develop additional protection measures as needed to maintain the conservation values of the easement and comply with the Yolo HCP/NCCP.

4.3.5.5 Swainson's Hawk and White-tailed Kite

Swainson's hawk and white-tailed kite prey species can be considered agricultural pests and rodenticides are sometimes used as part of general agricultural operations to control pest

populations. Rodenticides both reduce available food resources and can directly harm individual Swainson's hawks and white-tailed kites that ingest prey that have been poisoned by rodenticides. The use of rodenticides is prohibited on all lands in the reserve system, including cultivated lands, in order to avoid effects to Swainson's hawk and white-tailed kite.

The removal or cutting of trees on lands in the reserve system is prohibited except as reasonably necessary and/or prudent for (1) fire breaks, (2) prevention or treatment of disease; or (3) removing vegetation and debris which poses a health and safety hazard or a threat to standard agricultural operations including, but not limited to, downed trees or limbs. In cases where the cutting or removal of a tree is deemed necessary due to one of the reasons mentioned above, the removal of the tree shall not occur during the Swainson's hawk or white-tailed kite nesting season (February 1 through October 1) to avoid disturbance during the breeding season. No standing tree shall be removed until it has been verified that the tree is not an active Swainson's hawk or white-tailed kite nest tree. The Conservancy will coordinate with the wildlife agencies where Swainson's hawks or white-tailed kites are present within the reserve system on or near cultivated lands, to develop additional protection measures as needed to maintain the conservation values of the easement and comply with the Yolo HCP/NCCP.

4.3.5.6 Western Burrowing Owl

Farmers and land managers on lands in the reserve system will avoid disturbing burrows occupied by western burrowing owls. The Conservancy will coordinate with the wildlife agencies if burrowing owls are found on actively farmed lands within the reserve system to develop additional protection measures as needed to maintain the conservation values of the easement and comply with the Yolo HCP/NCCP.

4.3.5.7 Tricolored Blackbird

Tricolored blackbirds can nest in triticale and other types of grain crops, although this has not been documented in Yolo County. In the rare event that tricolored blackbirds nest in cultivated lands within the reserve system, the farmer will delay harvesting the crop and other agricultural practices a sufficient distance from the active nest to avoid harming, harassing, injuring or killing individuals. The restriction will be maintained until the tricolored blackbirds have finished nesting (i.e., fledglings are capable of acquiring food on their own). A qualified biologist will confirm the distance in which harvesting can occur and the time at which tricolored blackbirds have finished nesting (and therefore when the remaining harvest may occur). The Conservancy will coordinate with the wildlife agencies if tricolored blackbirds are found within the reserve system on or near actively farmed lands, to develop additional protection measures as needed to maintain the conservation values of the easement and comply with the Yolo HCP/NCCP.

4.4 Qualified Biologist

Qualified biologists will conduct several types of surveys and monitoring for the Yolo HCP/NCCP, including species surveys, planning-level habitat surveys, preconstruction surveys, construction monitoring, and effectiveness monitoring conducted on the reserve system. This requirement applies to all monitoring described in this HCP/NCCP that calls for a qualified biologist, including avoidance and minimization measures described in this chapter and the effectiveness monitoring described in Chapter 6, *Conservation Strategy*.

Qualified biologists are those biologists who have the experience, education, and training necessary to perform the tasks described in the Yolo HCP/NCCP accurately and in an unbiased fashion. The term *qualified biologist* is used generically to mean a biologist who is trained to perform the given task. Such a person is, more specifically, a wildlife biologist, botanist, or biological consultant who has been trained in wildlife biology or botany. Training must be in the field to which the task is related. For example, a wildlife biologist may not perform a covered plant survey or delineate land cover types for a project application unless the individual is competent in those fields.

If the task does not have the potential to result in take of covered species (e.g., land cover mapping or monitoring of the compliance of construction crews), applicants (or Permittees) may choose their own biologists to conduct these specialized tasks.

If the task has the potential to result in take of covered species (e.g., handling a California tiger salamander, establishing perimeters around an active nest or burrows, or conducting the effectiveness monitoring described in Section 6.5, *Monitoring and Adaptive Management*), the Conservancy must approve the biologist before the biologist can conduct such tasks. To be approved, the biologist must provide the Conservancy with credentials that demonstrate that he or she has an understanding of the monitoring protocols, data collection techniques, and handling procedures for the covered species. Upon Conservancy approval, the Conservancy will maintain a list of pre-approved qualified biologists who may conduct monitoring work for a 5-year period. The Conservancy will provide the list of qualified biologists in annual reports to the wildlife agencies. The Conservancy will keep resumes of the qualified biologists on file, available upon request by the wildlife agencies. Individuals who are not pre-approved by the Conservancy to conduct monitoring with the potential for take may conduct monitoring if they have the appropriate valid permits or authorizations from CDFW and USFWS for the species that they are monitoring. In either case, the biologist will possess all of the qualifications that would otherwise be required under a recovery permit.

4.5 Exemptions from Avoidance and Minimization Measures

These following covered activities are not subject to the avoidance and minimization measures described in this chapter[13]. For activities that are exempt from the avoidance and minimization measures, project proponents will report quantifiable natural community and covered species habitat losses (the Conservancy will not track effects that cannot be quantified) but will not submit an application package. Although these covered activities are exempt from the avoidance and minimization measures, all activities that are described as covered in Chapter 3, *Covered Activities*, will receive take coverage under the Yolo HCP/NCCP. Additionally, activities that are not covered under the Yolo HCP/NCCP are not subject to the avoidance and minimization measures in this chapter.

[13] Activities that are exempt from the avoidance and measures may still be subject to fees as described in Section 8.4.1.1, *Exemptions from HCP/NCCP Fees*. Similarly, some activities that are exempt from fees may still be subject to the avoidance and minimization measures.

The Conservancy will base its determination as to whether an activity qualifies for an exemption on land cover types mapped for the Yolo HCP/NCCP at the time of permit issuance and the nature of covered activities previously permitted on the site.

Many of the covered activities that are exempt from the avoidance and minimization measures in this chapter may also be exempt from the land cover fees, as described in Chapter 8, Section 8.4.1.1, *Exemptions from HCP/NCCP Fees*.

The following covered activities and projects are exempt from all of the avoidance and minimization measures in this chapter, and the Conservancy will not track these activities.

- Projects that do not result in ground disturbance, do not affect Swainson's hawk or white-tailed kite nests, do not result in the release of potential water quality contaminants, and do not create new wildlife barriers.
- Any covered activity described in Chapter 3, *Covered Activities*, that occurs on developed land cover types (see Table 2-1 for land cover types classified as developed), as verified in the field, unless the activity may affect covered species; may affect mapped or unmapped stream, riparian, pond, or wetland land cover types; may remove trees during the nesting season; or occurs in a stream setback.
- Routine infrastructure maintenance by Permittees or SPEs that occurs inside an urban planning unit (Planning Units 19, 20, 21, or 22) and does not affect stream, riparian, pond, or wetland land cover types.
- Natural community and species habitat enhancement activities implemented as a component of the Yolo HCP/NCCP conservation strategy, provided that a qualified biologist determines that such activities would have no adverse direct or indirect effects on sensitive natural communities or covered species habitat, and upon approval by the wildlife agencies on a case-by-case basis.

These exemptions overlap with the exemptions from conditions on covered activities described in land cover fees described in Section 8.4.1.1, *Exemptions from HCP/NCCP Fees*.

4.6 Revisions to Avoidance and Minimization Measures

The Conservancy may revise avoidance and minimization measures over the course of the permit term in response to problems that may arise during implementation. Avoidance and minimization measures may be modified through the adaptive management process, based on results of implementation. The wildlife agencies will review proposed revisions to avoidance and minimization measures and respond within 30 days. The Conservancy will not adopt revised avoidance and minimization measures until they are approved by the wildlife agencies. Allowing such revisions will ensure that out-of-date or ineffective avoidance and minimization measures do not persist and that best available science can be incorporated into the avoidance and minimization measures, as appropriate for the Yolo HCP/NCCP.

The Conservancy may also update survey protocols during the permit term, based on changes to the accepted protocol, with the concurrence from CDFW and USFWS.

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Chapter 5
Effects on Covered Species and Natural Communities

5.1 Introduction and General Approach

This chapter presents the analysis of effects of the covered activities on natural communities[1] and covered species. This chapter also presents the cumulative effects of projects other than Yolo HCP/NCCP covered activities in or near the Plan Area and effects on covered species' critical habitat.

The effects analysis relies on application of the best available information regarding implementation of the covered activities (Chapter 3, *Covered Activities*), the distribution and extent of natural communities and covered species and their habitats (Chapter 2, *Existing Ecological Conditions*, and Appendix A, *Covered Species Accounts*), and the natural history and ecological requirements of covered species (Appendix A). Effects are assessed, both qualitatively and quantitatively, on an evaluation of the likely responses of the natural communities and covered species to the effect mechanisms associated with implementing covered activities (Section 5.4, *Effect Mechanisms*). These effect mechanisms are grouped into three categories.

- Natural community and covered species habitat loss and fragmentation.
- Reduction in natural community and covered species habitat function.
- Harassment, injury, or mortality of covered species.

The approach to analyzing effects was programmatic. As described in Chapter 3, *Covered Activities*, the covered activities will occur over a wide geographic area over 50 years. Similarly, the reserve system will be assembled during implementation of the Yolo HCP/NCCP, so its exact location is not yet known. As a result, this effects analysis provides estimates of acres to be lost from covered activities and establishes maximum allowable loss for each natural community and habitat for each covered species. The impact limits for natural community (termed *maximum allowable loss*) and covered species habitat loss (termed *take limits*) presented in this chapter represent the total loss allowable under the Yolo HCP/NCCP. These losses will be offset by the conservation described in Chapter 6, *Conservation Strategy*.

The effects analysis was based on the major categories of covered activities described in Chapter 3, *Covered Activities*, and listed below.

- Urban projects and activities (planning units 19–22; Figure 5-1, *Covered Activities Footprints*).
- Rural projects and activities (planning units 1–18; Figure 5-1).
- Public and private operations and maintenance.
- Conservation strategy implementation.
- Neighboring landowner protection program.

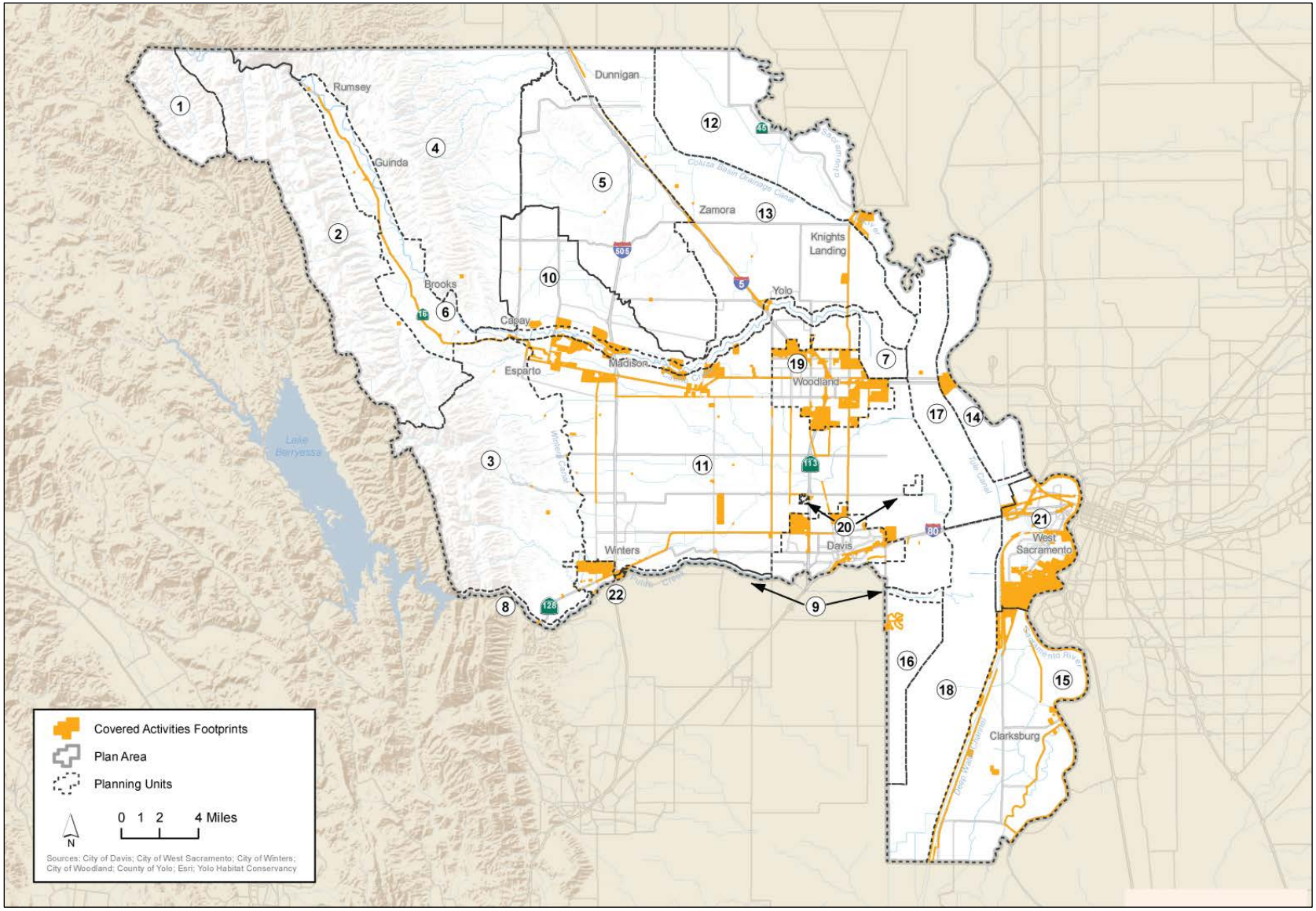
[1] *Natural communities* is used throughout this document to refer generally to both the natural and seminatural (e.g., cultivated) ecological communities conserved under the Yolo HCP/NCCP. *Seminatural communities* is used when referring specifically to this subset of communities.

Over 79 percent of the acreage of covered activities will be concentrated within urban and unincorporated community growth boundaries, and over 90 percent of the Plan Area will remain undeveloped.

The remainder of this chapter is organized as follows.

- Section 5.2, *Regulatory Context*, describes the regulations influencing the framework of the effects analysis and dictating the type of information or findings that must result from the analysis.
- Section 5.3, *Terminology,* defines key terms used in the effects analysis.
- Section 5.4, *Effect Mechanisms,* describes the various mechanisms by which covered activities may adversely affect natural communities and covered species.
- Section 5.5, *Effects Analysis Approach and Methods*, presents methods applied to the effects analysis and the approach by which these effects have been characterized and categorized.
- Section 5.6, *Effects on Natural Communities,* describes the effects of covered activities on each natural community the HCP/NCCP affects, including information necessary for compliance with the Natural Community Conservation Planning Act (NCCPA).
- Section 5.7, *Effects on Covered Species,* describes the effects of covered activities on each covered species, including information necessary for compliance with the NCCPA and the federal Endangered Species Act (FESA).
- Section 5.8, *Cumulative Effects*, is an analysis of cumulative effects as defined under Section 7 of FESA. This analysis is not a requirement for an HCP or NCCP, but is intended to assist the U.S. Fish and Wildlife Service (USFWS) in their mandatory cumulative effects analysis consistent with FESA, Section 7. As described in this section, the definition of cumulative effects under Section 7 of FESA is narrower than that for the National Environmental Policy Act (NEPA) or the California Environmental Quality Act (CESA). The environmental impact statement/environmental impact report (EIS/EIR) prepared for the Yolo HCP/NCCP presents a more thorough analysis of the cumulative effects of all projects (Yolo Habitat Conservancy 2017).
- Section 5.9, *Critical Habitat,* is an analysis of the effects on critical habitat that has been formally designated by USFWS. This analysis is not a requirement for an HCP or NCCP, but is intended to assist the USFWS in their mandatory critical habitat analysis consistent with FESA, Section 7. The only covered species with designated critical habitat in the Plan Area is California tiger salamander. Although the USFWS recently formally designated critical habitat for the western yellow-billed cuckoo, the Plan Area does not contain any designated critical habitat for this species.

Figure 5-1. Covered Activities Footprints



5.2 Regulatory Context

This effects analysis is intended to meet applicable legal and regulatory requirements under the NCCPA and the FESA, as described below. This analysis includes mandatory elements of an HCP and an NCCP, and information necessary for the USFWS and California Department of Fish and Wildlife (CDFW) to make their necessary findings for issuance of permits.

Sections of the NCCPA that are relevant to the effects analysis are as follows.

- Section 2820(a)(6) requires that NCCP conservation measures be based upon the best available information regarding the impacts of permitted activities on covered species.
- Section 2820(b)(9) requires that an NCCP include provisions to ensure that implementation of the mitigation and conservation measures is roughly proportional in time and extent to the impact on habitat or covered species authorized under the plan.
- Sections 2820(f)(1)(B) and (C) state that CDFW's determination of the level of assurances for plan participants shall consider, among other factors, the use of the best available science and adequacy of the analysis of the impact of take on covered species.

Sections of FESA relevant to this effects analysis are as follows.

- Section 10(a)(2)(B)(i) requires that an HCP specify the impacts on covered species that will likely result from the taking.
- Section 10(a)(2)(B)(ii) and (iv) state that the USFWS may only issue an incidental take permit if, among other requirements, the applicant will minimize and mitigate impacts to the maximum extent practicable, and the taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.

As described in Chapter 1, Section 1.4.1.1.1, *Section* 7, the USFWS will need to consult internally to comply with Section 7 of FESA prior to issuance of permits. As a component of this internal consultation, the USFWS must prepare a written biological opinion describing how the agency's action will affect the listed species and its critical habitat. The USFWS' HCP handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service 2016) recommends that an HCP include the information necessary for USFWS to complete the internal consultation process under Section 7 of FESA. Section 7 information requirements relevant to the effects analysis are as follows (51 *Federal Register* [FR] 106).

- Section 4012.14(c)(4) requires a description of the manner in which an action may affect any listed species or critical habitat.
- Section 402.202 defines *effects of the action* as the direct and indirect effects of an action on the species or critical habitat, together with the cumulative effects of other activities that are interrelated and interdependent with the action. The definitions of these types of effects are presented in the next section.

5.3 Terminology

The following terminology is applied for the purpose of this effects analysis.

Effect/affect. The term *effect* refers to a change that is the result of a covered activity. This analysis focuses on effects that change the condition of a natural community, a covered species, or its habitat. Effects can be either adverse or beneficial. The verb *affect* is used to mean "to have an effect on."

Impact. The term *impact* is only used when collectively assessing the effects of all take from covered activities on the species as a whole. Impacts are described in Section 5.7, *Effects on Covered Species*, in the sections for each species titled, *Impact of Take on the Species*.

Temporary loss versus permanent loss. For the purpose of this analysis, *temporary loss* is defined as the alteration of land cover for less than one year that allows the disturbed area to recover to pre-project or ecologically improved conditions within one year (e.g., prescribed burning, construction staging areas) of completing construction. *Ecologically improved* means that the site's ability to provide ecological functions is improved compared to its condition prior to disturbance caused by a covered activity or project. Any natural community or species habitat loss associated with a covered activity that has a duration exceeding one year, or that has a duration of less than one year but takes more than one year to recover immediately following construction, is considered a *permanent loss* for the purpose of this analysis.

Direct versus indirect effects. *Direct effects* are defined as those that occur at the same time and place as the action; *indirect effects*[2] are defined as those that occur later in time or farther removed in distance. This analysis considers all effects caused by the action—both direct and indirect—for each effect category.

Take limit versus take maximum allowable loss. The term *take limit* refers to the maximum take allowed for covered species under the HCP/NCCP. For the purpose of this plan, take is quantified in terms of loss of species habitat. Since the term *take* does not apply to natural communities, the maximum acreage of natural communities authorized for removal under the HCP/NCCP is referred to as *maximum allowable loss*.

Cumulative effect. *Cumulative effects* are defined, per the implementing regulations for Section 7 of FESA (50 Code of Federal Regulations [CFR] 402.02), as "the effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation." This definition applies only to Section 7 analyses and should not be confused with the broader use of this term in NEPA or other environmental laws.

[2] Implementing regulations under Section 7 of FESA (50 CFR 402.202) define indirect effects as those that are caused by the action *and are later in time.* Federal Council on Environmental Quality regulations (50 CFR Section 1508.8) and California Environmental Quality Act (CEQA) guidelines (Section 15358) define indirect effects as those caused by an action that are later in time *or farther removed in distance*. The second definition of indirect effects includes noise and lighting effects beyond the project boundary that occur during project implementation (such impacts would be treated as direct effects under the definition under FESA Section 7 regulations). For consistency with the EIS/EIR for this HCP/NCCP, the Yolo HCP/NCCP adopts the CEQA guidelines' definition for indirect effects.

5.4 Effect Mechanisms

Chapter 3, *Covered Activities*, describes a wide range of ongoing activities and projects that will be covered by the Yolo HCP/NCCP and permits. These projects and activities have many similarities in terms of their effects on the covered species. These similarities of effects are grouped into three categories of *effect mechanisms*.

- Permanent or temporary removal of natural communities or covered species habitat, and the fragmentation that results from this removal.
- Reduction in function due to natural community degradation or loss of habitat suitability as a result of adjacent covered activities.
- Effects that could result in the injury or killing of covered species individuals, or significant disruption of behavioral patterns, that likely results in injury of individuals (i.e., harm).

Effect mechanisms are categorized in this manner to facilitate a meaningful assessment of the impact of these effects on each of the covered species (Section 5.7, *Effects on Covered Species*).

Each section below describes effect mechanisms related to each of the five main covered activity categories described in Chapter 3, *Covered Activities.* Unlike Chapter 3, which provides details on the activities themselves, this section provides a description of how these groups of covered activities affect natural communities and habitat for covered species. Each of the categories of effect mechanisms is described below. Specific effects on each natural community and covered species are described in Section 5.6, *Effects on Natural Communities,* and Section 5.7, *Effects on Covered Species,* respectively.

5.4.1 Loss and Fragmentation of Natural Communities and Covered Species Habitats

Covered activities will result in the removal of natural community and covered species habitat acreage within the footprint of the activity. Figure 5-1, *Covered Activities Footprints,* shows the locations where development will occur in the Plan Area. The mechanisms through which the covered activities are expected to affect natural communities and covered species are described below by covered activity category. Effects related to the neighboring landowner protection program category are described in Section 5.4.4, *Neighboring Landowner Protection Program.*

5.4.1.1 Urban Projects and Activities

Urban projects and activities, described in Chapter 3, Section 3.5.1, *Urban Projects and Activities*, include all covered development activities within the urban planning units (planning units 19–22: Figure 1-2, *Planning Units*). Urban development will result in loss of an estimated 5,935 acres of natural communities and another 2,899 acres of other land cover types (Table 5-3, *Loss of Natural Communities and Other Land Cover Types:* planning units 19–22). Figure 3-2, *General Plan Build Out within Plan Area,* shows where urban development will occur in the incorporated cities.

The primary effect mechanism of development projects in the urban planning units is conversion of natural communities and covered species habitats to developed land. Development activities that involve construction of structures or placement of impermeable surfaces result in permanent natural community and habitat loss. This analysis assumes that, with the exception of avoidance of

sensitive natural communities, all covered development activities in the urban planning units result in permanent loss of natural communities and species habitat. This assumption likely overstates the actual loss of natural community and species habitat, because some covered development activities will result in only temporary loss of natural communities and covered species habitats (as defined in Section 5.3, *Terminology*) through vegetation clearance for staging and temporary access roads during construction activities.

Loss of natural communities and covered species habitats could result in fragmentation of the remaining lands. Fragmentation effects would be minimal, however, because urban development is limited to contiguous areas within the urban planning units.

5.4.1.2 Rural Projects and Activities

This section examines effects associated with rural projects and activities including general rural development; rural public services, infrastructure, and utilities; and agricultural economic development and open space.

Covered rural projects and activities, described in Chapter 3, Section 3.5.2, *Rural Projects and Activities*, include a number of activities within the rural planning units (planning units 1–18: Figure 1-2, *Planning Units*): general rural development, rural public services, infrastructure, and utilities; and agricultural economic development and open space. This will result in loss of an estimated 5,706 acres of natural communities (Table 5-3, *Loss of Natural Communities and Other Land Cover Types:* planning units 1–18). The locations for these activities are shown in Figure 3-2, *General Plan Build Out within Plan Area*; Figure 3-4, *Planned Public Services, Infrastructure, and Utilities*; Figure 3-5, *Planned Aggregate Mining*; and Figure 3-6, *Publicly Owned Land.*

The effects mechanisms related to development activities in the rural planning units are similar to those described in Section 5.4.1.1, *Urban Projects and Activities*. In general, losses in the rural planning units will consist of smaller acreages distributed within a larger area than in the urban planning units. Yolo County strictly regulates land divisions in rural areas. Minimum lot sizes in agricultural areas ranges from 40 to 320 acres, and the County General Plan prohibits the division of agricultural land for non-agricultural uses. The conversion of agricultural land for non-agricultural uses is strongly regulated. Where agricultural land is planned for conversion, 1:1 mitigation is required under pre-HCP/NCCP conditions. Residential subdivisions are prohibited as are any land use activities incompatible with agriculture.

5.4.1.3 Public and Private Operations and Maintenance

Covered operations and maintenance activities are described in Chapter 3, Section 3.5.3, *Public and Private Operations and Maintenance.* Table 3-2, *Operations and Maintenance, Methods and Assumptions*, describes the methods and assumptions used to estimate acres of effect from operations and maintenance activities. An estimated 506 acres of land cover would be permanently affected by operations and maintenance activities (Table 3-2, *Spatially Undefined Activities, Methods and Assumptions*).

Operations and maintenance activities could result in natural community or covered species habitat loss. Instream activities may require vegetation removal to access project sites (e.g., to reach a gage or bank stabilization site) or for sediment removal. Maintenance of facilities such as buildings and trails in recreation areas also often requires vegetation removal to allow for safe access to facilities. In addition, vegetation removal along road shoulders and utility rights-of-way will likely be needed

to ensure safe road conditions and to provide for the maintenance of utility lines. Maintenance also will involve removing or reducing vegetation to prevent overgrowth and for fire prevention and management.

Effects of operations and maintenance activities could be either permanent or temporary, as many activities involve ongoing, repeated disturbance, while others involve limited disturbance of short duration that is not frequently repeated. For the purpose of the Yolo HCP/NCCP, only those operations and maintenance activities for which vegetation is restored to its prior or better condition within one year of disturbance are considered to result in temporary effects. The effects of operations and maintenance activities are expected to be low because each event is expected to involve small patches of land cover disturbance of short duration (less than one year), and because project proponents will implement *AMM3, Confine and Delineate Work Area; AMM8, Avoid and Minimize Effects of Construction Staging Areas and Temporary Work Areas;* and species-specific avoidance and minimization measures to minimize effects (Chapter 4, Section 4.3.2, *General Construction and Operations and Maintenance* and Section 4.3.4, *Covered Species*).

5.4.1.4 Conservation Strategy Implementation

Most covered conservation activities are not expected to result in loss or fragmentation of natural communities or covered species habitat. Restoration activities, however, will involve conversion of cultivated lands or grassland to riparian, pond, or emergent wetland land cover types, resulting in loss of these natural communities and of habitat for covered species relying on cultivated lands and grassland.

Recreation or management facilities built and maintained within the reserve system could result in a small amount of habitat removal. These facilities will be sited and built to avoid or minimize their effects on covered species, but a small amount of loss may nevertheless occur.

5.4.2 Reduction in Function of Natural Communities and Covered Species Habitats

In addition to removal of natural community and covered species habitat acreage within the footprint of an activity, as described above, many of the covered activities would result in the reduction in function of surrounding natural communities and covered species habitats. These effects could be temporary, during construction, or include indirect effects that persist after the activity is completed. The mechanisms through which these effects would occur are described below by covered activity category. Effects related to the neighboring landowner protection program category are described in Section 5.4.4, *Neighboring Landowner Protection Program.*

5.4.2.1 Urban Projects and Activities

The following effect mechanisms would reduce the function of natural communities and covered species habitats surrounding urban development areas. These effects are limited to the urban interface with natural communities and covered species habitats, which the Yolo Habitat Conservancy (Conservancy) expects will be minimal in urban areas.

Noise, vibrations, and lighting. Urban development activities will involve use of equipment that would temporarily affect wildlife in surrounding areas during construction. Noise and vibrations could render surrounding habitat less suitable for some covered species during construction.

Temporary noise and vibrations during construction could result in temporary abandonment or reduction in use of habitat by covered species in the surrounding affected areas. Sporadic and unpredictable noise events (such as those resulting from construction activities) could be perceived as a threat, causing wildlife to startle and flee affected areas. Urban development will also result in ongoing noise associated with residences and businesses. Continuous noise within the hearing range of wildlife species could interfere with their ability to detect and/or discriminate between important sounds, such as warning or mating calls (Francis and Barber 2013; Dooling and Popper 2007).

Both short- and long-term light exposure could affect wildlife. Short-term exposure to bright lights could temporarily reduce visual capacity in some species, making them vulnerable to predation. Longer-term night lighting could disorient wildlife, alter foraging and reproductive behaviors, increase predation risk, and inhibit movement to and from breeding areas by stimulating light-seeking behavior (Longcore and Rich 2004). The incorporation of urban-habitat interface elements into project design will minimize these effects (Chapter 4, Section 4.3.1, *General Project Design*; *AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interfaces*). In addition, directing construction lighting into project sites and limiting the lighting of natural areas adjacent to construction areas will minimize lighting effects during construction activities (Chapter 4, Section 4.3.2, *General Construction and Operations and Maintenance; AMM7, Control Night-Time Lighting of Project Construction Sites*).

Increased activity of humans and pets. Urban development will directly result in increased human activity associated with human occupancy of developed areas adjacent to natural communities and covered species habitats. Human activities associated with occupancy and use of new developments will result in increased ambient noise levels (e.g., traffic noise, residential development activities) and human activity (e.g., increased traffic, increased intrusion of humans into adjacent habitat areas, night lighting of habitat areas emanating from adjacent structures). These increases in activities are expected to cause covered species to reduce their use of habitat adjacent to new developments, or abandon these areas altogether. Increased numbers of cats and dogs in the vicinity of new development could increase levels of predation on native species and their prey as well as alter foraging and reproductive behaviors. Increased levels of human access into adjacent habitat areas also increase the risk for wildfire that could result in temporary periodic removal of vegetation that supports habitat for covered and other native species.

Invasive species. Removal of native vegetation during construction will increase the opportunities for nonnative, invasive plant species to become established and spread into covered species habitat. These invasive plants compete with native species for space, water, and nutrients, and often displace native species. Covered development activities could also result in ongoing, indirect effects of the spread of invasive species. In extreme cases, spread of invasive species can result in the loss of natural community or covered species habitat acreage, rather than just a reduction in function.

In addition, nonnative aquatic wildlife is known to adversely affect native amphibian populations. Bullfrogs prey upon and compete with California tiger salamanders, for example, and aquarium species released in the wild could introduce new diseases to wild amphibian populations. Ornamental plants and native cultivars could spread to adjacent habitat areas and outcompete and displace native species; they could also hybridize (interbreed) with local native plants, thereby disrupting the genetics of the native population. Such hybridization could cause a number of problems for native plant populations, including poor growth and reproduction.

Runoff, altered hydrology, erosion, and sedimentation. Urban development activities, including construction of structures, roads, and other paved areas, will increase the extent of impermeable surfaces, which could alter local surface runoff patterns (i.e., timing and amount of runoff) that support native vegetation (e.g., wetland and riparian vegetation) and wildlife. Increases in the amount of runoff, especially during storm events, could result in greater levels of scour and/or incision of local creeks, increased sediment loads, alteration of downstream hydrology, and decreased groundwater recharge. Decreased groundwater recharge could result in degradation of riparian and wetland natural communities due to water loss. High runoff temperature would also result in an increase in instream water temperatures when runoff enters local streams affecting habitat conditions for covered and other native aquatic organisms.

In-channel operation of equipment to construct and replace bridges and install and repair flood control and water conservation structures will mobilize sediment from stream beds and banks, causing increased turbidity that would temporarily affect habitat conditions for native aquatic organisms. Construction of in-channel flood control and water conservation structures would have similar effects.

Occupancy of new developments will likely increase the amount of pollutants such as grease, oil, detergents, and lawn pesticides that could be transported from residences during wet weather. Traffic along new roads and higher traffic volumes on widened roads will also increase the amount of petroleum-based pollutants (e.g., oil) that will be transported from road surfaces during wet weather. An increase in the quantity of pollutants reaching local streams through increased runoff could affect the biological and physical characteristics of native aquatic organisms and their habitats.

5.4.2.2 Rural Projects and Activities

This section examines effects associated with rural projects and activities; rural public services, infrastructure, and utilities; and agricultural economic development and open space.

The effect mechanisms that could reduce the function of natural communities and covered species habitat surrounding development in the rural planning units are similar to those described above for urban development. Effect mechanisms that are expected to be substantially different in rural areas than in urban areas are described below.

Planned improvements to roads will result in temporary construction noise and ongoing noise and roadway lighting effects. Noise associated with traffic on new or expanded roads could reduce the use of habitat by covered species in adjacent habitat. Many bird species avoid roadways in proportion to the traffic noise and volume, for reasons such as interference of roadway noise with their ability to communicate (Federal Highway Administration 2004). Aversion to movement through these habitat areas can result in a reduction in genetic flow within and among populations of covered species (Shilling 2013).

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

Rural development tends to result in an increase in generalist wildlife species commonly found in urban areas (e.g., opossum, skunk, coyote, American crow), and a decrease in specialized or human-sensitive species (Glennon and Kretser 2005; Lenth et al. 2006). Such trends decrease the health of natural communities and could result in harm of covered species. Cumulatively, these rural development projects fragment the landscape and make it more likely that wildlife populations will become segmented and isolated.

Within the Plan Area, water quality effects may arise from horses or other livestock that are kept close to streams. Similarly, new agricultural commercial and industrial facilities, such as commercial stables, equestrian event facilities, feedlots, dairies, poultry projects, and wineries, may produce waste that is rich in nutrients or other potential pollutants. In addition, exposed soils common to equestrian or livestock enclosures are potential sources of erosion and sediment input to streams. Existing Yolo County ordinances, as well as National Pollutant Discharge Elimination System (NPDES) permits overseen by the Regional Water Quality Control Boards (Regional Boards), require many avoidance and minimization measures targeted at protecting water quality in local streams.

5.4.2.3 Public and Private Operations and Maintenance

Equipment used for operations and maintenance activities will generate noise, vibrations and soil compaction. If conducted at night, such activities will result in lighting effects. Noise, vibrations, and lighting could affect natural communities and covered species habitat in adjacent areas as described above for urban development. For operations and maintenance, these effects will be temporary, short in duration, and small in area.

Equipment used during operations and maintenance could carry seeds of invasive species and spread them into new areas. Clearing of land for operations and maintenance activities would increase the opportunities for nonnative, invasive plant species to become established. The potential effects of invasive plant species on natural communities and covered species habitat are as described above for urban development.

Operations and maintenance activities could result in erosion and sedimentation effects as described above for urban development. Erosion and sedimentation associated with maintenance-related disturbance of soils (e.g., grading, resurfacing) could result in temporary reduced function of receiving waters and land surfaces as habitat for covered species (e.g., increased turbidity, reduced dissolved oxygen, silting over vegetation). Project proponents, however, will comply with stormwater management plans that regulate development as part of compliance with regulations under NPDES permit requirements. Covered activities that result in any fill of waters or wetlands will also comply with requirements under Section 404 of the Clean Water Act and State Water Quality Control Board (State Board) and Regional Board regulations.

Removal of woody and other debris from channels or irrigation canals could alter in-channel aquatic habitat structure and hydrodynamics affecting cover for native aquatic organisms, and basking and foraging habitat available for reptile species (e.g., western pond turtle, giant garter snake).

5.4.2.4 Conservation Strategy Implementation

Conservation actions (i.e., restoration, enhancement, and management of the reserve system) are expected to have a net benefit on all covered species; nevertheless, some conservation actions may have temporary or limited permanent adverse effects on covered species. In other cases, activities that are designed to benefit one or more covered species may harm another set of covered species.

The reserve system, however, is designed to be large and diverse enough to ensure that the net effect of all conservation actions is beneficial to all covered species across the system.

Conservation actions could involve use of equipment that generates temporary noise, vibrations, and soil compaction resulting in similar indirect effects as described for urban development. Equipment used during conservation actions could carry seeds of invasive species and spread them into new areas of the reserve system.

Management of some reserve system lands may require establishment and maintenance of new firebreaks. Maintenance of firebreaks (i.e., mowing and disking) is primarily expected to retain the existing land cover (e.g., grassland); however, disking of firebreaks during the dry season could alter vegetation structure. While this would not eliminate natural communities and covered species habitats, it could reduce their function. Land that is regularly disked will not count toward the acre commitment for western burrowing owl and California tiger salamander habitat.

Some habitat enhancement activities may temporarily and adversely affect wildlife habitat. Periodic dredging of ponds to maintain pond capacity and habitat quality may have temporary adverse effects on pond species. The cleared bank conditions that precede establishment of native riparian plants can also trigger rapid establishment of weedy or undesirable aggressive species if these species are not controlled at the site.

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

The Permittees are covered for incidental take of covered species resulting from public use within the permit area, inside or outside of the reserve system, provided that usage is consistent with park management plans and the guidelines of the Yolo HCP/NCCP. Although the permits do not cover incidental take for private individuals, recreational activities allowed on reserves are expected to have some minor effects on covered species. Since wildlife is most active at dawn and dusk or at night, disruptions of wildlife movement are not anticipated to be significant. Trails can fragment otherwise intact landscapes and can also facilitate predator movements and invasion by nonnative animals (e.g., feral cats, dogs, pigs). Trails are also often a source of invasion by nonnative plant species that are transported into the reserve by trail users. As described in Chapter 6, *Conservation Strategy*, recreational uses will be limited to low-intensity activities such as hiking, wildlife observation, horseback-riding and non-motorized bicycling on established, managed trails. Any new trails will be carefully sited and maintained to minimize the disturbance of habitat and wildlife and to avoid disturbance of cultural and archaeological resources within reserves.

In addition to the conservation actions described above, it will also be necessary for the Conservancy to install or replace infrastructure in the reserve system—including signage, fences and gates, field facilities, dirt roads, paved roads, vehicle bridges, and culverts—to ensure that required management and monitoring activities can be conducted. These activities would have effects similar to other covered activities. Temporary construction effects are likely as well. All facilities within the reserve system will be sited on already disturbed areas to the extent possible and in areas that minimize effects on covered species. All activities will comply with the conditions on covered activities (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*).

5.4.3 Harassment, Injury, or Mortality of Individuals

5.4.3.1 Urban Projects and Activities

The operation of equipment and vehicles during construction of urban development projects could result in the injury or mortality of covered species that cannot avoid operating equipment (e.g., crushing or striking of individuals, destruction of nests with eggs or nestlings). These activities also could result in harassment of individuals, particularly bird species, causing them to abandon nests.

New development is expected to result in increased densities of off-leash pets, primarily cats and dogs, in surrounding natural community areas. These pets are expected to cause increased predation (e.g., cats preying on small mammals and nesting birds) and harassment of native wildlife (e.g., dogs chasing wildlife).

Accidental introduction of contaminants in project construction sites associated with construction-related activities (e.g., fuel spills) could result in mortality or inhibit normal behaviors of covered and other native wildlife species that come into contact with these contaminants. The introduction of contaminants associated with maintenance-related activities (e.g., fuel spills) would have similar effects.

Urban development could result in ongoing, indirect effects related to harassment, injury, or mortality of wildlife individuals. New or increased traffic associated with new developments or road construction and improvement adjacent to wildlife habitat areas increases the risk for vehicle-wildlife collisions (e.g., crushing of small mammals, reptiles, and amphibians present on road surfaces; flying birds being hit by moving vehicles).

5.4.3.2 Rural Projects and Activities

Rural development is expected to result in the same types of effects related to species harassment, injury, or mortality as described above for urban development. These effects are expected to be greater in the rural planning units, however, due to the higher likelihood of covered species presence near rural development.

Aggregate material excavation could result in direct mortality if covered species become trapped in excavated areas. Excavation of trenches to install underground utilities (e.g., sewage mains, natural gas pipelines, telecommunications lines) could also cut or trap wildlife species, which could result in injury or mortality of individuals that are unable to escape (e.g., predation, starvation, hypothermia).

5.4.3.3 Public and Private Operations and Maintenance

The use of equipment and vehicles during operations and maintenance activities could result in the injury or mortality of covered species as described above for urban development. During channel maintenance, placement of material dredged from channels along or on channel embankments could bury covered and other native wildlife that are present and cannot avoid operating equipment (e.g., reptiles, amphibians, wildlife in burrows in embankments where dredge material is placed). Trenching activity could injure species occurring in the channel, and vegetation removal could result in habitat loss. Juvenile mammals and ground-nesting birds could be disturbed or injured by mowing equipment during operations and maintenance activities, or rodent burrows used by covered species could be buried by disking of fire breaks. In addition, tree removal could destroy or injure eggs or nestling birds.

5.4.3.4 Conservation Strategy Implementation

Some habitat enhancement activities could result in harassment of covered species. For example, planting emergent vegetation in aquatic California tiger salamander habitat could temporarily disturb amphibians occupying the pond. Tractors and other farming equipment could disturb or injure covered species on cultivated lands in the reserve system.

Monitoring and research activities required by the Yolo HCP/NCCP (Chapter 6, Section 6.5, *Monitoring and Adaptive Management*) could also disturb wildlife. For example, to determine the presence of some covered species (e.g., California tiger salamander larvae), individuals may need to be handled by a qualified biologist. Such handling constitutes harassment—a form of take—under FESA and requires authorization. Translocation activities, which must be coordinated with and approved by CDFW and USFWS, could also cause take through injury or loss of individuals due to capture, handling, transportation, release, and/or the inability of the individual to find new shelter.

5.4.4 Neighboring Landowner Protection Program

The conservation strategy aims to increase populations of covered species through habitat protection, restoration, and enhancement. Certain covered species may disperse from the reserve system, in response to this active management, onto neighboring private lands that are not part of the reserve system. The Yolo HCP/NCCP includes a neighboring landowner protection program to protect landowners in the Plan Area near reserves on agricultural lands from the regulatory consequences of covered species dispersal.

The neighboring landowner protection program only applies to normal agricultural practices described in Appendix M, *Yolo Agricultural Practices.* The neighboring landowner protection program also only provides coverage for species that disperse onto lands after the creation of the neighboring reserve (i.e., only for take authorization above baseline levels on the neighboring land as determined by surveys). Take granted through the neighboring landowner protection program could slightly reduce the beneficial effects of the conservation strategy due to take of individuals that disperse off the reserve lands. There would be no additional take of covered species habitat (or natural communities) as a result of the neighboring landowner protection program. The neighboring landowner protection program is described in detail in Chapter 7, Section 7.7.7.1, *Neighboring Landowner Protection Program*.

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

- Covered species that are expected to increase in numbers on the reserves.
- Covered species that are likely to spread from the reserve system onto neighboring lands as their populations increase.
- Covered species for which there is a reasonable likelihood of take from routine, ongoing agricultural activities that would occur on the neighboring lands.

Based on the criteria above, only four of the 12 covered species have the potential to disperse onto adjacent properties and result in take: valley elderberry longhorn beetle, giant garter snake, California tiger salamander, and western pond turtle. Take coverage is therefore only available through this program for these four covered species.

Participation in this program is voluntary. Interested landowners wanting coverage must sign an opt-in agreement with the Conservancy. Owners of private lands that are actively used for agricultural purposes (e.g., crop production) adjacent to reserve system lands will receive take coverage for one or more of these four species under the Yolo HCP/NCCP if they opt in to this program. Take coverage by species is based on the neighboring land's distance from the nearest reserve land. A radius was set for each species over which the program applies based on the species' typical dispersal distance. Although these species are capable of dispersing further than these distances, each radius accounts for the most likely area of effect.

- Valley elderberry longhorn beetle = 0.25 mile.
- Giant garter snake and western pond turtle = 0.5 mile.
- California tiger salamander = 1.0 mile.

Coverage will be provided to agricultural operations only for take beyond the baseline condition that existed prior to the establishment of the neighboring reserves. Furthermore, this coverage will be limited only to ongoing and routine agricultural activities on lands enrolled in the neighboring landowner protection program. Ongoing and routine activities would include normal farming practices. Coverage under the neighboring landowner protection program expires when the Permits expire. See Chapter 7, Section 7.7.7.1, *Neighboring Landowner Protection Program*, for additional details of this program, including the process for landowner notification, request for coverage, and extension of take coverage. The neighboring landowner protection program does not transfer if the property is sold (Section 7.7.7.1, *Neighboring Landowner Protection Program*).

Based on the landowner participation in other counties with approved HCPs and NCCPs (e.g., San Joaquin County, East Contra Costa County, Santa Clara Valley) that have similar programs, it is assumed that up to three percent of eligible lands will enter into neighboring land agreements, for a total of no more than 2,347 acres. Of this, it is assumed that most of the potential effects will occur on land cover types that support farming (agricultural and grassland land cover types), which are used by California tiger salamander and western pond turtle for non-breeding, secondary foraging, or dispersal habitat, and not as breeding or primary habitat. The habitat for the valley elderberry longhorn beetle and western pond turtle on cultivated lands is typically of low value (and non-breeding), so the magnitude of impacts is expected to be low or very low. Giant garter snakes may use wetlands, rice lands, and irrigation channels adjacent to reserves for foraging, cover, or dispersal. Although rice lands and irrigation ditches can provide high-value habitat for the giant garter snake, ongoing agricultural practices are not expected to adversely affect populations of this species, as giant garter snakes commonly persist in cultivated landscapes, particularly rice lands.

Adverse effects from allowable agricultural activities on giant garter snake, and western pond turtle could result from rodent control (rodenticide use is not a covered activity in the Yolo HCP/NCCP), active farming practices, vehicle and machinery travel, runoff from fields, or disturbance to adjacent streams or wetlands.

The amount of take to be authorized for giant garter snake, western pond turtle, California tiger salamander, and valley elderberry longhorn beetle through this program includes up to all individuals (or elderberry shrubs, in the case of valley elderberry longhorn beetle) that are above baseline conditions within no more than 2,347 acres enrolled in the neighboring landowner protection program. The amount of take to be authorized for giant garter snake individuals are those above baseline up to the take total included for all covered activities as listed in Table 5-2(b).

5.5 Effects Analysis Approach and Methods

This section describes the organization and approach of the effects analysis for each natural community (Section 5.6, *Effects on Natural Communities*) and covered species (Section 5.7, *Effects on Covered Species*). It also describes the quantitative and qualitative methods for assessing effects.

The effects analysis for each natural community (Section 5.6, *Effects on Natural Communities*) and covered species (Section 5.7, *Effects on Covered Species*) begins with a summary of the geographic information system (GIS) model used to assess effects, and a summary of the distribution of modeled natural community or covered species habitat in the Plan Area. For covered species, each species section also summarizes the known distribution of the species in the Plan Area. This information is intended to provide the reader with context for the evaluation of effects of the covered activities on natural communities and covered species.

Each effects analysis includes an assessment of the adverse effects of covered activities, the beneficial effects of the conservation strategy, and the net effects of the Yolo HCP/NCCP on each natural community and covered species. The covered species analyses (Section 5.7, *Effects on Covered Species*) are more rigorous than the analyses for natural communities, to meet incidental take issuance criteria under FESA and the NCCPA. Section 5.6, *Effects on Natural Communities*, includes a section that describes effects common among natural communities (Section 5.6.1, *Effects of Covered Activities Common to All Natural Communities*), and the subsequent analyses refer back to this section as appropriate for each natural community. The approach used for each of the three categories of effects (adverse, beneficial, and net effects) is described below.

5.5.1 Adverse Effects

Adverse effects include any effects of the covered activities that reduce the amount or quality of a natural community or covered species habitat. For covered species, adverse effects may reduce the number, range, reproductive success, or survival of the covered species. Adverse effects may also affect species behavior in ways that adversely affect reproduction or survival. The approaches to evaluating adverse effects are described for each natural community or covered species in terms of the following:

- Loss and fragmentation of natural community or covered species habitat (for maximum acres of loss, see Table 5-1, *Maximum Allowable Permanent Loss, Natural Communities*).
- Reduction in function of natural community or covered species habitat (for maximum acres of loss, equivalent to take, see Tables 5-2[a], *Habitat-Based Take Limits, Covered Species* and 5-2[b], *Forms of Take and Take Limits, Covered Species*).
- Harassment, injury, or mortality of covered species (Table 5-2[b], *Forms of Take and Take Limits, Covered Species*).
- Impact of take on covered species.

5.5.1.1 Loss and Fragmentation of Natural Community or Covered Species Habitat

Maximum allowable natural community or covered species habitat loss is expressed as an amount (acres) and as a percentage of the total in the Plan Area. This percentage is relevant because most of the Plan Area is expected to remain undeveloped, and only a small percentage of the total land in the

Plan Area will be affected by covered activities. The analysis quantifies both permanent and temporary loss, but assumes that most loss is permanent, with only a very small acreage of loss associated with bridge replacements considered temporary.

This section also describes the locations of substantial spatially defined acreage losses in relation to important habitat areas (e.g., if habitat loss is expected to occur in known population centers for the species). To estimate natural community and covered species habitat loss resulting from covered activities over the course of the permit term, it was first necessary to identify the baseline conditions on which the effects are assumed to occur (i.e., the anticipated composition and distribution of land cover at the time of Yolo HCP/NCCP implementation). Establishing a baseline helps to ensure that the estimated amount of permanent loss is appropriately scaled (i.e., to ensure effects are not under- or overestimated). The baseline for natural communities was established through the land cover mapping described in Chapter 2, *Existing Ecological Conditions*. Covered species habitat models (described in Appendix A, *Covered Species Accounts*) use the same land cover mapping, so the same baseline is used for covered species habitat.

5.5.1.1.1 Spatially Defined Covered Activities

The areal extent of loss for each natural community and covered species habitat type was assessed for both spatially defined and spatially undefined covered activities. *Spatially defined* covered activities are those for which the GIS data developed for this HCP/NCCP spatially depicts the activities' locations. The direct effects of spatially defined covered activities were estimated by overlapping the GIS data for covered activities footprints (Figure 5-1, *Covered Activities Footprints*) over GIS baseline data (layers of geographic data for each of the natural communities and covered species habitat models) (Section 2.6.3, *Covered Species Habitat Models*, and Appendix A describe how habitat models were developed). Approximately 91 percent of all natural community and covered species habitat loss was based on the analysis of spatially defined covered activities. All covered activities except operations and maintenance were spatially defined. The intersection between the covered activities layer and the natural community or covered species habitat model layer provided the estimated maximum allowable permanent loss of 12,649 acres and temporary loss of 66 acres (Table 5-1). Table 3-1, *Spatially Defined Urban and Rural Development, Methods and Assumptions,* describes how existing information was used to develop the covered activities layer of 17,551 acres.. The covered activities layer overlaps with all land cover types, including land cover types that make up natural communities and covered species habitat, and land cover types such as orchards and vineyards that do not make up natural communities or covered species habitat models.

Table 5-1. Maximum Allowable Loss, Natural Communities

Natural Community	Existing Acreage	Maximum Allowable Loss (Permanent)	Maximum Allowable Loss (Temporary)	Percent Lost[a]
Rice	35,724	87	0	less than 1%
Cultivated Lands (non-rice)	214,939	9,910	203	less than 1%
Grassland	80,911	1,734	28	2%
Serpentine	247	0	0	0%
Chamise Chaparral	30,187	0	0	0%
Mixed Chaparral	14,518	0	0	0%
Oak and Foothill Pine	43,772	0	0	0%
Blue Oak Woodland	35,891	3	0	less than 1%

Natural Community	Existing Acreage	Maximum Allowable Loss (Permanent)	Maximum Allowable Loss (Temporary)	Percent Lost[a]
Closed-Cone Pine-Cypress	212	0	0	0%
Montane Hardwood	3,087	0	0	0%
Valley Oak Woodland	181	0	0	0%
Alkali Prairie	312	4	0	1%
Vernal pool complex[b]	299	0	0	0%
Fresh Emergent Wetland	26,309	88	0	less than 1%
Valley Foothill Riparian	12,565	588	0	4%
Lacustrine and Riverine	13,493	236	31	2%
TOTAL NATURAL COMMUNITIES	**512,646**	**12,649**	**266**	**2%**

Note

[a] Rounded to nearest percent.

[b] This includes depressional seasonal wetlands that potentially support federally listed vernal pool crustaceans.

The Conservancy excluded from the covered activities layer projects known to have required discretionary approvals for development but not yet constructed. These activities are expected to develop prior to approval of the Yolo HCP/NCCP, would have no additional discretionary approvals, and therefore would not be subject to the requirements of this HCP/NCCP unless they seek coverage as a SPE.[3] Assumptions used to define the covered activities layer are made only to estimate an accurate overall level of take proposed for coverage under this HCP/NCCP; these assumptions will not influence the amount of take authorization provided to each covered activity. During implementation, it is expected that some activities will have more loss of natural communities or loss of covered species habitat (i.e., take or loss authorized) than what is assumed in this effects analysis, while others will have less. The total limits of natural community loss or covered species take allocated to the HCP/NCCP as a whole, however, cannot be exceeded. The GIS intersection of the covered activities layer with natural communities or modeled species habitat layers assumed the maximum loss without the application of any avoidance or minimization measures. The covered activities layer included both permanent and temporary effect categories.

Effects on special habitat features within covered species habitat were also assessed. Swainson's hawk nest trees and ponds providing habitat for California tiger salamander were also assessed by overlapping GIS data for nest trees and ponds with the covered activities GIS layer.

5.5.1.1.2 Spatially Undefined Covered Activities

Spatially undefined activities are those activities for which specific locations are unknown. Spatially undefined activities included operations and maintenance for roadways, levee operations and maintenance, reclamation district operations and maintenance, Cache Creek Resources Management Plan implementation, and other conservation strategy implementation. Footprint effects from these activities were estimated based on the assumptions provided in Table 3-2, *Spatially Undefined*

[3] Proponents of approved projects assumed to develop prior to HCP/NCCP adoption could seek coverage under the Yolo HCP/NCCP if the activity is covered, take coverage is available, and the proponent follows the SPE application requirements described in Chapter 4, *Application Process and Conditions on Covered Activities*. Such coverage will be tracked and counted against allowable natural community and covered species habitat losses.

Activities, Methods and Assumptions. These assumptions were also used to establish limits for natural community and covered species habitat loss, so effects would not exceed those analyzed under this HCP/NCCP.

5.5.1.1.3 Fragmentation

A qualitative approach was used to assess fragmentation effects, including wildlife connectivity. Fragmentation effects were assessed based on the known locations of covered activities relative to the distribution of natural communities and covered species habitat, and relevant scientific information related to population distribution and dispersal or local movement patterns of covered species.

5.5.1.2 Reduction in Function of Natural Community or Covered Species Habitat

The section on *Reduction in Function* in the effects analysis for each natural community or covered species describes the diminished function for each natural community and covered species that could result from covered activities, consistent with the effect mechanisms described in Section 5.4.2, *Reduction in Function of Natural Communities and Covered Species Habitats.* This analysis is qualitative, and based on the best available information for each natural community and covered species regarding vulnerability to each effect mechanism.

5.5.1.3 Harassment, Injury, or Mortality

The section on *Harassment, Injury, or Mortality* for each covered species describes the potential for harassment, injury, or mortality to covered species that could result from covered activities, consistent with the effects mechanisms described in Section 5.4.3, *Harassment, Injury, or Mortality of Individuals.* This section describes the potential for effects such as crushing (injury, mortality) of covered species by construction equipment and harassment by pets introduced by occupancy of new developments. Harassment, injury, or mortality of covered species is assessed qualitatively by evaluating how the effect mechanisms described in Section 5.4.3 would affect each covered species.

5.5.1.4 Impact of Take on the Species

HCPs are required (Section 10(a)(2)(A)(i) of FESA) to describe the impact of take on each covered species. The impact of take is defined as the effect of covered activities on the long-term survival and recovery of the species. For each covered species, the section on *Impact of Take on the Species* describes the combined effects of covered activities on the long-term survival and recovery (or conservation[4]) of the species, in the context of the species' range and abundance, and the best available information regarding stressors on the species.

[4] For non-listed species, conservation refers to maintaining or enhancing the condition of a species so that state listing is no longer necessary (NCCPA Section 4805(d)).

Table 5-2 (a). Habitat-Based Take Limits, by Covered Species

Species	Existing Modeled Habitat in Plan Area (acres)[a]	Take Limit, Permanent	Take Limit, Temporary	Percent Remaining[b]
Valley elderberry longhorn beetle				
Riparian habitat	9,447	523	0	95%
Non-riparian habitat	3,932	61	1	98%
Total	**13,379**	**584**	**1**	**96%**
California tiger salamander				
Aquatic breeding habitat	1,004	12	1	99%
Upland habitat	86,505	398	1	100%
Total	**87,509**	**410**	**2**	**100%**
Western pond turtle				
Aquatic habitat	53,907	369	31	99%
Nesting and overwintering habitat	137,185	3,133	112	98%
Total	**191,092**	**3,502**	**143**	**99%**
Giant garter snake				
Rice habitat	31,168	87	0	100%
Aquatic habitat	6,596	109	1	98%
Freshwater emergent habitat	25,897	76	0	100%
Active season upland movement	6,612	441	3	93%
Overwintering habitat	6,783	1,235	5	82%
Total	**77,056**	**1,966**	**9**	**97%**
Swainson's hawk				
Nesting habitat	15,673	651	0	94%
Natural foraging habitat	79,336	1,407	22	98%
Cultivated lands foraging habitat	214,078	9,399	202	96%
Total	**309,087**	**11,457**	**224**	**96%**
White-tailed kite				
Nesting habitat	31,732	661	0	98%
Primary foraging habitat	101,758	2,609	29	97%
Secondary foraging habitat	134,740	7,969	205	94%
Total	**268,230**	**11,239**	**234**	**96%**
Western yellow-billed cuckoo				
Nesting/foraging habitat	**3,868**	59	0	98%
Western burrowing owl				
Primary habitat	37,694	861	1	98%
Other habitat	66,160	2,311	218	97%
Total	**103,854**	**3,172**	**219**	**97%**
Least Bell's vireo				
Nesting/foraging habitat	**4,719**	**39**	0	99%
Bank swallow				
Nesting habitat	**962**	**37**	**0**	**96%[c]**

Species	Existing Modeled Habitat in Plan Area (acres)[a]	Take Limit, Permanent	Take Limit, Temporary	Percent Remaining[b]
Tricolored blackbird				
Nesting habitat	4,680	86	0	98%
Foraging habitat	261,133	8,942	230	97%
Total	**265,813**	**9,028**	**230**	**97%**
Palmate-bracted bird's beak				
Habitat	**312**	**4**	0	99**%**

a. Take limits are established based on modeled habitat for each covered species. In implementation, take limits of covered species will be measured based on field conditions as described in Section 7.5.11, *Compliance Tracking.*

b. Rounded to nearest percent.

c. Actual nests will be avoided. Up to 37 acres of barren floodplain may be permanently affected by bank stabilization activities along Cache Creek undertaken through the CCRMP as needed to protect property or valuable resources. The natural, dynamic fluvial processes along Cache Creek are expected to create additional barren floodplain during the 50-year permit term.

d. The effects analysis, based on the covered activities footprint and operations and maintenance assumptions, predicts 37 nest trees may be removed. However, the Swainson's hawk nest tree take limit is set at 20 to account for the implementation of avoidance and minimization measures. The number of nest trees per planning unit will not exceed those provided in Table 5-5 and the total will not exceed 20 nest trees.

Table 5-2(b). Forms of Take and Take Limits, by Covered Species[5]

Species	Harm[a]	Injury or Mortality[b]	Harassment[c]
Palmate-bracted bird's beak	4 acres of permanent habitat loss	No injury or mortality, except as part of management and enhancement where needed for the benefit of the population (e.g., damage to seeds in seed bank during ground disturbance related to management and enhancement).	Not applicable.
Valley elderberry longhorn beetle	Harm resulting from permanent loss of 523 acres of riparian habitat and 61 acres of non-riparian habitat, and temporary disturbance of one acre of non-riparian habitat.	Potential injury or mortality of individuals associated with the 523 acres of riparian habitat and 61 acres of non-riparian habitat	Potential harassment of individuals associated with the 523 acres of riparian habitat and 61 acres of non-riparian habitat (includes elderberry shrubs within 100 feet of disturbance, and shrubs that would be transplanted)

[5] Take in the form of harm or harassment applies only to the federal ESA. Take in the form of injury or mortality applies to the federal ESA and CESA definitions of take.

Species	Harm[a]	Injury or Mortality[b]	Harassment[c]
California tiger salamander	Harm resulting from permanent loss of 12 acres of aquatic habitat and 398 acres of upland habitat. Also, potential harm to individuals within 55 acres of upland habitat, resulting from removing aquatic habitat within a 1.2-mile radius (i.e., the 55 acres will no longer have aquatic habitat within 1.3 miles). Also, temporary disturbance of one acre of aquatic and one acre of upland habitat.	Potential injury or mortality of individuals associated with 12 acres of aquatic habitat and 398 acres of upland habitat.	Potential harassment of individuals associated with 12 acres of aquatic habitat and 398 acres of upland habitat.
Western pond turtle	Harm resulting from permanent loss of 369 acres of aquatic habitat and 3,133 acres of upland habitat. Also, potential harm to individuals within 569 acres of upland habitat, resulting from removing aquatic habitat within a 1,640-foot radius (i.e., 569 acres of uplands will no longer have aquatic habitat within 1,640 feet). Also, temporary disturbance of 31 acres of aquatic habitat and 112 acres of upland habitat.	Potential injury or mortality of individuals associated with 369 acres of aquatic habitat and 3,133 acres of upland habitat.	Potential harassment of individuals associated with 369 acres of aquatic habitat and 3,133 acres of upland habitat.

Species	Harm[a]	Injury or Mortality[b]	Harassment[c]
Giant garter snake	Harm resulting from permanent loss of 87 acres of rice, 109 acres of aquatic habitat, 76 acres of fresh emergent wetland habitat, 441 acres of upland within 200 feet of aquatic, and 1,123 acres of upland between 200 and 820 feet from aquatic. Also, potential harm resulting from removing aquatic habitat from 69 acres of upland habitat within 200 feet of aquatic, and temporary disturbance of 9 acres of upland habitat.	Potential injury or mortality of individuals associated with 87 acres of rice, 109 acres of aquatic habitat, 76 acres of fresh emergent wetland habitat, 441 acres of upland within 200 feet of aquatic, and 1,123 acres of upland beyond 200 feet. Injury, mortality, or harassment of up to an estimated 815 individuals associated with this habitat (Appendix P).	Potential harassment of individuals associated with 87 acres of rice, 109 acres of aquatic habitat, 76 acres of fresh emergent wetland habitat, 441 acres of upland within 200 feet of aquatic, and 1,123 acres of upland beyond 200 feet. Injury, mortality, or harassment of up to an estimated 815 individuals associated with this habitat (Appendix P).
Swainson's hawk	Harm resulting from permanent loss of 651 acres of nesting habitat, 1,407 acres of natural foraging habitat, and 9,399 acres of cultivated lands foraging habitat. Also, loss of up to 20 nest trees (removed while inactive) and temporary loss of 224 acres of foraging habitat.	No injury or morality of individuals, with application of the HCP/NCCP avoidance and minimization measures.	No harassment of individuals, with application of the HCP/NCCP avoidance and minimization measures.

Species	Harm[a]	Injury or Mortality[b]	Harassment[c]
White-tailed kite	Harm resulting from the permanent loss of 661 acres of nesting habitat and 10,578 acres of foraging habitat. Also, loss of up to 1 nest tree[6] (removed while inactive), and temporary disturbance of 234 acres of foraging habitat (29 acres primary and 205 acres secondary foraging habitat).	No injury or morality of individuals, with application of the HCP/NCCP avoidance and minimization measures.	No harassment of individuals, with the avoidance and minimization measures in place.
Western yellow-billed cuckoo	Harm resulting from the permanent loss of 59 acres of habitat.	No injury or morality of individuals, with application of the HCP/NCCP avoidance and minimization measures.	No harassment of individuals, with the avoidance and minimization measures in place.
Western burrowing owl	Harm resulting from permanent loss of 861 acres of primary habitat, and 2,311 acres of other habitat, including up to 4 occupied sites.[d] Also, temporary disturbance of 1 acre of primarily habitat and 218 acres of other (cultivated lands) habitat.	No injury or morality of individuals, with application of the HCP/NCCP avoidance and minimization measures.	Harassment of individuals associated with up to 4 occupied sites, through relocation of birds consistent with Section 4.3.4, *AMM18, Minimize Take and Adverse Effects on Habitat of Western Burrowing Owl* (between 4 and 8 birds).
Least Bell's vireo	Harm resulting from the permanent loss of 39 acres of habitat.	No injury or morality of individuals, with the avoidance and minimization measures in place.	No harassment of individuals, with the avoidance and minimization measures in place.
Bank swallow	Harm resulting from permanent loss of 37 acres of barren floodplain potential nesting habitat.	No injury or mortality of individuals, with the avoidance and minimization measures in place.	No harassment of individuals, with the avoidance and minimization measures in place.

[6]Counted as a nest tree if occupied by active nest within the last five years.

Species	Harm[a]	Injury or Mortality[b]	Harassment[c]
Tricolored blackbird	Harm resulting from permanent loss of 86 acres of nesting habitat and 8,942 acres of foraging habitat. Also, temporary disturbance of 230 acres of foraging habitat.	No injury or mortality with the avoidance and minimization measures in place.	No harassment of individuals with the avoidance and minimization measures in place.
Palmate-bracted bird's-beak	Harm resulting from the loss of four acres of habitat.	No removal of occurrences except as needed during enhancement or restoration for the purpose of benefitting the population.	Not applicable

a. Harm is defined as, "An act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation when it actually kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering." (50 CFR 17.3) Habitat modification or degradation includes effects resulting from fragmentation (e.g., if upland habitat for California tiger salamander becomes unsuitable as a result of removing nearby aquatic habitat).

b. Injury or mortality includes actions that directly kill wildlife, such as bulldozers or other construction equipment crushing individuals. In addition to the take described in this column, there is potential for take of valley elderberry longhorn beetle, California tiger salamander, giant garter snake, and western pond turtle within up to 2,347 acres of lands that may be enrolled in the Neighboring Landowner Protection program. This take would be in the form of injury or mortality of any individuals that establish adjacent to the reserve system beyond baseline conditions within the enrolled areas. This also may include harm to valley elderberry longhorn beetle resulting from loss of elderberry shrubs that establish adjacent to the reserve system beyond baseline conditions within the enrolled areas (Neighboring Landowner Protections).

c. Harassment is defined as, "an intentional or negligent act which creates the likelihood of injury of an endangered species by annoying the species to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering."(50 CFR 17.3)

d. An "occupied site" is defined as a breeding or wintering burrow or burrow complex occupied by a single breeding pair or nonbreeding individual.

5.5.2 Beneficial Effects

For each natural community and covered species, the effects analysis includes an assessment of the beneficial effects of the conservation strategy. The *Beneficial Effects* section for each natural community and covered species summarizes relevant biological goals and objectives, and the conservation measures that will be implemented to achieve them for the benefit of each natural community and covered species.

5.5.3 Net Effects

For each natural community and covered species, the effects analysis includes an assessment of the net effects of the Yolo HCP/NCCP implementation, including the adverse effects of covered activities and the beneficial effects of the conservation strategy. For each natural community and covered species, the *Net Effects* section expresses the net change in natural community or habitat acreage, considering both loss resulting from covered activities and gain resulting from restoration. It also

describes the gain in amount of protected lands for each natural community and covered species, in terms of acreage and percentage increase. This section also factors in the beneficial effects of enhancement and management. Considering both adverse and beneficial effects, the net effects assessment concludes how the Yolo HCP/NCCP will adequately minimize and mitigate effects on each species and conserve the species in the Plan Area consistent with FESA and NCCPA standards.

5.6 Effects on Natural Communities

The approach and methods for analyzing the effects on natural communities are described in Section 5.5, *Effects Analysis Approach and Methods*. To minimize redundancy, this section begins by describing effects of covered activities that are common to all natural communities (Section 5.6.1, *Effects of Covered Activities Common to all Natural Communities*). It then describes effects specific to each natural community (Sections 5.6.2 through 5.6.8). For each natural community, adverse, beneficial, and net effects are described. The beneficial effects discussions refer to the biological goals and objectives described in Chapter 6, Section 6.3, *Biological Goals and Objectives.* Only those natural communities affected by Yolo HCP/NCCP covered activities are addressed in this section.[7] For more details on the direct and indirect effects of the covered activities on non-covered special-status species, see the Biological Resources section of the EIS/EIR for this HCP/NCCP (Yolo Habitat Conservancy 2017).

Table 5-3, *Loss of Natural Communities and Other Land Cover Types*, provides the amount of natural community loss by planning unit and summaries for permanent and temporary loss of each natural community type. Table 5-4, *Natural Community Benefits and Net Effects*, provides the amount of each natural community loss in relation to the amount of conservation for each natural community.

5.6.1 Effects of Covered Activities Common to All Natural Communities

5.6.1.1 Loss and Fragmentation

Covered activities will convert natural communities to developed land, thereby reducing the extent of each natural community and resulting in loss of habitat for native species. Habitat loss is the single greatest threat to biodiversity in the United States (Wilcove et al. 1998). The extent of loss, and types of activities resulting in loss, are described for each natural community in Sections 5.6.2 through 5.6.8.

Covered activities could also result in fragmentation of the remaining natural communities, contributing to loss of the ecological integrity of large natural community blocks, ecosystem function, biological diversity, and habitat connectivity for native species. Over 50 percent of the covered activities will be concentrated within urban planning units that support approximately two percent of the natural community acres in the Plan Area (10,490/512,646 acres). Over 90 percent of the Plan Area will remain undeveloped, as shown in Table 5-3, *Loss of Natural Communities and Other Land Cover Types.*

[7] The following natural communities will not be affected by HCP/NCCP covered activities so are not discussed in this chapter: serpentine grassland, chamise chaparral, mixed chaparral, oak and foothill pine, closed-cone pine-cypress, montane hardwood, valley oak woodland, and vernal pool complex.

New roads will be limited to urban growth areas; road projects in unincorporated communities are limited to upgrading and widening existing roads. Upgrading roads (e.g., increasing lanes, improving road surfaces, straightening road alignments) could reduce the ability of wildlife to cross, due to increased width and higher traffic volume and velocity, thus diminishing connectivity between natural community areas. In Yolo County, however, effects on covered species associated with road upgrades or other covered activities are expected to be far less than in counties with more extensive and less compact rural development. Yolo County restricts development in rural areas to existing communities and does not allow any new rural residential communities or new roads to fragment the rural countryside.

5.6.1.2 Reduction in Function

In addition to removing and fragmenting natural communities, described above, covered activities could reduce the function of natural communities in the vicinity of covered activities.

Construction activities, operations and maintenance activities, and habitat restoration and management could temporarily affect natural communities in the vicinity of the covered activities. These activities will generate noise, human activity, and other disturbances (e.g., ground vibrations) associated with operating equipment and other related activities, which could cause native wildlife to reduce their use of affected areas during the activities. Other temporary direct effects of construction (altered runoff, dust) could result in localized degradation of ecosystem functions (e.g., erosion, dust accumulation on or burying of herbaceous vegetation).

Permanent effects of new developments on adjacent natural communities include ongoing visual effects (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), effects of human activity (e.g., trampling of vegetation), pet-related disturbance (e.g., pets harassing or harming wildlife), and other disturbances associated with human occupancy following construction. These disturbances could affect use by native wildlife species associated with the natural communities that are adjacent to new developments, and could damage native vegetation. For example, lighting could cause native wildlife species that are active nocturnally to avoid habitat around permanent development. In addition, uncontrolled pets could prey on individuals and nests of covered and other bird species or alter their reproductive behavior, as well as prey on reptile and amphibian species. Project proponents will minimize these effects on natural communities through establishment of buffers around sensitive natural communities, as described in *AMM9, Establish Buffers around Sensitive Natural Communities* and *AMM10, Avoid and Minimize Effects on Wetlands and Waters* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*).

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Table 5-3. Loss of Natural Communities and Other Land Cover Types

		Estimated Permanent Loss from Covered Activities by Planning Unit (acres)[a]																									
Natural Community	**Existing Acreage**	**Little Blue Ridge 1**	**North Blue Ridge 2**	**South Blue Ridge 3**	**Capay Hills 4**	**Dunnigan Hills 5[b]**	**Upper Cache Creek 6**	**Lower Cache Creek 7**	**Upper Putah Creek 8**	**Lowr Putah Creek 9**	**Hungry Hollow Basin 10**	**Willow Slough Basin 11**	**Colusa Basin 12**	**Colusa Basin Plains 13[b]**	**North Yolo Basin 14**	**South Yolo Basin 15**	**Yolo Basin Plains 16**	**North Yolo Bypass 17**	**Woodland 18**	**Davis 19**	**West Sacramento 20**	**Winters 21**	**Valley Landscape Unit 22**	**Total Perm. Loss in PUs**	**Perm. Loss from O&M (Unk PU)**	**Loss from Restoration[d]**	**Total Perm Loss**	**Total Temp. Loss**
Natural Communities																											
Rice	35,724	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	0	0	0	68	19	0	**87**	**0**
Cultivated Lands (non-rice)	214,939	0	0	6	0	1,398	25	398	0	0	450	1,905	175	25	256	304	0	34	0	1,406	583	1,812	361	9,138	69	702	**9,910**	**203**
Grassland	80,911	0	11	10	10	143	3	8	0	0	7	82	0	25	0	27	5	10	0	723	56	215	155	1,490	35	210	**1,734**	**28**
Serpentine	247	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Chamise Chaparral	30,187	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Mixed Chaparral	14,518	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Oak and Foothill Pine	43,772	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Blue Oak Woodland	35,891	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	**3**	**0**
Closed-Cone Pine-Cypress	212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Montane hardwood	3,087	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Valley Oak Woodland	181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Alkali Prairie	312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	**4**	**4**
Vernal pool complex	299	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Fresh Emergent Wetland	26,309	0	0	0	0	7	0	0	0	0	0	7	0	10	0	17	0	1	0	0	0	42	0	84	4	0	**88**	**0**
Valley Foothill Riparian	12,565	0	0	0	0	0	10	11	0	0	0	11	7	0[e]	17	119	0	0	0	0	18	329	5	529	59	0	**588**	**0[b]**
Lacustrine and Riverine[c]	13,493	0	0	0	0	0	0	0	0	0	4	15	0	0	8	14	0	0	0	37	5	112	5	201	34	0	**236**	**31**
Total Natural Communities	**512,646**	**0**	**11**	**16**	**10**	**1,548**	**38**	**417**	**0**	**0**	**461**	**2,020**	**182**	**60**	**281**	**481**	**5**	**45**	**0**	**2,237**	**662**	**2,510**	**526**	**11,510**	**222**	**912**	**12,649**	**266**
Other Land Cover Types																											
Other Agriculture	62,164	0	0	1	0	713	17	79	2	54	84	156	11	12	0	23	0	0	0	128	237	12	80	1,609	20	0	1,628	2
Semiagriculture, Incidental to Ag	30,510	0	0	8	0	129	61	51	1	7	40	376	55	15	33	31	0	9	0	128	129	49	57	1,179	115	0	1,294	9
Eucalyptus	369	0	0	0	0	0	0	0	0	0	0	0	0	94	0	0	0	0	0	0	0	0	46	141	0	0	141	0
Barren and Developed	47,806	0	1	8	0	207	59	47	1	3	44	240	1	145	66	198	0	1	0	829	245	946	13	3,055	148	44	3,172	37
Total Other Land Cover Types	**140,848**	**0**	**1**	**17**	**0**	**1,050**	**137**	**177**	**4**	**64**	**167**	**772**	**67**	**267**	**99**	**252**	**0**	**10**	**0**	**1,085**	**611**	**1,007**	**196**	**5,843**	**283**	**44**	**6,177**	**48**

Notes:

[a]Columns headings correspond to planning unit numbers.

[b] The Public Draft HCP/NCCP included the projected impacts of the Dunnigan Specific Plan within Planning Units 5 and 13. Since then, Yolo County has removed the Dunnigan Specific Plan from the County General Plan to allow for more incremental development of the Plan Area. While the Dunnigan Specific Plan is no longer a covered activity, the area remains a possible location for future development in Yolo County within the 50-year permit term because of its proximity to I-5 and the existing Dunnigan community, and its location outside of the floodplain, among other reasons. The Final HCP/NCCP maintains the location and amount of impact in the analysis in the event similar development is approved in the future.

[c] Assumed avoidance in Planning Units 1–9

[d] Assumed 75% of restoration in cultivated lands and 25% in grassland.

[e]Assumed avoidance of riparian in Planning Unit 13. Perm. = permanent; Temp. = temporary; PUs = planning units; O&M = operations and maintenance; Ag = agriculture

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Table 5-4. Natural Community Benefits and Net Effects

Natural Community	(A) Existing Acres in Plan Area	(B) Baseline PEL[a] Category 1	(C) Baseline PEL Category 2	(D) Outside Baseline PEL 1–2	(E) Estimated and Allowable Loss	(F) Estimated Loss (% of Total)	(G) Remaining Outside Baseline PEL 1–2	(H) Protection Requirements for Compensation and Conservation	Minimum Open Space Protection			
									HCP/NCCP Protection Requirements and Category 1 Baseline PEL		HCP/NCCP Protection Requirements and Category 1 and 2 Baseline PEL	
									(I) Area (acres)	(J) % of Plan Area	(K) Area (acres)	(L) % of Plan Area
Cultivated Lands – Rice	35,724	3,475	1,728	30,521	87	less than 1%	30,433	2,800	6,275	18%	8,003	22%
Cultivated Lands – Non-rice	214,939	6,394	3,552	204,897	9,910	5%	194,874	14,362	20,756	10%	24,308	11%
Grassland	80,911	4,609	3,456	72,832	1,734	2%	71,090	4,430	9,039	11%	12,495	16%
Serpentine	247	0	162	85	0	0%	85	0	0	0%	162	66%
Chamise	30,187	1,040	13,784	15,313	0	0%	15,313	0	1,040	3%	14,824	49%
Mixed Chaparral	14,518	444	3,490	10,559	0	0%	10,559	0	444	3%	3,934	27%
Oak and Foothill Pine	43,772	5,175	10,683	27,906	0	0%	27,906	0	5,175	12%	15,858	36%
Blue Oak Woodland	35,891	6,118	3,490	26,283	3	less than 1%	26,280	10	6,128	17%	9,618	27%
Closed-Cone Pine-Cypress	212	0	209	3	0	0%	3	0	0	0%	209	99%
Montane hardwood	3,087	232	821	2,011	0	0%	2,011	0	232	8%	1,053	34%
Valley Oak Woodland	181	20	0	161	0	0%	161	20	40	22%	40	22%
Alkali Prairie	312	141	0	146	4	1%	143	34	174	57%	174	57%

Natural Community	(A) Existing Acres in Plan Area	(B) Baseline PEL[a] Category 1	(C) Baseline PEL Category 2	(D) Outside Baseline PEL 1–2	(E) Estimated and Allowable Loss	(F) Estimated Loss (% of Total)	(G) Remaining Outside Baseline PEL 1–2	(H) Protection Requirements for Compensation and Conservation	Minimum Open Space Protection			
									HCP/NCCP Protection Requirements and Category 1 Baseline PEL		HCP/NCCP Protection Requirements and Category 1 and 2 Baseline PEL	
									(I) Area (acres)	(J) % of Plan Area	(K) Area (acres)	(L) % of Plan Area
Vernal pool complex	299	1	285	13	0	0%	13	0	1	0%	286	96%
Fresh Emergent Wetland	26,309	5,402	9,559	11,347	88	less than 1%	11,258	500	5,902	23%	15,461	59%
Valley foothill Riparian	12,565	611	1,421	10,412	588	4%	9,864	1,600	2,211	18%	3,632	30%
Lacustrine and Riverine	13,493	621	926	11,662	236	2%	11,442	600	1,221	9%	2,147	16%
Total Natural Communities	**512,646**	**34,282**	**53,730**	424,009	**12,650**	2%	411,435	**24,356** [b]	58,577	12%	112,143	22%

a. PEL = Public and easement lands. See Chapter 6, Table 6-1(a), *Baseline Public and Easement Lands,* for descriptions of each of the categories of baseline public and easement lands.

b. This does not include 50 acres of bank swallow habitat consisting of floodplain that does not fall into any of the above categories.

5.6.2 Cultivated Lands Seminatural Community

The cultivated lands seminatural community consists of nonrangeland agricultural crops that provide habitat for covered species (Figure 5-2, *Cultivated Lands Seminatural Community and Covered Activities Footprints*).[8] Crop types that do not provide covered species habitat are not included in the cultivated lands natural community (Chapter 2, Section 2.5, *Other Land Cover Types*). This seminatural community accounts for 250,663 acres (49 percent) of the natural communities in the Plan Area including rice; it is most prevalent in the eastern portion of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*, provides a detailed account of land cover types and acres in the Plan Area).

This analysis considers the cultivated lands seminatural community in two parts—rice and non-rice lands—because rice generally supports a different assemblage of species that require wetland conditions.

5.6.2.1 Adverse Effects

Covered activities will remove up to 9,997 acres (four percent) of cultivated lands seminatural community of in the Plan Area: up to 87 acres (less than one percent) of rice lands and 9,910 acres (four percent) of non-rice lands (Tables 5-1, *Maximum Allowable Loss, Natural Communities,* and 5-3, *Loss of Natural Communities and Other Land Cover Types*).

All the development-related loss (68 acres) of the rice lands is expected to result from urban development in the Woodland planning unit (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*).[9] The remaining estimated 22 percent (19 acres) of permanent loss of rice lands is expected to result from operations and maintenance activities (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*).

An estimated 42 percent (4,162 acres) of the non-rice cultivated lands permanent loss will occur in the urban planning units (19–22), while the remainder of spatially defined non-rice cultivated loss is concentrated primarily in the Dunnigan Hills and Willow Slough Basin planning units (5 and 11), with small loss in planning units 6, 7, 10, 12, 13, 14, 15, and 17 (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*). An estimated 702 acres of permanent loss is expected to result from restoration, and another 69 acres of permanent loss is expected to result from operations and maintenance activities. Construction activities will also result in an estimated 203 acres of temporary loss of this seminatural community. Each temporary disturbance is expected to be small, likely no greater than approximately ten acres (and often much less). Disturbance of small areas of cultivated lands during the 50-year permit term, with each disturbance to last for no more than one year, will remove minor amounts of foraging habitat but is unlikely to adversely affect Swainson's hawk foraging behavior. Cultivated lands regularly experience temporary disturbances and continue to provide habitat for Swainson's hawk when the disturbance is completed.

[8] Rangelands are lands grazed by livestock and typically include grassland, oak woodland, and other natural communities that are not cultivated.

[9] The accounting of loss of natural communities by covered activity types is based on estimates of development throughout the permit term. Actual impacts by covered activity type are likely to vary from these estimates. Loss of natural community types are limited by the Permits to the total amounts listed in Table 5-1, not by covered activity type.

Fragmentation effects are expected to be minimal because most of the development will be in consolidated blocks within or adjacent to existing urban areas of Davis and Woodland. Most of the county will remain as a large, interconnected cultivated lands seminatural community.

Section 5.6.1.2, *Reduction in Function*, qualitatively describes other effects on this seminatural community that are common to all of the natural communities.

5.6.2.2 Beneficial Effects

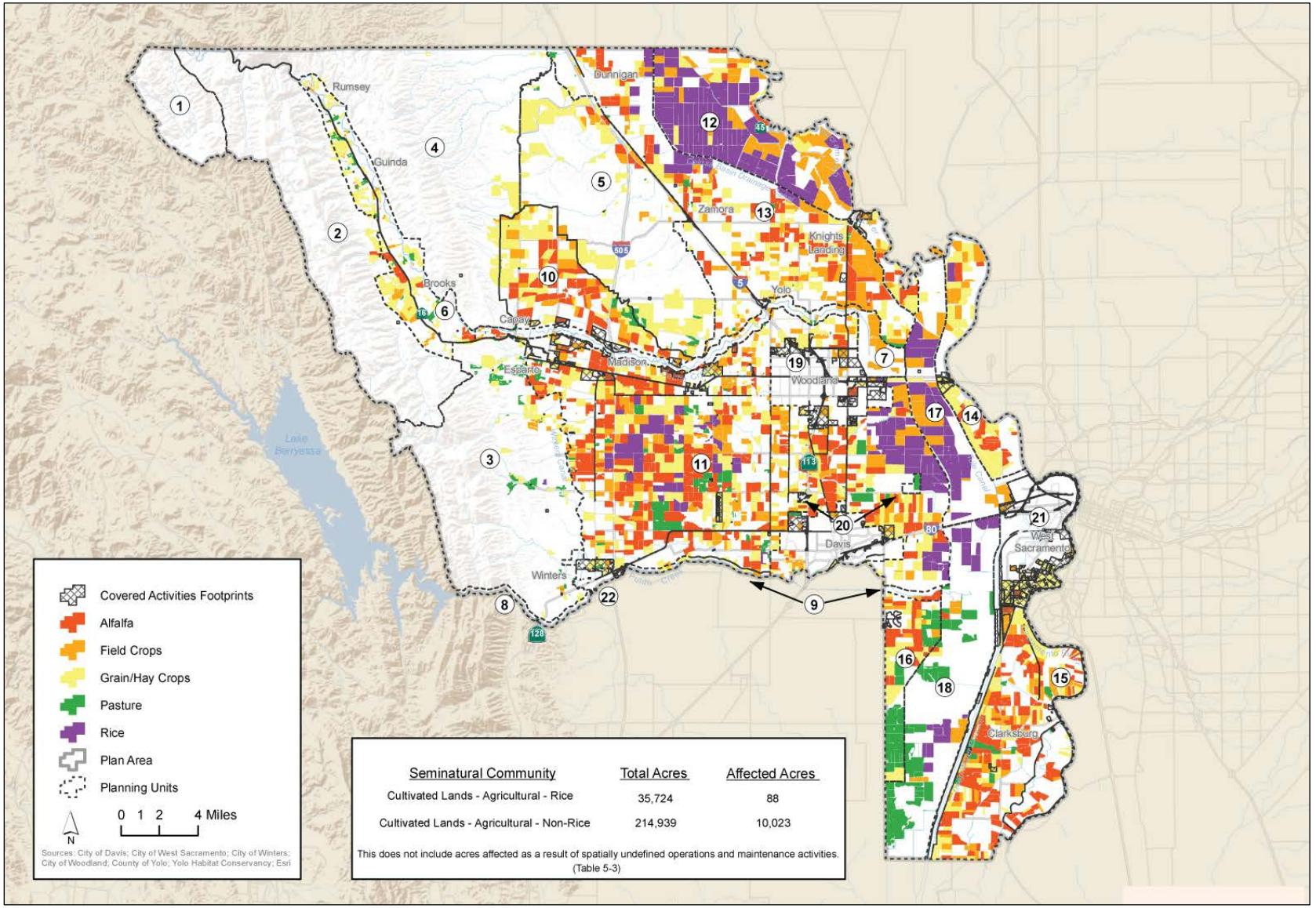
The Yolo HCP/NCCP will protect at least 14,362 acres of unprotected non-rice cultivated lands seminatural community (Objective NC-CL1.1) and 2,800 acres of unprotected rice lands seminatural community (Objective NC-CL1.2) through implementation of CM1 (Table 5-4, *Natural Communities Benefits and Net Effects*). The entire protected cultivated lands seminatural community will be managed and enhanced, particularly through planting hedgerows to provide cover and suitable conditions for prey, thereby enhancing food base, and through planting trees to provide raptor nesting and perching sites (Objective NC-CL1.3; CM1).

Conservation of the cultivated lands seminatural community will provide many ecosystem benefits in the Plan Area. Although the historic conversion of natural vegetation to cultivated lands has eliminated large areas of native species habitat, many agricultural systems continue to support abundant wildlife and provide important breeding, foraging, and roosting habitat for many resident and migratory wildlife species. Covered species that use cultivated lands include Swainson's hawk, giant garter snake, and tricolored blackbird. These species have come to rely on the habitat value of certain cultivated lands, farming practices, and crop types. Swainson's hawks in the Central Valley rely on cultivated lands for foraging, given the lack of grassland foraging habitat remaining in California (Hartman and Kyle 2010). Orchards and vineyards develop a dense overstory canopy that generally precludes access to ground-dwelling prey by foraging Swainson's hawks, white-tailed kites, western burrowing owls, and other covered species associated with cultivated lands. The cultivated lands in the reserve system will be protected from development and conversion to orchards and vineyards.

Protection and management of cultivated lands consistent with the Yolo HCP/NCCP conservation strategy will ensure these lands continue to provide habitat for covered and other native species, and are not converted to orchards or vineyards, which have very low habitat value for wildlife. Irrigated pastures, alfalfa, and annually cultivated irrigated cropland provide foraging habitat for covered species, including the Swainson's hawk, white-tailed kite, western burrowing owl, and tricolored blackbird. Grain, corn, and rice fields provide foraging habitats for waterfowl, wading birds, and shorebirds. Additionally, the 2,800 acres of rice lands will provide aquatic habitat for the giant garter snake and western pond turtle.

Small patches of important wildlife habitats associated with cultivated lands, such as isolated oaks, trees and shrubs along field borders and roadsides, remnant groves, riparian corridors, water conveyance channels, grassland, ponds, and wetlands will also be protected (Conservation Measure 1, Section 6.4.1.4.1, *Reserve System Design Criteria*). Maintenance of these small but important wildlife habitats will benefit covered wildlife species as well as a diversity of non-covered native wildlife. Cultivated lands are used primarily for foraging by several species that nest in riparian areas, roadside trees, or isolated trees and groves. Wetlands, streams, ponds, hedgerows, groves, and other remnant natural or created habitats will be maintained to provide the full range of habitat elements necessary to support covered species in cultivated lands.

Figure 5-2. Cultivated Lands Seminatural Community and Covered Activities Footprints



5.6.2.3 Net Effects

Implementation of the Yolo HCP/NCCP will result in less than a one percent net decrease (-87 acres) of the rice component of the cultivated lands seminatural community and an estimated five percent net decrease (-9,910 acres) of the non-rice component in the Plan Area (Table 5-4, *Natural Community Benefits and Net Effects*). The Yolo HCP/NCCP will protect 17,162 acres of unprotected cultivated lands seminatural community, increasing the total protected acres (Category 1 public and easements lands) of this seminatural community in the Plan Area to 22 percent for rice lands and 11 percent for non-rice cultivated lands. With full implementation of the Yolo HCP/NCCP, 18 percent (6,275 acres) of the rice lands component and 10 percent (20,756) of the non-rice cultivated lands seminatural community in the Plan Area will be in category 1 public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). All lands in the reserve system supporting the cultivated lands seminatural community will be enhanced and managed to improve and sustain values for covered and other native wildlife species in the Plan Area.

5.6.3 Grassland Natural Community

The grassland natural community is composed of five vegetation types that support grasses and associated annual and perennial forbs, as described in Chapter 2, *Existing Ecological Conditions*. In many cases, grassland is dominated by native and exotic forbs in certain seasons or during different periods within a season (D'Antonio et al. 2007). Many of the species that occupy this natural community also occur as understory plants in other natural communities such as blue oak woodland (California Department of Fish and Game 1999; Allen-Diaz et al. 2007). The grassland natural community accounts for 80,911 acres (16 percent) of the Plan Area (Table 5-1, *Maximum Allowable Loss, Natural Communities*). The largest expanses of grassland natural community in the Plan Area are in the South Blue Ridge planning unit, Capay Hill planning unit, and the Dunnigan Hills planning unit (planning units 3 through 5 in Figure 5-3, *Grassland and Covered Activities Footprints*).

5.6.3.1 Adverse Effects

Covered activities will permanently remove up to 1,734 acres (2 percent) of grassland natural community in the Plan Area (Tables 5-1, *Maximum Allowable Permanent Loss, Natural Communities* and 5-4, *Loss of Natural Communities and Other Land Cover Types*). Of this, 66 percent (1,149 acres) will result from development in the urban planning units (19–22). Another five percent (82 acres) will occur in the Willow Slough Basin planning unit (planning unit 11) primarily as a result of expansion of the Yolo County Central Landfill, and eight percent (143 acres) will occur in planning unit 1. An estimated 10 percent (210 acres) of the permanent grassland natural community loss is expected to occur as a result of wetland or riparian natural community restoration (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*). Covered activities are expected to result in temporary loss of up to 28 acres of the grassland natural community, primarily resulting from stream enhancement activities associated with the Cache Creek Resources Management Plan (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*).

Fragmentation effects are expected to be minimal because the covered activities potentially affecting habitat are primarily at the edges of blocks of grassland natural community.

Section 5.6.1.2, *Reduction in Function*, qualitatively describes other effects on this natural community that are common to all of the natural communities.

5.6.3.2 Beneficial Effects

The Yolo HCP/NCCP will protect at least 4,430 acres of unprotected grassland natural community, including a large, interconnected block in the Dunnigan Hills planning unit (planning unit 5) (Objective NC-G1.1; CM1) (Table 5-4, *Natural Community Benefits and Net Effects*). This natural community will be managed and enhanced in the reserve system (Objective NC-G1.2; CM1). Grassland will be protected in large contiguous landscapes encompassing the range of vegetation, hydrologic, and soil conditions that characterize this community. Grassland in the Dunnigan Hills planning unit will provide upland habitat for California tiger salamander. Additional patches of grassland associated with wetland land cover types will be protected to provide upland habitat for giant garter snake, western pond turtle, and other native aquatic species requiring adjacent uplands.

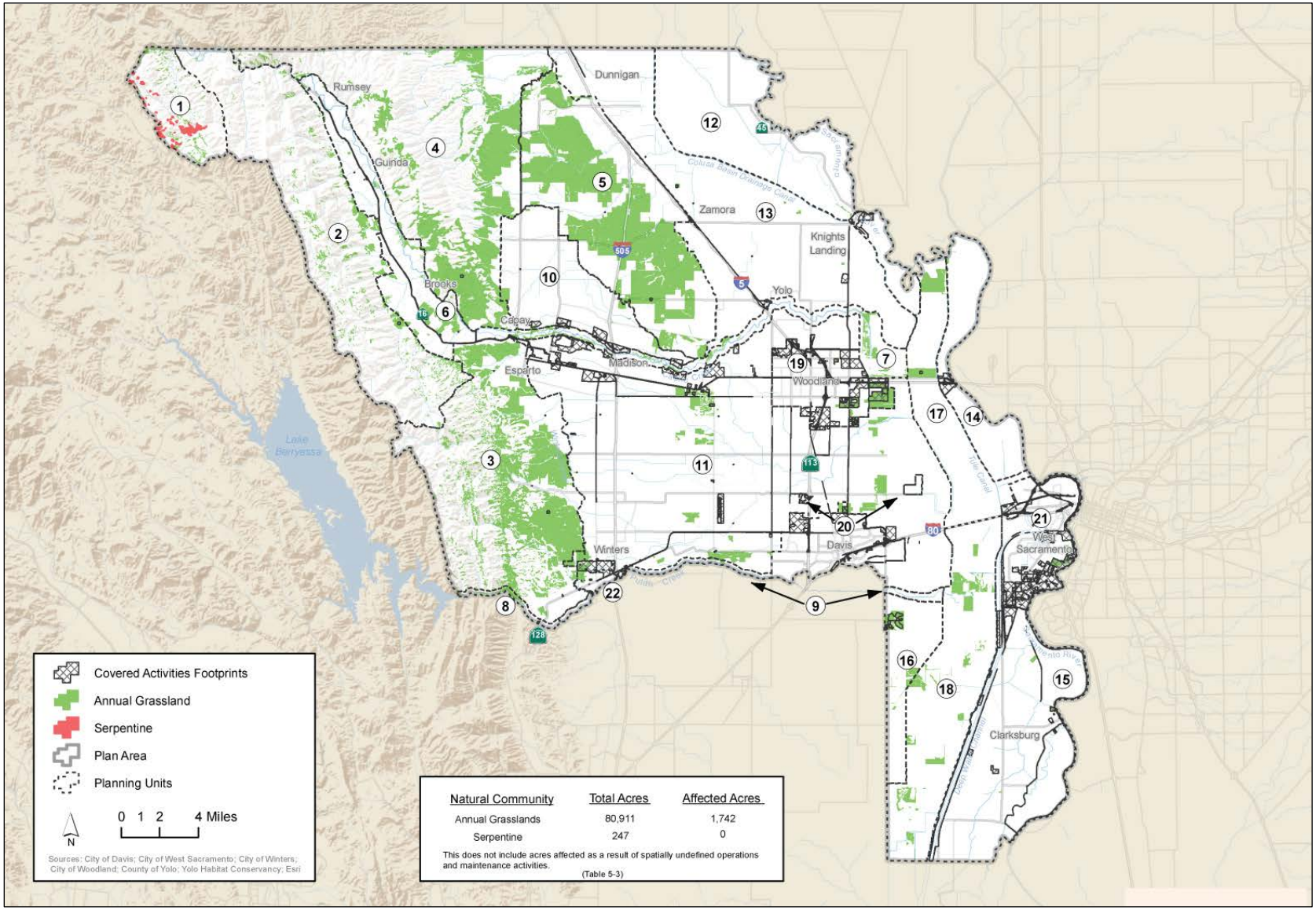
Grassland in the reserve system will be managed to sustain or increase native biodiversity and wildlife habitat values, through measures such as livestock grazing, exotic plant control, erosion control along drainages, and prescribed burning where feasible. They will be managed to sustain a mosaic of grassland vegetation alliances and increase the extent, distribution, and density of native perennial grasses intermingled with other native species, including annual grasses, geophytes, and other forbs. They will also be managed to increase opportunities for movement by broad-ranging animals through grassland, increase burrow availability for burrow-dependent species, and increase prey, especially small mammals and insects, for grassland-foraging species.

Conservation of the grassland natural community will have many ecosystem benefits. Although native grassland species have been reduced in abundance or distribution, through anthropogenic influences, native plant species remain rich in number, persisting and coexisting with nonnative plants in traditional locations with remaining grassland. Some animal species have also adjusted well to nonnative grassland. Thus, the current grassland community offers highly valuable habitats to many grassland dependent species. The protected grassland will provide habitat for numerous native wildlife species, including rare and endangered species such as Swainson's hawk, golden eagle, prairie falcon, short-eared owl, white-tailed kite, western burrowing owl, grasshopper sparrow, and American badger.

5.6.3.3 Net Effects

The Yolo HCP/NCCP will result in an estimated two percent decrease (-1,734 acres) of the grassland natural community in the Plan Area (Table 5-4, *Natural Community Benefits and Net Effects*). With full implementation of the Yolo HCP/NCCP, 16 percent (12,495 acres) of the grassland natural community in the Plan Area will be conserved in Category 1 and 2 public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). The protected, managed, and enhanced grasslands will be of high value, consisting primarily of large, contiguous expanses in areas with high concentrations of covered grassland associated species in the Dunnigan Hills planning unit and other portions of the Conservation Reserve Area. Therefore, the Yolo HCP/NCCP will result in a net benefit to the grassland natural community.

Figure 5-3. Grasslands and Covered Activities Footprints



5.6.4 Valley Foothill Riparian Natural Community

The valley foothill riparian natural community consists of a multilayered woodland plant community with a tree overstory and diverse shrub layer. This natural community is composed of 13 vegetation types (Table 2-1, *Natural Communities and Other Land Cover Types*), reflecting the diversity of riparian conditions. The valley foothill riparian natural community occurs most extensively along Cache Creek, Putah Creek, Willow Slough, Union School Slough, Dry Slough, Chickahominy Slough, the Colusa Basin Drain, and the Sacramento River. Many other streams, sloughs, and canals, and some lowland areas with shallow groundwater away from watercourses, support less developed riparian vegetation. This natural community accounts for 12,565 acres (two percent) of the Plan Area (Table 2-1, *Natural Communities and Other Land Cover Types*; Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). A more detailed description of the valley foothill riparian natural community is provided in Chapter 2, Section 2.4.5.4, *Valley Foothill Riparian Natural Community*.

5.6.4.1 Adverse Effects

Covered activities will remove up to 588 acres (five percent) of valley foothill riparian natural community in the Plan Area (Table 5-1, *Maximum Allowable Loss, Natural Communities*; Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). An estimated 64 percent (352 acres) of the loss is expected to result from development in the urban planning units (19–22), and the remainder is distributed among planning units 5–7 and 10–15 (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*; Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). Operations and maintenance activities will result in the removal of an estimated 60 acres of this natural community: this loss is considered to be permanent even if the disturbed area is planted with riparian vegetation because the natural community will take more than one year to restore.

Fragmentation effects are expected to be minimal except in the urban planning units. Patches of valley foothill riparian natural community that are avoided within urban growth areas could become isolated by surrounding urban development. Project proponents will establish setbacks consistent with *AMM10, Avoid and Minimize Effects on Wetlands and Waters* and *AMM9, Establish Buffers around Sensitive Natural Communities* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*) to minimize this effect.

Section 5.6.1.2, *Reduction in Function*, qualitatively describes other effects on this natural community that are common to all of the natural communities.

5.6.4.2 Beneficial Effects

The Yolo HCP/NCCP will protect at least 1,600 acres of unprotected valley foothill riparian natural community distributed primarily in the Cache Creek and Putah Creek planning units (Objective NC-VFR1.1; CM1) (Table 5-4, *Natural Community Benefits and Net Effects*). The HCP/NCCP will also restore valley foothill riparian natural community to yield no net loss as a result of covered activities, and will restore another 20 acres independent of effect (Objective NC-VFR1.2; CM2). The protected and restored valley foothill riparian natural community will be managed and enhanced in the reserve system by reducing the relative extent of nonnative plants that degrade habitat function and by improving native plant diversity and vegetation structure. The Conservancy will manage

invasive species in the riparian natural community (Objective L-2.1) and allow for natural fluvial processes to promote riparian succession and diversity (Objective L-2.3).

Additionally riparian natural community outside the reserve system (i.e., not included in conservation easements) along Cache Creek in planning unit 7 will be managed and enhanced consistent with the Cache Creek Resources Management Plan, as described in Chapter 6, Section 6.5.8.1.1, and riparian natural community outside the reserve system along Putah Creek in planning unit 9 will be monitored and enhanced consistent with direction from the Lower Putah Creek Coordinating Committee, as described in Section 6.5.8.1.2.

Conservation of the valley foothill riparian natural community will have numerous ecological benefits. More than 225 species of birds, mammals, reptiles, and amphibians use riparian areas in California for forage, water, thermal and escape cover, nesting and breeding, and migration and dispersal (Riparian Habitat Joint Venture 2004). Riparian communities are critical for the conservation of resident and migratory land birds in California (Gains 1980). Remnant valley/foothill riparian communities in the Plan Area, while highly degraded relative to their historical state, provide habitat for covered species, including Swainson's hawk, white-tailed kite, and valley elderberry longhorn beetle. Riparian areas also serve an important function as movement corridors for mammals and other wildlife if they provide suitable connections between larger blocks of habitat (Fischer et al. 2000). Additionally, riparian vegetation adjacent to streams moderates water temperature for fish and other aquatic wildlife, produces invertebrates that serve as a vital food source for fish and other wildlife, and is a source of coarse woody and other organic material that provides habitat and substrate and food for the aquatic foodweb for macroinvertebrates and fish (Pusey and Arthington 2003).

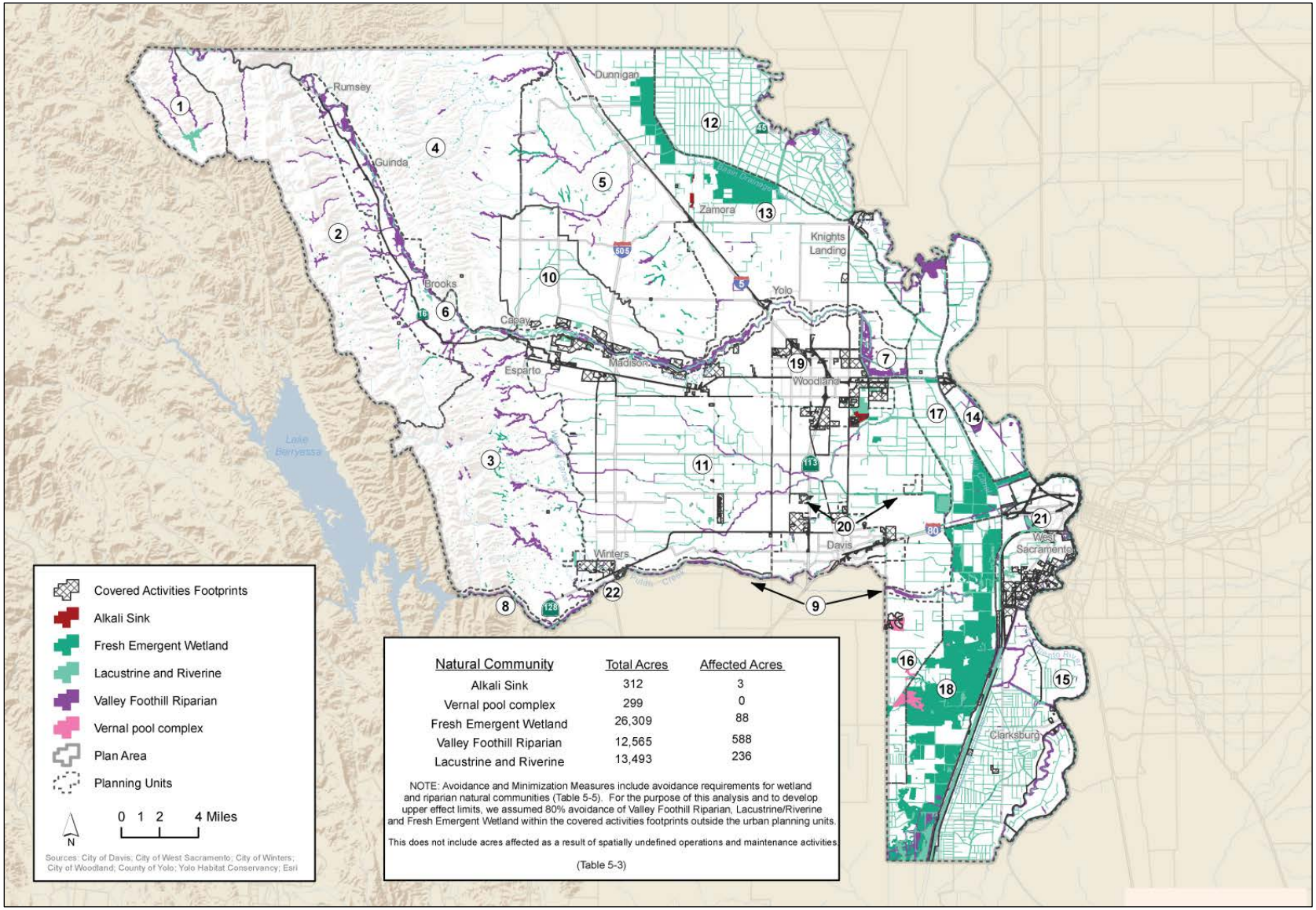
5.6.4.3 Net Effects

The Yolo HCP/NCCP will result in a net gain of the valley foothill riparian natural community in the Plan Area, restoring up to 598 acres to offset the maximum of 588 acres of loss, and restoring at least an additional 20 acres independent of effect. With full HCP/NCCP implementation, 30 percent (3,632 acres) of the riparian natural community in the Plan Area will be conserved in public and easement lands Categories 1 and 2. These lands will be monitored and adaptively managed in the reserve system to sustain the ecological value of this natural community for covered species. The Yolo HCP/NCCP will result in a net benefit to the valley foothill riparian natural community.

5.6.5 Alkali Prairie Natural Community

The alkali prairie natural community hydrology is determined by a mixture of rainfall, runoff, and flooding from adjacent drainages that vary annually depending on both local and upper watershed precipitation patterns. The soils are composed of saline-alkaline clay with salts that include sodium, magnesium, and boron. The alkali prairie natural community accounts for 312 acres, or 0.06% of the Plan Area, most of which is southeast of the city of Woodland (Table 5-1, *Maximum Allowable Loss, Natural* Communities; Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). A more detailed description of the alkali prairie natural community is provided in Chapter 2, Section 2.4.5.1, *Alkali Prairie Natural Community.*

Figure 5-4. Riparian and Wetlands and Covered Activities Footprints



Natural Community	Total Acres	Affected Acres
Alkali Sink	312	3
Vernal pool complex	299	0
Fresh Emergent Wetland	26,309	88
Valley Foothill Riparian	12,565	588
Lacustrine and Riverine	13,493	236

NOTE: Avoidance and Minimization Measures include avoidance requirements for wetland and riparian natural communities (Table 5-5). For the purpose of this analysis and to develop upper effect limits, we assumed 80% avoidance of Valley Foothill Riparian, Lacustrine/Riverine and Fresh Emergent Wetland within the covered activities footprints outside the urban planning units.

This does not include acres affected as a result of spatially undefined operations and maintenance activities.

(Table 5-3)

5.6.5.1 Adverse Effects

Covered activities will remove up to 4 acres (1%) of the alkali prairie natural community in the Plan Area (Table 5-1, *Maximum Allowable Loss, Natural Communities*: Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). This loss will result from future widening of Road 102 and Road 25, and infrastructure installation and maintenance at the Woodland Regional Park. The infrastructure installation and maintenance include installation of a stormwater conveyance and pre-treatment system, maintenance and/or future upgrade of a well on the property, and construction of access to monitoring wells. In addition, road widening and infrastructure installation would add to the habitat fragmentation by increasing the existing spatial separation between areas supporting alkali prairie natural community. Implementation of *AMM9, Establish Buffers around Sensitive Natural Communities,* will minimize adverse effects on this natural community.

5.6.5.2 Beneficial Effects

The Yolo HCP/NCCP will place a conservation easement on 164 acres of open space supporting 33.7 acres of alkali prairie natural community at the Woodland Regional Park and incorporate this land into the reserve system. The Conservancy will prepare and implement a management and monitoring plan for this site. The framework will guide enhancement activities for alkali prairie natural community. It will focus specifically on controlling Italian ryegrass and other invasive species, implementing measures to restore hydrological functions of alkali prairie habitat, and maintaining adjacent habitat for pollinators. The Conservancy will monitor the enhanced sites to assess the effectiveness of these actions toward improving and expanding habitat for palmate-bracted bird's beak.

5.6.5.3 Net Effects

The Yolo HCP/NCCP will result in net loss of 1% (4 acres) of the alkali prairie natural community in the Plan Area (Table 5-4, *Natural Community Benefits and Net Effects*). With full HCP/NCCP implementation, 57% (174 acres) of the remaining alkali prairie natural community in the Plan Area will be protected with conservation easements on category 1 public and easement lands. These will be monitored and adaptively managed in the reserve system to sustain the ecological value of this natural community for covered species. The Yolo HCP/NCCP will result in a net benefit to the alkali prairie natural community. Fresh Emergent Wetlands Natural Community

The fresh emergent wetlands natural community accounts for 26,309 acres (five percent) of the Plan Area (Table 5-1, *Maximum Allowable Loss, Natural Communities*, Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). This natural community is most commonly found on level to gently rolling landscapes along rivers, lakes, and creeks, but can be found anywhere the topography allows perennial or seasonal soil saturation or flooding by fresh water. Perennially flooded areas are typically dominated by cattails, tule, and California bulrush that can reach up to 12 feet in height. Seasonally saturated or inundated areas contain much shorter vegetation and are more variable in their plant species composition. Dominant species in many lower elevation seasonal wetlands include Baltic rush, iris-leaved rush, and spikerushes. Additional detail on this natural community is provided in Chapter 2, Section 2.4.5.3, *Fresh Emergent Wetland Natural Community*.

Freshwater emergent wetlands east of the Dunnigan Hills and the Cache/Putah Basin are predominately found in managed waterfowl habitat that is flooded during the winter and dry during

the summer. A much smaller extent with the same winter-flooded hydrologic regime is associated with sewage treatment plants, the lower Willow Slough Bypass, and abandoned agricultural land in the lower Yolo Bypass. This natural community also includes small areas of unmanaged vegetation and areas that are inundated during the summer. Sedges and rushes dominate the emergent wetlands within the drainages located between the Blue Ridge and State Route 16, between Rocky Ridge and Interstate 5, and in the Dunnigan Hills. There are bulrush and cattail emergent wetlands in the Willow Slough Bypass just east of Davis, and alkali bulrush emergent wetlands in the lowlands just west of the Sacramento River Deep Water Ship Channel in southeast Yolo County.

5.6.5.4 Adverse Effects

Covered activities will permanently remove up to 88 acres (less than one percent) of fresh emergent wetlands natural community in the Plan Area (Table 5-1, *Maximum Allowable Loss, Natural Communities*; Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). Of this, 47 percent (42 acres) is expected to result from urban development in the West Sacramento planning unit (planning unit 21); the remaining development-related loss will likely be distributed among planning units 5, 11, 13, 15, and 17 (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*). Operations and maintenance activities will result in permanent loss of an estimated five acres of fresh emergent wetland (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*).

Fragmentation effects are expected to be minimal because the covered activities potentially affecting habitat are primarily at the edges of blocks of fresh emergent wetlands natural community.

Section 5.6.1.2, *Reduction in Function*, qualitatively describes other effects on this natural community that are common to all of the natural communities.

5.6.5.5 Beneficial Effects

The Yolo HCP/NCCP will protect 500 acres of unprotected fresh emergent wetland (Objective NC-FEW1.1; CM1) and restore up to 88 acres to result in no net loss of this natural community (Objective NC-FEW1.2; CM2) of fresh emergent wetland (Table 5-4, *Natural Community Benefits and Net Effects*). An additional 714 acres of fresh emergent wetlands on pre-permit reserve lands will be enrolled into the reserve system (Table 6-2(b); Appendix D, *Glossary of Terms*, provides a definition of pre-permit reserve lands). This natural community will be managed and enhanced in the reserve system (Objective NC-FEW1.3; CM3) to sustain and improve ecosystem values.

Conservation of the fresh emergent wetland natural community will provide numerous ecosystem benefits, including providing habitat for giant garter snake, tricolored blackbird, western pond turtle, and other native species dependent upon this natural community. A variety of native and nonnative freshwater invertebrates and resident fish species, waterfowl, pisciverous (fish-eating) birds, semi-aquatic mammals, and insectivorous birds inhabit or forage in the fresh emergent wetland natural community. Invertebrates and organic material produced in the fresh emergent wetland natural community supports the aquatic foodweb and production of food for native aquatic organisms. A wide variety of waterfowl and other birds migrating along the Pacific Flyway use the fresh emergent wetland natural community. Abundant and diverse plant and invertebrate populations in these wetlands provide important food resources for migrating waterfowl and many other wildlife species that forage in and over these wetlands.

5.6.5.6 Net Effects

Implementation of the Yolo HCP/NCCP will result in no net loss of the fresh emergent wetland natural community in the Plan Area as a result of covered activities, and will protect 500 acres of unprotected fresh emergent wetland (Table 5-4, *Natural Community Benefits and Net Effects*). With full implementation of the Yolo HCP/NCCP, 59 percent of the fresh emergent wetland natural community in the Plan Area will be conserved in Category 1 and 2 public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*), including baseline and newly protected lands. At least 1,250 acres of this natural community will be included in the Yolo HCP/NCCP reserve system (500 acres newly protected lands and 750 acres pre-permit reserve lands), and will be monitored and adaptively managed to sustain or improve values for covered and other native species. The Yolo HCP/NCCP will result in a net benefit to this natural community.

5.6.6 Lacustrine and Riverine Natural Community

The lacustrine and riverine natural community includes a variety of lakes, reservoirs, and ponds (lacustrine); rivers and streams (riverine); and other open-water land cover types such as stock ponds, stormwater detention ponds, and wastewater treatment ponds. The lacustrine and riverine natural community is designated as open water in the land cover database (Table 2-1, *Natural Communities and Other Land Cover Types*) and accounts for 13,493 acres in the Plan Area.

5.6.6.1 Adverse Effects

Covered activities will remove up to up to 236 acres (two percent) of lacustrine and riverine natural community in the Plan Area (Table 5-1, *Maximum Allowable Loss, Natural Communities*; Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). An estimated 72 percent (159 acres) of the lacustrine and riverine natural community loss will result from development in the urban planning units (planning units 19–22) (Figure 5-4, *Riparian and Wetlands, and Covered Activities Footprints*). Additional loss is expected to be distributed though planning units 3, 5, 7, 10, 11, and 13 through 15. Operations and maintenance activities are expected to result in permanent loss of an estimated 34 acres of lacustrine and riverine natural community (Table 5-3, *Loss of Natural Communities and Other Land Cover Types*).

Fragmentation effects are expected to be minimal because project proponents will implement avoidance measures and setbacks described in *AMM9, Establish Buffers around Sensitive Natural Communities* and *AMM10, Avoid and Minimize Effects on Wetlands and Waters* to protect wetlands and continuous stream corridors (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*).

Section 5.6.1.2, *Reduction in Function*, qualitatively describes other effects on this natural community that are common to all of the natural communities.

5.6.6.2 Beneficial Effects

The Yolo HCP/NCCP will protect at least 600 acres of unprotected lacustrine and riverine natural community (Objective NC-LR1.1; CM1), and will restore additional acres to result in no net loss of this natural community (Objective NC-LR1.2; CM2). The Yolo HCP/NCCP will restore at least 36 acres of aquatic habitat for California tiger salamander. Within the 600 acres of protected lacustrine and riverine natural community, the Conservancy will protect at least 36 acres of aquatic habitat for California tiger salamander. The remainder will provide habitat for western pond turtle, and

portions are expected to provide aquatic habitat for giant garter snake. This natural community will be managed and enhanced in the reserve system (Objective NC-LR1.3; CM3) to sustain its value for covered and other native species.

5.6.6.3 Net Effects

Implementation of the Yolo HCP/NCCP will result in no net loss of lacustrine and riverine natural community in the Plan Area (Table 5-4, *Natural Community Benefits and Net Effects*). Additionally, the Yolo HCP/NCCP will protect 600 acres of this natural community. With full implementation of the Yolo HCP/NCCP, an estimated 2,147 acres, comprising 16 percent of the lacustrine and riverine natural community in the Plan Area, will be conserved on Category 1 and 2 public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*), including baseline and newly protected lands. The Yolo HCP/NCCP will result in a net benefit to this natural community.

5.6.7 Other Land Cover Types

Covered activities will convert 6,087 acres of land cover types such as orchards and vineyards, eucalyptus, and barren and developed areas that do not fall within any of the natural community or seminatural community categories. Although the conservation strategy will not focus on these lands, many of them do have conservation value by providing open space for connectivity and buffers around development. Eucalyptus provides nesting opportunities for Swainson's hawk and white-tailed kite. The conservation strategy will protect, restore, manage, and enhance lands that provide greater habitat value than these other land cover types.

5.6.8 Natural Communities Not Affected by Covered Activities

Covered activities will not affect any of the following natural community types occurring in the Plan Area.

5.6.8.1 Serpentine

The Plan Area includes 247 acres of serpentine natural community, of which 162 acres (66 percent) are in Category 2 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). The 162 acres of open space include lands on UC Davis McLaughlin Reserve, and the Bureau of Land Management's (BLM) Cache Creek Natural Area within the Little Blue Ridge planning unit in the far northwestern corner of the Plan Area (Figure 5-3, *Grassland and Covered Activities Footprints*). This natural community is well represented on conserved lands in the Plan Area.

5.6.8.2 Chamise

The Plan Area includes 30,187 acres of chamise natural community, of which 1,040 acres are in Category 1 open space and 13,784 are in Category 2 baseline public and easement lands, for a total of 49 percent of this natural community occurring on Categories 1 and 2 public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). Chamise is a very common natural community type in California. The baseline public and easement lands supporting this natural community in the Plan Area consist mostly of the BLM's Cache Creek Natural Area, CDFW's Knoxville Wildlife Area, and Yolo County's Otis Ranch Open Space Park in the western and northwestern

portions of the Plan Area (Figure 2-7, *Distribution of Shrubland and Scrub Natural Communities in the Plan Area*). This natural community is well represented on conserved lands in the Plan Area.

5.6.8.2.1 Mixed Chaparral

The Plan Area includes 14,518 acres of mixed chaparral, of which 444 acres are in Category 1 baseline public and easement lands and 3,490 acres are in Category 2 baseline public and easement lands, for a total of 27 percent of this natural community type in Category 1 and 2 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). Mixed chaparral is a common natural community type in California. The open space lands supporting this natural community in the Plan Area consist mostly of the BLM's Cache Creek Natural Area and CDFW's Knoxville Wildlife Area (Figure 2-7, *Distribution of Shrubland and Scrub Natural Communities in the Plan Area*). This natural community is well represented on conserved lands in the Plan Area.

5.6.8.2.2 Oak and Foothill Pine Woodland

The Plan Area includes 43,772 acres of oak and foothill pine woodland natural community, of which 5,175 acres are in Category 1 baseline public and easement lands and 10,683 acres are in Category 2 baseline public and easement lands, for a total of 36 percent of this natural community in Category 1 and 2 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). Most of the open space supporting this natural community is on the Oak Ranch Property (protected through a conservation easement held by Rangeland Trust), BLM's Cache Creek Natural Area, and Audubon's Bobcat Ranch. This natural community is well represented on conserved lands in the Plan Area.

5.6.8.2.3 Blue Oak Woodland

The Plan Area includes 35,891 acres of blue oak woodland natural community, of which 6,118 acres are in Category 1 baseline public and easement lands and 3,490 acres are in Category 2 baseline public and easement lands, for a total of 27 percent of this natural community in Category 1 and 2 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). Most of the open space supporting this natural community is on the Oak Ranch Property (protected through a conservation easement held by Rangeland Trust), BLM's Cache Creek Natural Area, and Audubon's Bobcat Ranch. This natural community is well represented on conserved lands in the Plan Area.

5.6.8.2.4 Closed-Cone Pine-Cypress

The Plan Area includes 212 acres of closed-cone pine-cypress natural community, of which 209 acres (99 percent) are in Category 2 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*), primarily on BLM's Cache Creek Natural Area and on Audubon's Bobcat Ranch. This natural community is well represented on conserved lands in the Plan Area.

5.6.8.2.5 Montane Hardwood

The Plan Area includes 3,087 acres of montane hardwood natural community, of which 232 acres are in Category 1 baseline public and easement lands and 821 acres are in Category 2 baseline public and easement lands, for a total of 34 percent of this natural community in Category 1 and 2 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). The protected area are scattered among patches of oak woodland on BLM lands along the western edge of the Plan Area. This natural community is well represented on conserved lands in the Plan Area.

5.6.8.2.6 Valley Oak Woodland

The Plan Area includes 181 acres of valley oak woodland natural community, of which 20 acres (11 percent) are in Category 1 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). The Yolo HCP/NCCP will newly protect an additional 20 acres of this natural community type, for a total of 22 percent of this natural community being protected countywide (Table 5-4). With this additional protection, this natural community will be well represented on conserved lands in the Plan Area.

5.6.8.2.7 Vernal Pool Complex

The Plan Area includes 299 acres of vernal pool complex natural community, of which one acre is in Category 1 open space and 285 acres are in Category 2 open space, for a total of 96 percent of this natural community in Category 1 and 2 baseline public and easement lands (Table 5-4, *Natural Community Benefits and Net Effects*). These open space acres are within Yolo Bypass Wildlife Area, Davis Communications Facility, and the Yolo County Grasslands Regional Park Burrowing Owl Preserve. This natural community is well represented on conserved lands in the Plan Area.

5.7 Effects on Covered Species

Table 5-5, *Covered Species Habitat Loss*, provides the amount of habitat loss for each covered species, by habitat type and planning unit, and for both permanent and temporary loss. Table 5-6, *Covered Species Benefits and Net Effects*, provides the amount of habitat lost in relation to the amount of conservation for each species, in the context of total habitat and habitat in baseline public and easement lands. The sections below describe adverse, beneficial, and net effects of the Yolo HCP/NCCP on each covered species.

5.7.1 Palmate-Bracted Bird's Beak

The palmate-bracted bird's-beak habitat model is based on GIS digitization of the alkali prairie natural community in the Plan Area (Appendix A, *Covered Species Account*). This natural community was identified from current and historical soils maps, aerial imagery from 1933 and 1952, and current Google Earth imagery. Additional habitat was mapped in planning unit 13 using polygons supplied by CDFW. The total extent of palmate-bracted bird's-beak modeled habitat in the Plan Area is 312 acres (Table 5-2, *Habitat-Based Take Limits, Covered Species*).

Modeled habitat for palmate-bracted bird's-beak is located in two areas, one in the Colusa Basin Plains planning unit and a second that overlaps the Woodland and Willow Slough Basin planning units. Palmate-bracted bird's-beak has not been documented within the Colusa Basin Plains planning unit; however, the Woodland and Willow Slough Basin planning units support two known occurrences of palmate-bracted bird's-beak. One occurrence (California Natural Diversity Database [CNDDB] Element Occurrence #1) was originally documented in 1963 and has been surveyed on multiple occasions between 1981 and 2012 (CNDDB 2014). This occurrence is on protected land managed by the Center for Natural Lands Management for the benefit of palmate-bracted bird's-beak and other rare plants. The second occurrence (CNDDB Element Occurrence #27), located in Woodland Regional Park, was documented in 1996 (CNDDB 2014) and observed again in 2009 (UC

Davis Center for Plant Diversity 2009) and in 2015.[10] More specific detail on the habitat and ecology of palmate-bracted bird's-beak is provided in Appendix A, *Covered Species Accounts*.

5.7.1.1 Adverse Effects

5.7.1.1.1 Habitat Loss and Fragmentation

Habitat loss has been the primary cause of the range-wide decline of palmate-bracted bird's-beak (U.S. Fish and Wildlife Service 2009). Implementation of the covered activities will result in the removal of four acres of modeled habitat for palmate-bracted bird's-beak in the Yolo HCP/NCCP Plan Area (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Populations or individuals of the species within this habitat, however, will be avoided.

5.7.1.1.2 Reduction in Habitat Function

Habitat loss from spatially defined activities will result in a small, unquantified reduction of habitat function in the remaining habitat. Temporary ground disturbances and permanent long-term activities could result in a reduction in habitat function. The reduction in function could take the following forms.

Road Construction. Habitat disturbance associated with road construction and pipeline excavation activities would promote the spread of invasive plant species that compete with palmate-bracted bird's-beak and its host plants.

Runoff. The increased area of paved surfaces and installation of infrastructure promote changes in runoff patterns and provide opportunities for erosion and sedimentation into the habitat.

Recreation. The City of Woodland will build a new parking lot and staging area for trail access, create up to 3.1 miles of new foot trails accessible to hikers and mountain bikers, and potentially build a new education center on the Woodland Regional Park site. Recreational use on the site could result in trampling of palmate-bracted bird's beak. Equestrians will not be able to use the trail, however, due to the sensitive nature of habitat on the site and the potential for horses to stray from trails and harm rare plants.

The City of Woodland will closely monitor allowable recreational uses on the site to ensure compliance with the terms of the conservation easement and the protection of the conservation values of the site, including palmate-bracted bird's-beak populations. If there is evidence that recreational users stray from trails and may be disturbing rare plant populations, the City of Woodland will work with the Conservancy to design and implement recreational use restrictions or controls that will eliminate that disturbance. If despite these controls these disturbances continue, the City of Woodland may need to close or partially close recreational use on the site to ensure the maintenance of the site's conservation values, and to restore degraded areas. With these measures in place, the City of Woodland will protect palmate-bracted bird's-beak from recreation-related disturbances.

These disturbances reduce the amount of habitat suitable for use by palmate-bracted bird's-beak and reduce the resources available for the growth and reproduction of the species. Moreover,

[10] Zippin, D. B and P. Marchand. Personal observation during site visit to Woodland Regional Park, Woodland, CA, July 16, 2015. No plants were observed during a visit during the blooming season in 2016.

habitat fragmentation greatly reduces habitat function because it prevents the natural ebb and flow of the population into different parts of the habitat, which limits the amount of suitable habitat that is actually occupied by the species.

5.7.1.1.3 Harassment, Injury, or Mortality

Even if no palmate-bracted bird's-beak plants are currently present in a specific location, seeds may be present in the soil and could be lost when the habitat is removed. The covered activities will, however, avoid known locations of the plant, therefore minimizing the risk of affecting this species.

5.7.1.1.4 Impact of Take on the Species

On a species-wide basis, the amount of habitat lost will be quite small (<0.1 percent). Loss of this habitat is not expected to result in the direct loss of individual plants as populations and individual plants will be avoided, although undetected seeds present in the soil may be affected as described above. The avoidance of populations or individuals is important because only two population groups throughout the species' range (Delevan National Wildlife Refuge and Colusa National Wildlife Refuge) are large and relatively stable, both being protected and managed on federal lands (U.S. Fish and Wildlife Service 2009; California Department of Fish and Wildlife 2014). One group (at Sacramento National Wildlife Refuge) consists of three small populations, all of which were established via translocated seeds, and another group (at Mendota Wildlife Area/Alkali Sink Ecological Reserve) consists of two small populations, one of which was established via translocated seeds. Another group on private lands in western Madera County consisted of a few widely scattered individuals; the habitat at that location has been disked, and the population may no longer be present (California Department of Fish and Wildlife 2014). Habitat for the population located in Livermore is partially preserved, but no management activities have been implemented to maintain the population.

5.7.1.2 Beneficial Effects

The Yolo HCP/NCCP will benefit palmate-bracted bird's-beak by expanding the protected amount of palmate-bracted bird's-beak habitat in the Plan Area (alkali prairie), by enhancing the function of the protected habitat, and by maintaining the occupied habitat. Management and enhancement actions will increase the population of palmate-bracted bird's-beak at Woodland Regional Park. Overall, protecting 33 acres of alkali prairie will protect approximately 11 percent of the remaining habitat for palmate-bracted bird's-beak in the Plan Area.

5.7.1.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in a net one percent (four acres) loss of palmate-bracted bird's beak habitat in the Plan Area. The Yolo HCP/NCCP will place a conservation easement on 33 acres of habitat on Woodland Regional Park. With full implementation of the Yolo HCP/NCCP, 56 percent of the palmate-bracted bird's-beak habitat in the Plan Area will be protected on category 1 public and easement lands, and 100 percent of all occupied habitat in the Plan Area will be protected. Woodland Regional Park will be monitored and adaptively managed to improve values for palmate-bracted bird's-beak. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on palmate-bracted bird's-beak, to the maximum extent practicable, and will provide for the conservation of this species in the Plan Area.

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Table 5-5. Covered Species Habitat Loss[c]

		Permanent Loss from Covered Activities with a Spatially Defined Footprint by Planning Unit (acres)[f]																										
Covered Species	**Existing Acreage**	**Little Blue Ridge 1**	**North Blue Ridge 2**	**South Blue Ridge 3**	**Capay Hills 4**	**Dunnigan Hills 5[f]**	**Upper Cache Creek 6**	**Lower Cache Creek 7**	**Upper Putah Creek 8**	**Lowr Putah Creek 9**	**Hungry Hollow Basin 10**	**Willow Slough Basin 11**	**Colusa Basin 12**	**Colusa Basin Plains 13[f]**	**North Yolo Basin 14**	**South Yolo Basin 15**	**Yolo Basin Plains 16**	**North Yolo Bypass 17**	**Woodland 18**	**Davis 19**	**West Sacramento 20**	**Winters 21**	**Valley Landscape Unit 22**	**Total Perm. Loss in PUs**	**O&M Perm. Loss**	**Restoration**	**Total Perm. Loss**	**% Remaining**	**Total Temp. Loss**
Valley elderberry longhorn beetle																												
Riparian habitat	9,447	0	0	1	0	0	10	11	0	0	0	0	7	0	17	119	0	1	0	0	0	329	5	501	13	0	523	95%	0
Non-riparian habitat	3,932	0	0	0	0	0	0	6	0	0	0	0	0	0	0	21	0	0	0	0	0	32	2	60	1	0	61	98%	1
Total	**13,379**	**0**	**0**	**1**	**0**	**0**	**10**	**17**	**0**	**0**	**0**	**0**	**7**	**0**	**17**	**140**	**0**	**1**	**0**	**0**	**0**	**361**	**7**	**561**	**14**	**0**	**584**	**96%**	**1**
California tiger salamander																												
Aquatic breeding habitat	1,004	0	0	0	0	1	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	12	0	0	12	99%	1
Upland habitat	86,505	0	0	0	10	310	0	0	0	0	0	0	0	26	0	0	5	0	0	0	0	0	0	349	13	36	398	100%	1
Total	**87,509**	**0**	**0**	**0**	**10**	**311**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**36**	**0**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**361**	**13**	**36**	**410**	**100%**	**2**
Ponds - seasonal in aquatic breeding habitat (no. of ponds)	434	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	3	0		3	99%	0
Western pond turtle																												
Aquatic habitat	53,907	0	0	1	0	3	1	0	0	0	4	16	0	1	8	31	0	1	0	105	7	145	5	329	40	0	369	99%	31
Nesting and overwintering habitat	137,185	0	10	11	10	105	7	19	0	0	7	73	7	64	17	146	0	11	0	694	69	545	199	1,994	35	1,104	3,133	99%	112[c]
Total	**191,092**	**0**	**11**	**11**	**10**	**108**	**7**	**19**	**0**	**0**	**11**	**79**	**8**	**65**	**25**	**177**	**0**	**12**	**0**	**815**	**76**	**690**	**204**	**2,323**	**74**	**1,104**	**3,502**	**99%**	143
Ponds - perennial in aquatic habitat (no. of ponds)	1,003	0	1	1	1	1	0	0	0	0	0	2	0	0	0	2	0	0	0	2	0	8	1	19	0	0	19	98%	1
Ponds - perennial in nesting and overwintering habitat (no. of ponds)	149	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	5	0	0	5	97%	0
Total (no. of perennial ponds)	***1,152***	***0***	***1***	***1***	***1***	***1***	***0***	***0***	***0***	***0***	***0***	***2***	***0***	***1***	***0***	***2***	***0***	***0***	***0***	***2***	***0***	***12***	***1***	***24***	***0***	***0***	***24***	*98%*	*1*
Giant garter snake																												
Rice habitat	31,168	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	68	0	0	0	68	19	0	87	100%	0
Aquatic habitat	6,596	0	0	0	0	0	0	0	0	0	0	2	0	1	8	13	0	0	0	10	0	69	0	103	6	0	109	98%	1
Freshwater emergent habitat	25,897	0	0	0	0	1	0	0	0	0	0	0	0	10	0	17	0	1	0	0	0	42	0	71	4	0	76	100%	0
Active season upland movement	6,612	0	0	0	0	13	0	0	0	0	0	0	6	3	23	73	0	1	0	105	0	210	0	433	7	0	441	93%	3
Overwintering habitat	6,783	0	0	0	0	20	0	0	0	0	0	0	0	13	22	219	0	3	0	329	0	298	0	905	5	343	1,235	87%	5
Total	**77,056**	**0**	**0**	**0**	**0**	**34**	**0**	**0**	**0**	**0**	**0**	**2**	**6**	**27**	**52**	**322**	**0**	**6**	**0**	**511**	**0**	**610**	**0**	**1,584**	**42**	**343**	**1,966**	**98%**	**9**
Drainage miles	1,083																							20	37	0	57	95%	0
Swainson's hawk																												
Nesting habitat	15,673	0	0	0	0	4	2	6	0	0	1	12	5	23	7	24	0	0	0	36	32	361	66	580	71	0	651	94%	0
Natural foraging habitat	79,336	0	0	10	0	144	3	7	0	0	7	89	0	31	0	27	5	10	0	52	53	0	152	589	15	803	1,407	99%	22
Cultivated lands foraging habitat	214,078	0	0	6	0	1,396	25	391	0	0	447	1,893	173	24	255	304	0	34	0	1,400	582	1,810	358	9,099	65	236	9,399	96%	202
Total	**309,087**	**0**	**0**	**16**	**0**	**1,561**	**36**	**428**	**0**	**1**	**461**	**2,043**	**197**	**169**	**292**	**451**	**5**	**45**	**0**	**1,488**	**667**	**2,171**	**576**	**10,268**	**151**	**1,039**	**11,457**	**97%**	**224**
Nest trees	534	0	0	0	0	1	0	1	0	0	0	7	0	1	2	0	0	0	0	4	5	13	0	34[a]	3	37[a]	37[a]	93%	0

		Permanent Loss from Covered Activities with a Spatially Defined Footprint by Planning Unit (acres)[f]																										
Covered Species	**Existing Acreage**	**Little Blue Ridge 1**	**North Blue Ridge 2**	**South Blue Ridge 3**	**Capay Hills 4**	**Dunnigan Hills 5[f]**	**Upper Cache Creek 6**	**Lower Cache Creek 7**	**Upper Putah Creek 8**	**Lowr Putah Creek 9**	**Hungry Hollow Basin 10**	**Willow Slough Basin 11**	**Colusa Basin 12**	**Colusa Basin Plains 13[f]**	**North Yolo Basin 14**	**South Yolo Basin 15**	**Yolo Basin Plains 16**	**North Yolo Bypass 17**	**Woodland 18**	**Davis 19**	**West Sacramento 20**	**Winters 21**	**Valley Landscape Unit 22**	**Total Perm. Loss in PUs**	**O&M Perm. Loss**	**Restoration**	**Total Perm. Loss**	**% Remaining**	**Total Temp. Loss**
White-tailed kite																												
Nesting habitat	31,732	0	0	0	0	4	2	6	0	0	1	12	5	23	7	24	0	0	0	36	36	361	66	585	76	0	661	98%	0
Primary foraging habitat	101,758	0	11	10	0	221	10	89	0	0	80	492	40	28	0	197	5	10	0	481	179	279	216	2,347	26	236	2,609	98%	29
Secondary foraging habitat	134,740	0	0	6	0	843	18	316	0	0	378	1,480	135	32	256	135	0	34	0	1,209	400	1,584	300	7,125	41	803	7,969	95%	205
Total	**268,230**	**0**	**11**	**16**	**0**	**1,068**	**30**	**411**	**0**	**0**	**459**	**1,984**	**180**	**83**	**263**	**356**	**5**	**44**	**0**	**1,726**	**615**	**2,224**	**582**	**10,057**	**103**	**1,039**	**11,239**	**96%**	**234**
Western yellow-billed cuckoo																												
Nesting/foraging habitat	3,868	0	0	0	0	0	0	7	0	0	0	3	0	0	13	33	0	0	0	0	0	0	0	56	4	0	59	98%	0
Western burrowing owl																												
Primary habitat	37,694	0	0	0	0	147	0	13	0	0	8	158	0	26	0	28	5	10	0	52	55	0	110	612	13	236	861	98%	1
Other habitat	66,160	0	0	0	0	175	0	91	0	0	80	488	47	6	0	177	0	0	0	139	131	65	69	1,467	41	803	2,311	98%	218
Total	**103,854**	**0**	**0**	**0**	**0**	**322**	**0**	**104**	**0**	**0**	**88**	**646**	**47**	**32**	**0**	**205**	**5**	**10**	**0**	**192**	**186**	**65**	**178**	**2,079**	**54**	**1,039**	**3,172**	**98%**	**219**
Least Bell's vireo																												
Nesting/foraging habitat	4,719	0	0	0	0	0	0	11	0	0	0	0	7	0	17	0	0	1	0	0	0	0	0	36	3	0	39	98%	0
Bank swallow																												
Nesting habitat	962	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	0	37	100%	0
Tricolored blackbird																												
Nesting habitat	4,680	0	0	0	0	1	0	0	0	0	0	0	0	0	0	35	0	1	0	0	0	48	0	84	2	0	86	98%	0
Foraging habitat	261,133	0	11	16	10	1,219	24	154	0	0	193	1,385	41	46	212	255	5	29	0	1,391	408	1,996	439	7,832	80	1,030	8,942	97%	230
Total	**265,813**	**0**	**11**	**16**	**10**	**1,220**	**24**	**154**	**0**	**0**	**193**	**1,385**	**41**	**46**	**212**	**290**	**5**	**30**	**0**	**1,391**	**408**	**2,044**	**39**	**7,917**	**81**	**1,030**	**9,028**	**98%**	**230**
Palmate-bracted bird's beak																												
Habitat	312	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0	4	98%	0

Note

[a] Although the covered activities footprint overlaps with 37 Swainson's hawk nest trees, only 20 may be taken under the Permits. No more than the amount of nest trees specified herein for each Planning Unit may be taken, with the total not to exceed 20 nest trees.

[b] The Public Draft HCP/NCCP included the projected impacts of the Dunnigan Specific Plan within Planning Units 5 and 13. Since then, Yolo County has removed the Dunnigan Specific Plan from the County General Plan to allow for more incremental development of the Plan Area. While the Dunnigan Specific Plan is no longer a covered activity, the area remains a possible location for future development in Yolo County within the 50-year permit term because of its proximity to I-5 and the existing Dunnigan community, and its location outside of the floodplain, among other reasons. The Final HCP/NCCP maintains the location and amount of impact in the analysis in the event similar development is approved in the future.

[c] This table quantifies habitat directly removed as a result of covered activities, and does not include indirect effects such as habitat fragmentation, or other forms of take. Table 5-2(b) quantifies all take authorized under the Yolo HCP/NCCP, including habitat fragmentation (55 acres of upland habitat for California tiger salamander, 569 acres of upland habitat for western pond turtle, and 69 acres of upland habitat for giant garter snake).

[d] Nine acres of temporary effects on riparian habitat are treated as permanent.

[f] Discrepancies in totals for all planning units are due to rounding differences in the data.

Table 5-6. Covered Species Benefits and Net Effects[f]

	Existing Condition				Effect of HCP/NCCP Implementation				Outcome for Plan Area with HCP/NCCP Implementation			
Covered Species	**(A) Total Extent in Plan Area (acres)**	**(B) Existing Category 1 Public and Easement Lands (Protected Lands: acres)**	**(C) Existing Protected Category 2 Public and Easement Lands (acres)**	**(D) Total Existing Category 1 and 2 Public and Easement Lands (acres) B+C**	**(E) Permanent Loss (acres)**	**(F) Newly[f] Protected (acres)**	**(G) Restored (acres – assuming max. allowable loss)**	**(H) Pre-permit Reserve Lands (acres)[a]**	**(I) % Net Change (G-E)/A**	**(J) Total Category 1 and 2 Public and Easement Lands in Plan Area (acres, including restored) D+F+G**	**(K) Percent of Plan Area in Category 1 and 2 Public and Easement Lands J/(A-E)**	**(L) Total Reserve System (acres, HCP/NCCP monitored and adaptively managed) F+G+H**
Valley elderberry longhorn beetle												
Riparian habitat	9,447	423	1,165	1,588	523	1,600	576	10	Less than 1%	3,764	42%	2,186
Non-riparian habitat	3,932	284	208	492	61	0	0	120	-2%	492	13%	120
Total	**13,379**	**707**	**1,373**	**2,080**	**584**	**1,600**	**576**	**130**	**Less than 1%**	**4,256**	**33%**	**2,306**
California tiger salamander												
Aquatic breeding habitat	1,004	26	543	569	12	36	36	27	+2%	640	66%	99
Upland habitat	86,505	4,214	3,682	7,896	398	2,000	0	340	Less than 1%	9,896	11%	2,340
Total	**87,509**	**4,240**	**4,225**	**8,465**	**410**	**2,036**	**36**	**367**	**Less than 1%**	**10,536**	**12%**	**2,439**
Ponds - seasonal in aquatic breeding habitat (no. of ponds)	434	16	120	136	3	36	36	unknown	Less than 1%	208	48%	72+[b]
Western pond turtle												
Aquatic habitat	53,907	4,837	3,957	8,794	369	2,400	369	2,098	0%	11,543	22%	4,867
Nesting and overwintering habitat	137,185	14,460	20,691	35,151	3,133	3,475	0	978	-2%	38,626	29%	4,453
Total	**191,092**	**19,297**	**24,648**	**43,945**	**3,502**	**5,875**	**369**	**3,076**	**-2%**	**50,189**	**27%**	**9,320**
Giant garter snake												
Rice habitat	31,168	3,475	1,728	5,203	87	2,800	0	1,775	Less than 1%	8,003	26%	4,575
Aquatic habitat	6,596	574	551	1,125	109	420	109	140	0.0	1,654	25%	669
Freshwater emergent habitat	25,897	5,359	9,541	14,900	76	500	76	750	0.0	15,497	60%	1,326
Active season upland movement	6,612	628	1,285	1,913	441	1,160	0	130	-7%	3,073	50%	1,290
Overwintering habitat	6,783	409	1,524	1,933	1,235	2,315	0	115	-18%	4,248	77%	2,430
Total	**77,056**	**10,445**	**14,629**	**25,074**	**1,966**	**7,195**	**185**	**2,910**	**-2%**	**32,454**	**43%**	**10,290**
Swainson's hawk												
Nesting habitat	15,673	600	1,366	1,966	651	1,600	651	215	0%	4,217	28%	2,766
Natural foraging habitat	79,336	7,071	7,830	14,901	1,407	4,430	0	980	-2%	19,331	25%	5,365
Cultivated lands foraging habitat	214,078	6,387	1,821	8,208	9,399	14,362	0	3,600	-4%	22,570	11%	17,962
Total	**309,087**	**14,058**	**11,017**	**25,075**	**11,457**	**20,392**	**651**	**4,795**	**-3%**	**46,311**	**16%**	**26,031**
Nest trees	534	12	26	38	20	20		unknown	-4%	72	14%	20+
White-tailed kite												
Nesting habitat	31,732	3,214	1,449	4,663	661	1,600[c]	965	215	0%	7,228	23%	2,780
Foraging Habitat	236,498	9,848	5,581	15,429	10,578	18,792	0	3,330	-4%	34,221	15%	22,122
Total	**268,230**	**13,062**	**7,030**	**20,092**	**11,239**	**20,392**	**965**	**3,545**	**-4%**	**41,449**	**16%**	**23,902**
Western yellow-billed cuckoo												
Nesting/foraging habitat	3,868	350	812	1,162	59	500	60	135	0%	1,722	45%	695

Covered Species	Existing Condition				Effect of HCP/NCCP Implementation				Outcome for Plan Area with HCP/NCCP Implementation			
	(A) Total Extent in Plan Area (acres)	(B) Existing Category 1 Public and Easement Lands (Protected Lands: acres)	(C) Existing Protected Category 2 Public and Easement Lands (acres)	(D) Total Existing Category 1 and 2 Public and Easement Lands (acres) B+C	(E) Permanent Loss (acres)	(F) Newly[f] Protected (acres)	(G) Restored (acres – assuming max. allowable loss)	(H) Pre-permit Reserve Lands (acres)[a]	(I) % Net Change (G-E)/A	(J) Total Category 1 and 2 Public and Easement Lands in Plan Area (acres, including restored) D+F+G	(K) Percent of Plan Area in Category 1 and 2 Public and Easement Lands J/(A-E)	(L) Total Reserve System (acres, HCP/NCCP monitored and adaptively managed) F+G+H
Western burrowing owl												
Primary habitat	37,694	818	2,490	3,308	861	3,000	0	330	-2%	6,308	17%	3,330
Other habitat	66,160	1,351	1,546	2,897	2,311	2,500	0	770	-3%	5,397	8%	2,270
Total	**103,854**	**2,169**	**4,036**	**6,205**	**3,172[d]**	**5,500[d]**	**0**	**1,100[d]**	**-3%[d]**	**11,705**	**12%**	**6,600**
Least Bell's vireo												
Nesting/foraging habitat	4,719	359	925	1,284	39	600	608	110	+12%	2,492	53%	1,318
Bank swallow												
Nesting habitat	962	0	6	6	37	50	0	0	-4%	55	6%	50
Tricolored blackbird												
Nesting habitat	4,680	730	1,244	1,964	86	200	86	150	Less than 1%	2,260	49%	436
Foraging habitat	261,133	11,616	6,303	17,919	8,942	16,610	0.0	4,000	-3%	34,529	14%	20,610
Total	**265,813**	**12,346**	**7,547**	**19,893**	**9,028**	**16,810**	**86**	**4,150**	**-3%**	**36,789**	**14%**	**21,046**
Palmate-bracted bird's beak												
Habitat	312	141	0	141	4	33	0	141	1%	174	56%	174

[a] These acreages are estimated based on modeled habitat on baseline public and easement lands the Conservancy is most likely to enroll as pre-permit reserve lands.

[b] Number of ponds in pre-permit reserve lands are not currently known. There will be an estimated 28 ponds in the reserve system excluding pre-permit reserve lands, and there are expected to be more ponds include pre-permit reserve lands.

[c] To include at least two protected white-tailed kite nest trees.

[d] Within the affected western burrowing owl habitat, covered activities will displace no more than four occupied sites. Within the protected burrowing owl habitat, the Conservancy will protect at least two active burrowing owl nest sites, and will additionally protect two active nest sites for each nesting pair displaced, and one active nesting site or single owl site for each non-breeding single owl displaced by covered activities. See Section 6.3.4.9, *Western Burrowing Owl*, for more detail.

[e] The 112 acres of temporary effects on western pond turtle upland habitat include 40 acres of riparian natural community and 37 acres of barren that are not included in Table 5-1, *Maximum Allowable Loss, Natural Communities.* This is because the barren land cover type is not considered a natural community, and because temporary impacts to the riparian natural community are treated as permanent impacts on the natural community (due to the time it takes for riparian vegetation to recover). Components necessary to provide western pond turtle uplands would recover within one year, therefore the impact is treated as temporary for western pond turtle.

[f] This table addresses habitat protection and restoration, and does not address additional protection of covered species nest sites, breeding colonies, and other occupied areas as identified in Chapter 6, Table 6-2(c), Covered Species Occupancy Commitments.

5.7.2 Valley Elderberry Longhorn Beetle

The Plan Area includes 13,379 acres of modeled habitat for valley elderberry longhorn beetle, with 9,447 acres of riparian and 3,932 acres of nonriparian habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). The habitat model for valley elderberry longhorn beetle includes all land cover types in the valley foothill riparian natural community (riparian habitat) and all potentially suitable areas (described in Appendix A, *Covered Species Accounts*) within 250 feet of modeled riparian habitat (nonriparian habitat). Historically, valley elderberry longhorn beetle habitat included valley oak woodland which were more widespread than riparian habitat, but the current habitat distribution consists of these riparian corridors and adjacent lands. The model overestimates the actual amount of potentially occupied valley elderberry longhorn beetle habitat in the Plan Area, because only those riparian areas supporting elderberry shrubs are capable of supporting the species, and beetles are only expected to occupy a small proportion of those shrubs at any given time.

Occupied valley elderberry longhorn beetle habitat has been documented in numerous locations throughout the Sacramento River corridor (Eya 1976; Jones & Stokes 1985, 1986, 1987a, 1987b; U.S. Fish and Wildlife Service 1984; Barr 1991; Collinge et al. 2001) as well as along Putah Creek from Monticello Dam east to Davis (Eya 1976; U.S. Fish and Wildlife Service 1984; Barr 1991; Collinge et al. 2001) and along Cache Creek (Barr 1991). The population size and locations of this species in the Plan Area are not fully known, however, because the few surveys for the species in Yolo County have not been comprehensive; known occurrences throughout the species' range are based mostly on incidental observations (e.g., CNDDB). The distribution of elderberry shrubs in modeled habitat in the Plan Area cannot be determined at this time but will be determined during planning-level surveys (Table 4-1, *Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species*).

5.7.2.1 Adverse Effects

5.7.2.1.1 Habitat Loss and Fragmentation

Habitat loss is one of the greatest threats to valley elderberry longhorn beetle (Talley et al. 2006). Covered activities will remove up to 523 acres (five percent) of valley elderberry longhorn beetle riparian habitat in the Plan Area and up to 61 acres (two percent) of valley elderberry longhorn beetle nonriparian habitat in the Plan Area (Table 5-2, *Habitat-Based Take Limits, by Covered Species*).[11] Bridge construction activities will result in temporary loss of up to one acre of non-riparian valley elderberry longhorn beetle habitat (Table 5-5, *Covered Species Habitat Loss*).

This section reports riparian and nonriparian habitat loss separately, because riparian habitat likely has higher value for the valley elderberry longhorn beetle, even though historically the species' habitat was widespread in valley oak woodlands extending far beyond riparian areas. The greatest expected habitat losses resulting from covered activities are in the West Sacramento planning unit and South Yolo Basin planning unit (planning units 21 and 15). Approximately 64 percent of the riparian (329 acres) and 52 percent of the nonriparian (32acres) habitat loss is expected to occur in

[11] The accounting of loss of modeled species habitat is based on estimates of development throughout the permit term. Actual loss by habitat type is likely to vary from these estimates. Loss of species habitat is limited by the Permits to the total amounts listed in Table 5-2(a), not by covered activity type.

the West Sacramento planning unit as a result of urban development and levee improvements. Approximately 23 percent of riparian (119 acres) and 34 percent of nonriparian (21 acres) habitat loss is expected to occur in the South Yolo Basin planning unit, much of which will result from development within the unincorporated community of Clarksburg. Operations and maintenance are expected to permanently remove an estimated 13 acres of riparian habitat and one acre of nonriparian habitat.

Although the distribution of valley elderberry longhorn beetle in modeled habitat in the Plan Area is not well known, numerous occurrences of this species have been recorded in the Lower Cache Creek and West Sacramento planning units (Eya 1976; Jones & Stokes 1985, 1986, 1987a, 1987b; U.S. Fish and Wildlife Service 1984; Barr 1991; Collinge et al. 2001; California Department of Fish and Game 2000), where a majority of the habitat loss will occur. Projects will be designed to avoid elderberry shrubs, if feasible. Unavoidable elderberry shrubs will be transplanted consistent with USFWS guidelines (Table 4-1, *Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species*).

Conservation actions will be designed to avoid removal of elderberry shrubs. Therefore, no removal of any elderberry shrubs is expected from conservation actions.

Habitat fragmentation is a known threat to valley elderberry longhorn beetle. Colonization of isolated sites or drainages is constrained by the limited ability of the species to disperse to these areas from occupied sites (Collinge et al. 2001). Development activities in the West Sacramento planning unit could fragment habitat where valley elderberry longhorn beetle is known to occur. Cache Creek Resources Management Plan activities are not expected to fragment valley elderberry longhorn beetle habitat, because the riparian corridors will remain intact, and the Cache Creek Resources Management Plan has restored and enhanced and will continue to restore and enhance riparian areas to provide continuous stretches of this natural community. Avoidance requirements for valley foothill riparian natural community and elderberry shrubs (Table 4-1, *Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species*) are expected to minimize the potential for valley elderberry longhorn beetle habitat fragmentation.

5.7.2.1.2 Reduction in Habitat Function

Covered activities could result in reduction in valley elderberry longhorn beetle habitat function in the following ways.

Dust. Temporary ground disturbances and permanent long-term activities (e.g., use of dirt trails in reserves and parks covered in the HCP/NCCP) could generate dust that could adversely affect adjacent valley elderberry longhorn beetle habitat. Dust is listed in the valley elderberry longhorn beetle recovery plan as a threat to the species (U.S. Fish and Wildlife Service 1984); however, one study indicates that dust deposition was not correlated with valley elderberry longhorn beetle presence (Talley et al. 2006), although dust was weakly correlated with elderberry stress symptoms (water stress, dead stems, smaller leaves). During times of drought, when elderberry shrubs are under stress, dust deposition could further stress the shrubs, potentially leading to their death. This loss of shrubs would adversely affect valley elderberry longhorn beetle (Talley and Hollyoak 2009).

Exhaust. Exhaust from construction and maintenance vehicles associated with covered activities may result in increases in particulates, heavy metals, and mineral nutrients that could influence the quality and quantity of elderberry shrubs and thereby affect beetle presence and abundance. The

results of a study by Talley and Hollyoak (2009) showed no relationship, however, between the distance of the shrubs from highways and the presence and abundance of the beetle.

Noise, Vibrations, and Lighting. Temporary noise, vibrations, and lighting from construction, operations and maintenance activities, and restoration and enhancement activities, and permanent noise, vibrations, and lighting from urban and rural development could adversely affect valley elderberry longhorn beetle. The effects of lighting on valley elderberry longhorn beetle are unknown, although insects are known to be subject to heavy predation when they are attracted to night lighting (Rich and Longcore 2006).

Argentine Ant. Permanent urban and rural development could result in introduction of the invasive Argentine ant (*Linepithema humile*) and spread into nearby valley elderberry longhorn beetle habitat. These ants spread rapidly in urbanized areas because of the increased availability of water in landscaped yards, and they spread from urbanized areas into nearby riparian vegetation. The Argentine ant poses a significant threat to valley elderberry longhorn beetle (Huxel et al. 2003; Talley et al. 2006). The ant enters the exit hole that the beetle makes prior to pupation and preys on the larva (Huxel et al. 2003). The invasion of riparian systems by the Argentine ant has continued to spread, and the species has affected valley elderberry longhorn beetle populations along Putah Creek in Yolo County (Huxel 2000).

Project proponents will minimize effects related to reduction in habitat function in areas surrounding covered activities through establishment of 100-foot buffers around shrubs (Table 4-1, *Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species*).

These effects may also occur as a result of ongoing agricultural practices on reserve system lands. Farmers will not remove elderberry shrubs from reserve system lands unless shrubs establish in areas where they will interfere with the economic use of the property, and they will maintain a 100-foot buffer around elderberry shrubs on these lands where possible, as described in Section 4.3.5.1, *Valley Elderberry Longhorn Beetle.* There may be cases, however, where maintaining such a buffer would interfere with agricultural practices (e.g., if existing access road or existing cultivated lands are within 100 feet of a shrub). This would be an ongoing effect and would not be expected to reduce habitat value below baseline conditions.

5.7.2.1.3 Harassment, Injury, or Mortality

Operation of equipment and vehicles to implement covered activities (e.g., construction of urban and rural development, operations and maintenance activities, and conservation actions) could result in removal of elderberry shrubs and mortality of valley elderberry longhorn beetle. Individual shrubs and beetles could be removed or crushed by moving construction-related equipment or suffer mortality from the accidental discharge of contaminants associated with equipment operation near shrubs. These effects will be minimized through implementation of measures to identify and avoid habitat for the valley elderberry longhorn beetle, and to transplant elderberry shrubs, consistent with the HCP/NCCP avoidance and minimization measures (*AMM12, Minimize Take and Adverse Effects on Habitat of Valley Elderberry Longhorn Beetle*; Table 4-1, *Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species*).

5.7.2.1.4 Impact of Take on the Species

The valley elderberry longhorn beetle occurs throughout the Central Valley. There are 201 extant CNDDB occurrences of valley elderberry longhorn beetle in California, 18 of which (nine percent range-wide) are in the Plan Area (Appendix A, *Covered Species Accounts*).

The Plan Area supports an estimated 13,379 acres of modeled valley elderberry longhorn beetle habitat (habitat that has potential to support the species' host plant), including 9,447 acres of riparian habitat and 3,932 acres of nonriparian habitat. Of this, covered activities will permanently remove up to 576 acres (four percent) of habitat, including 523 acres (four percent) of riparian habitat and 61 acres (less than one percent) of nonriparian habitat. Since modeled habitat does not necessarily support the species' host plant, which is required for occupancy, the loss of modeled habitat as described above overestimates the actual extent of habitat loss for this species. As the habitat model for this species overestimates the area that is actually suitable for this species habitat loss is also overestimated. Valley elderberry longhorn beetle populations are known to be present in the Lower Cache Creek and West Sacramento planning units, however, where most of the habitat loss is expected to occur. Take resulting from habitat loss and other adverse effects, described above, is not expected to result in an adverse impact on the long-term survival and recovery of the valley elderberry longhorn beetle for the following reasons.

- The Plan Area represents approximately 10 percent of the species' range-wide distribution.
- Most (65 percent) of the habitat loss is nonriparian habitat, which has lower value for valley elderberry longhorn beetle than riparian habitat.
- The amount of modeled riparian habitat that will be lost is a small fraction (three percent) of the total modeled riparian habitat in the Plan Area.
- Yolo County's implementation of the Cache Creek Resources Management Plan has resulted in the establishment of thousands of valley elderberry shrubs along the Cache Creek corridor: the Yolo HCP/NCCP will build off of this effort to provide large, contiguous patches of valley elderberry longhorn beetle habitat in this area.
- Lower Putah Creek Coordinating Committee efforts have resulted the increase of thousands of elderberry shrubs along the Putah Creek corridor. They grow elderberry plants at their nursery and establish them along the creek corridor using safe harbor agreements with USFWS. Yolo HCP/NCCP will build off of this effort to provide large, contiguous patches of valley elderberry longhorn beetle habitat in this area.
- Projects will be designed to avoid effects on elderberry shrubs, where feasible, and to transplant unavoidable shrubs to riparian areas in the reserve system and restore habitat within the reserve system.

5.7.2.2 Beneficial Effects

The Yolo HCP/NCCP will protect, restore, and enhance corridors of valley elderberry longhorn beetle riparian habitat that are spatially distributed to provide landscape-level connectivity among protected habitats (Objectives L1.3, L1.5, L1.6, NC-VFR1.1, NC-VFR1.2, NC-VFR1.3). Habitat connectivity is a critical factor for the valley elderberry longhorn beetle due to the species' poor dispersal abilities (Collinge et al. 2001). The Yolo HCP/NCCP will protect at least 1,600 acres and restore up to 576 acres of valley foothill riparian natural community in the Plan Area (Objectives NC-VFR1.1 and NC-VFR1.3; Table 5-6, *Covered Species Benefits and Net Effects*). Most of this

protection and restoration will occur in the areas with the highest concentrations of valley elderberry longhorn beetle occurrences in the Plan Area: the Lower Cache Creek planning unit and Lower Putah Creek planning unit (planning units 7 and 9).

When siting valley foothill riparian natural community protection, the Yolo HCP/NCCP will prioritize areas that support elderberry shrubs and that are connected to occupied or potentially occupied habitat (Objective VELB1.1). This will provide habitat to accommodate potential future expansion of the valley elderberry longhorn beetle population.

In addition, valley foothill riparian natural community restoration will expand the availability of suitable habitat by establishing elderberry shrubs consistent with USFWS 1999 guidelines (Objective VELB1.2). As described in the USFWS guidelines, the number of elderberry shrubs to be planted will depend on the number of elderberry stems one inch in diameter or greater removed by covered activities, and whether or not the stems removed show signs of occupancy by valley elderberry longhorn beetle (occupied stems have a higher replacement ratio than unoccupied stems). The Yolo HCP/NCCP will protect valley elderberry longhorn beetle habitat within a larger connected system of reserves to accommodate potential future shifts in its distribution in response to changed environmental conditions (e.g., effects of climate change on the future distribution of valley elderberry longhorn beetle habitat).

5.7.2.3 Net Effects

Implementation of the Yolo HCP/NCCP will result in an estimated net increase of 53 acres (576 acres restored and 523 acres lost, or less than one percent increase) of valley elderberry longhorn beetle riparian habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full HCP/NCCP implementation, 42 percent of the valley elderberry longhorn beetle habitat in the Plan Area will be conserved on Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including baseline and newly protected lands. At least 1,600 acres of these Category 1 and 2 public and easement lands will be newly protected and incorporated into the reserve system. The Conservancy will monitor and adaptively manage all reserve system lands to sustain populations of valley elderberry longhorn beetle and their habitat (Table 5-6, *Covered Species Benefits and Net Effects*).

The habitat that will be lost as a result of covered activities is widely distributed throughout the Plan Area, and only a small fraction of it supports elderberry shrubs. While some proportion of the affected habitat likely does not support elderberry shrubs, the habitat to be restored will include elderberry shrubs and is therefore much more likely to support valley elderberry longhorn beetle than the habitat lost. Moreover, these shrubs will be planted near sites the species is known to occupy. Restoring suitable habitat near occupied areas is necessary to expand populations of valley elderberry longhorn beetle because of the species' poor dispersal ability. Additionally, shrubs that are removed will be transplanted to restoration sites, many of which will continue to provide suitable habitat for the species despite being counted as lost habitat. Therefore, although there is only a small net gain in habitat amount (53 acres), the net gain to the population is expected to be substantial because transplanting will minimize losses, and restoration will provide the highest-value habitat most likely to be colonized by the species. These measures are expected to offset any population effects resulting from covered activities and to facilitate expansion of valley elderberry longhorn beetle populations in the Plan Area.

Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the valley elderberry longhorn beetle through the increase in available habitat adjacent to known occupied habitat. These restored areas will be protected, and will be managed and monitored to support the species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on valley elderberry longhorn beetle, to the maximum extent practicable, and will provide for the conservation of this species in the Plan Area.

5.7.3 California Tiger Salamander

The Plan Area includes 87,509 acres of modeled habitat for California tiger salamander, with 1,004 acres of aquatic breeding habitat and 86,505 acres of upland habitat (Table 5-2*, Habitat-Based Take Limits, by Covered Species*). The modeled aquatic breeding habitat consists of all mapped vernal pools, alkali prairies, and ponds (except those known to be perennial[12]) that occur below an elevation of 1,509 feet. The modeled upland habitat consists of all potentially suitable upland land cover types such as grassland and oak woodland (Appendix A, *Covered Species Accounts*) within 1.3 miles of modeled aquatic habitat and below an elevation of 1,509 feet. The North Yolo Basin, South Yolo Basin, and West Sacramento planning units (planning units 14, 15, and 21) were excluded from the model because they are isolated from occupied habitat and unlikely to be occupied in the future due to limited available suitable habitat and substantial movement barriers. Upland habitat in the Yolo Bypass is suitable dispersal habitat but is considered to be generally unsuitable as aestivation habitat because of frequent flooding.

Known occurrences of California tiger salamander in the Plan Area include one occurrence near the southern end of the Capay Hills planning unit (planning unit 4), one occurrence at the western edge of the Colusa Basin Plains planning unit (planning unit 13), and four occurrences at the northern end of the Dunnigan Hills planning unit (planning unit 5).

5.7.3.1 Adverse Effects

5.7.3.1.1 Habitat Loss and Fragmentation

Habitat loss and fragmentation are considered the most significant threat to California tiger salamander throughout its range (Twitty 1941; Hansen and Tremper 1993; Shaffer et al. 1993; Jenning and Hayes 1994; Fisher and Shaffer 1996; Launer and Fee 1996; Loredo et al. 1996; Davidson et al. 2002). Covered activities will permanently remove up to 12 acres (one percent) of California tiger salamander aquatic breeding habitat and up to 398 acres (less than one percent) of the California tiger salamander upland habitat in the Plan Area (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Operations and maintenance activities may result in additional temporary loss of up to one acre of aquatic habitat and one acre of upland habitat for California tiger salamander.

The greatest loss of habitat is expected to occur in the Dunnigan Hills area. Unincorporated community development in the Dunnigan Hills and Colusa Basin Plains planning units (planning units 5 and 13) within the Dunnigan growth boundary will result in an estimated 11 acres of aquatic habitat loss and 336 acres of upland habitat loss. These amounts make up approximately 92 percent of the total aquatic habitat loss and 96 percent of the total upland habitat loss anticipated to occur due to covered activities. The majority of California tiger salamander occurrences in the Plan Area

[12] Perennial ponds are not included as habitat as they may harbor invasive species that exclude California tiger salamander.

(five out of six) were recorded in these planning units. While covered activities will not remove any of these current occurrences, rural development within the Dunnigan growth boundary will occur in the location of an extirpated occurrence. There is also a known occurrence in the vicinity of the Capay Hills planning unit (planning unit 4), where an estimated five percent (10 acres) of the upland habitat loss will occur.

Conservation actions could result in the conversion of up to 10 acres of California tiger salamander upland habitat (e.g., grassland) to aquatic habitat to meet no net loss of aquatic California tiger salamander aquatic habitat in the Plan Area.

Ascent Environmental assessed the effects of fragmentation that would potentially result from California tiger salamander breeding habitat being removed from surrounding upland habitat (Appendix O, *Fragmentation Effects*). They identified upland habitat within 1.2 miles of the 12 acres of aquatic habitat that will be removed. They deducted the upland habitat acreage that would be directly removed by covered activities. Of the habitat that would remain after loss resulting from covered activities, they identified areas that would remain within 1.2 miles of another source of aquatic habitat. They estimated that with the removal of 12 acres of aquatic habitat, there would no longer be aquatic habitat within 1.2 miles of approximately 55 acres of upland habitat.

5.7.3.1.2 Reduction in Habitat Function

Covered activities in the vicinity of California tiger salamander habitat may reduce the function of the habitat for this species. Construction and operations and maintenance activities will have a temporary effect, while the ongoing disturbance resulting from occupation of developed areas will have a permanent effect. The following factors may reduce California tiger salamander habitat functions.

Noise, human activity, and vibrations. Noise, human activity, and vibrations associated with construction and maintenance-related operation of equipment and with ongoing occupation of developed areas could cause California tiger salamander to avoid the affected habitat thereby reducing the function of the habitat. Additionally, lighting could affect the nocturnal activity patterns of California tiger salamander. These effects are not cited as stressors on the species, however, and the effects of these mechanisms on California tiger salamander are unknown.

Introduction of nonnative wildlife. One of the primary threats to California tiger salamander is the introduction of nonnative wildlife into its habitat (Fisher and Shaffer 1996). The increase in human populations in development near California tiger salamander habitat will increase opportunities for introduction of these nonnative species. Mosquitofish (*Gambusia affinis*) are often introduced into ponds by vector control agencies to eliminate mosquitos near areas populated by humans. There is evidence that mosquitofish prey directly on California tiger salamander larvae (Leyse and Lawler 2001). Fish that are introduced inadvertently or for recreational fishing, such as bass, green sunfish, carp, fathead minnow, and bullhead, may compete with California tiger salamanders for food, and prey on the larvae (Shaffer et al. 1993). Introduced bullfrogs are a known stressor that in some cases eliminates California tiger salamanders from ponds; bullfrogs also compete for food and prey on the larvae (Shaffer et al. 1993).

Domestic dogs and cats. Domestic dogs and cats that accompany unincorporated community development in the rural community growth boundaries may reduce the function of California tiger salamander habitat (Cook and Northen 2001 in Center for Biological Diversity 2001). Dogs can dig

up rodent burrows being used by aestivating California tiger salamanders. Both dogs and cats hunt rodents that create burrows for California tiger salamanders.

Pesticides and herbicides. Pesticides and herbicides may enter California tiger salamander habitat from adjacent covered operations and maintenance activities, or from nearby urban or rural development. Pesticides and herbicides may adversely affect California tiger salamander habitat (U.S. Fish and Wildlife Service 2000b). Pesticide and herbicide use, however, is not a covered activity under the Yolo HCP/NCCP.

Hydrologic alterations. The increase in impermeable surfaces and other hydrologic alteration resulting from urban and rural development could cause increased runoff into nearby habitat areas and sedimentation. Increased sedimentation can degrade California tiger salamander habitat by filling pools and reducing the salamanders' ability to detect aquatic food items (U.S. Fish and Wildlife Service 2000b).

Urban runoff. Occupancy of new developments could increase the amount of pollutants such as grease, oil, detergents, and lawn pesticides transported from residences into aquatic habitat during wet weather. Traffic along new roads and higher traffic volumes on widened roads could also increase the amount of petroleum-based pollutants (e.g., oil) transported from road surfaces to aquatic habitats during wet weather. These pollutants can affect California tiger salamander prey populations. Pollutants that potentially injure or kill California tiger salamanders are described in Section 5.7.3.1.3, *Harassment, Injury, or Mortality*.

Rodent control. Measures to control California ground squirrel and pocket gopher could reduce the availability of upland burrows for use by California tiger salamanders (Loredo-Prendeville et al. 1994). Rodententicides will not be an allowed use in the reserve system for natural (non-cultivated) lands. Use of rodenticides is not a covered activity under the Yolo HCP/NCCP.

Fire break maintenance. Management of some reserves may require establishment and maintenance of new fire breaks. Maintenance of fire breaks (i.e., mowing, crushing) is primarily expected to retain the existing land cover (e.g., grassland); mowing of fire breaks during the dry season, however, could alter the vegetation structure. Although this would not eliminate California tiger salamander habitat, it could reduce its function of providing cover. On the other hand, tall vegetation can impede California tiger salamander movement, and mowing could therefore improve upland dispersal habitat for this species. Although conservation actions could result in short-term reduction in California tiger salamander habitat function, they will provide for long-term enhancement of habitat function.

Implementation of *AMM13, Minimize Take and Adverse Effects on California Tiger Salamander,* will minimize the reduction in habitat function as a result of covered activities.

5.7.3.1.3 Harassment, Injury, or Mortality

Equipment and vehicles operated to implement covered activities (e.g., construction of urban and rural development, operations and maintenance activities, and conservation actions) could crush or strike individual California tiger salamanders, resulting in injury or mortality. Outside of the breeding season, California tiger salamanders typically aestivate in rodent burrows; consequently, the likelihood of construction equipment or vehicles crushing or striking individuals is low during this period. With the exception of the Dunnigan Specific Plan Area (Figure 3-1, *General Plan Land Use in the Plan Area*), which is located adjacent to known occupied California tiger salamander habitat in

the Capay Hills planning unit, the covered activities will be implemented in areas that are not currently known to be occupied by California tiger salamander. Therefore, the likelihood for injury or mortality of individuals is considered to be low.

Over the long-term, traffic associated with new developments and operations and maintenance activities could injure or crush salamanders present on road surfaces. In addition, predation caused by increased numbers of nonnative species associated with occupancy of new permanent developments could result in harassment, injury, or mortality of the species.

Accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) into aquatic habitats could result in harassment, injury, or mortality of individual eggs, larvae, juvenile, and adult California tiger salamander through changes in aquatic habitat structure and conditions. Oil and hydrocarbon contaminants in runoff have been detected in ponds adjacent to roads and were linked to die-offs of and deformities in California tiger salamanders (U.S. Fish and Wildlife Service 2000b).

Implementation of *AMM13, Minimize Take and Adverse Effects on California Tiger Salamander,* will minimize the harassment, injury, or mortality of California tiger salamander as a result of covered activities.

California tiger salamanders may disperse onto cultivated lands on the reserve system from nearby habitat. To minimize harassing, injuring, or killing salamanders as a result of normal agricultural practices on these lands, the Conservancy will avoid acquisition of California tiger salamander reserve lands within 1.3 miles (California tiger salamander dispersal distance) of cultivated lands acquired for the reserve system unless pre-approved by the wildlife agencies (Section 6.4.1.8.4, *California Tiger Salamander.*

5.7.3.1.4 Impact of Take on the Species

In the Central Valley and surrounding Sierra Nevada foothills, the California tiger salamander occurs from northern Yolo County southward to northwestern Kern County and northern Tulare and Kings Counties. Along the coastal regions of California, the species occurs from southern San Mateo County south to San Luis Obispo County, with isolated populations in Sonoma and northwestern Santa Barbara Counties. Throughout California, 1,003 California tiger salamander occurrences have been documented, six of which (less than one percent range-wide) are in the Plan Area (Appendix A, *Covered Species Accounts*).

The Plan Area supports an estimated 87,509 acres of modeled California tiger salamander habitat, including 1,004 acres of aquatic habitat and 86,505 acres of upland habitat. Of this, covered activities will permanently remove up to 398 acres of upland dispersal and aestivation habitat and up to 12 acres of aquatic breeding habitat (Table 5-5, *Covered Species Habitat Loss*). Take resulting from this habitat loss and other adverse effects, described above, is not expected to result in an adverse impact on the species' long-term conservation in the Plan Area for the following reasons.

- The Plan Area includes less than one percent of the range-wide number of occurrences of this species.
- Covered activities will remove a small proportion (less than one percent) of the modeled habitat in the Plan Area and will not remove any critical habitat (for critical habitat analysis, see Section 5.9, *Critical Habitat*).

- Indirect and fragmentation effects are expected to be minimal because the covered activities potentially affecting habitat are primarily at the edges of large habitat blocks.

5.7.3.2 Beneficial Effects

The Yolo HCP/NCCP will protect 4,430 acres of grassland natural community (Objective NC-AG1.1), at least 2,000 acres of which will be sited in California tiger salamander modeled upland habitat in the Dunnigan Hills planning unit (Objective NC-AG1.2) (Table 5-6, *Covered Species Benefits and Net Effects*). The Yolo HCP/NCCP will also protect at least 36 acres of aquatic California tiger salamander habitat in association with the 2,000 acres of protected upland habitat (Objective CTS1.2; Table 5-6, *Covered Species Benefits and Net Effects*). Additionally, the Yolo HCP/NCCP will restore (or create, if restoration opportunities are limited) at least one acre of aquatic habitat for each acre lost, and an additional 24 acres of aquatic habitat independent of effect, for a total of 36 acres of aquatic restoration if all loss occurs. The Yolo HCP/NCCP will conserve at least five breeding pools supporting California tiger salamander. The Yolo HCP/NCCP will manage and enhance the functions of the protected and restored habitat by maintaining or increasing the abundance of native burrowing rodents that provide burrow habitat for California tiger salamander (Objective CTS1.4) and by controlling nonnative predator populations (CTS1.4). Achievement of these objectives will substantially benefit the California tiger salamander by providing a large, interconnected reserve system that is managed and enhanced to sustain this species in the Plan Area.

5.7.3.3 Net Effects

With full HCP/NCCP implementation, 66 percent of the aquatic habitat and 11 percent of the upland habitat in the Plan Area will be conserved in Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including baseline and newly protected lands. Of all the Category 1 and 2 public and easement lands, at least 36 acres of aquatic habitat and 2,000 acres of upland habitat will consist of newly protected lands. All lands in the reserve system supporting California tiger salamander habitat will be monitored and adaptively managed to sustain habitat values for this species. Full implementation of the Yolo HCP/NCCP will result in a net two percent increase of California tiger salamander aquatic habitat and less than a one percent net decrease in upland habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*).

Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the California tiger salamander through the assembly of a reserve system and conservation that is managed and monitored to support the species on critical habitat consistent with the species' recovery needs. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on California tiger salamander, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.7.4 Western Pond Turtle

The Plan Area includes 191,092 acres of modeled habitat for the western pond turtle, with 53,907 acres of aquatic habitat and 137,185 acres of upland habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). The aquatic habitat includes five land cover types: water, bulrush-cattail wetland alliance, bulrush-cattail freshwater marsh super alliance, alkali bulrush-bulrush brackish marsh super alliance, and rice. The nesting and overwintering habitat includes all undeveloped upland vegetation land cover types between 1,312 and 1,630 feet from aquatic habitat (Holland 1994). Additional detail on the habitat model is provided in Appendix A, *Covered Species Accounts*.

The distribution of western pond turtles throughout suitable habitat in the Plan Area is not well known. The species has been documented in Lower Putah Creek planning unit (planning unit 9), Lower Cache Creek planning unit (planning unit 7), and in the Willow Slough Bypass in the Willow Slough Basin planning unit (planning unit 11).

5.7.4.1 Adverse Effects

5.7.4.1.1 Habitat Loss and Fragmentation

The most significant threats to the western pond turtle are the continuing loss, degradation, and fragmentation of occupied habitat (U.S. Fish and Wildlife Service 1992; Holland pers. comm.). Covered activities will result in loss of up to 3,502 acres of western pond turtle habitat, including up to 369 acres of aquatic habitat and 3,133 acres of nesting and overwintering habitat, or two percent of the total western pond turtle habitat in the Plan Area (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Additionally, up to 143 acres of western pond turtle habitat (31 acres of aquatic and 112 acres of nesting and overwintering) will be temporarily disturbed as a result of construction for bridge replacements and Cache Creek Resources Management Plan operations and maintenance (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). An estimated 1,118 acres of upland habitat loss will result from habitat restoration as these uplands will be converted to aquatic habitat for western pond turtle.

An estimated 45 percent of the western pond turtle habitat loss, including 278 acres of aquatic habitat loss and 1,507 acres of nesting and overwintering habitat, is expected to result from urban development in the Woodland, Davis, West Sacramento, and Winters planning units (planning units 19–22). Another three percent (108 acres) and five percent (177 acres) of the habitat loss is expected to result from activities in planning units 5 and 15, respectively. The remainder of the habitat loss will likely be distributed in planning units 2 through 4, 6 through 14, and 17 (Table 5-5, *Covered Species Habitat Loss*).

Covered activities could result in fragmentation of western pond turtle habitat. In particular, ponds and other aquatic habitat could become isolated in urban development areas, affecting the ability for western pond turtles to travel between ponds. This would adversely affect dispersal and genetic exchange for the species. Ascent Environmental assessed the effects of fragmentation that would potentially result from western pond turtle aquatic habitat being removed from surrounding upland habitat (Appendix O, *Fragmentation Effects*). They identified upland habitat within 1,640 feet of the aquatic habitat that will be removed and deducted the upland habitat acreage that would be directly removed by covered activities. Of the habitat that would remain after loss resulting from covered activities, they identified areas that would remain within 1,640 feet of another source of aquatic habitat. They estimated that with the expected aquatic habitat loss, an estimated 569 acres of upland habitat would no longer be adjacent to suitable aquatic habitat.

5.7.4.1.2 Reduction in Habitat Function

In addition to the habitat removal described above, the following categories of covered activities could render habitat less suitable for the western pond turtle.

Noise, lighting, and vibrations. Noise, lighting, vibrations, and general human activity from urban and rural development (temporary from construction, or permanent and ongoing from the occupation of developed areas) could render nearby western pond turtle habitat less suitable for the

species, and cause western pond turtles to avoid these areas. Noise, lighting, and vibrations, however, have not been cited as stressors threatening this species.

Humans and pets. Increased activity of humans and pets in the vicinity of urban and rural development may have permanent, ongoing effects on western pond turtle habitat. Activity from humans and pets may cause western pond turtles to leave an area or behave in ways that adversely affect their survival. Studies have shown, for example, that western pond turtles basked for significantly shorter periods near human recreational trails (Nyhof 2013). Shorter basking periods can interfere with aquatic turtles' thermoregulation, leading to a decline in their ability to carry out necessary behaviors and physiological processes (Nyhof 2013). *AMM2, Design Developments to Minimize Indirect Effects at the Urban-Habitat Interface* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*) includes measures to minimize the effects of humans and pets in habitat surrounding development.

Invasive species. Invasive species could be introduced to western pond turtle habitat indirectly via urban and rural development. Invasion of nonnative tamarisk (present in Yolo County) has been found to change channel morphology and hydrology, degrading western pond turtle habitat along the Mojave River (Lovich and de Gouvenain 1998). Deliberate release into the wild by pet owners of nonnative turtles such as red-eared sliders and painted turtles may threaten western pond turtle populations in California (Dudley and Collins 1995). Additionally, the intensity of predation on western pond turtle hatchlings from bullfrogs has been great enough to eliminate recruitment in southern California populations (Overtree and Collings 1997).

Runoff. Runoff from rural and urban construction sites (temporary) and from developed areas (permanent, ongoing) could result in contamination and sedimentation of nearby western pond turtle habitat. *AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interfaces*, includes measures to minimize urban runoff into nearby areas.

Operations and maintenance activities. Equipment used for operations and maintenance activities generate noise and vibrations that could affect western pond turtles. Humans and equipment could cause activity and disturbances that result in western pond turtle avoidance of nearby areas. Operations and maintenance activities could also generate runoff that could affect nearby aquatic habitat. These effects would be similar to those described above for urban and rural development.

Conservation actions. Conservation actions could result in temporary noise and human activity, and runoff into adjacent habitat, affecting western pond turtle use of habitat, as described above for urban and rural development.

5.7.4.1.3 Harassment, Injury, or Mortality

Equipment and vehicles used to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, aggregate mining operations) could crush western pond turtle individuals, resulting in injury or mortality.

Over the long-term, traffic associated with new developments and operations and maintenance activities could injure or crush individual juvenile and adult western pond turtles. Urban and rural development activities could lead to an increased risk of pet-related (e.g., introduced pet turtle) disease transmission and the introduction of nonnative aquatic predators into breeding habitat adjacent to new permanent developments. In addition, vegetation maintenance activities associated

with maintaining existing and new canals, ditches, and flood control and other infrastructure may involve clearing or disturbing nesting and overwintering habitat, which could destroy or disturb active nests and overwintering pond turtles.

Accidental introduction of contaminants (e.g., fuel spills) associated with construction, operations, and maintenance activities into aquatic environments could also result in harassment, injury, or mortality of western pond turtles. The likelihood of this occurring is low, however, because turtles are expected to avoid work sites that produce ongoing noise, human activity, and other construction-related disturbances.

Project proponents will implement AMM1 through AMM10 (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*) to avoid and minimize these effects from construction activities.

5.7.4.1.4 Impact of Take on the Species

Take resulting from the permanent and temporary loss or conversion of western pond turtle habitat and other effects described above is not expected to result in an adverse impact on the long-term conservation of the western pond turtle for the following reasons.

- The Plan Area represents a small portion of the species' entire range in California and southern Oregon.
- Habitat loss will be widely dispersed throughout the Plan Area and will not be concentrated in any one location, minimizing effects on occupied areas.
- Only one percent of the species' habitat in the Plan Area will be removed or converted.

5.7.4.2 Beneficial Effects

The western pond turtle will benefit from the protection of 2,400 acres of aquatic habitat, 3,475 acres of upland habitat, and restoration of up to 369 acres of aquatic habitat. Additionally, 2,098 acres of aquatic habitat and 978 acres of upland habitat will be protected on pre-permit reserve lands (Table 5-6).

5.7.4.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in less than a one percent net decrease in aquatic western pond turtle habitat and a two percent net decrease (-3,502 acres) of total western pond turtle habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full implementation of the HCP/NCCP, an estimated 27 percent of the western pond turtle habitat in the Plan Area will be conserved in Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including baseline and newly protected lands. Of these lands, at least 5,875 acres will consist of newly protected lands in the reserve system. All lands in the reserve system supporting western pond turtle habitat will be adaptively managed to sustain habitat values for this species in the Plan Area.

Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the western pond turtle through the assembly of a reserve system in association with existing conservation lands, and the management and monitoring of reserve system lands to support the species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on western pond turtle, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.7.5 Giant Garter Snake

The Plan Area includes 77,056 acres of modeled giant garter snake habitat, with 31,168 acres of rice habitat, 6,596 acres of aquatic (lacustrine and riverine) habitat, 25,897 acres of freshwater emergent wetland habitat, 6,612 acres of active season upland movement habitat, and 6,783 acres of overwintering habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Rice, aquatic (lacustrine and riverine), and freshwater emergent wetlands provide aquatic habitat for foraging and breeding, while uplands provide opportunities for basking and to find cover in burrows and crevices during the active season, and to provide cover and refuge during the dormant winter period (Hansen and Brode 1980; Hansen 1998). The modeled rice (rice lands and associated water conveyance channels) and freshwater emergent wetland habitats were based on the known distribution of the species, and limited to areas east of Highway 113 and east of Interstate 5 from its junction with Highway 113 (Appendix A, *Covered Species Accounts*, Figure A-5).[13] The modeled freshwater emergent wetland habitat is generally seasonal or managed wetlands that may also support perennial wetland. The modeled active season upland movement habitat includes all natural land cover types occurring within 200 feet of modeled rice and freshwater emergent wetland habitats within the geographic range described above (Hansen 1986; Wylie et al. 1997; U.S. Fish and Wildlife Service 1999). The modeled overwintering habitat consists of all natural land cover types occurring between 200 feet and 820 feet from modeled rice and freshwater emergent wetland habitats (Hansen 1986; Wylie et al. 1997). Projects typically only mitigate for loss of giant garter snake uplands within 200 feet of aquatic habitat, which is designated as active season upland movement habitat in the Yolo HCP/NCCP habitat model. Additional detail on the habitat model is provided in Appendix A, *Covered Species Accounts*.

Giant garter snakes are documented in two distinct subpopulations in the Plan Area: the Colusa Basin and Willow Slough/Yolo Bypass along the eastern edge of Yolo County (California Department of Fish and Wildlife 2014; Hansen 2006, 2007, 2008; Wylie et al. 2004; Wylie and Martin 2005; Wylie and Amarello 2006). The Colusa Basin subpopulation is located in the northeastern portion of the Plan Area, in the Colusa Basin and Colusa Basin Plains planning units (planning units 12 and 13). The Willow Slough/Yolo Bypass subpopulation is located in the southeastern portion of the Plan Area, primarily in the Willow Slough Basin and South Yolo Bypass planning units (planning units 11 and 18) but extending into the Woodland planning unit (planning unit 19). Appendix A, *Covered Species Accounts,* Figure A-5, shows the distribution of modeled habitat and giant garter snake occurrences in the Plan Area.

5.7.5.1 Adverse Effects

5.7.5.1.1 Habitat Loss and Fragmentation

Continued loss of wetland and other suitable habitat resulting from agricultural and urban development is one of the greatest threats to the giant garter snake: as much as 95 percent of historical habitat for the giant garter snake in the Central Valley has been lost as a result of agricultural and urban conversion (Wylie et al. 1997). Implementation of the covered activities will result in the removal of up to 87 acres of modeled giant garter snake rice habitat (less than one percent), 109 acres of aquatic habitat (two percent), 76 acres of fresh emergent wetland habitat (less than one percent), 441 acres of active season upland movement habitat (seven percent), and

[13] The acreages of rice lands vary from year to year. This data is from 2008, with some updating from 2014.

1,235 acres of overwintering habitat (18 percent) (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). These losses represent an estimated three percent of the total modeled giant garter snake habitat in the Plan Area (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). An estimated 57 miles (five percent) of drainage channels providing giant garter snake aquatic habitat will be permanently affected by covered activities, including 20 miles from development-related activities and 37 miles from operations and maintenance (Table 5-5, *Covered Species Habitat Loss*). All loss of giant garter snake habitat from covered activities is assumed to be permanent, although loss of one percent of the habitat in the Plan Area (343 acres) will result from conversion of upland habitat to aquatic habitat (i.e., restoration) (Table 5-5, *Covered Species Habitat Loss*).

An estimated 42 percent (1,121 acres) of the giant garter snake habitat loss will result from urban development in the Woodland, Davis, and West Sacramento planning units (planning units 19–21), with the greatest loss (610 acres, or 31 percent of total habitat loss) occurring in the West Sacramento planning unit. With the possible exception of the far eastern edge of the Woodland planning unit, these urban planning units are not known to be occupied by giant garter snake and are not generally considered high-value habitat areas for the species. Other smaller habitat losses are somewhat more broadly distributed in the Plan Area and occur as a result of a variety of activities including urbanization, pipeline and road construction, and operations and maintenance activities (Table 5-5, *Covered Species Habitat Loss*). In general, most activities will not substantially reduce modeled habitat near known population centers of giant garter snake, or result in fragmentation of giant garter snake habitat.

Up to 343 acres of upland habitat for giant garter snake may be removed as a result of restoration of freshwater emergent wetland natural community. This creation of giant garter snake aquatic habitat is expected to benefit the species; however, acreage is included in the total habitat loss described above.

Ascent Environmental assessed the effects of fragmentation that would potentially result from giant garter snake aquatic habitat being removed from the vicinity of surrounding upland habitat (Appendix O, *Fragmentation Effects*). They identified upland habitat within 200 feet (active season upland habitat) and 820 feet (overwintering habitat) of aquatic habitat that will be removed. They deducted the upland habitat acreage that would be directly removed by covered activities. Of the habitat that would remain after loss resulting from covered activities, they identified areas that would remain within 200 feet or 820 feet of another source of aquatic habitat. They estimated that with the expected aquatic habitat loss, and estimated 69 acres of active season upland habitat (within 200 feet of aquatic habitat) and 195 acres of overwintering habitat (between 200 and 820 feet from aquatic habitat) would no longer be adjacent to suitable aquatic habitat.

5.7.5.1.2 Reduction in Habitat Function

In addition to the habitat removal described above, the following categories of covered activities could render habitat less suitable for giant garter snake.

Noise, lighting, and vibrations. Noise, lighting, and vibrations from urban and rural development (temporary from construction, or permanent and ongoing from the occupation of developed areas) could render nearby giant garter snake habitat less suitable for the species, and cause giant garter snakes to avoid these areas. Noise, lighting, and vibrations, however, have not been cited as stressors affecting this species.

Humans and pets. Increased activity of humans and pets in the vicinity of urban and rural development could have permanent, ongoing effects on giant garter snake habitat. Human activity may cause giant garter snakes to leave an area. Predation by domestic cats has been cited as a threat to the giant garter snake (U.S. Fish and Wildlife Service 1993).

Invasive species. Invasive species that could be introduced to giant garter snake habitat indirectly via urban and rural development include bullfrog and predatory game fish. Although the extent of bullfrog predation and its effect on giant garter snake populations is not well understood, estimates suggest that 22 percent of newborn giant garter snakes on the Colusa National Wildlife Refuge succumb to bullfrog predation (Wylie et al. 2003). Introduced predatory game fish such as black bass, sunfish, and channel catfish prey on giant garter snakes and compete with them for smaller prey (Hansen 1988; U.S. Fish and Wildlife Service 1993).

Runoff. Runoff from rural and urban construction sites (temporary) and from developed areas (permanent, ongoing) could result in contamination and sedimentation of nearby giant garter snake aquatic habitat. Project proponents will implement *AMM15, Minimize Take and Adverse Effects on Habitat of Giant Garter Snake* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*), which requires that project design limit runoff into nearby covered species habitat.

Operations and maintenance. Equipment used for operations and maintenance activities generates noise and vibrations that could affect giant garter snakes. Humans and equipment could cause activity and disturbances that result in giant garter snake avoidance of nearby areas. Operations and maintenance activities could also generate runoff that could affect nearby aquatic habitat. These effects would be similar to those described above for urban and rural development. Operations and maintenance activities in aquatic habitat also could cause turbidity and sedimentation of aquatic habitat; project proponents will implement water quality maintenance requirements in *AMM15, Minimize Take and Adverse Effects on Habitat of Giant Garter Snake* to minimize these effects.

Conservation actions. Conservation actions could result in temporary noise and human activity, and runoff into adjacent habitat, affecting giant garter snake use of habitat, as described above for urban and rural development. Project proponents will implement *AMM15, Minimize Take and Adverse Effects on Habitat of Giant Garter Snake* to minimize these effects.

5.7.5.1.3 Harassment, Injury, or Mortality

Equipment and vehicles used to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, and agricultural and water infrastructure operations) could crush individual giant garter snakes or their nests resulting in injury or mortality. As described in Appendix P, ICF estimated that 352 to 815 individual garter snakes could potentially be harassed, injured, or killed as a result of covered activities.

Over the long-term, urban and rural development may lead to an increased risk for pet-related (e.g., unleashed dogs and cats) predation and the introduction of nonnative aquatic predators into habitat adjacent to new permanent developments.

During operations and maintenance activities, clearing or disturbing adjacent upland areas that provide suitable active season upland and overwintering habitat could injure or kill overwintering giant garter snakes. As most of the covered activities are not associated with known population

centers of giant garter snake, this would not be expected to substantially affect the species in the Plan Area.

Accidental introduction of contaminants (e.g., fuel spills) associated with construction, operations, and maintenance activities into aquatic habitats could also result in harassment, injury, or mortality of individual giant garter snakes. The likelihood of this occurring is low, however, because snakes are expected to avoid work sites that produce ongoing noise, human activity, and other construction-related disturbances.

Project proponents will implement AMM1 through AMM10 and AMM15 (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*) to avoid and minimize these effects from construction activities. In addition, seasonal restrictions and best management practices per *AMM15, Minimize Take and Adverse Effects on Habitat of Giant Garter Snake*, to limit these effects from maintenance activities will be implemented.

During normal and routine farming practices on the reserve system, channel maintenance activities could result in injury or mortality of giant garter snakes. This effect will be minimized as described in Section 4.3.5.3, *Giant Garter Snake*.

5.7.5.1.4 Impact of Take on the Species

The giant garter snake is endemic to the wetlands of the Central Valley. The Plan Area includes two of the 13 giant garter snake subpopulations identified in the species' draft recovery plan (USFWS 1993), making the Plan Area important for the long-term survival and conservation of the species.

The Plan Area supports an estimated 77,056 acres of giant garter snake habitat. Of this, covered activities will permanently remove up to 1,966 acres (3 percent). Take resulting from habitat loss and other adverse effects, described above, is not expected to result in an adverse impact on the long-term conservation of the species for the following reasons.

- The amount of giant garter snake habitat that will be removed is small relative to the amount available in the Plan Area. Moreover, removal will occur in multiple, widely separate areas and will not therefore affect any one area disproportionately.
- Most of the affected habitat is outside the two subpopulation centers for this species, and few giant garter snakes are expected to be affected.
- Avoidance and minimization measures will minimize the effects of covered activities on surrounding giant garter snake habitat.

5.7.5.2 Beneficial Effects

The Yolo HCP/NCCP will protect 7,195 acres of unprotected giant garter snake habitat, including 2,800 acres of rice habitat, 420 acres of aquatic habitat, 500 acres of freshwater emergent wetland habitat, 1,160 acres of active season upland movement habitat, and 2,315 acres of overwintering habitat (Objectives GGS1.1, GGS1.2, and GGS1.3, CM1) (Table 5-6, *Covered Species Benefits and Net Effects*). Additionally, the Yolo HCP/NCCP will restore freshwater emergent wetland and aquatic habitat for giant garter snake to result in no net loss (Objective GGS1.3, CM2). In addition to the newly protected and restored giant garter snake habitat, the Yolo HCP/NCCP will enroll 2,910 acres of pre-permit reserve lands supporting giant garter snake into the reserve system, and will monitor, and adaptively manage these lands consistent with the Yolo HCP/NCCP conservation strategy.

The 10,290 acres of newly protected and pre-permit reserve lands supporting giant garter snake habitat will be sited in association with other Category 1 and 2 public and easement lands to establish a large, interconnected network of protected giant garter snake habitat in the Colusa Basin and Yolo Bypass/Willow Slough giant garter snake recovery units. These amounts and their configuration are consistent with the recovery needs of the giant garter snake in the Plan Area.

5.7.5.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in less than one percent net loss of rice habitat for giant garter snake, no net loss of fresh emergent wetland and aquatic habitat, and a net two percent decrease in total habitat for this species (Table 5-6, *Covered Species Benefits and Net Effects*). With full implementation of the HCP/NCCP, 43 percent of the giant garter snake habitat in the Plan Area will be conserved in Category 1 and 2 public and easement lands, including baseline and newly protected lands. Of these Category 1 and 2 public and easement lands, at least 7,195 acres will be newly protected lands, and at least 2,910 acres will be pre-permit reserve lands. All of the reserve system lands will be monitored and adaptively managed to sustain habitat values for giant garter snake. Management will include providing water during the giant garter snake's active season. Most of the habitat that will be lost as a result of covered activities is located outside of the two subpopulation centers for giant garter snake that occur in the Plan Area. Giant garter snake habitat will be protected in and around these two subpopulations to protect and facilitate their expansion. Additional lands will be protected and restored to provide connectivity and facilitate genetic exchange between these two important subpopulations.

Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the giant garter snake through the assembly of a reserve system in association with existing conservation lands consistent with the recovery needs for the giant garter snake. The reserve system will be monitored and adaptively managed to support the species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on giant garter snake, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.7.6 Swainson's Hawk

The habitat model for Swainson's hawk includes nesting habitat, cultivated lands foraging habitat, and natural foraging habitat in planning units 3–7 and 9–22. The Plan Area includes 309,087 acres of modeled Swainson's hawk habitat, with 15,673 acres of nesting habitat, 79,336 acres of natural foraging habitat, and 214,078 acres of cultivated lands foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). The nesting habitat includes all potentially suitable woodland and riparian land cover types, eucalyptus, and remnant woody vegetation outside of the blue oak woodland and oak and foothill pine natural communities; the model includes such habitat occurring in isolated patches or as isolated trees in agricultural fields or field borders outside of the South Blue Ridge and Capay Hills planning units (planning units 3 and 4) below an elevation of 350 feet. Cultivated lands foraging habitat includes all field crops, grain and hay crops including alfalfa, pasture, miscellaneous grasses, and truck and berry crops at an elevation of 500 feet or lower. The natural foraging habitat includes suitable uncultivated grassland and seasonal wetland land cover types. Additional detail on the habitat model is provided in Appendix A, *Covered Species Accounts*.

Swainson's hawks have been extensively surveyed in the Plan Area, and numerous nest trees have been recorded throughout the modeled habitat areas (Appendix A, *Covered Species Accounts*, Figure A-6). For example, surveys conducted in 2007 located a total of 290 active breeding territories in the

Plan Area (Estep 2008). The highest nesting concentrations are from north of Woodland to County Road 12; along oak and cottonwood dominated riparian corridors such as Willow Slough, Putah Creek, and the Sacramento River; and between Davis and Woodland and west to approximately Interstate 505 and east to the Sacramento River (Estep 2008).

5.7.6.1 Adverse Effects

5.7.6.1.1 Habitat Loss and Fragmentation

In California, causes of Swainson's hawk population decline are thought to be loss of nesting habitat (Schlorff and Bloom 1984), loss of foraging habitat to urban development, and conversion to unsuitable agriculture such as orchards and vineyards (Bechard et al. 2010; England et al. 1995). Covered activities will permanently remove up to 651 acres (four percent) of modeled nesting habitat and 10,806 acres (four percent) of modeled foraging habitat for Swainson's hawk in the Plan Area (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). In addition, covered activities will temporarily remove up to 224 acres of foraging habitat as a result of operations and maintenance, bridge replacement, and other temporary construction activities (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Each temporary disturbance is expected to be small, likely no greater than approximately ten acres (and often much less). Disturbance of small areas of cultivated lands during the 50-year permit term, with each disturbance to last for no more than one year, will remove minor amounts of foraging habitat but is unlikely to adversely affect Swainson's hawk foraging behavior. Cultivated lands regularly experience temporary disturbances and continue to provide habitat for Swainson's hawk when the disturbance is completed.

An estimated 52 percent of the Swainson's hawk nesting habitat loss (495 acres) and 41 percent of the foraging habitat loss (4,407 acres) is expected to result from development in the urban planning units: Woodland, Davis, West Sacramento, and Winters (planning units 19–22; Table 5-5). All of these activities will be required to avoid active Swainson's hawk nests, as described in Table 4-1, *Avoidance and Minimization Measures for Sensitive Species and Natural Communities*.

Covered activities will remove up to 20 nest trees. A nest tree is defined as a tree that has supported an active nest anytime within the previous five years. This estimate is based on the assumption that, on average, 80 percent of nest trees will be avoided in the covered activities footprint. If a nest tree is removed, the removal must occur outside the nesting season, during a year when the nest is not active, or after young have fledged and the nest is no longer being used by Swainson's hawks (Table 4-1, *Avoidance and Minimization Measures for Sensitive Species and Natural Communities*).

Habitat restoration could result in conversion of up to 1,039 acres of Swainson's hawk foraging habitat (an estimated 803 acres agricultural and 236 acres natural) to wetland natural communities that do not provide habitat for this species. An estimated 642 acres of this foraging habitat will be converted to nesting habitat for this species. No nesting habitat will be removed as part of habitat restoration.

Covered activities will result in minimal habitat fragmentation for Swainson's hawk. Most of the habitat loss will occur in concentrated areas. An estimated 99 percent of the natural foraging habitat and 96 percent of the cultivated lands foraging habitat will remain, primarily in large, interconnected blocks throughout the lower elevations of the Plan Area. As described in Chapter 7, Section 7.7.1.8, *Regional Loss of Swainson's Hawk Habitat,* the Conservancy will implement contingency measures such as a landowner incentive program to encourage farmers to grow suitable crops for Swainson's hawk if foraging habitat and population numbers drop below a

specified threshold. Where urban development is sited near nesting habitat, however, the nesting habitat could become less functional (Section 5.7.6.1.2, *Reduction in Habitat Function*).

Ascent Environmental assessed the effects of fragmentation that would potentially result from Swainson's hawk nesting habitat being removed from the vicinity of surrounding foraging habitat (Appendix O, *Fragmentation Effects*). They identified foraging habitat within 3.27 miles of the nesting habitat that will be removed. They deducted the upland habitat acreage that would be directly removed by covered activities. Of the habitat that would remain after loss resulting from covered activities, they identified areas that would remain within 3.27 miles of nesting habitat. They estimated that with the expected nesting habitat loss, all foraging habitat would still be within 3.27 miles of nesting habitat.

5.7.6.1.2 Reduction in Habitat Function

Covered activities may reduce the function of Swainson's hawk habitat in the following ways.

Noise, vibrations, lighting, and human activity. Swainson's hawks may be vulnerable to noise, vibrations, lighting, and human activity disturbance from construction, operations and maintenance, and restoration activities in the vicinity of active nests. Project proponents will minimize these effects through establishment of 1,300-foot buffers around active nests (Table 4-1, *Avoidance and Minimization Measures for Sensitive Species and Natural Communities*).

Increasing distance between nesting trees and foraging habitat. New urban development that will surround avoided nesting habitat is likely to render the avoided nesting habitat less functional, by creating a larger distance between nesting and foraging habitat. Swainson's hawks have been recorded nesting in urban landscapes in Yolo County (England et al. 1995); in all cases the nest trees were within five miles of suitable foraging habitat. Swainson's hawk nesting habitat in areas identified for urban development also will be within five miles of foraging habitat; therefore, Swainson's hawks are expected to be able to commute between their urban nesting habitat and foraging areas, even with the new development increasing the distance between foraging and nesting habitat. There is, however, an energy cost to commuting between nest trees and foraging habitat, and the reproductive success of urban birds is lower for those in urban landscapes than those in rural areas (England et al. 1995). An estimated 1,258 acres of Swainson's hawk nesting habitat and 50 nest trees in the vicinity of new urban development will not be removed but will be indirectly affected by expanding urbanization in the vicinity of nest trees that that could increase the distance between nesting habitat and foraging habitat. However, as described in Section 5.7.6.1.1, *Habitat Loss and Fragmentation*, with the riparian habitat loss, all foraging habitat would still be within 3.27 miles of nesting habitat. Therefore the effect, if any, is expected to be negligible.

Fire break maintenance. Management of some reserves may require establishment and maintenance of new fire breaks. Maintenance of fire breaks (i.e., mowing or disking) is primarily expected to retain the existing land cover (e.g., grassland); however, disking or mowing of fire breaks during the dry season could alter vegetation structure. Although this would not eliminate Swainson's hawk habitat, it could reduce its function by reducing suitability for rodents and other Swainson's hawk prey items. Although conservation actions could result in short-term loss of Swainson's hawk habitat function, they will provide for long-term enhancement of habitat function.

5.7.6.1.3 Harassment, Injury, or Mortality

Equipment and vehicles used to implement covered activities (e.g., construction for urban and rural development, operations and maintenance activities, and habitat restoration and enhancement) could result in injury or mortality of Swainson's hawk, as individual Swainson's hawk nests could be destroyed by construction-related equipment, and nests or juveniles could be abandoned due to disturbance, leading to nest failure or juvenile mortality. Construction of above-ground transmission lines as part of development activities could cause mortality of Swainson's hawks from strikes and electrocution.

Contaminants associated with construction, operations, and maintenance activities could result in harassment, injury, or mortality of individual hawks. The likelihood of this occurring is low, however, because Swainson's hawks generally spend little time on the ground.

Project proponents will avoid take of active nest trees, including eggs and juvenile and adult Swainson's hawks, through measures that include surveying for active nest trees, creating setbacks from potential nest trees, and conducting seasonal and height restrictions on tree pruning and removal near active nests (*AMM16, Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite* in Chapter 4, Section 4.3, *Avoidance and Minimization Measures*).

Normal and routine farming practices on cultivated lands in the reserve system are not expected to result in injury or mortality of Swainson's hawks because the species is mobile and can move out of harms way, and because the species is adapted to foraging in an agricultural setting.

5.7.6.1.4 Impact of Take on the Species

The Swainson's hawk breeds in the open grassland, shrub-steppe, and agricultural regions of western North America from southern Canada to northern Mexico. Central Valley Swainson's hawks winter from Central Mexico to northern and central South America (Appendix A, *Covered Species Accounts*). With the conversion of much of the species' historical range to agriculture, the Swainson's hawk has adapted to agricultural landscapes compatible with its foraging needs and in proximity to suitable nesting habitat. Most nesting Swainson's hawks in California are found in the Central Valley, from Tehama County south to Kern County, an area almost entirely converted to agricultural landscapes. Nearly 2,000 breeding pairs are estimated to occur in the Central Valley based on a survey of the statewide population (Anderson et al. 2007). The area comprising Yolo, Solano, Sacramento, and San Joaquin Counties is considered the core of the Central Valley breeding population of Swainson's hawk due to the area containing higher densities than anywhere else in the species' range. The population in the Plan Area is large and widely distributed, with an estimated 300 nesting pairs (Estep 2008), representing about 14 percent of the statewide population. Although covered activities will remove up to 20 nest trees from the Plan Area, removal of nest trees does not necessarily result in reduction in the Swainson's hawk population. If a nest tree is removed in the vicinity of other suitable nesting habitat, the nesting pair is likely to relocate to a nest tree elsewhere within its nesting territory.

Based on modeled habitat for the Swainson's hawk, the Plan Area supports an estimated 309,087 acres of potentially suitable habitat, including 15,673 acres of nesting habitat and 293,414 acres of foraging habitat. Sustainability of the Swainson's hawk population in the Plan Area is dependent on providing and maintaining suitable nesting sites interspersed in sufficient acreage of compatible agricultural and grassland landscapes that support abundant, accessible prey. Covered activities will permanently remove up to 11,457 acres (four percent) in the Plan Area, including 1,407 acres of

natural foraging habitat, 9,399 acres of cultivated lands foraging habitat, and 651 acres (seven percent) of nesting habitat. In addition, covered activities will temporarily remove up to 224 acres of Swainson's hawk foraging habitat (Table 5-5, *Covered Species Habitat Loss*).

Nesting pairs may successfully relocate to other nest trees within their territories. Some displaced nesting pairs may also successfully relocate to locations in the Plan Area outside their original nesting territories. Some displaced pairs may not find alternative nesting opportunities outside of their original nesting territories within the Plan Area, however, because the nesting population in the Plan Area is large and could be saturated (i.e., all available nesting habitat may already be occupied) due to limited suitable nesting. Therefore, covered activities could result in a reduction in the number of nesting pairs in the Plan Area, particularly near urban and rural development. Beneficial effects described below, however, will offset these effects and provide for species recovery in the Plan Area.

5.7.6.2 Beneficial Effects

The Yolo HCP/NCCP will protect, manage, and enhance 18,792 acres of unprotected Swainson's hawk foraging habitat, including 14,362 acres of cultivated lands foraging habitat and 4,430 acres of natural foraging habitat (Objectives SH1.1 and SH1.2, CM1) (Table 5-6, *Covered Species Benefits and Net Effects*). Additionally, the Yolo HCP/NCCP will enroll 4,580 acres of pre-permit reserve lands that provide foraging habitat. The Conservancy will monitor and adaptively manage these lands consistent with the Yolo HCP/NCCP conservation strategy as required to meet Objective SH1.4 (CM1).

The Yolo HCP/NCCP will protect 1,600 acres of existing valley foothill riparian forest (Objective NC-VFR1.1) and restore additional valley foothill riparian forest to result in no net loss of this natural community providing additional nesting habitat for Swainson's hawk (Objective NC-VFR1.3, CM1, CM2). Restored habitats (e.g., valley foothill riparian nesting areas) may require several years to several decades to achieve conditions suitable for nesting by Swainson's hawks; however, sufficient nesting habitat is currently available in the Plan Area to support a very large and dense nesting population. Riparian habitats restoration will be designed to provide future nesting habitat and thereby increase nesting opportunities during the permit term.

Some biological objectives are designed to maintain habitat functions for Swainson's hawks by maintaining nest habitat diversity in the Plan Area. Agricultural practices have removed so much of the species' historical nesting habitat that Swainson's hawks often nest in isolated trees, tree rows along field borders or roads, or small clusters of trees on agricultural lands. Protection and maintenance of these small isolated nesting habitats are essential to sustaining the distribution and abundance of the species in the Plan Area. To achieve this, the Yolo HCP/NCCP will plant trees within cultivated lands foraging habitat in the reserve system as needed to achieve a density of one suitable nesting tree per 10 acres[14] across reserve system lands (Objective SH1.5, CM3).

The Yolo HCP/NCCP will protect at least 20 previously unprotected Swainson's hawk nest trees[15] in the reserve system (Objective SH1.3, CM1), including protected valley foothill riparian natural community and scattered habitat patches throughout the cultivated lands reserve system. This will

[14] A suitable Swainson's hawk nesting tree is defined as a native tree at least 20 feet in height.
[15] A Swainson's hawk nest tree is defined as a tree that has been used for Swainson's hawk nesting within the last five years.

ensure that the density of nest trees in protected nesting habitat will be comparable to the density of nest trees in suitable habitat throughout the Plan Area.

Habitat that provides cover and supports prey populations within the cultivated lands seminatural community has high foraging value for Swainson's hawk. To help retain this important habitat element, the Yolo HCP/NCCP will protect remnant noncultivated areas of high value to wildlife within cultivated land reserves (CM1) and establish new hedgerows along field borders and roadsides to enhance prey populations (Objective NC-CL1.4, CM3). The Conservancy will manage and enhance natural foraging lands to further enhance conditions suitable for prey populations and maintain habitat suitability for Swainson's hawk. These conservation actions will help ensure that Swainson's hawk populations are sustained throughout the protected Swainson's hawk habitat and the long-term viability of the species is enhanced in the Plan Area.

In an effort to maintain the plan area-wide nesting population in the event agricultural land use conversions on non-reserve lands reduce the extent of suitable foraging habitat in the future, the conservancy will monitor agricultural land uses/crop types and the nesting population. Monitoring will provide essential information on the availability of suitable foraging habitat in the plan area that can be compared with estimated minimum acreage thresholds established in order to maintain the current nesting population (Estep 2015). If available habitat drops below the threshold and the nesting population declines correspondingly, the conservancy will confer with the CDFW and USFWS and implement additional actions as needed to help overcome habitat deficits (Section 7.7.1.2.8, *Changed Circumstances, Regional Loss of Swainsons Hawk Foraging Habitat*).

5.7.6.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in an estimated two percent net decrease of Swainson's hawk natural foraging habitat and a four percent net decrease of cultivated lands foraging habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). The Yolo HCP/NCCP will result in an estimated three percent net decrease in nesting habitat for Swainson's hawk (Table 5-6, *Covered Species Benefits and Net Effects*), but the actual net loss is expected to be less than three percent because this does not factor in the tree plantings required under Objective SW1.5.

With full implementation of the HCP/NCCP, 19,286 acres of natural foraging habitat and 22,508 acres of cultivated lands foraging habitat will be conserved in Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including public and easement lands and newly protected lands. This represents 14 percent of the natural and cultivated lands foraging habitat in the Plan Area. Additionally, 4,517 acres of nesting habitat, representing 31 percent of the nesting habitat in the Plan Area, will be conserved in Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*). Of these Category 1 and 2 public and easement lands with Swainson's hawk nesting and foraging habitat, at least 20,285 acres will consist of newly protected lands, and at least 4,795 acres will consist of pre-permit reserve lands. These newly protected and pre-permit reserve lands will be included in the HCP/NCCP reserve system, and will be monitored and adaptively managed to sustain Swainson's hawk habitat values (Table 5-6, *Covered Species Benefits and Net Effects*). Overall, the Yolo HCP/NCCP will provide a substantial net benefit to the Swainson's hawk. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on Swainson's hawk, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

The potential effects of future land use changes in the Plan Area unrelated to Yolo HCP/NCCP implementation is provided in Section 5.8, *Cumulative Effects*.

5.7.7 White-Tailed Kite

The Plan Area includes 268,230 acres of modeled habitat for white-tailed kite, with 31,732 acres of nesting habitat, 101,758 acres of primary foraging habitat, and 134,740 acres of secondary foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Nesting habitat includes several woodland and riparian vegetation types, including isolated patches of trees in agricultural fields, below an elevation of 500 feet. One nest tree may be removed. Primary foraging habitat includes grassland, pasture, and alfalfa, which produce high densities of white-tailed kite prey, below an elevation of 500 feet and within one mile of modeled nesting habitat and reported nesting locations. Secondary foraging habitat includes several natural vegetation types and agricultural crops, which are used less frequently than those in the primary category, below an elevation of 500 feet and within one mile of modeled nesting habitat and reported nesting locations. Additional detail on the habitat model is provided in Appendix A, *Covered Species Accounts*.

Comprehensive surveys of the Plan Area for white-tailed kite have not been conducted. Jim Estep surveyed the lowland portion of Yolo County in 2007, and reported a total of 13 nest trees. Most of these nests were found in riparian areas, including three along Putah Creek, three along Willow Slough, two along Dry Slough, one along the Sacramento River, one along Willow Slough Bypass, and one along the Knights Landing Ridge Cut. Two nonriparian sites were reported in West Sacramento and Dunnigan.

5.7.7.1 Adverse Effects

5.7.7.1.1 Habitat Loss and Fragmentation

Covered activities will permanently remove up to 11,239 acres of modeled white-tailed kite habitat, including 661 acres of nesting habitat (with up to one nest tree), 2,609 acres of primary foraging habitat, and 7,969 acres of secondary foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). This loss represents four percent of the total white-tailed kite modeled habitat in the Plan Area. Additionally, covered activities will temporarily remove up to 234 acres of foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Each temporary disturbance is expected to be small, likely no greater than approximately ten acres (and often much less). Disturbance of small areas of cultivated lands during the 50-year permit term, with each disturbance to last for no more than one year, will remove minor amounts of foraging habitat but is unlikely to adversely affect white-tailed kite foraging behavior. Cultivated lands regularly experience temporary disturbances and continue to provide habitat for white-tailed kite when the disturbance is completed.

An estimated 44 percent of the white-tailed kite habitat loss will result from urban development in the urban planning units, including the Woodland, Davis, West Sacramento, and Winters (planning units 19, 20, 21, and 22; Table 5-5, *Covered Species Habitat Loss*). The remainder of the habitat loss will be distributed throughout modeled habitat in the Plan Area, and will result from various activities such as unincorporated community development in Dunnigan Hills, Monument Hills, and Madison.

Ascent Environmental assessed the effects of fragmentation that would potentially result from white-tailed kite nesting habitat being removed from the vicinity of surrounding foraging habitat (Appendix O, *Fragmentation Effects*). They identified foraging habitat within 0.8 miles of the nesting habitat that will be removed (based on the distance the species typically forages from the nest). They deducted the upland habitat acreage that would be directly removed by covered activities. Of the habitat that would remain after loss resulting from covered activities, they identified areas that would remain within 0.8 mile of nesting habitat. They estimated that with the expected nesting habitat loss, all foraging habitat that would still be within 0.8 mile of nesting habitat.

5.7.7.1.2 Reduction in Habitat Function

In addition to habitat removal and fragmentation, described above, the following categories of covered activities could render habitat less suitable for white-tailed kite.

Noise, vibrations, lighting, and human activity. Construction-related ground disturbances, including noise, vibrations, lighting, and human activity disturbances in urban and rural areas, and similar ongoing disturbances to nearby habitat as a result of human occupation, could affect the ecological functions of white-tailed kite habitat. Project proponents will minimize these effects through the establishment of buffers as described in *AMM16, Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite*, and through design measures described in *AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interface* (Chapter 4, Section 4.3.4, *Covered Species*).

Operations and maintenance. Operations and maintenance activities could indirectly affect surrounding white-tailed kite habitat through noise, lighting, and human activity disturbance, as described above for urban and rural development. Project proponents will adhere to *AMM16, Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite* (Chapter 4, Section 4.3.4, *Covered Species*) to reduce effects on nesting habitat during the nesting season.

Conservation actions. Conservation actions could result in temporary noise and human activity disturbances to white-tailed kite habitat, as described above for urban and rural development. Project proponents will avoid and minimize these effects through adherence to *AMM16, Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite*.

5.7.7.1.3 Harassment, Injury, or Mortality

Operation of equipment and vehicles to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, and agricultural and water infrastructure operations) could disturb nesting, causing abandonment of white-tailed kite juveniles that could result in their injury or mortality.

Over the long-term, urban and rural development activities could affect the reproductive success of white-tailed kite. Ongoing human activity, noise, and other disturbances associated with occupancy of new infrastructure and developments could disrupt nesting behavior and thereby reduce nest productivity.

Contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) could result in harassment, injury, or mortality of individual birds. These effects are unlikely, however, because white-tailed kite is a highly mobile species that can readily avoid such hazards

and is expected to avoid work sites that generate ongoing noise and human activity, and other construction-related disturbances.

Project proponents will avoid and minimize these potential effects by implementing measures to identify and avoid effects on nesting colonies (*AMM16, Minimize Take and Adverse Effects on Habitat of Swainson's Hawk and White-Tailed Kite*).

Normal and routine farming practices on cultivated lands in the reserve system are not expected to result in injury or mortality of white-tailed kites because the species is mobile and can move out of harm's way, and because the species is adapted to foraging in an agricultural setting.

5.7.7.1.4 Impact of Take on the Species

The distribution of the white-tailed kite includes the southwest United States from Texas to California, and north to Washington State, and from Mexico to South America. California is currently considered the breeding range stronghold for the white-tailed kite in North America, with nearly all areas up to elevations at the western Sierra Nevada foothills and southeastern deserts occupied (Small 1994; Dunk 1995). The Plan Area represents a small portion of the species' range-wide distribution.

The Plan Area provides an estimated 268,230 acres of modeled white-tailed kite habitat: 15,673 acres of nesting habitat and 236,498 acres of foraging habitat. Covered activities will remove 11,565 acres (four percent) of the modeled white-tailed kite habitat in the Plan Area, of which 987acres are nesting habitat and 10,578 acres foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). This habitat loss and other adverse effects on white-tailed kite resulting from covered activities, as described above, are not expected to adversely affect the long-term survival and conservation of the species for the following reasons.

- The Plan Area represents a small portion of the species' range.
- Covered activities will remove a small portion (four percent) of the modeled habitat in the Plan Area.
- Most of the loss of foraging habitat will occur in cultivated lands that are abundant throughout the Plan Area.
- The avoidance and minimization measures will minimize effects on nesting colonies.

5.7.7.2 Beneficial Effects

The white-tailed kite will benefit through achievement of the biological goals and objectives for natural communities and Swainson's hawk. The Yolo HCP/NCCP will protect 4,430 acres of grassland natural community (Objective NC-AG1.1) and 14,362 acres of non-rice cultivated lands seminatural community (Objective NC-CL1.1) to provide 18,792 acres of foraging habitat for the white-tailed kite (Table 5-6, *Covered Species Benefits and Net Effects*). Additionally, the Yolo HCP/NCCP will enroll an estimated 3,330 acres of pre-permit reserve lands with white-tailed kite foraging habitat into the reserve system.

The Yolo HCP/NCCP will protect 1,600 acres of existing valley foothill riparian forest (Objective NC-VFR1.1) and restore valley foothill riparian natural community to result in no net loss of this natural community (Objective NC-VFR1.2, CM1, CM2), providing nesting habitat for white-tailed kite. Additional management and enhancement activities will further increase habitat functions for

white-tailed kite by improving habitat diversity in the Plan Area; these activities include enhancing grassland natural community and cultivated lands seminatural community to improve prey base, protecting existing nest trees on protected cultivated lands, and planting new trees within the cultivated landscape as well as within riparian and valley grassland communities.

5.7.7.3 Net Effects

The Yolo HCP/NCCP will result in an estimated zero percent net decrease of nesting habitat, and a four percent decrease in foraging habitat for white-tailed kite in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full HCP/NCCP implementation, one percent (41,342 acres) of white-tailed kite habitat in the Plan Area will be conserved in Category 1 and 2 public and easement lands, including baseline and newly protected lands. Of these, at least 20,285 acres will be newly protected and incorporated into the reserve system. All reserve system lands will be monitored and adaptively managed to sustain white-tailed kite habitat values. The Yolo HCP/NCCP will minimize and mitigate impacts to white-tailed kite, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.7.8 Western Yellow-Billed Cuckoo

The Plan Area includes 3,868 acres of modeled habitat for western yellow-billed cuckoo (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Modeled habitat for the western yellow-billed cuckoo includes suitable riparian vegetation types that occur in patch sizes of 25 acres or greater and have a width of at least 330 feet. Additional detail on the habitat model is provided in Appendix A, *Covered Species Accounts*.

Since 1965, nine occurrences of western yellow-billed cuckoo have been recorded in the Plan Area, two of which (both in the vicinity of Fremont Weir) are from the last 10 years (Appendix A). All of these records are presumed to be migrants and nonbreeding individuals.

5.7.8.1 Adverse Effects

5.7.8.1.1 Habitat Loss and Fragmentation

Covered activities will permanently remove up to 59 acres of modeled western yellow-billed cuckoo habitat, representing approximately three percent of the current extent of modeled habitat in the Plan Area (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). The habitat loss is distributed primarily among planning units 7, and 14, and 15 (Table 5-5, *Covered Species Habitat Loss*). Although covered activities will temporarily remove up to one acre of western yellow-billed cuckoo habitat, this acre is considered a permanent loss because restoration of the disturbed area is unlikely to be completed within one year of its removal. This acre is, therefore, included in the permanent loss acreage.

Covered activities are not expected to fragment habitat for western yellow-billed cuckoo. In accordance with avoidance requirements for riparian corridors (Table 4-1, *Avoidance and Minimization Measures for Sensitive Natural Communities and Covered Species*), development activities will limit removal of habitat to the edges of riparian corridors and will not bisect these corridors. Development will reduce the size of habitat patches, however, rendering them less suitable for supporting western yellow-billed cuckoo. Suitable modeled western yellow-billed

cuckoo habitat only includes patches that are 25 acres or greater in size, and covered activities may reduce patches to less than 25 acres in size.

5.7.8.1.2 Reduction in Habitat Function

In addition to habitat removal and fragmentation, described above, the following categories of covered activities could render habitat less suitable for western yellow-billed cuckoo.

Noise and lighting. Noise and lighting from urban and rural development (temporary from construction, or permanent and ongoing from the occupation of developed areas) could render nearby western yellow-billed cuckoo habitat less suitable for the species and could cause western yellow-billed cuckoos to avoid these areas or diminish their reproductive success. Traffic noise, for example, can reduce the distance over which migratory birds can detect acoustic signals such as song, an effect known as acoustic interference. Acoustic interference can impair the ability of birds to communicate with mates (Parris and Schneider 2008). Lighting has also been documented to adversely affect birds. Orientation under artificial lighting may result in alteration of bird behavior, such as causing diurnal birds to forage or sing at night or causing abnormal seasonal timing of migration and initiation of breeding behavior, although the effects of these altered behaviors on bird survival and reproductive success are unknown (Longcore and Rich 2004). Birds can also be disoriented and entrapped by lights at night, causing them to stay in an area that they would normally migrate through (Longcore and Rich 2004). Human disturbance, however, is rarely a factor affecting western yellow-billed cuckoos in California (Laymon 1998).

Humans and pets. The permanent, ongoing effect of increased activity of humans and pets in the vicinity of developed areas could reduce the suitability of western yellow-billed cuckoo habitat. Bird species richness in riparian areas has been found to decline as the level of development on surrounding lands increases, particularly as a factor of the density of buildings within 1,500 meters of riparian habitat (Miller et al. 2003). This effect appears to be strongest on ground-foraging and low-nesting birds (Miller et al. 2003), however, and western yellow-billed cuckoos forage in the tree canopy and are not low-nesters, nesting within a range of 1.3 to 13.0 meters from the ground (Laymon 1998). As stated above, however, human disturbance is rarely a factor affecting western yellow-billed cuckoos in California (Laymon 1998).

Invasive plants. Urban and rural development could result in the introduction and spread of invasive plant species that could in turn degrade western yellow-billed cuckoo habitat. The degradation of riparian habitat as a result of invasion by tamarisk and giant reed is a concern over much of the cuckoo's range (Laymon 1998). Domestic fig and black walnut have become dominant tree species along the Sacramento River, providing poor foraging and nesting opportunities for the species (Laymon 1998): species such as these could be introduced into habitat from nearby developed landscapes. Project proponents will implement *AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interface* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*) to minimize the spread of invasive species as a result of urban and rural development.

Operations and maintenance. Equipment used for operations and maintenance activities generates noise that could affect western yellow-billed cuckoos. Humans and equipment could result in disturbances from human activity that cause western yellow-billed cuckoos to avoid nearby areas. These effects would be similar to those described above for urban and rural development, and are expected to have minimal effect on the species.

Conservation actions. Conservation actions could result in temporary noise and other disturbances related to human activity in yellow-billed cuckoo habitat. As described above for urban and rural development, however, this effect is expected to be minimal.

Implementation of *AMM17, Minimize Take and Adverse Effects on Western Yellow-billed Cuckoo,* will minimize the reduction in habitat function as a result of covered activities.

5.7.8.1.3 Harassment, Injury, or Mortality

Equipment and vehicles used to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, and agricultural and water infrastructure operations) could crush individual cuckoo nests or cause nest disturbance that leads to juvenile abandonment and subsequent nesting failure or juvenile mortality.

Contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) could result in harassment, injury, or mortality of individual birds. The likelihood of this occurring is low, however, because western yellow-billed cuckoos are a highly mobile species that can readily avoid such hazards and are expected to avoid work sites.

Currently, western yellow-billed cuckoo occurs in the Plan Area as a rare migrant during fall or spring. Therefore, the likelihood that disturbance would affect a nesting pair is low. Should this species become established in the future, however, project proponents will minimize the potential for such adverse effects by implementing *AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interface* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*). In addition, project proponents will implement *AMM17, Minimize Take and Adverse Effects on Habitat of Western Yellow-Billed Cuckoo*, to minimize effects on individuals and nest trees.

5.7.8.1.4 Impact of Take on the Species

There are two recognized subspecies of yellow-billed cuckoo, *C. a. occidentalis*, found west of the Rocky Mountains, and *C. a. americanus*, found in deciduous forests east of the Rocky Mountains. There is a continuing debate over the taxonomic separation of the two subspecies based on genetic studies initiated by USFWS during the status review for federal listing. While the eastern subspecies' range includes all states east of the Rocky Mountains and the southern regions of Quebec and Ontario, breeding populations of the western subspecies are limited to California, Nevada, Utah, Arizona, southwestern Wyoming, southeastern Idaho, and the western parts of New Mexico, Texas, and Colorado (Halterman 1991). On October 3, 2014, the USFWS published a final rule designating the western distinct population segment of yellow-billed cuckoo as threatened (79 FR 59991–60038). Critical habitat for the western yellow-billed cuckoo was formally designated in 2014, but no critical habitat for this species is present in the Plan Area (79 FR 48548–48652). This species is also state listed as threatened. Studies conducted since the 1970s indicate that there may be fewer than 50 breeding pairs of western yellow-billed cuckoo in California (Gaines 1974; Halterman 1991; Laymon et al. 1997; 78 FR 192). Although sustained breeding populations occur to the north of the Plan Area at isolated sites along the Sacramento River, no western yellow-billed cuckoo breeding has been recorded recently in the Plan Area. The scattered sightings over the last 50 years are presumed to be from migrating birds.

The Plan Area supports an estimated 3,868 acres of modeled habitat for western yellow-billed cuckoo. Of this, covered activities will permanently remove up to 59 acres (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Take resulting from this habitat loss and other adverse effects,

described above, is not expected to adversely affect the long-term survival and conservation of western yellow-billed cuckoo for the following reasons.

- Cuckoo presence in the Plan Area is currently limited to infrequent migrants passing through the area.
- The potential breeding and migratory habitat to be lost is small (two percent) relative to the species' range and the amount of habitat that will remain in the Plan Area.
- Most permanently removed habitat consists of relatively small, fragmented riparian stands that are unlikely to support breeding populations of western yellow-billed cuckoo.

5.7.8.2 Beneficial Effects

The Yolo HCP/NCCP will protect 1,600 acres of unprotected valley foothill riparian natural community (Objective NC-VFR1.1), at least 500 acres of which will provide modeled habitat for western yellow-billed cuckoo (Objective WYBC1.1) (Table 5-6, *Covered Species Benefits and Net Effects*). Additionally, the Yolo HCP/NCCP will restore valley foothill riparian natural community to result in no net loss of the valley foothill riparian natural community (Objective NC-VFR1.2), which will be restored to provide suitable habitat for western yellow-billed cuckoo (Objective WYBC1.2). The Yolo HCP/NCCP will prioritize conservation of habitat corridors along Cache Creek (Objective L1.4), Putah Creek (Objective L1.5), and Sacramento River/Yolo Bypass (L-1.6), each of which supports a large contiguous patch of modeled western yellow-billed cuckoo habitat, although there are no nesting records of the species in these areas. The Yolo HCP/NCCP will also enhance and maintain the functions of the protected and restored valley foothill riparian natural community by reducing the relative extent of nonnative plants that degrade habitat function, and improving native plant diversity and vegetation structure (Objective L-2.1).

The protection and restoration of large, interconnected blocks of habitat will benefit western yellow-billed cuckoo, as this species is particularly vulnerable to habitat fragmentation (U.S. Fish and Wildlife Service 2013). The control of invasive riparian plants will also benefit this species, as many invasive riparian plant species degrade habitat value for western yellow-billed cuckoo.

In the Plan Area, riparian areas primarily provide opportunities for western yellow-billed cuckoos to forage and rest during migration (no nesting of this species has been recorded in the Plan Area over the last 50 years). Moreover, the channelized and riprapped banks of rivers in parts the Plan Area provide few opportunities for river meandering and habitat restoration that would provide high-value yellow-billed cuckoo breeding habitat (Greco 2008). Western yellow-billed cuckoos will nest in a variety of marginal habitats, however, particularly at the edges of their range (Laymon 1998). The conserved habitat in the Plan Area will benefit migrating western yellow-billed cuckoos and may also increase nesting opportunities for this species in the Plan Area, although the likelihood for increased nesting is low because of the limited opportunities for restoring nesting populations in the Plan Area (Greco 2008).

5.7.8.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in no net loss of western yellow-billed cuckoo habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full implementation of the HCP/NCCP an estimated 45 percent of western yellow-billed cuckoo habitat in the Plan Area will be conserved on Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including baseline and newly protected lands. Of these, at

least 500 acres will consist of lands held in conservation easements that are newly protected and enrolled into the Yolo HCP/NCCP reserve system. All reserve system lands supporting western yellow-billed cuckoo habitat will be monitored and adaptively managed to sustain habitat values for this species. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on western yellow-billed cuckoo, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.7.9 Western Burrowing Owl

The Plan Area includes 103,854 acres of modeled habitat for western burrowing owl, including 37,694 acres of primary habitat and 66,160 acres of other habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Primary habitat includes all suitable land cover types in preferred natural lands, pastures, and other open or barren areas on the lower slopes and valley floors. Other habitat includes selected pasture types where uncultivated field borders may be suitable for nesting burrows and fields that may be suitable for foraging. Additional detail on the habitat model is provided in Appendix A, *Covered Species Accounts*.

Although comprehensive surveys of the Plan Area have not been conducted, the Burrowing Owl Preservation Society, in partnership with the Institute for Bird Populations, conducted surveys in 2007 and 2014. Although these were not comprehensive county-wide surveys, the results indicate that the majority of *known* burrowing owl breeding locations are in the southern portion of Yolo County, centered in and around the City of Davis (in the Davis planning unit), the Yolo Bypass Wildlife Area (in the Yolo Basin Plains planning unit), and the South Yolo Bypass planning unit. No new occurrences were found during the 2014 surveys, although there may be breeding populations elsewhere in the planning area since the surveys were not comprehensive. These surveys do not represent the total number of burrowing owl breeding pairs, but they do indicate the locations of the most significant known breeding areas for the western burrowing owl in the Plan Area.

5.7.9.1 Adverse Effects

5.7.9.1.1 Habitat Loss and Fragmentation

Habitat loss and fragmentation are the primary factors that have led to the decline of western burrowing owls throughout California (California Department of Fish and Wildlife 2013; Gervais et al. 2008). Covered activities will remove up to 3,172 acres of modeled western burrowing owl habitat, including 861 acres of primary habitat and 2,311 acres of other habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). This loss represents three percent of the total western burrowing owl habitat in the Plan Area. Up to an additional 218 acres of other habitat and one acre of primary habitat will be temporarily removed through bridge replacement activities and other covered activities (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Each temporary disturbance is expected to be small, likely no greater than approximately ten acres (and often much less). Disturbance of small areas of cultivated lands during the 50-year permit term, with each disturbance to last for no more than one year, will remove minor amounts of foraging habitat but is unlikely to adversely affect western burrowing owl foraging behavior.

Western burrowing owls may be displaced from up to four occupied sites (an occupied site is a breeding or wintering burrow or burrow complex occupied by a single breeding pair or nonbreeding individual).

An estimated 19 percent (621 acres) of the western burrowing owl habitat loss will result from development in these urban planning units: Woodland, Davis, West Sacramento, and Winters (planning units 19–22; Table 5-5, *Covered Species Habitat Loss*). The remainder of the loss will be distributed throughout modeled habitat in the Plan Area, and will result from various activities such as rural development in Dunnigan Hills, Monument Hills, and Madison, and mining in the Lower Cache Creek planning unit (planning unit 7). Covered activities will not substantially reduce modeled habitat near known population centers of western burrowing owl, or result in fragmentation of western burrowing owl habitat.

5.7.9.1.2 Reduction in Habitat Function

In addition to habitat removal and fragmentation, described above, the following categories of covered activities could render habitat less suitable for the western burrowing owl.

Noise, vibrations, lighting, and human activity. Western burrowing owl may be vulnerable to noise, vibrations, lighting, and other disturbances related to human activity from construction of urban and rural development. Project proponents will minimize construction-related disturbance through implementation of *AMM18, Minimize Take and Adverse Effects on Habitat of Western Burrowing Owl* (Chapter 4, Section 4.3.4, *Covered Species*).

Western burrowing owls may also be vulnerable to ongoing noise, vibrations, lighting, and visual disturbances as a result of human occupation of new developments. Increased disturbance of nesting birds by humans and dogs could diminish the ecological functions of western burrowing owl habitat adjacent to new development. Burrowing rodent populations, prey for burrowing owls, also could decline as a result of pets (i.e., domestic cats) and active control measures implemented as maintenance around new developments or facilities. Project proponents will minimize these effects through establishment of buffers as described in *AMM18, Minimize Take and Adverse Effects on Habitat of Western Burrowing Owl* (Chapter 4, Section 4.3.4, *Covered Species*), and through leash laws, fencing, and other design measures described in *AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interface*.

Fire break maintenance. Management of some reserve system lands may require establishment and maintenance of new fire breaks. Maintenance of fire breaks (i.e., mowing or disking) is primarily expected to retain the existing land cover (e.g., grassland); however, disking or mowing during the dry season could alter vegetation structure of the fire breaks. Although this would not eliminate western burrowing owl habitat, it could decrease its function by reducing its suitability for rodents and other burrowing owl prey items. Although conservation actions could result in short-term loss of western burrowing owl habitat function, they will provide for long-term enhancement of habitat function.

Operations and maintenance. Operations and maintenance activities could indirectly affect surrounding western burrowing owl habitat through noise, lighting, and other disturbance related to human activity. Project proponents will implement to *AMM18, Minimize Take and Adverse Effects on Habitat of Western Burrowing Owl*, to reduce these effects consistent with CDFW (2013) guidelines.

Conservation actions. Conservation actions could result in temporary noise and other disturbances to western burrowing owl habitat as a result of human activity. Project proponents will avoid and minimize these effects through adherence to *AMM18, Minimize Take and Adverse Effects on Habitat of Western Burrowing Owl*, consistent with CDFW (2013) guidelines.

5.7.9.1.3 Harassment, Injury, or Mortality

Equipment and vehicles used to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, and agricultural and water infrastructure operations) could crush eggs and nestlings in burrows resulting in direct injury or mortality of western burrowing owls. Additionally, noise and other disturbances related to human activity associated with implementing the covered activities could cause adults to abandon nesting burrows, if present, or inhibit their brooding and feeding behaviors, which could cause juvenile mortality. Operation of construction equipment should not result in mortality or injury of adult individuals, however, because adult western burrowing owls are highly mobile.

Over the long-term, urban and rural development activities could affect the reproductive success of western burrowing owls. Western burrowing owls are sensitive to disturbances of nesting burrows during the reproductive period. Ongoing noise and other disturbances related to human activity associated with occupancy of new developments and facilities, in addition to disturbance by domestic cats and loose-running dogs, could disrupt nesting pairs, thereby reducing nest productivity. In addition, native or nonnative predators supported by human developments (e.g., raccoons, skunks) could cause mortality of western burrowing owl nestlings or fledglings, if nesting burrows are present near these developments.

Contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) could result in harassment, injury, or mortality of individual birds. These effects are unlikely, however, because western burrowing owls are expected to avoid work sites that generate ongoing noise and other disturbances related to human activity.

Project proponents will avoid and minimize these effects by implementing measures to identify and avoid habitat for western burrowing owls (*AMM18, Minimize Take and Adverse Effects on Habitat of Western Burrowing Owl*).

5.7.9.1.4 Impact of Take on the Species

The breeding range of the western burrowing owl extends south from southern Canada throughout most of the western half of the United States and central Mexico. The winter range extends from central California southeast through Arizona, New Mexico, and Texas and south into northern and central Mexico, coinciding with southern breeding range where the species is resident year-round (Haug et al. 1993). Burrowing owls were once widespread and generally common over western North America in treeless, well-drained grassland, steppes, deserts, prairies, and agricultural lands (Haug et al. 1993). Burrowing owl populations throughout the species' North American range are reportedly declining (Klute et al. 2003).

The Plan Area supports an estimated 103,853 acres of modeled habitat for the western burrowing owl, of which covered activities will remove up to 3,172 acres (three percent). An estimated 62 percent of this loss is *other habitat*, which consists of cultivated lands that are typically less suitable for western burrowing owl than primary habitat. Take resulting from this habitat loss and other adverse effects, described above, is not expected to adversely affect the long-term survival and conservation of the species for the following reasons.

- The amount of habitat loss is small (three percent of habitat in Plan Area) relative to the species range and the amount remaining in the Plan Area.

- Implementation of the avoidance and minimization measures will substantially minimize effects on occupied burrowing owl burrows.

5.7.9.2 Beneficial Effects

The Yolo HCP/NCCP will protect 3,000 acres of unprotected modeled primary habitat (Objective WBO1.1, CM1) and at least 2,500 acres of unprotected modeled other habitat (Objective WBO1.2) for the western burrowing owl (Table 5-6, *Covered Species Benefits and Net Effects*). Additional western burrowing owl habitat is likely to be protected to meet the Swainson's hawk habitat protection commitment (Objective SH1.1, CM1) because much of the Swainson's hawk modeled cultivated lands foraging habitat is also modeled habitat for western burrowing owl (Appendix A, *Species Accounts*, Figures A-6 and A-9). Within the protected burrowing owl habitat, the Conservancy will prioritize acquisition of occupied habitat in the Yolo Bypass and adjacent lands, the area with the greatest potential for long-term sustainability of the species, and acquisition of lands adjacent to protected occupied sites that have enhancement potential (Objective WBO1.3).

Protected western burrowing owl habitat will be managed and enhanced to improve habitat value for the species. The Yolo HCP/NCCP will enhance and maintain the functions of protected grassland (primary habitat) by installing artificial burrows, creating conditions for increasing the abundance of native rodents and reducing the relative cover of nonnative grasses and forbs that reduces habitat value for covered and native species (Objectives WBO 1.5, NC-G1.2). The Yolo HCP/NCCP will also maintain and enhance the cultivated lands seminatural community (other habitat) to maintain or increase the abundance of native rodent species that provide prey for raptors (Objective NC-CL1.4).

5.7.9.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in an estimated net three percent decrease of modeled western burrowing owl habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full implementation of the Yolo HCP/NCCP, an estimated 17 percent of the burrowing owl habitat in the Plan Area will be conserved on Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including baseline and newly protected lands. Of these lands, at least 5,500 acres will consist of newly protected lands supporting modeled western burrowing owl habitat, which will be incorporated into the reserve system, and an additional 1,100 acres of pre-permit reserve lands supporting modeled western burrowing owl habitat will be enrolled into the reserve system. All reserve system lands will be monitored and adaptively managed to sustain habitat value for this species. The Conservancy will prioritize acquisition in areas occupied by the species that have the highest potential for sustainability, and lands with enhancement potential adjacent to protected, occupied sites. Therefore, the Yolo HCP/NCCP will minimize and mitigate impacts on western burrowing owl, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.7.10 Least Bell's Vireo

The Plan Area includes 4,719 acres of modeled least Bell's vireo habitat (Table 5-2, *Habitat-Based Take Limits, Covered Species*). The model for least Bell's vireo habitat consists of various land cover types in the valley foothill riparian natural community. Detail on the habitat model is provided in Appendix A, *Covered Species Accounts*. The USFWS indicates that the least Bell's vireo may have been extirpated from the Plan Area by 1996 (51 FR 16474). In April 2010, however, two least Bell's vireos were positively identified in the southern portion of the Yolo Bypass Wildlife Area, and the two birds

subsequently returned in the spring of 2011 (Appendix A, *Covered Species Accounts*). Least Bell's vireo was confirmed nesting in the Putah Creek Sinks in the Yolo Bypass Wildlife Area on April 26, 2010, although nesting was not successful (Whisler pers. comm. 2015). It is likely to occur during the permit term, however, because incidences of breeding least Bell's vireos have been increasing in the species' northern range.

5.7.10.1 Adverse Effects

5.7.10.1.1 Habitat Loss and Fragmentation

Habitat loss is a major factor that had contributed to the decline of least Bell's vireo (Kus 2002). Covered activities will permanently remove up to 39 acres (less than one percent) of modeled least Bell's vireo habitat in the Plan Area (Table 5-2, *Habitat-Based Take Limits, Covered Species*). No least Bell's vireo habitat will be temporarily lost as a result of covered activities.

An estimated 10 percent (three acres) of the least Bell's vireo habitat loss will result from operations and maintenance activities, including stream maintenance and enhancement along Cache Creek through the Cache Creek Resources Management Plan. The remainder of the habitat loss is distributed among planning units 7, 12, 14, and 17 (Table 5-5, *Covered Species Habitat Loss*).

5.7.10.1.2 Reduction in Habitat Function

In addition to habitat removal, described above, the following categories of covered activities could render habitat less suitable for the least Bell's vireo.

Noise and lighting. Noise and lighting from urban and rural development (temporary from construction, or permanent and ongoing from the occupation of developed areas) could render nearby least Bell's vireo habitat less suitable for the species, and cause least Bell's vireos to avoid these areas or diminish reproductive success. Traffic noise, for example, can reduce the distance over which acoustic signals such as song can be detected by migratory birds, an effect known as acoustic interference, which can impair the ability of birds to communicate with mates (Parris and Schneider 2008). Lighting has also been documented to adversely affect birds. Orientation under artificial lighting may result in alteration of bird behavior, such as causing diurnal birds to forage or sing at night or causing abnormal seasonal timing of migration and initiation of breeding behavior, although the effects of these altered behaviors on bird fitness are unknown (Longcore and Rich 2004). Birds can also be disoriented and entrapped by lights at night, causing them to stay in an area that they would normally migrate through (Longcore and Rich 2004).

Humans and pets. The permanent, ongoing effect of increased activity of humans and pets in the vicinity of developed areas could reduce the suitability of least Bell's vireo habitat. Bird species richness in riparian areas has been found to decline as the level of development on surrounding lands increases, particularly as a factor of the density of buildings within 1,500 meters of riparian habitat (Miller et al. 2003). Least Bell's vireos often nest near trails, and human disturbance such as trampling of nests or nest trees or clearing of vegetation can result in nest failure and abandonment (Kus 2002).

Invasive plants. Urban and rural development could result in the introduction and spread of invasive plant species that could in turn degrade least Bell's vireo habitat. The degradation of riparian habitat as a result of invasion by nonnative species is a threat to least Bell's vireo (Kus 2002). Project proponents will implement *AMM2, Design Developments to Minimize Indirect Effects*

at Urban-Habitat Interface (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*) to minimize the spread of invasive species as a result of urban and rural development.

5.7.10.1.3 Harassment, Injury, or Mortality

Operation of equipment and vehicles to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, and agricultural and water infrastructure operations) could result in injury or mortality of least Bell's vireo, as individual vireo nests could be crushed by moving construction-related equipment, and nests or juveniles could be abandoned due to disturbance, leading to nesting failure or juvenile mortality.

Contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) could result in injury or mortality of individual birds. The likelihood of this occurring is low, however, because least Bell's vireo is a highly mobile species that can readily avoid such hazards and is expected to avoid work sites that produce ongoing noise and other construction-related disturbances.

5.7.10.1.4 Impact of Take on the Species

The least Bell's vireo's historical breeding distribution in California once extended from coastal southern California through the San Joaquin and Sacramento Valleys as far north as Tehama County near Red Bluff. The Sacramento and San Joaquin Valleys are considered the center of the species' historical breeding range, supporting 60 to 80 percent of the historical population (51 FR 16474). Coinciding with widespread loss of riparian vegetation throughout California (Katibah 1984), Grinnell and Miller (1944) began to detect population declines in the Sacramento and San Joaquin Valley region. Surveys conducted in the late 1970s (Goldwasser et al. 1980) detected no least Bell's vireos in the Sacramento and San Joaquin Valleys, and the species was considered extirpated from the region. In 1986, the estimated statewide least Bell's vireo population was approximately 300 pairs (51 FR 16474), and the population was confined to southern California. By 1998, the population had increased to an estimated 2,000 pairs after extensive cowbird trapping efforts (Kus 2002), but the population remained confined to southern California. Recent sightings have been recorded in Yolo County, however, including 2010 and 2011 observations as described above, suggesting that the species range has expanded towards the northern extent of its historical breeding range. The recent sightings in the Yolo Bypass represent one of 300 occurrences recorded throughout the state (Appendix A, *Covered Species Accounts*). Covered activities are not expected to affect this occurrence. Breeding of least Bell's vireo has been not been documented in the Plan Area since the 1970s.

Based on modeled habitat for the least Bell's vireo, the Plan Area supports an estimated 4,719 acres of potentially suitable nesting and migratory habitat. Of this, covered activities will permanently remove up to 39 acres (less than one percent) (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Take resulting from this habitat loss and other adverse effects, described above, is not expected to adversely affect the long-term survival and conservation of the species for the following reasons.

- Least Bell's vireo occurrence is expected to be uncommon in the Plan Area.

- The nesting and migratory habitat to be lost is small relative to the amount of habitat in the Plan Area and the species range throughout California.
- Most of the permanently removed habitat consists of relatively small, fragmented riparian stands that provide low-value habitat for the vireo.

5.7.10.2 Beneficial Effects

The Yolo HCP/NCCP will protect 1,600 acres (Objective NC-VFR1.1) of unprotected valley foothill riparian natural community and restore 608 acres of this natural community (Objective NC-VFR1.2) (Table 5-6, *Covered Species Benefits and Net Effects*). Within this acreage, the Yolo HCP/NCCP will protect and restore 1,208 acres of least Bell's vireo habitat (600 acres protected and 608 restored) if all habitat loss occurs (Objectives LBV1.1). The Yolo HCP/NCCP will focus conservation within a habitat corridor along Cache Creek (Objectives L1.5), Putah Creek (Objective L1.6), and Sacramento River (Objective L.7), each of which supports a large contiguous patch of modeled least Bell's vireo habitat. The Yolo HCP/NCCP will also enhance and maintain the functions of the protected and restored valley foothill riparian community by reducing the relative extent of nonnative plants that degrade habitat function, and improving native plant diversity and vegetation structure.

The protection and restoration of large, interconnected blocks of habitat will benefit least Bell's vireo, countering the habitat fragmentation that is a primary factor contributing to this species' decline (Kus 2002). The control of invasive riparian plants will also benefit this species, as many invasive riparian plant species degrade habitat value for least Bell's vireo (Kus 2002). The conserved habitat will increase nesting opportunities for this species in the Plan Area.

5.7.10.3 Net Effects

The Yolo HCP/NCCP will result in an estimated 11 percent net increase of least Bell's vireo habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full implementation of the HCP/NCCP, an estimated 63 percent of least Bell's vireo habitat in the Plan Area will be conserved in Category 1 and 2 public and easement lands, including baseline and newly protected lands. Of these Category 1 and 2 public and easement lands, at least 1,168 acres (600 protected and 568 restored) will consist of newly protected lands that will be incorporated into the reserve system. All of the least Bell's vireo habitat in the reserve system will be monitored and adaptively managed to sustain habitat values for this species. The Yolo HCP/NCCP will minimize and mitigate impacts on least Bell's vireo to the maximum extent practicable and provide for the conservation of this species in the Plan Area.

5.7.11 Bank Swallow

The Plan Area includes 962 acres of modeled nesting habitat for bank swallow (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Modeled habitat for the bank swallow includes stream channels with suitable nesting substrate of vertical and friable river banks free of rip-rap (barren-gravel and sand bars land cover type). An active colony of bank swallow is present along the Cache Creek corridor, where bank swallows have nested on the banks of off-channel aggregate mines. In 2000, four colonies with an estimated 202 pairs were found along the Sacramento River in Yolo County between Verona and Knights Landing (Schlorff and Swolgaard unpublished data).

5.7.11.1 Adverse Effects

5.7.11.1.1 Habitat Loss and Fragmentation

One of the greatest threats to the bank swallow is ongoing habitat loss (Garrison 1998). There will be no permanent loss of bank swallow habitat as a result of covered activities. Up to 37 acres of barren floodplain providing potential bank swallow nesting habitat may be permanently affected by bank stabilization activities along Cache Creek, undertaken through the CCRMP as needed to protect property or valuable resources. The Conservancy expects that additional barren floodplain will form during the 50-year permit term, however, as a result of the natural, dynamic fluvial processes along Cache Creek. All covered activities, however, will avoid nesting colonies as described in *AMM20*, *Minimize Take and Adverse Effects on Habitat of Bank Swallow* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*).

Covered activities are not expected to fragment bank swallow habitat because the amount of habitat removal will be minimal and temporary.

5.7.11.1.2 Reduction in Habitat Function

In addition to habitat removal, described above, the following categories of covered activities could render habitat less suitable for bank swallow.

Mining. With the exception of mining, urban and rural development is not expected to occur in the vicinity of bank swallow habitat and, therefore, is not expected to affect the bank swallow. Mining activities will maintain a minimum 200-foot buffer adjacent to bank swallow habitat, consistent with guidance in the *Bank Swallow* (Riparian riparia) *Conservation Strategy for the Sacramento River Watershed* (Bank Swallow Technical Advisory Committee 2013). Bank swallows appear relatively insensitive to moderate levels of disturbance. Banks swallows have been nesting successfully along Cache Creek in the vicinity of mining activities, and colonies are known to persist in the vicinity of active farming, major roads, and public seashores where human activity can be substantial (Garrison 1998).

Operations and maintenance. Heavy equipment used for operations and maintenance activities generate noise that could affect western bank swallow, and humans and equipment could cause other disturbances related to human activity that result in bank swallows avoiding nearby areas. These effects would be similar to those described above for urban and rural development, and are expected to have minimal effect on the species. As described in *AMM20, Minimize Take and Adverse Effects on Habitat of Bank Swallow* (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*), operations and maintenance activities will typically maintain a 200-foot setback from active bank swallow colonies. Project proponents may apply a smaller buffer with approval by the Conservancy, USFWS, and CDFW.

Conservation actions. Conservation actions could result in temporary noise and other disturbances related to human activity in bank swallow habitat. As described above for urban and rural development, however, this effect is expected to be minimal.

5.7.11.1.3 Harassment, Injury, or Mortality

Equipment and vehicles used to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, and agricultural and water infrastructure operations) could result in direct injury or mortality of bank swallow. The

likelihood that nests or nestling birds would be injured or killed by equipment or vehicles is extremely low, because bank swallows usually nest in steep, eroding banks along streams. Burrow collapse due to human-related alteration of banks has been found to be the most significant, direct cause of mortality. Disturbance of incubating or nesting adults could lead to abandonment of the nest, or reduced brooding or feeding of young, which could lead to juvenile mortality. Project proponents will implement *AMM20*, *Minimize Take and Adverse Effects on Habitat of Bank Swallow*, including establishment of 200-foot setbacks from nesting colonies, to avoid harassment, injury, or mortality of individuals and nesting colonies.

5.7.11.1.4 Impact of Take on the Species

During the breeding season, bank swallows range throughout most of Alaska and Canada, southward from eastern Montana to Nevada, and eastward across the United States to Georgia. They are variably distributed throughout California, Texas, and New Mexico. In California, regular breeding occurs in Siskiyou, Shasta, Lassen, and Yolo Counties, and along the Sacramento River from Shasta County south to Yolo County. In the Plan Area, they nest along the Sacramento River and Cache Creek. Between 2000 and 2008, estimated numbers of breeding pairs in California have fluctuated between 6,320 and 8,530 (Garcia et al. 2008).

The Plan Area supports an estimated 962 acres of modeled bank swallow habitat. Of this, up to 37 acres will be removed by covered activities, although additional habitat is expected to be created through natural fluvial processes. Take resulting from this habitat loss and other adverse effects, described above, is not expected to adversely affect the long-term survival and conservation of the species for the following reasons.

- The species is relatively widespread outside the Plan Area.
- The habitat to be lost is temporary and is small (four percent) relative to the species range and the amount that will remain in the Plan Area.
- Avoidance and minimization measures will protect bank swallows from effects that may otherwise result from covered activities.

5.7.11.2 Beneficial Effects

The Yolo HCP/NCCP will conserve land within a habitat corridor along Cache Creek (Objective L1.4), which supports much of the bank swallow habitat in the Plan Area. In this area, the Yolo HCP/NCCP will protect at least 50 acres of unprotected bank swallow habitat, on a site that is occupied by bank swallows (Objectives BS1.1) (Table 5-6, *Covered Species Benefits and Net Effects*). Additionally, the Conservancy will manage the protected floodplain along Cache Creek to provide high-value foraging habitat for bank swallows by promoting open grass and wildflower vegetation and by controlling invasive plant species (Objective BS1.2). Natural floodplain land cover, particularly riparian grassland, provides vital foraging habitat for locally nesting bank swallow colonies (Bank Swallow Technical Advisory Committee 2013). These actions are expected to sustain the bank swallow nesting population along Cache Creek.

5.7.11.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in no 4 percent decrease in bank swallow habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full HCP/NCCP implementation, an estimated six percent of the bank swallow habitat in the Plan Area will be

conserved in Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including baseline and newly protected lands. Of this, 50 acres of protected habitat will be monitored and adaptively managed to sustain habitat values for this species. The Yolo HCP/NCCP will minimize and mitigate impacts on the bank swallow, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.7.12 Tricolored Blackbird

The Plan Area includes 265,813 acres of tricolored blackbird habitat, with 4,680 acres of nesting habitat and 261,133 acres of foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Nesting habitat includes marsh vegetation (e.g., bulrush and cattail) or thorny vegetation (e.g., blackberry) in the Yolo Bypass, Capay Valley, and Dunnigan Hills areas. Foraging habitat includes all potentially suitable vegetation types within eight miles of nesting habitat. Foraging habitat generally consists of grassland and agricultural areas with similar structure (e.g., pasture, grain and hay crops). The model also includes known recent colonies and sightings. Additional detail on the habitat model is provided in Appendix A, *Covered Species Accounts*.

Although comprehensive surveys of the Plan Area have not been conducted, species locality databases document 14 colonies in Yolo County from 1994 to 2004 (Appendix A, *Covered Species Accounts*). Most of these occurrences were recorded within and adjacent to the Willow Slough Basin planning unit, and several recent colonies and sightings were recorded in the North and South Yolo Bypass planning units. Surveys in 2007 identified a colony of 30,000 breeding adults nesting in milk thistle on the Conaway Ranch in the Yolo Bypass. The model for nesting habitat includes most of the records for the North and South Yolo Bypass planning units but does not include the colony records in the Willow Slough Basin planning unit. Based on a review of aerial imagery, it is likely that these nesting colonies are in small patches of nesting habitat below the minimum mapping unit used for the land cover mapping.

5.7.12.1 Adverse Effects

5.7.12.1.1 Habitat Loss and Fragmentation

One of the greatest threats to tricolored blackbird is the direct loss of habitat from human activities (Beedy and Hamilton 1999). Covered activities will permanently remove up to 9,028 acres of modeled tricolored blackbird habitat, including 86 acres of nesting habitat and 8,942 acres of foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). This loss represents one percent of the total tricolored blackbird modeled habitat in the Plan Area. Additionally, covered activities will temporarily remove up to 230 acres of foraging habitat (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). Each temporary disturbance is expected to be small, likely no greater than approximately ten acres (and often much less). Disturbance of small areas of cultivated lands during the 50-year permit term, with each disturbance to last for no more than one year, will remove minor amounts of foraging habitat but is unlikely to adversely affect tricolored blackbird foraging behavior. Cultivated lands regularly experience temporary disturbances and continue to provide habitat for tricolored blackbird when the disturbance is completed.

An estimated 43 percent of the tricolored blackbird habitat loss will result from urban development in the urban planning units: Woodland, Davis, West Sacramento, and Winters (planning units 19, 20, 21, and 22; Table 5-5, *Covered Species Habitat Loss*). Roughly half of the nesting habitat losses (48 acres) in the Plan Area are modeled in the West Sacramento planning unit and likely to result from

levee improvements. The remainder of the habitat loss will be distributed throughout modeled habitat in the Plan Area, and will result from various activities such as unincorporated community development in Dunnigan Hills, Monument Hills, and Madison. An estimated 11 percent (1,030 acres) of tricolored blackbird habitat loss will result from habitat restoration (Table 5-5, *Covered Species Habitat Loss*). Of this, 91 acres involve conversion of foraging habitat to fresh emergent wetland that will provide nesting habitat value for tricolored blackbird. Covered activities are not expected to reduce modeled habitat near known colonies of tricolored blackbird, or result in fragmentation of modeled tricolored blackbird habitat.

Ascent Environmental assessed the effects of fragmentation that would potentially result from tricolored blackbird foraging habitat being removed from the vicinity of surrounding foraging habitat (Appendix O, *Fragmentation Effects*). They identified foraging habitat within 8 miles of the nesting habitat that will be removed (based on the distance the species typically forages from the nest). They deducted the upland habitat acreage that would be directly removed by covered activities. Of the habitat that would remain after loss resulting from covered activities, they identified areas that would remain within 8 miles of nesting habitat. They estimated that with the expected nesting habitat loss, all foraging habitat would still be within 8 miles of nesting habitat.

5.7.12.1.2 Reduction in Habitat Function

In addition to habitat removal and fragmentation, described above, the following categories of covered activities could render habitat less suitable for tricolored blackbird.

Noise, vibrations, lighting, and human activity. Nesting tricolored blackbirds are sensitive to noise, vibrations, lighting, and other human-related disturbance from construction or urban and rural development, and similar ongoing disturbances to nearby habitat as a result of human occupation. The ecological functions of tricolored blackbird nesting and foraging habitat adjacent to new urban and rural developments (e.g., aggregate mining in Lower Cache Creek) could be diminished as a result of ongoing noise, pet-related, and other disturbances related to human activity associated with occupancy of new infrastructure and disturbance associated with developments.

Project proponents will minimize these effects through the establishment of buffers as described in *AMM20, Minimize Take and Adverse Effects on Habitat of Tricolored Blackbird*, and implementation of design measures described in *AMM2, Design Developments to Minimize Indirect Effects at Urban-Habitat Interface* (Chapter 4, Section 4.3.4, *Covered Species*).

Operations and maintenance. Operations and maintenance activities could indirectly affect surrounding tricolored blackbird habitat through noise, lighting, and other disturbance related to human activity as described above for urban and rural development. Project proponents will adhere to *AMM20, Minimize Take and Adverse Effects on Habitat of Tricolored Blackbird*, to reduce effects on nesting habitat during the nesting season.

Conservation actions. Conservation actions could result in temporary noise and other disturbances to tricolored blackbird habitat related to human activity. Project proponents, however, will avoid and minimize these effects through adherence to *AMM21, Minimize Take and Adverse Effects on Habitat of Tricolored Blackbird*.

5.7.12.1.3 Harassment, Injury, or Mortality

Equipment and vehicles used to implement covered activities (e.g., construction of new developments, restoration of habitat, maintenance of new and existing facilities, and agricultural and water infrastructure operations) could crush individual tricolored blackbird nests or cause nest disturbance that leads to juvenile abandonment and subsequent nesting failure or juvenile mortality.

Over the long-term, urban and rural development activities could affect the reproductive success of tricolored blackbird. Increased presence of vehicles and equipment could result in increased collisions with blackbirds on rural roads. Ongoing noise and other disturbances associated with occupancy of new infrastructure and developments, in addition to disturbance by domestic cats and loose-running dogs, could disrupt nesting colonies, thereby reducing nest productivity. In addition, native or nonnative predators supported by human developments (e.g., crows, coyotes) could cause mortality of eggs, nestlings, or fledglings located near new permanent developments.

Contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) could result in harassment, injury, or mortality of individual birds. The likelihood of these effects is low, however, because tricolored blackbird is a highly mobile species that can readily avoid such hazards and is expected to avoid work sites that generate ongoing noise and other construction-related disturbances.

Project proponents will avoid and minimize these potential effects through implementation of *AMM21, Minimize Take and Adverse Effects on Habitat of Tricolored Blackbird*.

Normal and routine farming practices on cultivated lands in the reserve system are not expected to result in injury or mortality of tricolored blackbirds because the species is mobile and can move out of harms way, and because the species is adapted to foraging in an agricultural setting. Tricolored blackbirds potentially nest in grain crops in counties other than Yolo. If they nest in grain crops in the Plan Area there is potential for crop harvesting to result in injury or mortality of eggs or chicks. This effect will be avoided, however, through implementation of the measures described in Section 4.3.5.7, *Tricolored Blackbird.*

5.7.12.1.4 Impact of Take on the Species

The tricolored blackbird is a colonial nesting passerine that is largely restricted to California. More than 95 percent of the California breeding population of tricolored blackbirds occurs in the Central Valley (Kyle and Kelsey 2011). Breeding also occurs in the foothills of the Sierra Nevada south to Kern County, the coastal slopes from Sonoma County to the Mexican border, and sporadically in the Modoc Plateau. The Plan Area constitutes a relatively small portion of the species' total range. Although the overall range of the tricolored blackbird is largely unchanged since the 1930s (Neff 1937; Hamilton 1998), large gaps now exist in the species' former range. Surveys during the 1990s (Hamilton et al. 1994; Beedy and Hamilton 1997; Hamilton 2004) indicated a significant declining trend in California populations since the 1930s, and a particularly dramatic decline since 1994. Statewide surveys conducted during the 2000s indicated some recovery from the recent (1999) population low; however, the population increases have primarily been limited to the San Joaquin Valley and the Tulare Basin (Kyle and Kelsey 2011). Recent surveys revealed very few nesting colonies in the Plan Area (Meese pers. comm.).

The Plan Area supports an estimated 265,813 acres of modeled tricolored blackbird habitat: 4,680 acres of nesting habitat and 261,133 acres of foraging habitat. Covered activities will remove 9,028 acres (three percent) of the modeled habitat in the Plan Area, 8,942 acres of which is foraging habitat and 86 acres of which is nesting habitat for tricolored blackbirds (Table 5-2, *Habitat-Based Take Limits, by Covered Species*). This habitat loss and other adverse effects on tricolored blackbird resulting from covered activities, as described above, are not expected to adversely affect the long-term survival and conservation of the species for the following reasons.

- The habitat loss is small (one percent of habitat in the Plan Area) relative to the species range and the amount that will remain in the Plan Area.
- Most of the loss of foraging habitat will be to cultivated lands that are abundant throughout the Plan Area.
- The avoidance and minimization measures will minimize effects on nesting colonies.

5.7.12.2 Beneficial Effects

The protection of grassland and cultivated lands seminatural community (Objectives NC-CL1.1, NC-CL1.2, and NC-G1.1) is expected to contribute an estimated 16,610 acres of tricolored blackbird foraging habitat to the reserve system (Table 5-6, *Covered Species Benefits and Net Effects*). The Yolo HCP/NCCP will also protect 500 acres of fresh emergent wetland natural community (Objective NC-FEW1.1), at least 200 acres of which will be sited in modeled tricolored blackbird nesting habitat (Objective TRBL1.1 and Table 5-6, *Covered Species Benefits and Net Effects*). The Yolo HCP/NCCP will restore fresh emergent wetland to achieve no net loss of this natural community (Objective NC-FEW1.2), potentially providing additional nesting opportunities for tricolored blackbird. Additionally, at least 4,150 acres of existing protected tricolored blackbird habitat on pre-permit reserve lands will be enrolled into the reserve system, including 4,000 acres of foraging habitat and 150 acres of nesting habitat (Objective TRBL1.2). The reserve system will include at least two tricolored blackbird colonies, which will be managed to maintain the colonies (Objective TRBL1.3), and the Conservancy will prioritize protection of additional colonies as they are found.

5.7.12.3 Net Effects

Full implementation of the Yolo HCP/NCCP will result in no net change in acres of tricolored blackbird nesting habitat, and a net three percent decrease in tricolored blackbird foraging habitat in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). With full implementation, an estimated 49 percent of nesting habitat (2,260 acres) and 14 percent of foraging habitat (34,529 acres) for tricolored blackbird in the Plan Area will be conserved in Category 1 and 2 public and easement lands (Table 5-6, *Covered Species Benefits and Net Effects*), including baseline and newly protected lands. Of these Category 1 and 2 public and easement lands, at least 16,810 acres will be newly protected lands in the reserve system, and an additional 4,150 acres of pre-permit reserve lands will be enrolled into the reserve system. All reserve system lands supporting tricolored blackbird habitat will be monitored and adaptively managed to sustain habitat value for tricolored blackbird. The Yolo HCP/NCCP will minimize and mitigate impacts on tricolored blackbird, to the maximum extent practicable, and provide for the conservation of this species in the Plan Area.

5.8 Cumulative Effects

As described above, the effects of covered activities were assessed in the context of existing conditions in the Plan Area. Some activities and projects that are outside the scope of the Yolo HCP/NCCP may nonetheless contribute to cumulative effects on covered species. An analysis of cumulative effects is not required in an HCP or NCCP; however, the Conservancy provides one here to support the federal biological opinion for the USFWS Section 7 internal consultation process (Chapter 1, *Introduction*, provides details). The scope of the cumulative analysis in a biological opinion is limited to non-federal actions because federal actions (i.e., any federal project, project with federal funding, or project that requires a federal permit) will be the subject of future Section 7 consultations in which cumulative effects can be considered more fully. To support this analysis, the cumulative projects evaluated in this section are limited to non-federal projects that are not covered by the Yolo HCP/NCCP. The EIS/EIR prepared for the Yolo HCP/NCCP presents a thorough analysis of the cumulative effects of all projects, federal and non-federal, when combined with the effects of the Yolo HCP/NCCP (Yolo Habitat Conservancy 2017).

5.8.1 Flood Control Infrastructure and Improvements

This section addresses local and state flood control infrastructure and improvements that are not covered under the Yolo HCP/NCCP. The California Department of Water Resources (DWR) maintains flood control levees along the Sacramento River and the Yolo Bypass. Levee maintenance activities are expected to be ongoing throughout the permit term of the Yolo HCP/NCCP. DWR levee maintenance and improvement activities are expected to result in the periodic removal of riparian vegetation that may support habitat for western yellow-billed cuckoo, least Bell's vireo, and valley elderberry longhorn beetle between levee improvement and maintenance events. Ongoing maintenance of levees and channel banks will perpetuate conditions that inhibit the natural floodplain processes (i.e., sedimentation, erosion, and channel migration); natural floodplain processes support the establishment of riparian vegetation that provides habitat for riparian-associated covered species. Effects on covered species from flood control infrastructure maintenance and improvement activities implemented by local flood control agencies[16] would be similar to those described for DWR actions.

DWR's FloodSafe Program is in the process of developing the Central Valley Flood Management Planning Program, which will identify flood improvement projects to be implemented over many years in the Central Valley (California Department of Water Resources 2010). The draft plan identified the potential development of an expansion of the Yolo Bypass (California Department of Water Resources 2012). Expansion of the Yolo Bypass capacity could remove agricultural lands from production of crop types that support habitat for western pond turtle, giant garter snake, Swainson's hawk, white-tailed kite, western burrowing owl, and tricolored blackbird. The proposed expansion could affect the core occupied habitat area of the Willow Slough/Yolo Bypass giant garter snake subpopulation adjacent to and west of the bypass. Additional agricultural lands could be removed from production during years that the bypass is operated, if the timing of flooding precludes cultivation of crops or if the frequency of bypass operation is such that it becomes no longer economically feasible to farm within the flood footprint of the bypass. Changes to the operation of

[16] For example, local reclamation and water districts that are not covered under the Yolo HCP/NCCP through Certificates of Inclusion.

the bypass could also result in increases in drowning of giant garter snakes that hibernate within the expanded bypass area and that cannot escape inundation.

5.8.2 Ongoing Management and Use of State Wildlife Areas

The Yolo Bypass Wildlife Area, Sacramento Bypass Wildlife Area, and Fremont Weir State Wildlife Area are located within the Plan Area in the Yolo Bypass. CDFW manages these wildlife areas primarily for controlled recreation (e.g., bird watching, hunting) and environmental education (e.g., school tours). CDFW manages the Yolo Bypass Wildlife Area primarily to provide habitat for wintering waterfowl and migratory shorebirds and for waterfowl viewing and hunting, as well as educational activities in partnership with the Yolo Basin Foundation. CDFW generally passively manages the Sacramento Bypass and Fremont Weir State Wildlife Area as natural habitat areas. Management of these wildlife areas includes maintenance of existing recreational access and facilities. Any proposed expansion of these facilities could result in removal of riparian, wetland, herbaceous, and agricultural land cover types that support modeled habitat for valley elderberry longhorn beetle, California tiger salamander, western pond turtle, giant garter snake, Swainson's hawk, white-tailed kite, western burrowing owl, least Bell's vireo, and tricolored blackbird. Effects of removing these habitats on associated covered species are expected to be minimal, however, because CDFW is expected to design any such expansion of facilities to avoid and minimize adverse effects on sensitive resources.

Habitat management practices (e.g., the areal extent of maintained habitat types) that CDFW implements in the Yolo Bypass Wildlife Area are expected to change over the term of the Yolo HCP/NCCP. Changes in the acreage of each managed habitat could reduce or increase the availability or value of habitat for western pond turtle, giant garter snake, Swainson's hawk, white-tailed kite, and tricolored blackbird.

5.8.3 Wind Energy Development

Wind energy development and operation is not a covered activity under the Yolo HCP/NCCP. The Yolo County General Plan Policies CC-4.5 and PF-10.2 encourage small- and large-scale wind energy development, and individual and community-based wind energy developments (Yolo County 2009); and Section 8-2.2418 of the County Code provides for the construction and operation of wind turbines on lands designated as agriculture within its jurisdiction. By Yolo County ordinance, large utility-scale wind energy systems are limited to lands zoned for specified agricultural uses, and small wind energy systems for onsite energy use may be established in specified lands zoned for agriculture, residential, commercial, and industrial uses.

Wind turbine farms are expected to include large commercial operations and smaller noncommercial operations comprising from one to several small turbines. Construction of wind turbine towers could remove agricultural, grassland, and riparian land cover types within the footprint of towers and associated facilities (e.g., maintenance roads and transmission lines). Removal of these land cover types, depending on their location, could remove habitat for all covered species except those that are valley foothill riparian obligates (i.e., western yellow-billed cuckoo, least Bell's vireo, tricolored blackbirds, and bank swallow). Construction and operation and maintenance equipment could result in death or injury of covered amphibian and reptile species and western burrowing owl, if present at project sites.

Rotating wind turbine blades are known to cause mortality or injury of birds during seasonal migrations and local foraging flights. The susceptibility of each species for wind turbine fatalities is a function of its flight behavior (e.g., flying height above the ground), wind speed, and atmospheric conditions (e.g., fog). Operation of wind turbines in the Plan Area could result in injury and mortality of all the covered bird species, though the flight location and behavior of some species are such that risk for turbine-collision mortality would be minimal (e.g., western yellow-billed cuckoo).

5.8.4 Solar Farms

Solar farms are not covered activities under the Yolo HCP/NCCP. As of the preparation of this HCP/NCCP, there are no solar farms being planning in the Plan Area. Solar farm projects may occur, however, during the 50-year permit term. Construction of solar farms may result in habitat loss and fragmentation. Additionally, covered bird species may be injured or killed as a result of striking solar panels due to the "lake effect" in which birds and their insect prey mistake reflective solar panels for water bodies. Concentrated solar plants can kill birds as they are incinerated while flying through the concentrated beams of light (American Bird Conservancy 2015).

5.8.5 Utilities Infrastructure

The PG&E HCP would cover activities associated with PG&E's utility infrastructure and these activities are not covered by the Yolo HCP/NCCP, except as necessary for development identified in the General Plans. During the Yolo HCP/NCCP permit term, new or replacement gas and electric utility infrastructure and facilities (e.g., gas pipelines, electric transmission lines, and substations) that are not covered under the Yolo HCP/NCCP could be constructed and operated within the Plan Area. Depending on where such facilities are located and the constructed footprints of these and associated facilities (e.g., maintenance roads), habitat for any of the covered species could be removed. Operation of construction and maintenance equipment could result in mortality and injury of covered amphibian and reptile species and western burrowing owl, if present at construction sites. New aboveground electric transmission lines would also create a collision and electrocution hazard for covered bird species, although Swainson's hawk is likely to be more susceptible to these hazards because of its foraging flight habits. Pacific Gas & Electric Company (PG&E) owns and operates most utilities in the Plan Area. PG&E is developing their own HCP for all operations and maintenance of their electric and gas utility lines (distribution and transmission) throughout the Sacramento Valley, including all of Yolo County.

5.8.6 Agricultural and Ranching Practices

The Yolo HCP/NCCP does not cover routine cultivation practices on agricultural lands and grazing practices by agricultural and ranching operations outside the Yolo HCP/NCCP reserve system and the neighboring landowner protection program. These activities will continue over the Yolo HCP/NCCP permit term.

Ongoing farming practices, such as the operation of farm equipment to till and harvest fields and to maintain irrigation water delivery channels, could result in injury or mortality of western pond turtle and giant garter snake if present when equipment is operated. Ongoing ranching operations such as road construction, road maintenance, and livestock grazing may limit or degrade habitat for covered species, including California tiger salamander and western pond turtle. Ranching activities such as pond maintenance and moderate livestock grazing, however, contribute to maintaining

habitat functions for associated covered species, such as western pond turtle. Rodent control on grazing lands may adversely affect western burrowing owl through reductions in prey and nesting habitat. Some ongoing agricultural activities on cultivated lands may limit or degrade foraging habitat for tricolored blackbird and western burrowing owl. Cattle in ranchlands could trample covered species, and habitat could be lost due to agricultural practices that change the hydrology of an area.

Water transfers that result in fallowing or idling farm land or changing the mix of crop types grown could remove, increase, or decrease the function of crop lands as habitat for agricultural-associated covered species, such as western pond turtle, giant garter snake, and Swainson's hawk. For example, fallowing or idling of rice land would remove habitat for western pond turtle and giant garter snake while creating foraging habitat for Swainson's hawk. Water transfers may also directly affect the availability of aquatic habitat for giant garter snake and western pond turtle (e.g., dewatering of conveyance channels that support habitat). Changes in crop types and cropping practices in response to changing agricultural markets and new technologies could result in similar effects on agricultural-associated covered species.

Conversion of natural habitats to agriculture may result in removing habitat for covered species (e.g., California tiger salamander) or altering the function of the converted land as habitat for covered species (e.g., conversion of grassland to cropland may result in increased or decreased foraging habitat value of the converted land for Swainson's hawk, depending on the crop types grown). Conversion of cropland to orchards and vineyards and conversion from alfalfa to other crop types on lands outside of the reserve network could diminish the value of these lands for Swainson's hawk foraging. This conversion could ultimately lead to a declining nesting population within the plan area as food availability becomes increasingly limited. Estep (2015) reviewed current and historic land use/crop patterns and Swainson's hawk nesting distribution and abundance, and developed a model to establish an estimated threshold acreage of suitable and high value foraging habitat required to sustain the current nesting population. In an effort to maintain the plan area-wide nesting population the Yolo HCP/NCCP will implement measures described in Chapter 7, Section 7.7.1.2.8, *Regional Loss of Swainson's Hawk Habitat,* if Swainson's hawk foraging habitat throughout the Plan Area drops below threshold levels and there is in a decline the county-wide Swainson's hawk population.

5.8.7 Existing and New Roadways

Ongoing vehicular traffic on existing roadways, private roads, and new roadways will continue to result in collisions and subsequent mortality or injury of susceptible covered species (e.g., giant garter snake, western pond turtle, California tiger salamander) and, to a lesser extent, covered bird species (the behaviors and mobility of the covered bird species along roadways typically result in low risk for vehicle collisions). Construction of new roadways not covered under the Yolo HCP/NCCP could remove habitat for covered species, depending on where these roads are located, and operation of construction and maintenance equipment could result in mortality and injury of covered wildlife species if present in construction rights-of-way.

5.8.8 Tribal Lands Management

The Yocha Dehe Wintun Nation is the only federally recognized tribe with trust landholdings in the Plan Area. Potential new and ongoing tribe activities that could result in cumulative effects include transportation, utility, flood control, and water supply infrastructure development, improvements,

and maintenance; ongoing agricultural and ranching practices; land development; and any other type of development or land use that may be undertaken by the tribe. These activities could result in the adverse effects on covered species described above. Based on the location of tribal trust lands in the Plan Area, however, the potential for effects on occurrences and habitat is likely limited to valley elderberry longhorn beetle, Swainson's Hawk, California tiger salamander, white-tailed kite, western pond turtle, and tricolored blackbird.

5.8.9 Climate Change

Climate change is likely to affect covered species during the HCP/NCCP permit term. The following are examples of potential effects of climate change on covered species in the Plan Area.

- Higher temperatures and earlier spring conditions may disrupt environmental cues that covered plants (palmate bracted bird's-beak) and covered animal species rely on to initiate critical life-history events such as migration, as with Swainson's hawk, least Bell's vireo, and western yellow-billed cuckoo (Parmesan 2006; Parmesan and Yohe 2003; Penuelas and Filella 2001; Miller-Rushing et al. 2010; Ibáñez et al. 2010).
- Higher temperatures may exceed the thermal tolerances of some species, which may displace species or reduce growth and survival (Parmesan 2007; Albright et al. 2010; Perry et al. 2012).
- Higher temperatures already are resulting in more winter precipitation falling as rain and earlier snowmelt, which has increased the risk of winter flooding of terrestrial habitats and reduced water availability for plants and animals in late summer (Knowles and Cayan 2004). Increased winter flooding could result in flooding of giant garter snake overwintering habitat, resulting in giant garter snake mortality and rendering previously suitable overwintering habitat unsuitable.
- An increase in heat waves and a greater likelihood of prolonged drought will reduce the growth and survival of vegetation and the survival of terrestrial wildlife in summer (Gershunov et al. 2009; Mastrandrea et al. 2009).
- Warmer spring and summer temperatures, combined with reduced precipitation as a result of reduced snowpack and earlier spring snowmelts, increase the risk of wildland fires and wildfire-related deaths of terrestrial wildlife and damage to terrestrial habitats (Westerling et al. 2006).
- Reduced precipitation and runoff volumes may reduce the extent of water-dependent habitats such as ponds (Pyke 2004).
- Sea level rise, increased storm surge, and heavy winter rains will increase the risk of catastrophic flooding of wetland and riparian habitats in winter (Parker et al. 2011).

The physical changes associated with climate change are expected to be widespread and long-lasting, even if meaningful climate change actions (e.g., reductions in greenhouse gas emissions) are made now (Solomon et al. 2009).

5.8.10 Summary of the Effects of Covered Activities in Addition to Cumulative Effects

Covered activities will remove covered species habitat and result in the harassment, injury, and mortality of covered species. The net effect of implementing the Yolo HCP/NCCP on covered species, however, is beneficial, as described in Section 5.7, *Effects on Covered Species*. Therefore, implementation of the Yolo HCP/NCCP will not contribute to cumulative effects.

5.9 Critical Habitat

Critical habitat is defined in Section 3 of the ESA as follows.

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

Although a critical habitat analysis is not required content for an HCP, the USFWS must evaluate whether the federal action of issuing a section 10(a)(1)(B) permit will adversely modify designated critical habitat in their Section 7 Biological Opinion prepared to issue the federal Section 10(a)(1)(B) Incidental Take Permit for this HCP/NCCP. This assessment is provided to support that analysis.

Critical habitat is present in the Plan Area for California tiger salamander, Colusa grass, Solano grass, vernal pools tadpole shrimp, delta smelt, and Chinook salmon (Figure 5-5, *Critical Habitat in the Plan Area*).[17] Of these, only the California tiger salamander is a covered species under the Yolo HCP/NCCP. The USFWS formally designated critical habitat for the Central Valley population of the California tiger salamander in 2005 (70 FR 49379–49458). Planning units 5 and 13, in the Dunnigan Hills area, include 2,730 acres designated by the USFWS as California tiger salamander Critical Habitat Unit 1. Approximately 1,050 acres of HCP/NCCP modeled California tiger salamander habitat are present in Critical Habitat Unit 1.

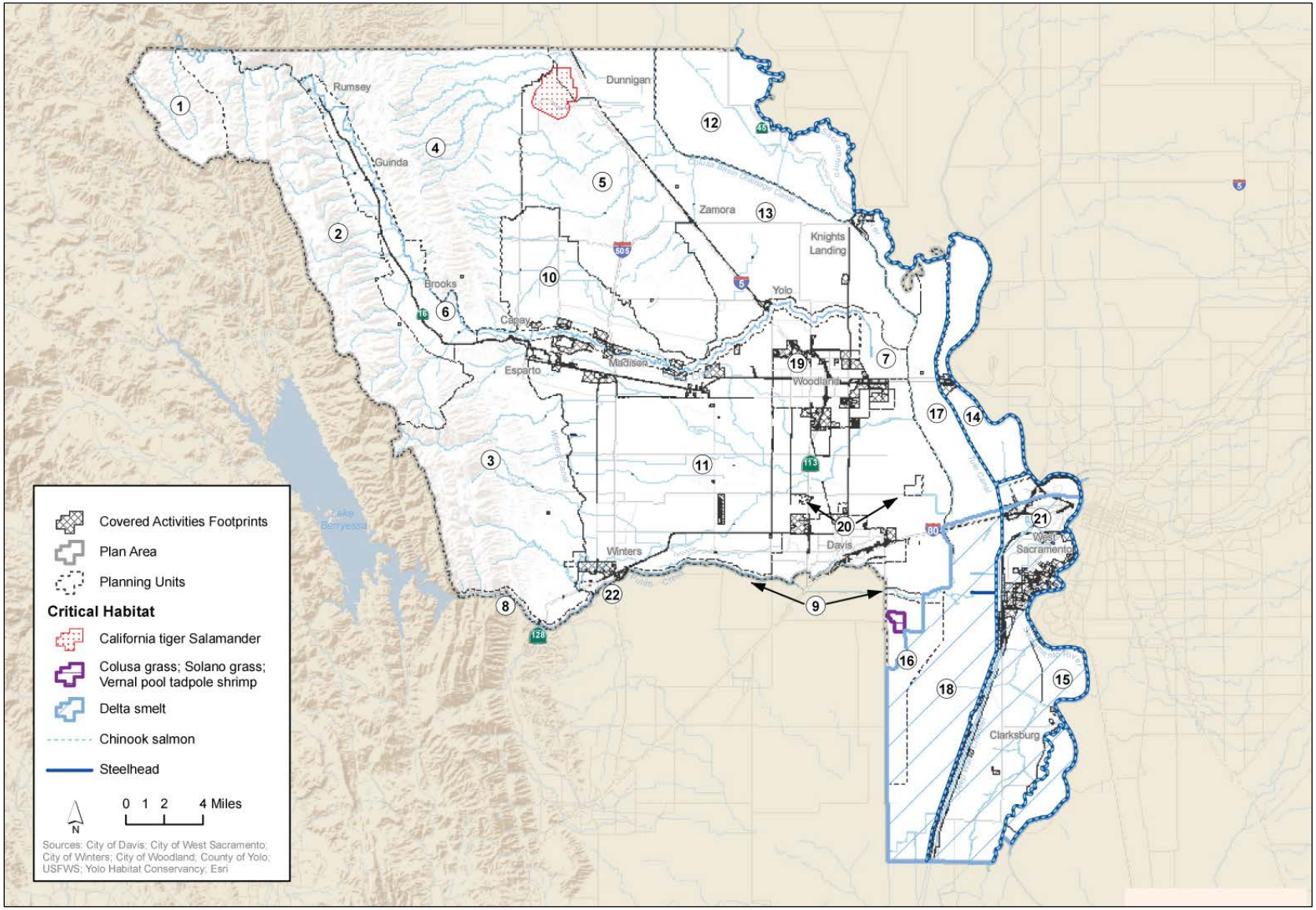
AMM13, Minimize Take and Adverse Effects on Habitat of California Tiger Salamander (Chapter 4, Section 4.3, *Avoidance and Minimization Measures*) prohibits the removal of California tiger salamander habitat by covered activities within the boundary of Critical Habitat Unit 1. Based on this assessment, the covered activities are not expected to adversely modify designated critical habitat.

The critical habitat for Colusa grass, Solano grass, and vernal pool tadpole shrimp is at the Davis Communications Site (Figure 5-5). There are no Yolo HCP/NCCP covered activities on this site, therefore the HCP/NCCP will not affect critical habitat for these species. Activities that affect wetlands or waters of the U.S. within critical habitat for delta smelt or Chinook salmon will necessitate permitting under Section 404 of the Clean Water Act, and this permitting will require USFWS to make a finding that the project does not adversely modify critical habitat for the delta

[17] Critical habitat for the western yellow-billed cuckoo was formally designated in 2014, but no critical habitat for this species is present in the Plan Area (79 FR 48548–48652).

smelt and NMFS to make the same finding for Chinook salmon. The Yolo HCP/NCCP does not result in adverse modification of critical habitat for these species.

Figure 5-5. Critical Habitat in the Plan Area



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Chapter 6
Conservation Strategy

6.1 Introduction

This chapter presents the Yolo HCP/NCCP conservation strategy, which was designed to meet the regulatory requirements of the federal Endangered Species Act (FESA) and the Natural Community Conservation Planning Act (NCCPA). The conservation strategy provides for the conservation of covered species in the Plan Area necessary to meet the requirements of the NCCPA and includes the mitigation of impacts necessary under Section 10 of FESA to allow covered activities in the Plan Area to move forward. The conservation strategy also will build on decades of local, state, and federal conservation efforts in the Plan Area, including the establishment of the Yolo Bypass Wildlife Area, implementation of the Cache Creek Resources Management Plan (CCRMP) and Willow Slough Watershed Integrated Resources Management Plan, and the efforts of the Lower Putah Creek Coordinating Committee (LPCCC).

Combined with the responsible land use planning of the Plan Area jurisdictions, existing and new conservation efforts will provide significant habitat for many species, including those covered by the Yolo HCP/NCCP. The Yolo HCP/NCCP is only one part of a significant conservation network, so conservation resulting from the Yolo HCP/NCCP will add to the large amount of land that already has varying levels of conservation status in the Plan Area (Table 6-1(a), *Baseline Public and Easement Lands*). This land conserves a diverse array of natural communities and species habitat. Furthermore, existing conservation organizations that work in the Plan Area, such as the Yolo County Resource Conservation District, Tuleyome, Putah Creek Council, Yolo Basin Foundation and the Cache Creek Conservancy, have long worked to improve habitat in the Plan Area, including through the installation of hedgerows on cultivated lands and the restoration of riparian vegetation and ponds to benefit wildlife. Furthermore, the Yolo Habitat Conservancy (Conservancy) is developing the Yolo Regional Conservation Investment Strategy/Local Conservation Plan concurrent with the Yolo HCP/NCCP. The Regional Consevation Investment Strategy/Local Conservation Plan, which is compatible with but separate from the Yolo HCP/NCCP, will guide the conservation of sensitive species that are not covered by the HCP/NCCP and the natural communities upon which they depend. Although the Yolo HCP/NCCP will benefit many of these species and natural communities, the Regional Conservation Investment Strategy/Local Conservation Plan extends the benefits of this HCP/NCCP to species and natural communities that are addressed at the project level through the California Environmental Quality Act (CEQA).

To meet the NCCPA permit standards, the conservation strategy provides for the conservation of covered species by protecting, enhancing, restoring, and managing natural communities, covered species habitats, and occurrences of covered species.

The conservation strategy achieves the following objectives, pursuant to the NCCPA (Section 2820):

- Conserve, restore, and provide for the management of representative natural and seminatural communities;
- Establish reserves that provide for the conservation of covered species within the Yolo HCP/NCCP geographic area and linkages to adjacent habitat outside the Plan Area;

Table 6-1(a). Baseline Public and Easement Lands

Baseline public and easement lands are all lands throughout the Plan Area with varying levels of conservation prior to HCP/NCCP permit issuance (all categories below). These categories are used for the gap analysis to assess the baseline level of natural community and covered species habitat conservation in the Plan Area, and are factored into the amount of additional conservation needed through the HCP/NCCP.

Type of Conservation	Definition	Acres
Category 1[a]	Land for which a primary management goal is related to ecological protection. The land consists predominantly of suitable habitat and is covered by an irrevocable conservation mandate that precludes changes in land use that could result in degradation or loss of ecological functions. The irrevocable conservation mandate is a perpetual conservation easement or, in the case of Yolo Bypass Wildlife Area, a state mandate. This category is also referred to as "baseline protected lands."	34,264
Category 2	Land without an irrevocable conservation mandate but with a management goal and/or acquisition purpose related to ecological protection. The land is predominantly natural habitat or in a use that supports covered species habitat. This category includes public lands held in fee title and private lands in cases where a conservation entity (e.g., land trust) holds fee title, without permanent easements in place. Although Category 2 Public and Easement Lands were used to inform development of the HCP/NCCP conservation commitments, these lands do not meet the definition of "protected" under the Yolo HCP/NCCP conservation strategy.	53,730
Category 3	Land that consists of public open space, but its primary management goal is not related to ecological protection,and it has no irrevocable conservation mandate. Such land includes natural habitat or a use that supports covered species habitat. This category includes public lands without a conservation mandate or private lands held in fee title by a conservation organization (i.e., agricultural land trust), without permanent conservation easements in place.	2,973
TOTAL		90,967

Note:

[a] For the purpose of the effects analysis, all lands that will be conserved under a permanent conservation easement during plan implementation are also considered to be Category 1 Public and Easement Lands. Those lands that were protected prior to Yolo HCP/NCCP implementation are termed baseline public and easement lands. The term baseline indicates lands that were set aside prior to Yolo HCP/NCCP implementation.

- Protect and maintain habitat areas that are large enough to support sustainable populations of covered species;
- Incorporate in the reserve system a range of environmental gradients and high habitat diversity to provide for shifting species distributions in response to changing circumstances (e.g., in response to climate change); and
- Sustain the effective movement and genetic interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the reserve system.

The conservation strategy is also designed to streamline compliance by the covered activities with CEQA, National Environmental Policy Act (NEPA), and other applicable environmental regulations (Chapter 1, *Introduction*). The conservation strategy achieves this goal by providing for the conservation of the species in the Plan Area and by incidentally providing for habitat needs of non-covered native species associated with each of the natural communities.

The Yolo HCP/NCCP conservation strategy identifies the intended biological outcomes of Yolo HCP/NCCP implementation and describes the means by which the Conservancy will achieve these outcomes. The conservation strategy includes specific and measurable biological goals and objectives and comprehensive conservation measures. The conservation strategy follows a logical sequence, from the biological goals and objectives, to the conservation measures, to the monitoring and adaptive management strategy. The biological goals and objectives (Section 6.3) articulate *what* the conservation strategy is meant to achieve. The conservation measures (Section 6.4) describe *how* the Conservancy will meet the biological goals and objectives (i.e., the actions to be implemented to achieve the goals and objectives). Section 6.4 includes three broad categories of conservation measures:

- Section 6.4.1, *Conservation Measure 1*, *Establish Reserve System,* describes the Yolo HCP/NCCP's commitments for land acquisition and enrollment to establish the reserve system. It includes acreage commitments for natural communities and species habitat, describes land protection mechanisms and enrollment requirements, and provides guidelines and commitments for identifying lands to acquire;
- Section 6.4.2, *Conservation Measure 2, Restore Natural Communities,* describes the Yolo HCP/NCCP's commitments for natural community and species habitat restoration. It defines *restoration*, specifies restoration commitments, and provides restoration criteria and techniques; and
- Section 6.4.3, *Manage and Enhance the Reserve System*, describes the Yolo HCP/NCCP's commitments for natural community and species habitat management and enhancement. It defines *management* and *enhancement,* describes the requirements for preparing reserve management plans, and describes management and enhancement actions at the landscape, natural community, and species levels.

The monitoring and adaptive management strategy (Section 6.5) describes how the Conservancy will know whether it is meeting the goals and objectives and how the Conservancy will adjust the strategy, as needed, to ensure that the goals and objectives are met. The sections that follow introduce these elements in more detail.

6.1.1 Overview of Reserve System and Other Public and Easement Lands

Although it is not possible to recreate the natural communities that existed in the Plan Area prior to the introduction of anthropogenic activities, Yolo County and the cities have minimized the impact of these activities by designing and implementing compact urban development and minimizing the footprint of rural development, structures, and infrastructure, outside of urban areas. Yolo County and the Cities of Davis, West Sacramento, Winters, and Woodland have worked to protect agricultural land and natural communities outside of the Yolo HCP/NCCP process for more than 160 years, most significantly by directing growth to cities through adopted land use planning policies. As a result, more than 88 percent of Yolo County's population lives within the incorporated cities. Together, the cities and established towns of Yolo County house more than 93 percent of the population but account for less than six percent of the total area (Yolo County General Plan, p. LU-2). This land use planning has resulted in the protection of extensive agricultural lands on the valley floor and other areas that support natural communities and covered species habitat. Many of the lands that are in public ownership and under private conservation and agricultural easements support natural communities and valuable habitat for covered species. Lands that are in public ownership or under private conservation or agricultural easements that help conserve natural communities and covered species habitats in the Plan Area are referred to as *public and easement lands*. Public and easement lands that were conserved prior to Yolo HCP/NCCP implementation are referred to as *baseline public and easement lands* (Figure 6-2, *Baseline Public and Easement Lands*).

The Conservancy will build the reserve system adjacent to and around the baseline protected lands (i.e., baseline Category 1 lands) to expand and connect lands that are likely to remain in open space and support natural communities and covered species. The conservation strategy involves integrating *newly protected lands* with *baseline public and easement lands* and enrolling some of the baseline public and easement lands into the reserve system as *pre-permit reserve lands* so that the Conservancy, other Permittees, or wildlife agencies can monitor and adaptively manage these lands consistent with the Yolo HCP/NCCP's biological goals and objectives. The pre-permit reserve lands will be used for the conservation component of the strategy, and will not be used for mitigation purposes.

Tables 6-1(a), *Baseline Public and Easement Lands,* and 6-1(b), *Reserve System Land Types*, define and describe the terms used in the Yolo HCP/NCCP to refer to the various types of lands in the Plan Area relative to their existing or future conservation status. Category 1 lands are considered *baseline protected lands* and therefore eligible for enrollment into the reserve system as *pre-permit reserve lands* but do not count as *newly protected lands* (Table 6-1(b), *Reserve System Land Types*). Category 2 lands count as *newly protected lands* if the wildlife agencies agree that a property is eligible as newly protected because it is not covered by an irrevocable conservation mandate and the Conservancy places these lands in a conservation easement and manages them. Placement of Category 2 lands into conservation easements, in addition to enrolling them into the reserve system, has a conservation benefit above and beyond the enrollment of Category 1 lands into the reserve system. Category 3 lands count as *newly protected lands* if placed in perpetual conservation easements. Where permanent conservation easements can be placed on these Category 2 and 3 lands, consistent with the HCP/NCCP, they will be elevated to Category 1 and thus contribute toward achieving Yolo HCP/NCCP natural community and species habitat *newly protected lands* commitments (Table 6-2(a), *Newly Protected Lands Commitments*). Figure 6-2, *Baseline Public and Easement Lands,* presents the distribution in the Plan Area of Category 1, 2, and 3 baseline public

and easement lands. Table 6-1(b), *Reserve System Land Types,* also provides a breakdown between lands that will be protected or restored to mitigate for the loss of natural communities and covered species habitat, and lands that will provide conservation beyond mitigation to meet the NCCP standard.

Table 6-2(a), *Newly Protected Lands Commitments*, provides the acre commitments by natural community and by species for newly protected lands. Table 6-2(b), *Pre-permit Reserve Lands Commitments*, provides the acre commitments by natural community and by species for pre-permit reserve lands that the Conservancy will enroll into the reserve system. Implementation of the Yolo HCP/NCCP to meet the biological goals and objectives will result in 24,406 acres of newly protected natural communities and species habitat, up to 956 acres of restoration or creation if the maximum allowable wetland or riparian loss is reached, 44 acres of restoration independent of effects, and 8,000 acres of additional pre-permit reserve lands enrolled into the reserve system, for a total of 33,362 acres conserved if the maximum natural community and covered species habitat loss occurs. Table 6-1(b), *Reserve System Land Types*, provides these acreage amounts and definitions for newly protected, restored or created, and pre-permit reserve lands. Table 6-2(c), *Covered Species Occupancy Commitments,* provides the occupancy commitments for the reserve system.

6.1.2 Biological Goals and Objectives

The biological goals and objectives reflect the expected ecological outcomes of full implementation of the Yolo HCP/NCCP. The biological goals set out the broad principles the Conservancy used to help guide the development of the conservation strategy. The biological objectives describe the conservation commitments. Objectives are measurable and quantitative; they clearly state a desired result and will collectively achieve the biological goals. Biological goals and objectives are the foundation of the conservation strategy and are intended to provide the following functions:

- Describe the desired biological outcomes of the conservation strategy and how those outcomes will provide for the conservation of covered species and their habitats,
- Provide quantitative commitments and timeframes for achieving the desired outcomes,
- Serve as benchmarks by which to measure progress in achieving those outcomes across multiple temporal and spatial scales, and
- Provide metrics for the monitoring program that will evaluate the effectiveness of the conservation measures and, if necessary, provide a basis to adjust the conservation measures to achieve the desired outcomes.

Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring,* provides each of the biological goals and objectives at the landscape, natural community, and covered species levels. For each biological objective, Table 6-3 indicates which conservation measures the Conservancy will implement to achieve the objective.

Section 6.2.1, *Process of Developing the Biological Goals and Objectives*, describes how the biological goals and objectives were developed. Section 6.3, *Biological Goals and Objectives*, describes the role of biological goals and objectives in the HCP/NCCP, presents the biological goals and objectives, and describes the underlying rationale for each goal and objective.

Table 6-1(b). Reserve System Land Types

The *reserve system* consists of all lands that are protected, monitored, and adaptively managed consistent with commitments in the Yolo HCP/NCCP. All lands defined below comprise the reserve system.

Type of Conservation	Definition	Mitigation/Conservation	Commitment (acres)[c]
Newly Protected Lands	Lands that were not previously (generally before permit issuance)[a] protected through a conservation easement or other mechanism and that the Conservancy places under a permanent conservation easement and enrolls in the reserve system. These include lands protected for mitigation and conservation lands to meet NCCPA requirements. Category 2 baseline public and easement lands (Table 6-1(a)) will count only toward newly protected lands upon wildlife agency approval and if placed in a perpetual conservation easement.	Newly protected *mitigation lands* are those lands the Conservancy will protect to mitigate the impacts of take consistent with Section 10(a)(1)(B) of the Endangered Species Act.	16,175
		Newly protected *conservation lands* are those the Conservancy will protect above and beyond the *mitigation land* commitments to meet conservation requirements of the NCCPA.	8,231
		Newly Protected Lands Subtotal	**24,406**
Restored/ Created Lands	Lands that the Conservancy places under a permanent conservation easement, or that are already protected through a conservation easement, and the Conservancy restores or creates as a wetland natural community type. (Restoration and Creation are further defined in Conservation Measure 2.)	Restored/created *mitigation lands* are those lands that the Conservancy will restore or create to mitigate the impacts of take consistent with Section 10(a)(1)(B) of the Endangered Species Act (mitigation will occur through a combination of newly protected and restored lands).	A sufficient number of acres to achieve a 1:1 ratio for wetlands, open water, and riparian ≤ 912
		Restored/created *conservation lands* are those that the Conservancy will restore or create above and beyond the *mitigation land* commitments to meet conservation requirements of the NCCPA. This restoration or creation will take place regardless of the level of natural community and habitat loss.	44
		Restored/Protected Lands Subtotal	**≤ 956**
Pre-permit Reserve Lands	Category 1 and 2 baseline public and easement lands (Table 6-1(a)) that are enrolled into the reserve system. Category 2 baseline public and easement lands that are counted as newly protected lands (defined above) are not counted as pre-permit reserve lands.	Pre-permit reserve lands are *conservation lands.* They will not count toward *mitigation.*	8,000
		TOTAL	**33,362**[b]

Notes:

a. As described in Chapter 7, *Section 7.5.10, Pre-Permit Reserve Lands,* if a landowner or the Conservancy upgrades conservation easements acquired prior to permit issuance to be consistent with the template provided in Appendix K, *Conservation Easement Template*, then these lands may count toward the newly protected lands commitments.

b. This assumes restoration of the the full 912 acres that are dependent on effect.

c. For additional information on cost and funding of the reserve system acres please refer to Chapter 8, and Appendices H and I.

Table 6-2 (a). Newly Protected Lands Commitments

Natural Community	Natural Community Protection Requirements	Covered Species Protection Requirements
Cultivated Lands (non-rice)	14,362 acres	2,500 acres western burrowing owl habitat
		14,362 acres Swainson's hawk foraging habitat
Cultivated Lands (rice)	2,800 acres	2,800 acres giant garter snake habitat
Grassland	4,430 acres, of which at least 3,000 acres is in planning unit 5.	2,115 acres western burrowing owl habitat
		At least 2,000 acres California tiger salamander habitat (prioritize protection in critical habitat)
		4,430 acres Swainson's hawk foraging habitat
Oak Woodland	30 acres (10 acres as mitigation for loss of three acres of Blue Oak Woodland and conservation of an additional 20 acres of valley oak woodland)	N/A
Alkali Prairie	33.7 acres on Woodland Regional Park	33.7 acres on Woodland Regional Park
Fresh Emergent Wetland	500 acres	500 acres giant garter snake habitat
		200 acres of tricolored blackbird nesting habitat and at least two active tricolored blackbird nesting colonies (colonies may be on pre-permit reserve land) (Table 6-2(b), *Pre-permit Reserve Lands Commitments*). High priority given to protecting colonies (in addition to the two protected) as colonies are found on potential Reserve System lands.
Valley Foothill Riparian	1,600 acres primarily in planning units 5 and 7.	Prioritize protection of valley elderberry longhorn beetle populations
		500 acres western yellow-billed cuckoo habitat
		600 acres least Bell's vireo habitat
Lacustrine and Riverine	600 acres	At least 36 acres of aquatic California tiger salamander habitat. At least five pools that support all life stages of the salamander through all water year types (restored pools may contribute to this requirement)
		At least 420 acres of giant garter snake habitat.
Other (Bank Swallow)	50 acres in planning unit 7	50 acres of bank swallow habitat in planning unit 7, with at least one active bank swallow colony
All Natural Communities Protected (Total)	24,406[a]	At least 1,160 acres of giant garter snake active-season upland movement habitat and 2,315 acres of giant garter snake overwintering habitat
		At least 18,865 acres white-tailed kite foraging habitat
		At least 20 Swainson's hawk nest trees and 2 white-tailed kite trees (active within last five years)
		At least two breeding pairs of western burrowing owls for each pair displaced as a result of covered activities.

Note:

a. This includes the 33.7 acres of alkali prairie on Woodland Regional Park, which was not included in Chapter 8, *Costs and Funding*, for the cost analysis and is not included on Table 6-1(b) for newly protected lands.

Table 6-2(b). Pre-permit Reserve Lands Commitments

Natural Community	Natural Community Enrollment Requirement	Covered Species Requirements
Cultivated lands (non-rice)	3,649 acres	700 acres of western burrowing owl habitat
		3,649 acres of Swainson's hawk foraging habitat
Cultivated lands (rice)	1,775 acres	1,775 acres of giant garter snake habitat
Grassland	335 acres	335 acres of western burrowing owl habitat
		335 acres of Swainson's hawk foraging habitat
Fresh emergent wetland	750 acres	155 acres of tricolored blackbird nesting habitat
		750 acres of giant garter snake habitat
Other Land Cover Types	1,491 acres	
Total	8,000 acres	

Table 6-2(c). Covered Species Occupancy Commitments

Covered Species	Occupancy Commitment
Palmate-bracted bird's beak	Increase the 10-year average population size of palmate-bracted bird's-beak on Woodland Regional Park by at least 10%, by managing and enhancing habitat. This will be achieved through monitoring and adaptive management of the population as described in Section 6.5.6.3.1, *Palmate-Bracted Bird's Beak.*
Valley elderberry longhorn beetle	Occupied habitat will be prioritized during the site selection process for the reserve system. The location of habitat protection is subject to wildlife agency approval consistent with Section 7.5.2, *Acquisition Process*. The intent of the HCP/NCCP is to protect occupied habitat, but protection may include unoccupied habitat that may become occupied in the future.
California tiger salamander	Protect at least five California tiger salamander breeding pools that are each found to support all life stages of the salamander through all water year types (i.e., drought year, wet year, moderate rainfall year).
Western pond turtle	Protect at least 3 breeding sites.
Giant garter snake	All giant garter snake habitat acquired for the reserve system that will count toward the achievement of the Yolo HCP/NCCP biological goals and objectives (Objectives GGS1.1, GGS1.2, and GGS1.3) will be occupied as defined in Section 6.4.1.8.3, *Giant Garter Snake*. A site is considered occupied if it is within an *occupied habitat unit*. The geographical extent of occupied habitat units at the time of Plan approval are shown in Figure 6-12. These units were identified based on species occurrence data, habitat quality, habitat connectivity, and habitat patch size. After five years, an occupied habitat unit is considered to remain occupied if there is documented presence of both male and female individuals in both adult and juvenile age classes during at least two out of every five consecutive calendar years (i.e., measurements start after five years of Plan implementation).
Swainson's hawk	Protect 20 Swainson's hawk nest trees (a nest tree is a tree that has been occupied within at least one of the previous five years). The schedule for nest tree protection will be based on the HCP/NCCP's Stay Ahead provisions (Section 7.5.3, *Stay Ahead Provision*).
White-tailed kite	Protect at least 2 nesting nest trees (a nest tree is a tree that has been occupied within at least one of the previous five years).
Western yellow-billed cuckoo	The HCP/NCCP has no occupancy requirements for this species, as there are no nesting populations currently known to occur in the Plan Area.
Western burrowing owl	Maintain at least two active burrowing owl nesting sites. Additionally, maintain at least two active nesting sites for each nesting pair displaced by covered activities, and one active nesting site or single owl site for each non-breeding single owl displaced by covered activities. (An active nesting site is defined as a breeding burrow or burrow complex occupied by a single breeding pair. A single owl site is defined as a burrow or burrow complex occupied by a nonbreeding individual.)
Least Bell's vireo	The HCP/NCCP has no specific occupancy requirements for this species, as there are no nesting populations currently known to occur in the Plan Area.
Bank swallow	50 acres of habitat on a site or sites occupied by this species in Planning Unit 7 or along the Sacramento River (a *site* is a habitat patch within one tenth of a mile of an occupied burrow).
Tricolored blackbird	Maintain at least two tricolored blackbird nesting colonies in the reserve system.

6.1.3 Conservation Measures

The conservation measures are the actions the Conservancy will implement to meet the biological goals and objectives. Although the conservation measures have been developed to meet all of the biological goals and objectives, the relationship between goals and objectives and conservation measures is not direct; most of the conservation measures address several goals and objectives, and most objectives will be met through a combination of conservation measures.

The conservation measures are described with sufficient detail and specificity to allow for their implementation. As a result of the large scale and long timeframe over which the Yolo HCP/NCCP will be implemented, the conservation measures are also designed to be flexible and allow for adaptive management with increasing knowledge over time. Preserving this flexibility is an important component of the conservation strategy. Section 6.4, *Conservation Measures*, describes each of the conservation measures in detail.

6.1.4 Monitoring and Adaptive Management

The monitoring and adaptive management program is an integral component of the conservation strategy. This program has been designed to use new information and insight gained during the course of HCP/NCCP implementation to ensure conservation measures can achieve the biological goals and objectives. The adaptive management process will afford the flexibility to allow the Conservancy to make changes to the conservation measures to improve their effectiveness over time. The Conservancy will use the results of monitoring and research efforts to assess progress toward achieving the biological goals and objectives and gauge the effectiveness of the conservation strategy. The monitoring and adaptive management program and its regulatory basis are described in Section 6.5, *Monitoring and Adaptive Management*.

6.2 Methods and Approach

This section describes the methods and the approaches used to develop the conservation strategy. Section 6.2.1, *Process of Developing the Biological Goals and Objectives,* describes the general process applied to developing the goals and objectives. Section 6.2.2, *Planning Units*, describes the areas that have been defined within the Plan Area for analysis and planning purposes.

6.2.1 Process of Developing the Biological Goals and Objectives

The conservation strategy is based on the best scientific data available (Chapter 2, *Existing Ecological Conditions*, and Appendix A, *Covered Species Accounts*,) and was designed using a multi-level ecological approach in accordance with principles of conservation biology, to be quantitative and measurable (Noss 1987).

The quantitative objectives are explicit, clear, and transparent, and they guide the conservation actions in the Plan Area, including adaptive management and compliance monitoring (Margules and Pressey 2000).

The objectives are based on both the need to provide for the conservation of the covered species, consistent with NCCPA standards, and need for mitigation for the effects of covered activities. The level of additional contribution to species conservation, beyond mitigation, was based on the following factors:

- The life history needs of each species (see Appendix A, *Covered Species Accounts*);
- Conservation needs based on recovery plans, five-year reviews, and other relevant conservation planning documents (see Chapter 2, *Existing Ecological Conditions,* and this chapter);
- The importance of the Plan Area to species conservation, in terms of the rarity of the species and the proportion of the species' range and population in the Plan Area. In general, species with a large portion of their range in the Plan Area may require more conservation than species with a small portion of their range in the Plan Area;
- The extent to which species habitat is already protected in the Plan Area (baseline protected lands). If most of the habitat for a covered species is already protected in the Plan Area, this warrants less additional habitat protection than would be necessary if only a small fraction of the habitat was already protected;
- Reserve land configuration and quality; and
- Plan specific factors such as land use policies and growth patterns in the Plan Area.

The rationale provided in subsections of Section 6.3, *Biological Goals and Objectives,* describes how the Conservancy used these factors to determine each of the quantitative objectives.

The conservation strategy addresses conservation of ecological processes, environmental gradients, regional biological diversity, and regional wildlife linkages primarily in the landscape-level biological goals and objectives. These goals and objectives were inherently difficult to develop because of the large scale of the processes and the general lack of data regarding their operation in the Plan Area. The land cover mapping described in Chapter 2, *Existing Ecological Conditions,* was assumed to be an adequate surrogate for regional biological diversity. If adequate and representative stands of these land cover types are preserved and enhanced, the Conservancy assumes that native biological diversity in general will be preserved and enhanced within the reserve system.

The Conservancy has developed the biological goals and objectives in accordance with the principles of conservation biology (Noss 1987); as such, they address, among other things, ecological processes, environmental gradients, biological diversity, and regional aquatic and terrestrial linkages. The biological goals and objectives fit into the ecological hierarchy described below.

- **Landscape.** Landscape-level biological goals and objectives are related to the overall condition of hydrological, physical, chemical, and biological processes in the Plan Area;
- **Natural community.** Natural community biological goals and objectives specifically address the needs of each natural community; and
- **Species.** Species-specific biological goals and objectives are designed to provide for the conservation of covered species and mitigate the adverse effects of covered activities.

The biological goals and objectives were developed first at the landscape level to meet the needs of the broadest array possible of covered natural communities and covered species. Next, each natural community was examined to determine what additional conservation was needed at the natural

community level that could benefit multiple covered species. Lastly, the expected benefits of achieving the landscape and natural community biological objectives for each covered species were evaluated, and species-specific biological goals and objectives were added as necessary to provide for the conservation of the species. Using this hierarchical approach, the conservation needs of many covered species are met through landscape-level and natural community biological goals and objectives. Additional conservation needs are met by species-specific goals and objectives for covered species whose conservation needs could not be fully addressed at the landscape and natural community levels.

The reserve system will be assembled through application of the biological goals and objectives related to reserve design and acres of protection and restoration. Although several parcels have been identified for acquisition,[1] the Conservancy will create the majority of the reserve system gradually over the permit term according to the criteria described in Conservation Measure 1, *Establish Reserve System*. This implementation approach is commonly used in HCPs and NCCPs to allow for achievement of conservation goals and objectives using a willing-seller approach and with the benefits of the free market in land acquisition. The land acquisition process is described in detail in Conservation Measure 1, *Establish Reserve System*, and in Chapter 7, *Plan Implementation.*

The factors that went into developing each of the biological objectives, including the protection and restoration acreage commitments and the reserve design objectives, are described in detail in the rationale for each objective in Section 6.3, *Biological Goals and Objectives*.

6.2.2 Planning Units

To facilitate the development of a spatially explicit conservation strategy, as well as ensure that biological goals and objectives are met consistently throughout the Plan Area, the Plan Area is divided into 22 planning units (Figure 6-1, *Yolo HCP/NCCP Planning Units*). The planning units were delineated to capture lands that support similar ecological, topographical, natural community, and land use conditions. These planning units identify the specific areas in which conservation actions (such as land acquisition and habitat restoration) will occur without identifying individual parcels for the actions. The planning units are large enough to allow for the achievement of natural community objectives, with protection or restoration of only a portion of the planning unit. This approach provides the flexibility needed to allow land acquisition to occur from willing sellers, while at the same time providing certainty to the wildlife agencies—California Department of Fish and Wildlife (CDFW) and U.S. Fish and Wildlife Service (USFWS)—that the necessary conservation will occur in the Plan Area for the conservation of covered species.

Planning units were identified to account for major natural geomorphic and ecological features as well as defined land use areas (i.e., development). To make implementation practical, planning unit boundaries were delineated using clearly recognizable features such as roads and parcel boundaries that best approximated natural geomorphic and ecological boundaries.

[1] Acquisition of land as used in the Yolo HCP/NCCP means the placement of conservation easements on or the fee title purchase of land parcels to protect natural communities and covered species habitat. The Conservancy expects, and the Yolo HCP/NCCP assumes, that the majority of acquisition will occur through conservation easements.

Figure 6-1. Yolo HCP/NCCP Planning Units

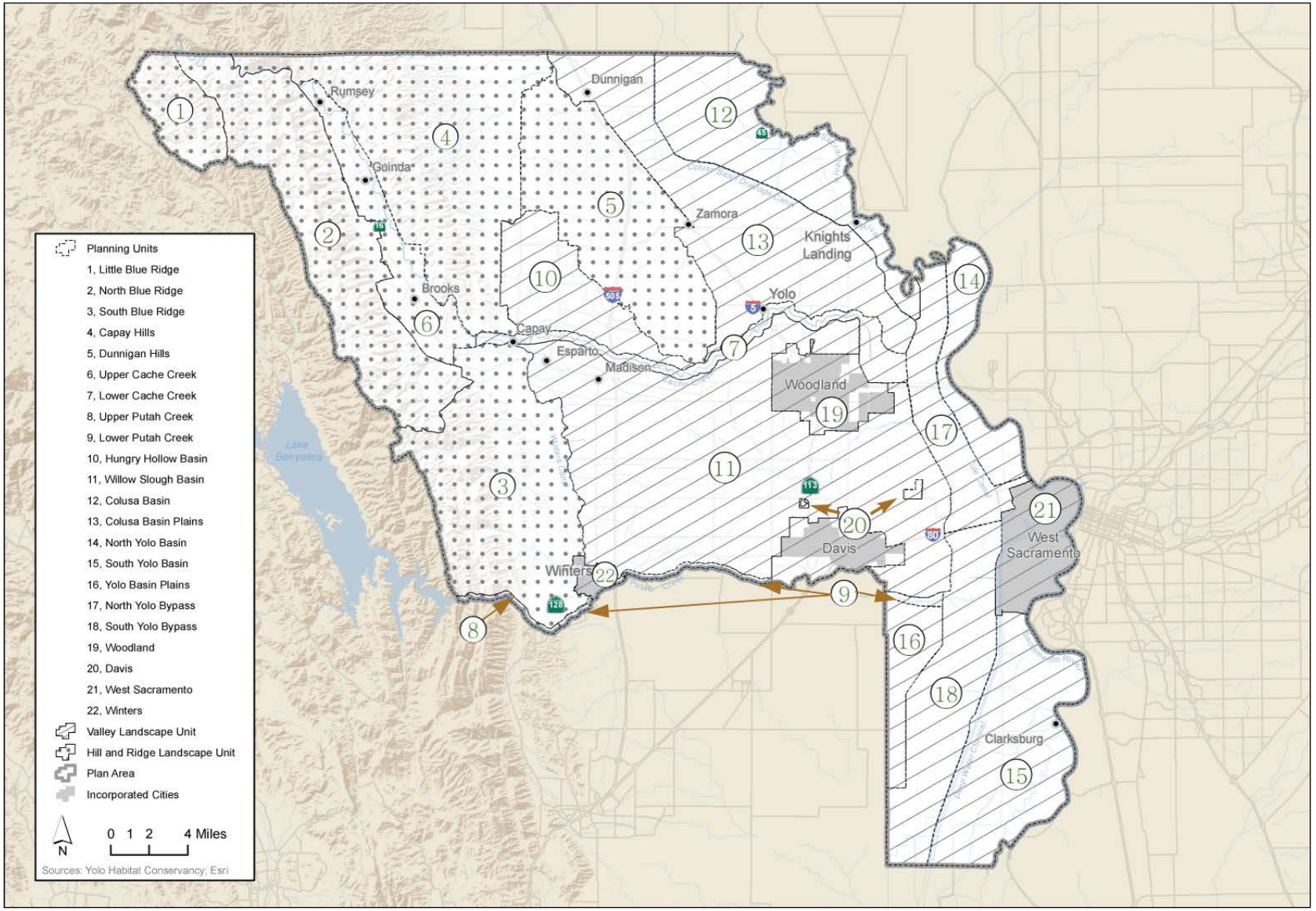
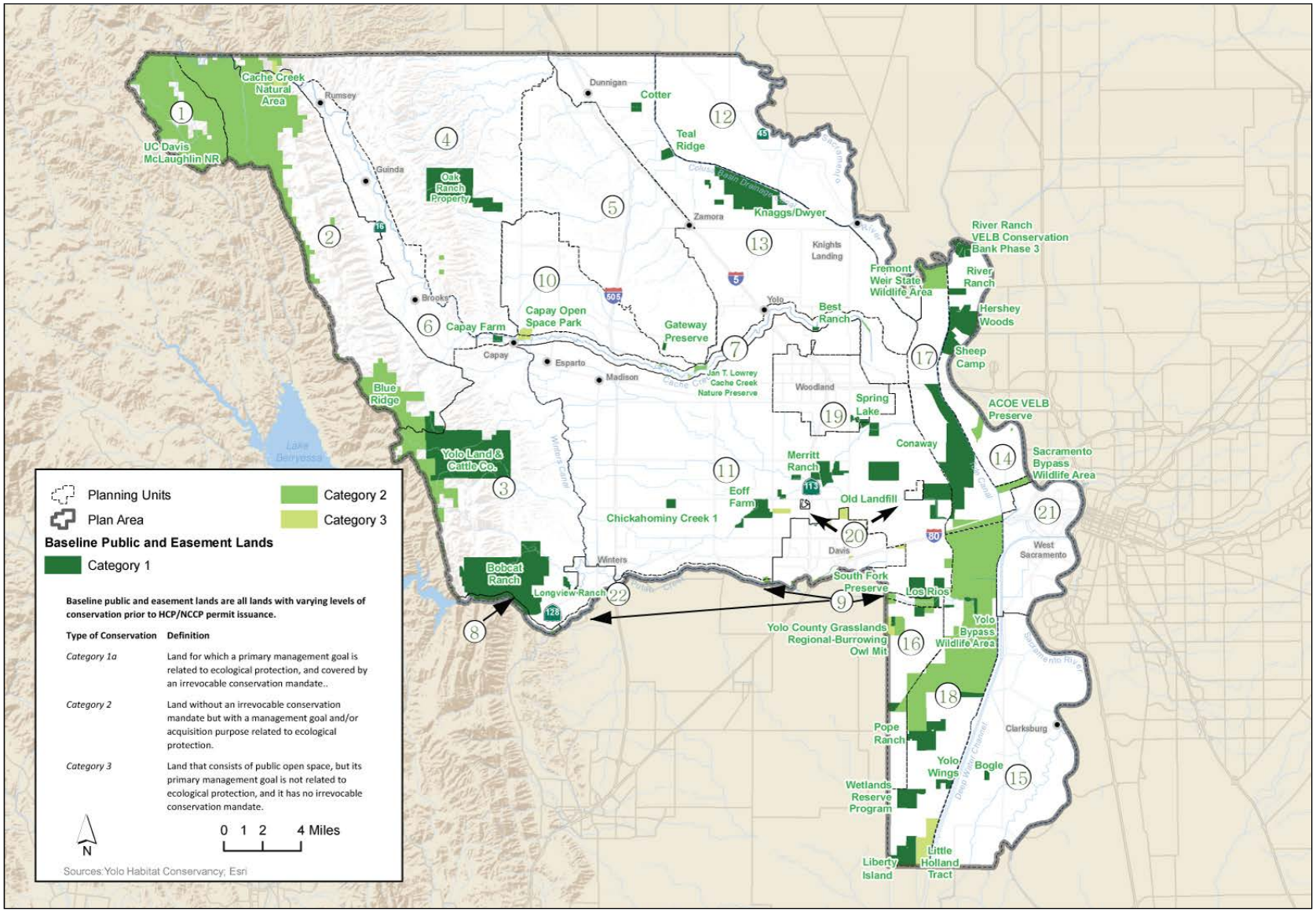


Figure 6-2. Baseline Public and Easement Lands



The reserve system will be assembled primarily in planning units 5, 7, 8, 9, 10, 11 and 13, and riparian areas adjacent to Putah and Cache Creeks and along the Sacramento River in planning units 12, 14, 15, and 21 (Figure 6-1, *Yolo HCP/NCCP Planning Units*). Planning units 19 through 22 are generally the urban growth areas for the Cities of Davis, Woodland, West Sacramento, and Winters and therefore are not suitable for conservation commitments, with limited exceptions for rare covered species and natural communities.

Planning units 1 through 4 and 6 are in the western portion of the Plan Area. These planning units support the rugged and largely inaccessible mountains of the coast range. They also support rural parts of the county with very low-density ranches, farms, and grazing lands. These planning units provide important habitat for a number of species but are not the primary location of habitat for covered species and include public lands where much of the natural communities and native species are protected. With the exception of riparian areas adjacent to Putah and Cache Creeks, the Yolo HCP/NCCP does not include conservation commitments in these planning units for the following reasons:

- Many of the natural communities found only in these planning units, such as serpentine grassland, mixed chaparral, and closed-cone pine-cypress, have a substantial fraction of their area protected in public and private lands owned in fee title or through conservation easement by the Bureau of Land Management, U.S. Forest Service, University of California Natural Reserve System, California Audubon, and local land trusts and conservancies. Therefore, Conservancy acquisition of these natural communities would add little to their existing protection;
- Natural communities in these planning units would either not experience impacts from covered activities or would experience very low impacts that could be addressed by consolidated conservation in planning units to the east; and
- Natural communities in these planning units are not under threat from non-covered activities because of their rural character, restrictive County land use controls, and, in some cases, their rugged terrain.

6.2.3 Baseline Public and Easement Lands Database

The Conservancy developed a baseline public and easement lands GIS dataset to identify baseline public and easement lands within the Plan Area. The Conservancy compiled this from various public sources. Although the boundaries depicted within the data do not represent legal boundaries in all cases, they represent the best available information and were considered to be adequate for guiding development of the conservation strategy at a landscape level. The Conservancy will acquire more detailed information for land acquisition and other decisions during HCP/NCCP implementation. The public dataset sources used to generate the baseline public and easement lands GIS data layer included the following:

- California Department of Fish and Game (now CDFW) Lands GIS data layer (2006);
- Conservation easement documents filed with the Yolo County Clerk Recorder between 2002 and 2014;
- City of Davis Public Lands and Easements dataset for lands within the City of Davis Planning Area (January 2014);

- Yolo County Protected Lands; and
- Yolo County Assessor's tax parcel data.

The Conservancy created the data layer by overlaying source data on County parcel boundary data. Parcels identified as baseline public and easement lands through source datasets were then attributed with the appropriate information. Based on the ownership information derived from the above sources, the data were evaluated and grouped into three resource protection-level categories based on the extent to which lands would be protected and managed for natural communities and covered species. The purpose of this categorization was to assess the level at which the lands might contribute to the Yolo HCP/NCCP conservation strategy, including meeting the biological goals and objectives of the HCP/NCCP. The Conservancy defined the baseline public and easement lands in three categories, defined in Table 6-1(a), *Baseline Public and Easement Lands.*

6.3 Biological Goals and Objectives

Sections 6.1 and 6.2, above, describe the purpose of the biological goals and objectives (Section 6.1.2, *Biological Goals and Objectives*) and the methods and approach used to develop the biological goals and objectives (Section 6.2.1, *Process of Developing the Biological Goals and Objectives*). This section introduces the format and organization of the biological goals and objectives (Section 6.3.1, *Structure of the Biological Goals and Objectives*) and provides all of the biological goals and objectives with the rationale for each objective (Section 6.3.2, *Landscape-Level Biological Goals and Objectives*).

The biological goals and objectives describe what the conservation strategy is intended to achieve. For details as to *how* these goals and objectives will be achieved, refer to Section 6.4, *Conservation Measures.* Terms used in this section are defined in Appendix D, *Glossary.*

6.3.1 Structure of the Biological Goals and Objectives

The biological goals and objectives articulate the intended outcomes that Yolo HCP/NCCP implementation will achieve. Biological goals are broad statements of intent. Biological objectives are expressed as specific outcomes that the HCP/NCCP is expected to achieve for ecosystems, natural communities, and covered species habitat. The biological objectives are measurable to the extent possible. Although the biological objectives presented in this chapter do not specify time commitments, Chapter 7, *Plan Implementation,* provides details on stay-ahead provisions to ensure that conservation stays ahead of natural community and covered species habitat loss.

The biological goals and objectives are summarized in Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring,* at the landscape, natural community, and species levels. Each biological objective will be met through implementation of one or more conservation measures listed in Table 6-3 (detailed descriptions of the conservation measures are found in Section 6.4, *Conservation Measures*).

The biological goals and objectives are organized hierarchically on the basis of the following ecological levels of organization:

- **Landscape.** The landscape-level biological goals and objectives focus on the extent, distribution, and connectivity among natural communities and improvements to the overall condition of hydrological, physical, chemical, and biological processes in the Plan Area in support of achieving natural community– and species-specific biological goals and objectives;
- **Natural community.** Natural community biological goals and objectives focus on maintaining or enhancing ecological functions and values of specific natural communities. Achieving natural community goals and objectives will also provide for the conservation of habitat of associated covered species and other native species; and
- **Species.** Species-specific biological goals and objectives address stressors and habitat needs specific to individual covered species (or, in some cases, groups of species with similar needs) that are not addressed under the landscape and natural community goals and objectives.

In addition, the Conservancy has provided a detailed description of each of the biological goals, as well as the associated rationale, in three separate sections. Section 6.3.2, *Landscape-Level Biological Goals and Objectives*, lists the landscape-level goals and objectives and describes the rationale for each. Section 6.3.3, *Natural Community Biological Goals and Objectives*, addresses the conservation strategy for natural communities using a nested approach. For each natural community, the landscape-level goals and objectives that would benefit that natural community are listed with a description of the benefit each provides. Next, the goals and objectives developed specifically for the natural community are listed with their associated rationale. Section 6.3.4, *Covered Species Biological Goals and Objectives*, uses the same nested approach for covered species. For each species, the landscape-level and natural community goals and objectives that would benefit that species are described along with their benefits, followed by goals and objectives developed for that species and their associated rationale. For the most part, the Yolo HCP/NCCP addresses the conservation of covered species through goals and objectives at the landscape and natural community levels. Species-specific goals and objectives were developed only when additional factors, such as specific habitat requirements or population factors, needed to be addressed to provide for the conservation of the species in the Plan Area.

Table 6-3. Biological Goals and Objectives and Applicable Conservation Measures and Monitoring

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Landscape-Level Goals and Objectives		
Goal L-1: Large interconnected landscapes within the range of physical and biological attributes (e.g., slope, soils, hydrology, climate, and plant associations) in the Plan Area to support the distribution and abundance of covered species and their habitats, provide for the movement and genetic interchange among populations of covered species, and conserve native biodiversity.		
Objective L-1.1: Conserve 32,406 acres of natural communities and covered species habitats, composed of 24,406 acres of newly protected lands and 8,000 acres of additional pre-permit reserve lands enrolled into the reserve system. Restore or create up to 956 acres of wetlands and riparian natural community.	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities	Track acres protected, restored, and enrolled.
Objective L-1.2: Include a variety of environmental gradients (e.g., hydrology, elevation, soils, slope, and aspect) within and across a diversity of protected and restored natural communities within the Plan Area.	Conservation Measure 1, Establish Reserve System	Qualitatively assess environmental gradients such as hydrology, elevation, soils, slope, and aspect across reserve system in annual reports (Section 6.4.1.4.1, *Reserve System Design Criteria*, provides more detail regarding environmental gradients).
Objective L-1.3: Increase the size and connectivity of the network of protected lands in the Plan Area by acquiring newly protected lands for the reserve system adjacent to and between baseline protected lands.	Conservation Measure 1, Establish Reserve System	Assess connectivity throughout reserve system (Section 6.5.6.1.3, *Assess and Monitor Landscape Linkages*).
Objective L-1.4: Prioritize land acquisition and natural community restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation, where it can be sustained by natural flows, within the Cache Creek floodplain and extending the length of Cache Creek from the west boundary of planning unit 7 to the Cache Creek Settling Basin exclusive of existing and potential aggregate mining areas (Figures 6–3, Ecological Corridors).	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities	Assess connectivity, quality of riparian vegetation, and flows along Cache Creek (Section 6.5.6.1.3, *Assess and Monitor Landscape Linkages*).

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Objective L-1.5: Prioritize land acquisition and natural community restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation, where it can be sustained by natural flows, within the Putah Creek floodplain and extending the length of Putah Creek from the west boundary of planning unit 9 to the Putah Sinks exclusive of existing and potential aggregate mining areas (Figure 6-3, Ecological Corridors).	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities	Assess connectivity, quality of riparian vegetation, and flows along Putah Creek (Section 6.5.6.1.3, *Assess and Monitor Landscape Linkages*). Although the Conservancy or its partners may acquire or restore riparian on either side of Putah Creek, within the Plan Area, to meet this objective, acquisition or restoration in the extended Plan Area (in Solano County) is not required for meeting this objective.
Objective L-1.6: Prioritize land acquisition and restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation along the Sacramento River and Yolo Bypass in planning units 12, 14, 15, and 21 (Figure 6-3, Ecological Corridors).	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities	Assess connectivity and quality of riparian vegetation along Sacramento River and Yolo Bypass (Section 6.5.6.1.3, *Assess and Monitor Landscape Linkages*).
Goal L-2: Ecological processes and conditions that sustain and reestablish natural communities and native species.		
Objective L-2.1: Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative plant and animal species across the reserve system.	Conservation Measure 3, Manage and Enhance the Reserve System	Track implementation and effectiveness of nonnative species control programs relative to success criteria.
Objective L-2.2: Increase the abundance of native insect pollinators that support reproduction of native plant species and long-term production of agricultural crops that support habitat for covered and other native wildlife species.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor results and effectiveness of any pollinator conservation efforts funded and implemented consistent with Appendix G, Pollinator Conservation Strategy.
Objective L-2.3: Allow for natural fluvial processes (erosion, deposition, meandering channels) along river reaches within the reserve system, consistent with goals of the Cache Creek Resources Management Plan and other relevant creek management plans that balance the need for natural fluvial processes with flood and erosion control needs.	Conservation Measure 3, Manage and Enhance the Reserve System	Visually evaluate the extent to which stream reaches are allowing natural fluvial processes within protected riparian areas throughout the Plan Area, and areas outside the reserve system along Cache Creek and Putah Creek.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Natural Community Level Goals and Objectives		
Cultivated Lands Seminatural Community		
NC-CL1: Cultivated lands that support habitat for covered and other native wildlife species.		
Objective NC-CL1.1: Protect at least 14,362 acres of unprotected non-rice cultivated lands that provide habitat value for covered and other native species. Field borders mapped as Semiagricultural/Incidental to Agriculture that provide habitat for covered species will count towards this requirement. Some of these lands may be substituted for grassland habitat upon approval by the wildlife agencies.	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective NC-CL1.2: Protect at least 2,800 acres of unprotected flooded rice that provides habitat value for covered and other native species. If these fields cannot be flooded due to drought or market conditions, ensure water remains in conveyance channels. Some of these lands may be substituted for wetlands that benefit covered species, upon approval by the wildlife agencies.	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective NC-CL1.3: Enroll at least 5,424 acres of cultivated lands natural community on baseline public and easement lands into the reserve system as pre-permit reserve lands.	Conservation Measure 1, Establish Reserve System	Track acres enrolled.
Objective NC-CL1.4: Maintain or enhance the habitat value of the cultivated lands natural community in the reserve system for raptors.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor crop types on reserve system lands. Section 6.5.6.2.1, *Cultivated Lands Monitoring Actions*.
Grassland Natural Community		
Goal NC-G1: Large, contiguous patches of grassland, and smaller patches within a mosaic of other natural community types, to sustain and enhance the distribution and abundance of associated covered and other native species in the Conservation Reserve Area.		
Objective NC-G1.1: Protect 4,430 acres of unprotected grassland, including at least 3,000 acres in the Dunnigan Hills planning unit (PU 5).	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective NC-G1.2: Maintain and enhance the functions of protected grassland in the reserve system as habitat for covered and other native species by increasing burrow availability for burrow-dependent species, and increasing prey abundance and accessibility for grassland-foraging species.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor burrow abundance and density in reserve system grassland.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Valley Foothill Riparian Natural Community		
Goal NC-VFR1: Functional valley foothill riparian natural community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-VFR1.1: Protect, manage, and enhance 1,600 acres of unprotected valley foothill riparian distributed primarily in planning units 7 and 9.	Conservation Measure 1, Establish Reserve System Conservation Measure 3, Manage and Enhance the Reserve System	Track acres protected.
Objective NC-VFR1.2: Restore and manage 608 acres of valley foothill riparian natural community. Site the restoration to improve connectivity among patches of existing valley foothill riparian vegetation within the Cache Creek and Putah Creek corridors and the Sacramento River. Widen the riparian zones along creek corridors wherever feasible, creating larger nodes of riparian natural community along narrow riparian stretches.	Conservation Measure 2, Restore Natural Communities	Track acres restored and lost.
Alkali Prairie Natural Community		
Goal NC-AP1: A reserve system that protects the habitat values of the remaining alkali prairie natural community in the Plan Area.		
Objective NC-AP1.1: Protect 35 acres of alkali prairie natural community on the Woodland Regional Park prior to any loss of this natural community as a result of covered activities (Figure 6-4, *Alkali Prairie Natural Community and Baseline Public and Easement Lands*).	Conservation Measure 1, Establish Reserve System	Track acres protected, and location.
Objective NC-AP1.2: Implement management activities (primarily control of nonnative plants and human activities) within the Woodland Regional Park to reduce adverse effects on habitat conditions and enhance the functions of alkali prairie within the reserve system as habitat for covered and other native species, such as saltgrass.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor relative cover and diversity of native alkali prairie species and relative cover of invasive nonnative species.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Fresh Emergent Wetland Natural Community		
Goal NC-FEW1: Functional fresh emergent wetland natural community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-FEW1.1: Protect and manage 500 acres of fresh emergent wetland.	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective NC-FEW1.2: Restore 88 acres of fresh emergent wetland natural community.	Conservation Measure 2, Restore Natural Communities	Track acres restored and lost.
Objective NC-FEW1.3: Enhance the functions of protected fresh emergent wetland as habitat for covered species (e.g., giant garter snake) and other native species.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor conditions as they relate to habitat suitability for covered species.
Lacustrine and Riverine Natural Community		
Goal NC-LR1: Functional lacustrine and riverine natural community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-LR1.1: Protect, manage, and enhance 600 acres of lacustrine and riverine natural community providing habitat for covered and other native species.	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective NC-LR1.2: Restore or create 236 acres of lacustrine/riverine natural community.	Conservation Measure 2, Restore Natural Communities	Track acres restored or created and lost.
Species Level Goals and Objectives		
Palmate Bracted Bird's-Beak		
Goal PBBB1: Provide for the conservation of palmate-bracted bird's-beak in the Plan Area.		
Objective PBBB1.1 Increase the 10-year running average of the size of the palmate-bracted bird's beak population on Woodland Regional Park by 10%, by managing and enhancing habitat.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor presence, vigor, and abundance of plants.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Valley Elderberry Longhorn Beetle		
Goal VELB1: Provide for the conservation of valley elderberry longhorn beetle in the Plan Area.		
Objective VELB1.1: Within the 1,600 acres of protected valley foothill riparian natural community (Objective NC-VFR1.1), prioritize protection of populations of valley elderberry longhorn beetle along Lower Cache Creek and Lower Putah Creek and Sacramento River, and adjacent lands to provide for valley elderberry longhorn beetle population expansion consistent with the occupancy commitment for valley elderberry longhorn beetle in Table 6-2(c).	Conservation Measure 1, Establish Reserve System	Track occupied acres protected.
Objective VELB1.2: Within the restored valley foothill riparian natural community (Objective NC-VFR1.2), establish elderberry shrubs and associated riparian plant species, and prioritize lands adjacent to existing populations to provide for population expansion.	Conservation Measure 2, Restore Natural Communities	Monitor elderberry shrubs in protected riparian, including monitoring for occupancy.
California Tiger Salamander		
Goal CTS1: Provide for the conservation of California tiger salamander in the Plan Area.		
Objective CTS1.1: Within the 3,000 acres of protected grassland in the Dunnigan Hills planning unit (Objective NC-G1.1), include at least 2,000 acres of modeled upland habitat within 1.3 miles of aquatic habitat for California tiger salamander and prioritize protection in designated critical habitat.	Conservation Measure 1, Establish Reserve System	Track acres protected and location of protected upland habitat.
Objective CTS1.2: Within the 600 acres of protected lacustrine and riverine natural community (Objective NC-LR1.1), protect at least 36 acres of California tiger salamander aquatic habitat. Within the 236 acres of restored or created lacustrine/riverine natural community (Objective NC-LR1.2), restore or create 36 acres of aquatic habitat. Within the protected and restored aquatic habitat, include at least five California tiger salamander breeding pools that are each found to support all life stages of the salamander through all water year types, consistent with the occupancy commitment for this species in Table 6-2(c).	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities Conservation Measure 3, Manage and Enhance the Reserve System	Track acres aquatic habitat protected and restored Monitor for all life stages of California tiger salamander.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Objective CTS1.3: If California tiger salamander is present or assumed to be present at the site of a covered activity, the covered activity will not remove aquatic habitat until at least four new occupied breeding pools[2] are discovered or established in the Dunnigan Hills area and protected in the Dunnigan Hills area, with sufficient surrounding uplands to support the individuals using the protected aquatic habitat.	Conservation Measure 1, Establish Reserve System	Track pools lost as a result of covered activities and pools protected.
Western Pond Turtle		
Goal WPT1: Provide for the conservation of the western pond turtle population in the Plan Area.		
Objective WPT1.1: Within protected and restored lacustrine and protected and enhanced riverine natural communities, add logs, rocks, and/or emergent vegetation for basking sites and other WPT habitat features, and meet the occupancy commitment for this species in Table 5-2(c).	Conservation Measure 3, Manage and Enhance the Reserve System	In annual reports, report the installation of logs or rocks or planting of emergent vegetation. Document species response to creation of basking sites.
Giant Garter Snake		
Goal GGS1: Provide for the conservation of giant garter snake in the Plan Area, including the Willow Slough/Yolo Bypass subpopulation and a segment of the Colusa Basin subpopulation, and connectivity between the two subpopulations.		
Objective GGS1.1: Protect and manage the 2,800 acres of protected rice land (Objective NC-CL1.2) in modeled giant garter snake habitat. Suitable emergent marsh can be substituted for rice land.	Conservation Measure 1, Establish Reserve System Conservation Measure 3, Manage and Enhance the Reserve System	Track acres protected.
Objective GGS1.2: Protect and manage 1,160 acres of upland natural communities (Objective L-1.1) to provide active season upland movement habitat and at least 2,315 acres to provide overwintering habitat for giant garter snake.	Conservation Measure 1, Establish Reserve System Conservation Measure 3, Manage and Enhance the Reserve System	Track acres protected.

[2] See glossary for definition of breeding pools.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Objective GGS1.3: Protect, restore, and manage the 500 acres of fresh emergent wetland natural community (Objective NC-FEW1.1), at least 420 acres of the lacustrine/riverine natural community (Objective NC-LR.1.1), the restored fresh emergent wetland (Objective NC-FEW1.2), and restored lacustrine and riverine natural community (Objective NC-LR1.2) to conserve the giant garter snake. Ensure at least 80% of the aquatic habitat is perennial, and the remainder provides aquatic habitat for the giant garter snake during the active season at least through July of each summer.	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities Conservation Measure 3, Manage and Enhance the Reserve System	Track acres protected and restored.
Objective GGS1.4: In addition to the newly protected and restored giant garter snake habitat (Objectives GGS1.1, GGS1.2, and GGS1.3), enroll at least 2,910 acres of giant garter snake habitat on eligible baseline public and easement lands into the reserve system as pre-permit reserve lands.	Conservation Measure 1, Establish Reserve System	Track acres enrolled.
Objective GGS1.5: Meet the occupancy commitment for giant garter snake in Table 6-2(c).	All conservation measures for this species are intended to contribute to this commitment.	Monitor occupancy within reserve system.
Swainson's Hawk		
Goal SH1: Provide for the conservation of Swainson's hawk in the Plan Area.		
Objective SH1.1: Within the 14,362 acres of protected non-rice cultivated land natural community (Objective CL1.1), maintain crop types that support Swainson's hawk foraging habitat.	Conservation Measure 1, Establish Reserve System	Monitor crop types on reserve system lands.
Objective SH1.2: Protect and manage the 4,430 acres of grassland natural community (Objectives NC-GR1.1) to ensure that it provides Swainson's hawk foraging habitat.	Conservation Measure 1, Establish Reserve System Conservation Measure 3, Manage and Enhance the Reserve System	Track acres protected in modeled Swainson's hawk foraging habitat.
Objective SH1.3: Protect and maintain at least 20 unprotected Swainson's hawk nest trees (active within the last five years at the time tree is protected) within the reserve system, consistent with the occupancy commitments for this species in Table 6-2(c).	Conservation Measure 1, Establish Reserve System Conservation Measure 3, Manage and Enhance the Reserve System	Track protection of nest trees.
Objective SH1.4: In addition to protection of newly protected lands (Objectives SH1.1, SH1.2, and SH1.3), enroll at least 4,580 acres of baseline public and easement lands into the reserve system as pre-permit reserve lands providing foraging habitat.	Conservation Measure 1, Establish Reserve System	Track enrolled lands with modeled Swainson's hawk habitat.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Objective SH1.5: In addition to restoration of riparian natural community (Objective NC-VFR1.2), establish trees suitable for Swainson's hawk nesting (native trees at least 20 feet in height) within the cultivated lands to meet a density of at least one tree per 10 acres (protected existing trees count toward the density requirement). Riparian restoration adjacent to these community types will also count toward nesting tree establishment.).	Conservation Measure 3, Manage and Enhance the Reserve System	Track nesting tree density in protected Swainson's hawk habitat, and track and monitor tree plantings.
White-tailed Kite		
Goal WTK1. Provide for the conservation of white-tailed kite in the Plan Area.		
Objective WTKI.1: Meet the occupancy commitment for white-tailed kite in Table 6-2(c).	Conservation Measure 1, Establish Reserve System	Track protection of nest trees.
Western Yellow-billed Cuckoo		
Goal WYBC1: Provide sufficient western yellow-billed cuckoo habitat to provide opportunities for migration and breeding in the Plan Area.		
Objective WYBC1.1: Within the 1,600 acres of protected valley-foothill riparian natural community (Objectives NC-VFR1.1), site at least 500 acres in modeled yellow-billed cuckoo habitat, and design at least 60 acres of the restored valley foothill riparian (Objective NC-VFR1.2) to provide suitable habitat for this species.	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities	Track protected acres, and evaluate habitat structure and suitability based on the best available information on the species' habitat requirements.
Western Burrowing Owl		
Goal WBO1: Provide for the conservation of western burrowing owl in the Plan Area.		
Objective WBO1.1: Of the 4,430 acres of protected grassland natural community (Objective NC-G1.1), site at least 3,000 acres in modeled western burrowing owl habitat.	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective WBO1.2: Of the 14,362 acres of protected non-rice cultivated lands (Objective NC-CL1.1), provide at least 2,500 acres of modeled western burrowing owl habitat.	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective WBO1.3: Maintain a minimum of two active burrowing owl nesting sites within the reverse system, and maintain two active nesting sites in the reserve system for each nesting pair displaced by covered activities and maintain one active nesting site or single owl site in the reserve system for each non-breeding single owl displaced by covered activities.	Conservation Measure 1, Establish Reserve System	Track number of occurrences and breeding pairs protected.

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Objective WBO1.4: Prioritize the acquisition of habitat protected under Objectives WBO1.1 and WBO1.2. The first priority is to identify and preserve occupied habitats in the Yolo Bypass and adjacent lands (Planning Units 16 and 18). This is the portion of the Plan Area that supports the greatest potential for long-term sustainability of breeding colonies. The second priority is to identify and preserve habitat adjacent to occupied sites that have enhancement potential. The third priority will focus on modeled habitat in the Plan Area with historic records of burrowing owl occupancy and lands that are capable of supporting nesting activity through management and enhancement actions.	Conservation Measure 1, Establish Reserve System	Document locations of habitat protected.
Objective WBO1.5: Implement management and enhancement practices to encourage burrowing owl occupancy on preserve lands. Management practices include maintaining appropriate vegetation height, prohibiting rodenticides, minimizing the spread of invasive weed species, and encouraging the presence of ground squirrels. Enhancement practices include the installation of artificial burrows to augment natural burrows where they are lacking, creating berms as future burrowing sites, and creation of debris piles to enhance prey populations. These actions are designed to maintain existing populations and encourage the expansion of nesting populations in the Plan Area.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor and evaluate habitat conditions and enhancements and repair or replace as needed.
Least Bell's Vireo		
Goal LBV1. Provide sufficient habitat area to support least Bell's vireos that migrate through the Plan Area and to support potential future reestablishment of a nesting population in the Plan Area		
Objective LBV1.1: Of the 1,600 acres of newly protected valley foothill riparian (Objective NC-VFR1.1), site at least 600 acres in modeled least Bell's vireo habitat, and design the restored valley foothill riparian (Objective NC-VFR1.2) to provide suitable habitat for this species.	Conservation Measure 1, Establish Reserve System Conservation Measure 2, Restore Natural Communities	Track protected acres, and evaluate habitat structure and suitability based on the best available information on the species' habitat requirements.
Bank Swallow		
Goal BS1. Provide for the conservation of bank swallow in the Plan Area.		
Objective BS1.1: Protect 50 acres of unprotected bank swallow habitat on a site occupied by this species in planning unit 7 or along the Sacramento River.	Conservation Measure 1, Establish Reserve System	Track acres protected

Biological Goals and Objectives	Applicable Conservation Measures (see Section 6.4, Conservation Measures, for full descriptions of conservation measures)	Monitoring
Objective BS1.2: Manage the 50 acres of protected bank swallow habitat (Objective BS1.1) to enhance bank swallow foraging habitat value by promoting open grass and forb vegetation, and controlling invasive plant species.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor vegetation in protected foraging habitat.
Tricolored Blackbird		
Goal TRBL1: Provide for the conservation of tricolored blackbirds in the Plan Area.		
Objective TRBL1.1: Within the 500 acres of protected fresh emergent wetland natural community (Objective NC-FEW1.1), site at least 200 acres in modeled tricolored blackbird nesting habitat.	Conservation Measure 1, Establish Reserve System	Track acres protected.
Objective TRBL1.2: Enroll at least 4,000 acres of tricolored blackbird foraging habitat and 150 acres of tricolored blackbird nesting habitat on baseline public and easement lands into the reserve system as pre-permit reserve lands.	Conservation Measure 1, Establish Reserve System	Track acres enrolled.
Objective TRBL1.3: Maintain at least two tricolored blackbird nesting colonies in the reserve system and prioritize newly protected nesting habitat in additional occupied areas as they are found. To avoid intensive disturbances (e.g., heavy equipment operation associated with construction activities) or other activities that may cause nest abandonment or forced fledging, include a buffer zone of at least 250 feet around protected active breeding colonies. This minimum buffer may be reduced in areas with dense trees, buildings, or other habitat features between potential nearby disturbances and the protected nest colonies or where there is sufficient topographic relief to protect the colonies from excessive noise or visual disturbance, as determined by a qualified biologist, with concurrence from the wildlife agencies.	Conservation Measure 1, Establish Reserve System	Track colonies protected, and monitor colony size.
Objective TRBL1.4: Maintain at least 300 acres, consisting of at least 150-acre blocks, of tricolored blackbird foraging habitat in the reserve system without pesticides.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor terms of conservation easement prohibiting pesticides.
Objective TRBL1.5: Manage and enhance protected tricolored blackbird nesting habitat to maintain habitat value for this species.	Conservation Measure 3, Manage and Enhance the Reserve System	Monitor condition of protected nesting habitat.

6.3.2 Landscape-Level Biological Goals and Objectives

The following landscape-level goals and objectives address conditions in the reserve system, ecological processes and conditions, and landscape-level factors that affect natural communities and covered species. The Conservancy, working with the wildlife agencies, developed these goals and objectives to follow the principles of conservation biology and the requirements of the NCCPA. These goals and objectives address biodiversity, ecosystem function, and the desired extent, distribution, connectivity, and ecological function of the landscape to support the habitats and life cycle requirements of many of the covered species in the Plan Area.

Landscape-level goals and objectives are listed below, followed by descriptions of the approach and rationale used to establish them. The conservation measures that will be implemented to achieve these goals and objectives are described in Section 6.4, *Conservation Measures*. Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring,* lists the conservation measures that support each biological objective.

Goal L-1 addresses the quantity and characteristics of land that will be protected in the reserve system. Goal L-2 addresses maintenance of ecological processes and conditions that sustain the natural communities and covered species in the reserve system.

Goal L-1: Large interconnected landscapes within the range of physical and biological attributes (e.g., slope, soils, hydrology, climate, and plant associations) in the Plan Area to support the distribution and abundance of covered species and their habitats, provide for the movement and genetic interchange among populations of covered species, and conserve native biodiversity.

> **Objective L-1.1:** Conserve 32,406 acres of natural communities and covered species habitats, including 24,406 acres of newly protected lands and 8,000 acres of additional pre-permit reserve lands enrolled into the reserve system. Restore or create 956 acres of wetlands and riparian natural community.
>
> **Rationale:** Achieving this objective is intended to protect the highest quality natural communities and covered species habitat in the Plan Area to optimize the ecological value of the reserve system for conserving covered species and native biodiversity. The commitment for total protected area amount is based on the sum of all natural community commitments. Achieving this objective is intended to protect natural communities, species-specific habitat elements, and species diversity on a landscape-level consistent with Section 2830(a)(3) of the NCCPA. Achieving this objective is also intended to conserve representative natural and seminatural landscapes to maintain the ecological integrity of large habitat blocks, including desired ecosystem function, and biological diversity, consistent with Section 2820(a)(4)(A) of the NCCPA. The newly protected area amount for each natural community is provided in Table 6-2(a), *Newly Protected Lands Commitments,* the pre-permit reserve lands amount for each natural community is provided in Table 6-2(b), *Pre-permit Reserve Lands Commitments,* and rationale for that commitment is provided in Section 6.3.3, *Natural Community Goals and Objectives*. Conservation Measure 1, *Establish Reserve System*, describes the site selection criteria that will be used to identify lands for protection to achieve this objective. Chapter 7, Section 7.5.3, *Stay-Ahead Provision,* provides details on the stay-ahead provision to ensure that conservation stays ahead of natural community and covered species habitat loss.

Additionally, wetland natural communities will be restored to offset loss of these natural communities as a result of covered activities, to comply with federal and state regulations and policies of no net loss of wetlands. Conservation Measure 2, *Restore Natural Communities*, describes the restoration techniques and criteria for each natural community. This restoration, in addition to the protection, management, and enhancement of wetlands. will result in a net benefit to wetland natural communities in the Plan Area.

Objective L-1.2: Include a variety of environmental gradients (e.g., hydrology, elevation, soils, slope, and aspect) within and across a diversity of protected and restored natural communities within the Plan Area.

Rationale: Achieving this objective will provide a range of habitat characteristics, food resources, and complexity for native species, including covered species. A variety of environmental gradients may allow shifting species distributions in response to potential future environmental changes, such as climate change, and is intended to facilitate species' responses to catastrophic events such as fire or extreme environmental fluctuations such as flood or drought. Achieving this objective will meet the requirements under Section 2820(a)(4)(D) of the NCCPA to protect a range of environmental gradients and provide for shifting distributions of species due to climate change.

Protection of a variety of environmental gradients in the reserve system is an important strategy to adapt to the expected effects of climate change (Nunez et al. 2013; Spencer et al. 2006). Changes in temperature range and precipitation patterns resulting from climate change may cause some areas of currently suitable habitat to become unsuitable for some species, while other areas of currently unsuitable habitat may become suitable. Climate change is expected to affect many habitats and species such that the temporal dynamics and spatial distributions change in unpredictable ways. Faced with large, uncertain, and dynamic responses, it is important that a broad range of habitat characteristics is available (i.e., elevation, water depth, slope, aspect) within an interconnected reserve system (Nunez et al. 2013). This is intended to ensure that, while some current habitat may be lost or altered as a result of climate change, sufficient suitable habitat will be available in response to climate change to sustain covered and other native species. Conservation Measure 1, *Establish Reserve System*, describes reserve design principles and criteria the Conservancy will apply to meet this objective.

Objective L-1.3: Increase the size and connectivity of the network of protected lands in the Plan Area by acquiring newly protected lands for the reserve system adjacent to and between baseline protected lands.

Rationale: Achieving this objective will protect and restore large blocks of connected natural communities to enhance ecosystem processes and connectivity and help increase the abundance, distribution, and diversity of covered and other native species (Spencer et al. 2006). Achieving this objective is also intended to contribute toward the maintenance of habitat areas large enough to support sustainable populations of covered species, consistent with Section 2820(a)(4)(C) of the NCCPA. Habitat loss, fragmentation, and degradation within and outside the Plan Area have disrupted the ecosystem function and large-scale habitat connectivity is necessary to sustain covered and other native species and maintain biodiversity. Conservation Measure 1, *Establish Reserve System*, describes reserve design principles and criteria the Conservancy will apply to meet this objective.

Objective L-1.4: Prioritize land acquisition and natural community restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation, where it can be sustained by natural flows, within the Cache Creek floodplain and extending the length of Cache Creek from the west boundary of planning unit 7 to the Cache Creek Settling Basin exclusive of existing and potential aggregate mining areas (Figures 6–3, *Ecological Corridors*).

Rationale: The Cache Creek Corridor (Figure 6-3, *Ecological Corridors*) is designed to provide connectivity between valley communities and the upland communities, and to provide a corridor for movement of native wildlife extending across the Conservation Reserve Area. This will build off prior conservation actions that have been implemented through the CCRMP. The CCRMP has included land protection, riparian restoration and enhancement, and protection of the entire in-channel portion of the creek from mining activities through development agreements and regulations. The Yolo HCP/NCCP incorporates future natural community enhancement and restoration along Cache Creek, to be implemented through the CCRMP (Section 6.5.8.1.1, *Cache Creek Resources Management Plan*).

A general conservation planning principle is to contribute to the restoration and maintenance of healthy riverine/riparian corridors, with particular attention to restoring wide *nodes* of riparian vegetation at strategic locations, maintaining and enhancing aquatic, hydrologic, and wetland connectivity, restoring natural habitat and flow conditions, and controlling exotic species (Spencer et al. 2006). Protection, restoration, management and enhancement actions within the Cache Creek corridor will be consistent with this principle. The Cache Creek corridor will not necessarily be continuous or of a uniform width; it will provide a well-placed linear sequence of "stepping stones" or a traversable mosaic of protected habitat patches with wider nodes of riparian vegetation. The corridor will contain non-riparian habitats (e.g., small interspersed grassland gaps). The width of the Cache Creek riparian corridor is limited by the width of the active floodplain and thus will vary in width. Additionally, the extent to which the Yolo HCP/NCCP can establish riparian vegetation in this corridor is limited by the natural hydrology. Some reaches of the creek are *losing reaches* where there is insufficient water to support riparian vegetation. This objective, therefore, targets only establishment and maintenance of riparian vegetation where it can be sustained by natural flows. This corridor will effectively reduce habitat fragmentation. Covered and other native wildlife species that will benefit are those using primarily riparian habitats or that prefer to move through canopied habitats (e.g., deer, songbirds, and riparian-associated native snakes and amphibians) and small and medium-sized native mammals (e.g., raccoon, ringtail, various small rodents). Conservation Measure 1, *Establish Reserve System*, describes reserve design principles and criteria the Conservancy will apply to protect or enroll lands into the reserve system within this corridor. Conservation Measure 2, *Restore Natural Communities*, describes riparian restoration, and Conservation Measure 3, *Manage and Enhance the Reserve System*, describes management and enhancement actions within this corridor.

Objective L-1.5: Prioritize land acquisition and natural community restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation, where it can be sustained by natural flows, within the Putah Creek floodplain and extending the length of Putah Creek from the west boundary of planning unit 9 to the Putah Sinks exclusive of existing and potential aggregate mining areas (Figure 6-3, *Ecological Corridors*).

Figure 6-3. Ecological Corridors

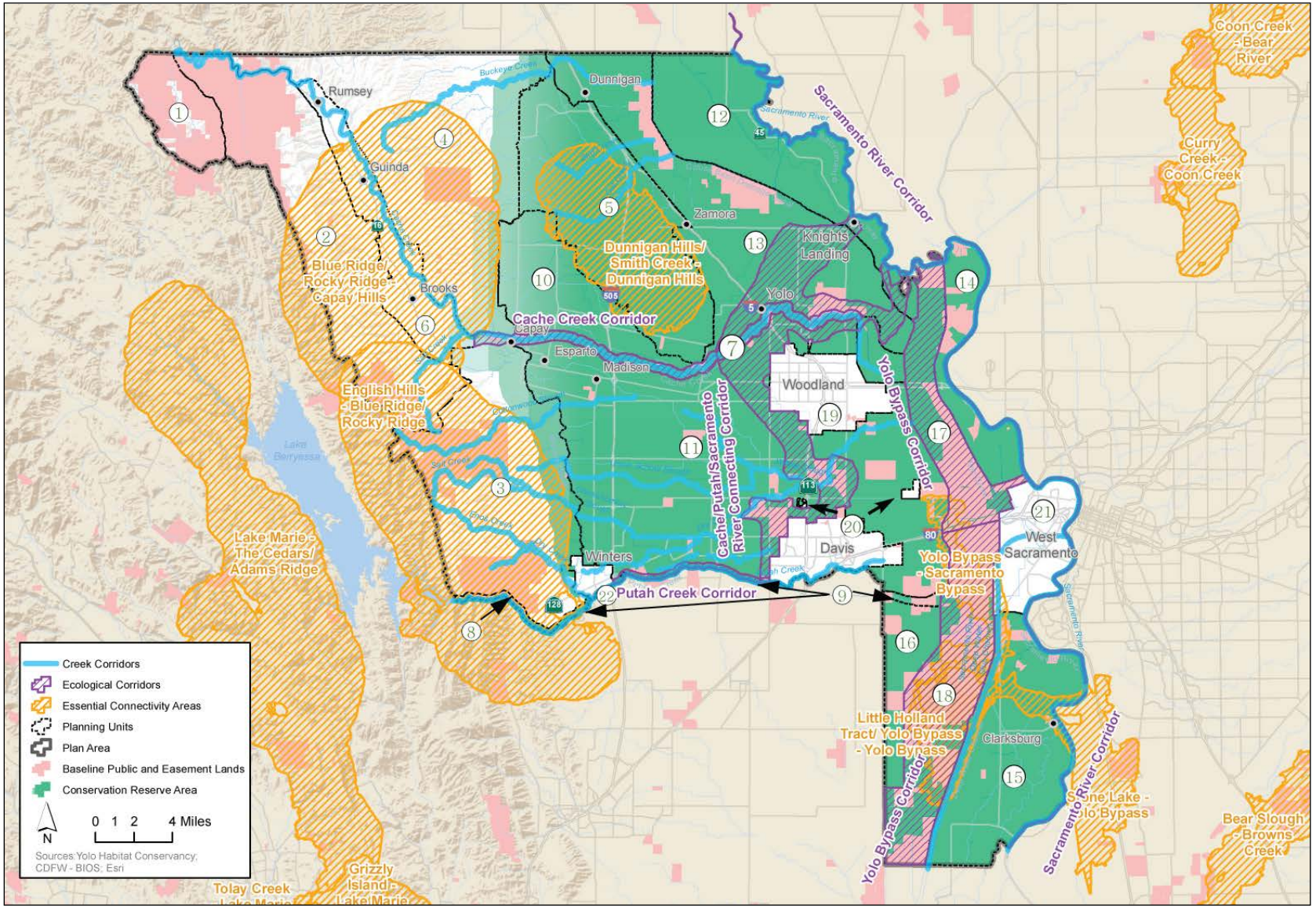
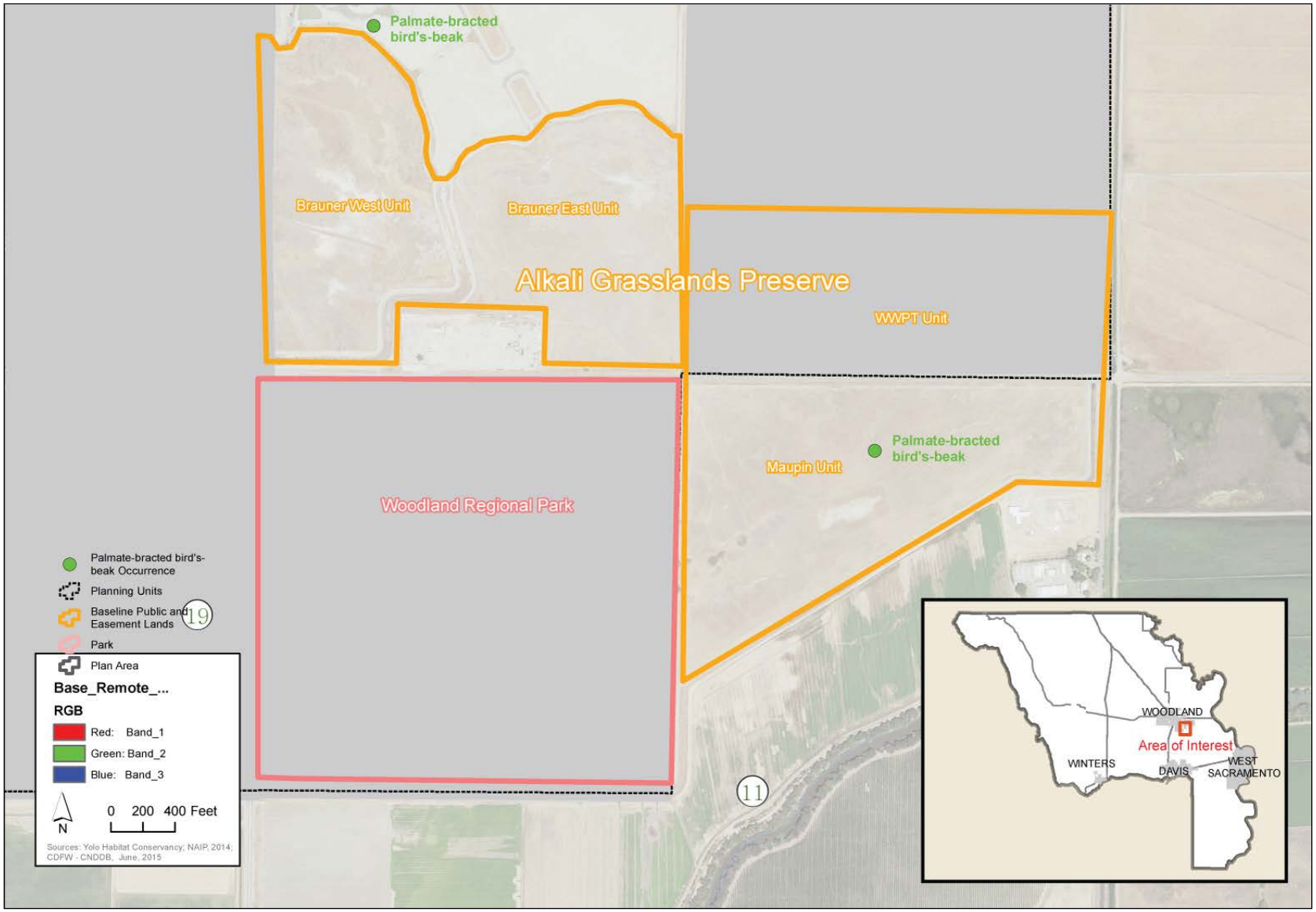


Figure 6-4. Alkali Prairie Natural Community and Baseline Public and Easement Lands



Rationale: The Putah Creek corridor (Figure 6-3, *Ecological Corridors*) will provide connectivity between the Conservation Reserve Area and natural communities in the South Blue Ridge planning unit. It will provide a corridor for movement of native wildlife, including wide-ranging species such as mule deer, extending to the City of Davis, where Putah Creek enters Solano County. The creek re-enters the Plan Area southeast of Davis and provides a corridor to the Putah Sinks. The rationale for establishing the Putah Creek Corridor for covered and other native species that will benefit from the corridor is the same as described for Objective L-1.4. This conservation will build off of protection and enhancement actions that the LPCCC has implemented in this area.

Conservation Measure 1, *Establish Reserve System*, describes reserve design principles and criteria the Conservancy will apply to protect or enroll lands into the reserve system within this corridor. Conservation Measure 2, *Restore Natural Communities*, describes riparian restoration, and Conservation Measure 3, *Manage and Enhance the Reserve System*, describes management and enhancement actions within this corridor, including actions the LPCCC will continue to implement (Section 6.5.8.1.2, *Lower Putah Creek Coordinating Committee*).

Objective L-1.6: Prioritize land acquisition and restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation along the Sacramento River and Yolo Bypass in planning units 12, 14, 15, and 21 (Figure 6-3, *Ecological Corridors*).

Rationale: The Sacramento River and Yolo Bypass support large, contiguous riparian corridors and provide valuable habitat for covered species including western yellow-billed cuckoo, bank swallow, least Bell's vireo, and valley elderberry longhorn beetle,

Goal L-2: Ecological processes and conditions that sustain and reestablish natural communities and native species.

Objective L-2.1: Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative plant and animal species across the reserve system.

Rationale: Achieving this objective will provide for the protection of species diversity consistent with Section 2820(a)(3) of the NCCPA. This objective is intended to provide for the increase of native species diversity to promote natural community resilience and resistance to disturbances such as drought and flooding (Fischer et al. 2006). Additionally, vegetation biodiversity in riparian and other natural communities provides the structural and ecological diversity necessary to provide suitable habitat for many wildlife species. Increasing the relative cover of native plant species also reduces potential negative effects of nonnative plants. The importance of native species diversity and reduction of invasive species is further discussed for natural communities in Section 6.3.3, *Natural Communities Biological Goals and Objectives*, and for covered species in Section 6.3.4, *Covered Species Biological Goals and Objectives*. Conservation Measure 3, *Manage and Enhance the Reserve System*, describes the habitat enhancement techniques and invasive species control program the Conservancy will apply to the reserve system to meet this objective.

Objective L-2.2: Increase the abundance of native insect pollinators that support reproduction of native plant species and long-term production of agricultural crops that support habitat for covered and other native wildlife species.

Rationale: Current scientific evidence indicates that native insect pollinators, particularly bees, may be in decline in North America (Cane and Tepedino 2001). Native insect pollinators support the reproduction of many of the native plant species that comprise natural communities in the Plan Area and the continued viability of crop types that support habitat for agricultural-associated covered, local concern, and other native wildlife species in the Plan Area (Appendix G). The Pollinator Conservation Strategy (Appendix G) identifies conservation actions designed to maintain and increase the abundance of native insects that are pollinators of cultivated crops and native plants in the Plan Area. Implementation of these conservation actions will also support conservation of the Yolo HCP/NCCP natural communities and covered and other native wildlife species. For example, maintenance and establishment of patches of natural vegetation along field margins support production of food for native insectivorous and seed eating birds, provide habitat for the production of rodents and other small mammals that are prey for native raptors and other carnivores, provide nesting habitat for ground nesting birds, and escape cover for native rodents and other small mammals. Conservation Measure 3, *Manage and Enhance the Reserve System*, describes the measures the Conservancy will implement to meet this objective.

Objective L-2.3: Allow for natural fluvial processes (erosion, deposition, meandering channels) along river reaches within the reserve system, consistent with goals of the CCRMP and other relevant creek management plans that balance the need for natural fluvial processes with flood and erosion control needs.

Rationale: Prior to channel straightening and levee construction in the Plan Area, rivers and tributaries flowed and meandered through wide floodplains. Many native species are adapted to periodically flooded riparian habitat (Katibah 1984). The process and pattern of seasonal inundation drives plant succession and vegetation structure in the floodplain and are especially important in maintaining early seral stage vegetation for species such as least Bell's vireo. Actively eroding reaches are important for maintaining nesting habitat for bank swallow. Floodplain processes are also essential for the creation and renewal of western yellow-billed cuckoo habitat.[3] The Permittees, however, must balance the ecological need for natural fluvial processes with the need to control flooding and erosion, to provide for human safety and protect property. The CCRMP includes sinuosity guidelines for each reach of Cache Creek to provide this balance between ecological and flood and erosion control needs (Yolo County 2002).

6.3.3 Natural Community Biological Goals and Objectives

This section describes the goals and objectives that guide the Yolo HCP/NCCP conservation strategies for natural communities. For each natural community, this section lists applicable landscape-level goals and objectives that would benefit the natural community, and describes these benefits. Then natural community goals and objectives are listed, followed by a description of the rationale for establishing each natural community objective. Conservation measures designed to meet all objectives are found in Section 6.4, *Conservation Measures*. The extent of conserved natural communities expected with full implementation of the Yolo HCP/NCCP is shown in Table 6-2(a), *Newly Protected Lands Commitments,* and Table 6-2(b), *Pre-permit Reserve Lands Commitments*.

[3] Personal communication, Steve Greco. Ecologist. University of California, Davis. March 2015.

6.3.3.1 Cultivated Lands

6.3.3.1.1 How Achieving the Landscape Objectives Will Benefit the Cultivated Lands Seminatural Community

Achieving Objective L-1.3 will provide for a large, interconnected reserve system. While connectivity is not of critical importance to highly mobile covered species that are able to traverse unsuitable terrain, such as Swainson's hawks and white-tailed kites, connectivity is an important factor for species such as giant garter snake and western pond turtle. As described in Conservation Measure 1, *Establish Reserve System*, the Conservancy will prioritize acquisition of rice lands providing habitat for giant garter snake and western pond turtle in areas adjacent to and between baseline protected conservation lands.

6.3.3.1.2 Cultivated Lands Seminatural Community Goals and Objectives

The landscape-level biological goals and objectives, and associated conservation measures, discussed above, are expected to provide for the conservation of the cultivated land seminatural community within the Plan Area. The goal and objectives below address additional needs specific to this seminatural community that will not otherwise be met at the landscape level.

Goal NC-CL1: Cultivated lands that support high-quality habitat for covered and other native wildlife species.

Objective NC-CL1.1: Protect at least 14,362 acres of unprotected non-rice cultivated lands that provide habitat value for covered and other native species. Field borders mapped as *Semiagricultural/Incidental to Agriculture* that provide habitat for covered species will count toward this requirement. Some of these lands may be substituted for grassland habitat upon approval by the wildlife agencies.

Rationale: Cultivated landscapes are highly dynamic and subject to seasonal and annual changes in overall crop patterns and vegetation type and structure. Wildlife species that use these habitats have learned to exploit those elements within this landscape that provide them with suitable and accessible food or other resource values.

Achieving this objective will ensure sufficient cultivated lands in the reserve system to provide for the conservation of the species in the Plan Area. Irrigated pastures, alfalfa, grazing land, and annually cultivated, irrigated cropland provide foraging habitat for covered species including Swainson's hawk, white-tailed kite, western burrowing owl, and tricolored blackbird. Alfalfa and pasture crop types provide high-value Swainson's hawk and tricolored blackbird foraging habitat. Grain and corn fields provide foraging habitats for waterfowl, wading birds, and shorebirds. Field borders and hedgerows provide uncultivated land that promotes rodents, insects, and other prey species for covered raptors.

In determining the areal extent and spatial configuration of non-rice cultivated lands to be conserved, the following factors were considered: spatial and functional needs of covered species; current extent of protected non-rice cultivated lands in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for covered species that rely on cultivated lands; and the amount of non-rice cultivated lands available that can reasonably be protected in targeted conservation areas. Covered activities will result in the permanent loss of 9,910 acres of non-rice cultivated lands. With 14,362 acres of newly protected

non-rice cultivated lands and lands that are already protected, a total of 24,308 acres of non-rice cultivated lands will be protected in conservation easements in the Plan Area (11 percent of the Plan Area: Table 5-4, *Natural Community Benefits and Net Effects*). The Conservancy will meet this objective through establishment of conservation easements as described in Conservation Measure 1, *Establish Reserve System.*

Objective NC-CL1.2: Protect at least 2,800 acres of unprotected flooded rice cultivated lands that provides habitat value for covered and other native species. If these fields cannot be flooded because of drought or market conditions, ensure water remains in conveyance channels. Some of these lands may be substituted for wetlands that benefit covered species, upon approval by the wildlife agencies.

Rationale: Flooded rice fields provide habitat for numerous aquatic and wetland wildlife species. Rice provides aquatic habitat for giant garter snake and western pond turtle. It also provides important foraging habitat for waterfowl, wading birds, and shorebirds. In the winter, it provides valuable foraging habitat for white-tailed kite. A wide variety of waterfowl and other birds migrating along the Pacific Flyway use rice fields in the Plan Area when they are inundated (Sterling and Buttner 2011). Irrigation ditches and field borders associated with rice fields provide aquatic, overwintering, and movement habitat for giant garter snake, tri-colored blackbird, and aquatic and nesting habitat for western pond turtle. This objective will be met through establishment of conservation easements as described in Conservation Measure 1, *Establish Reserve System.*

Objective NC-CL1.3: Enroll at least 5,424 acres of cultivated lands natural community on baseline public and easement lands into the reserve system as pre-permit reserve lands.

Rationale: Baseline public and easement lands in the Plan Area currently support cultivated lands that provide habitat for covered species. But many of these lands are not managed for the covered species or monitored effectively to ensure management actions are working. By enrolling these lands into the reserve system as pre-permit reserve lands, they will be monitored and adaptively managed consistent with the Yolo HCP/NCCP conservation strategy. This enhanced management and monitoring will increase their conservation value for several covered species and will help to meet many of the HCP/NCCP biological goals and objectives. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective NC-CL1.4: Maintain or enhance the habitat value of the cultivated lands natural community in the reserve system for raptors.

Rationale: A number of practices on the cultivated lands natural community in the reserve system will enhance the value of these lands for foraging raptors, including covered raptors (Swainson's hawk, white-tailed kite, and western burrowing owl). For example, the establishment of hedgerows consisting of uncultivated strips adjacent to cultivated fields provides a stable source of rodent species such as California vole, a valuable prey species for Swainson's hawk. Planting trees will provide raptor nesting, perching, and roosting opportunities. The requirement that the cultivated lands not be converted to orchards and vineyards will ensure that the crops provide foraging value for raptors. These practices to enhance habitat value for foraging raptors on cultivated lands are described in Conservation Measure 3, *Manage and Enhance the Reserve System*.

6.3.3.2 Grassland Natural Community

6.3.3.2.1 How Achieving the Landscape-Level Objectives Will Benefit the Grassland Natural Community

Achieving Objective L-1.2 will provide a variety of environmental gradients in the reserve system, thus increasing opportunities for protecting a diversity of grassland species dependent upon specific microclimates or conditions. Protecting a range of conditions is likely to capture species richness, genetic variation, and other elements of biodiversity that are poorly known or surveyed (Spencer et al. 2006).

Achieving Objective L-1.3 will increase the size and connectivity of protected grassland and will eliminate grassland fragmentation in the reserve system. Grassland fragmentation limits movement of widely ranging wildlife, and limits dispersal of covered species such as California tiger salamander. It also limits dispersal of some grassland insects (Collinge and Palmer 2002) and grassland plant species with wind-dispersed seeds (Soons et al. 2005).

Achieving Objective L-2.1 in grassland will increase diversity and relative cover of native plant species, and decrease abundance of undesirable nonnative plant species. Nonnative grass species such as wild oats (*Avena* spp.) and bromes (*Bromus* spp.) are so well established in California grassland that they are considered naturalized, and are unlikely to ever be eradicated (Reiner 1999). There are some invasive species, however, such as yellow star thistle, which can dominate grassland and severely limit its habitat value for native species. Management practices such as controlled livestock grazing can reduce nonnative species in favor of native species, and grassland management is necessary to reduce or eradicate aggressive nonnatives that provide unfavorable habitat conditions for native wildlife (Reiner 1999). Additionally, bullfrogs, red-eared sliders, and nonnative predatory fishes will be controlled in stock ponds and seasonal wetlands associated with grassland to improve native aquatic wildlife biodiversity. Conservation Measure 3, *Manage and Enhance the Reserve System*, describes grassland management and enhancement measures to achieve this objective.

6.3.3.2.2 Grassland Natural Community Goals and Objectives

The landscape-level biological goals and objectives, and associated conservation measures, discussed above, are expected to contribute to the conservation of the grassland natural community within the reserve system. The goal and objectives below address additional needs specific to this natural community that will not otherwise be met at the landscape level.

Goal NC-G1: Large, contiguous patches of grassland, and smaller patches within a mosaic of other natural community types, to sustain and enhance the distribution and abundance of associated covered and other native species in the Conservation Reserve Area.

Objective NC-G1.1: Protect 4,430 acres of unprotected grassland, including at least 3,000 acres in the Dunnigan Hills planning unit (PU 5).

Rationale: Grassland provide important habitat for a variety of covered species and contribute to the region's biodiversity by providing food and cover for wildlife and habitat for native grasses and forbs. Large protected patches of grassland will maintain the diversity of ecosystem functions supported by grassland in the Plan Area (e.g., production of seeds that serve as food for birds and rodents; production of insects, rodents, and other small species that serve as prey

for snakes, songbirds, and raptors; and capture of surface water and groundwater that support watersheds and flow in perennial, intermittent, and ephemeral streams). Protected grassland will provide habitat for covered species that are dependent on grassland for part or all of their lifecycle, including California tiger salamander, western burrowing owl, tri-colored blackbird, and Swainson's hawk. Protected grassland will also provide habitat for other native wildlife species (e.g., grasshopper sparrow, western meadowlark, grey fox, American badger, small rodents).

In determining the areal extent and spatial configuration of grassland to be conserved, the following factors were considered: current extent of protected grassland in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for covered grassland species; and the amount of grassland available that can reasonably be protected in targeted conservation areas. Covered activities will result in the loss of up to 1,734 acres of grassland. With the achievement of this objective, 16 percent of this natural community in the Plan Area will be conserved in Category 1 and 2 Public and Easement Lands (12,495 acres conserved out of 80,911 acres total, Table 5-4, *Natural Community Benefits and Net Effects*). At least 3,000 acres of the 4,430 acres of newly protected lands will be protected in the Dunnigan Hills planning unit (PU 5), which contains the largest area of contiguous grassland in the Conservation Reserve Area. The Dunnigan Hills planning unit supports an important population of California tiger salamander and includes the only designated critical habitat for this species in the Plan Area.

Although the majority of grassland protection and restoration will occur in planning unit 5, grassland protection will also occur elsewhere where upland habitat for giant garter snake is needed adjacent to restored fresh emergent wetland natural community, and where occupied burrowing owl habitat is targeted for acquisition.

Conservation Measure 1, *Establish Reserve* System, describes how Objective NC-G1.1 will be met through establishment of conservation easements sited consistent with reserve design criteria.

Objective NC-G1.2: Maintain and enhance the functions of protected grassland in the reserve system as habitat for covered and other native species by increasing burrow availability for burrow-dependent species, and increasing prey abundance and accessibility for grassland-foraging species.

Rationale: The habitat functions of grassland communities include providing food, cover, and nesting/seasonal habitat for a variety of vertebrate covered and other native wildlife species (e.g., California tiger salamander, rodents, grasshopper sparrow, western meadowlark, horned lark, Swainson's hawk, northern harrier, and insects, including native pollinator species). Enhancing these functions will support the use of grassland habitats by these species and potentially increase their reproduction rate and survival. Conservation Measure 3, *Manage and Enhance the Reserve System,* describes grassland management and enhancement measures to achieve this objective.

6.3.3.3 Valley Foothill Riparian Natural Community

6.3.3.3.1 How Achieving the Landscape-Level Objectives Will Benefit the Valley Foothill Riparian Natural Community

Achieving Objective L-1.3 will provide reserve system connectivity. Many wildlife species use riparian corridors for dispersal and migration. The Yolo HCP/NCCP science advisors recommend using riparian corridors as the "backbones" to connect the reserve system (Spencer et al. 2006). It is therefore important for the Yolo HCP/NCCP to expand protected riparian areas to build a reserve system that provides connectivity in perpetuity. The Yolo HCP/NCCP will achieve this objective through prioritizing land acquisitions adjacent to and between baseline protected lands that contain valley foothill riparian areas, as described in Conservation Measure 1, *Establish Reserve System,* and summarized in Table 6-2(a), *Newly Protected Lands Commitments.* Baseline protected lands are shown in Figure 6-2, *Baseline Public and Easement Lands*.

Achieving Objectives L-1.4, L-1.5, and L-1.6 will result in the protection, management and enhancement of large, contiguous valley foothill riparian areas along Cache Creek, Putah Creek, and Sacramento River. The Science Advisors (Spencer *et al.* 2006) identified Cache Creek and Putah Creek as important areas in which to conserve the valley foothill riparian community and provide wildlife habitat connectivity. These corridors support some of the largest contiguous patches of valley foothill riparian natural community remaining in the Plan Area, and therefore support wildlife species that are rare or absent in other parts of the Plan Area.

Achieving Objective L-2.1 in the valley foothill riparian natural community will increase the native biodiversity and relative cover of native plant species through enhancement and management (e.g., invasive plant management) and through riparian restoration (e.g., planting a diversity of native species) as described in Conservation Measure 3, *Manage and Enhance the Reserve System.* High species diversity promotes natural community resilience, and native biodiversity in riparian systems generates structural diversity that constitutes habitat for many riparian wildlife species.

6.3.3.3.2 Valley Foothill Riparian Natural Community Goals and Objectives

The landscape-level biological goals and objectives, and associated conservation measures, discussed above, are expected to contribute to the conservation of the valley foothill riparian natural community within the reserve system. The goal and objectives below address additional needs specific to this natural community that will not otherwise be met at the landscape level.

Goal NC-VFR1: Functional valley foothill riparian natural community that benefits covered species and promotes native biodiversity in the Plan Area.

> **Objective NC-VFR1.1:** Protect, manage, and enhance 1,600 acres of unprotected valley foothill riparian habitat distributed primarily in planning units 7 and 9.
>
> **Rationale:** The valley foothill riparian natural community supports a high diversity of native wildlife species and provides essential foraging and breeding habitat for six covered species: western yellow-billed cuckoo, least Bell's vireo, Swainson's hawk, white-tailed kite, valley elderberry longhorn beetle, and western pond turtle. Other native species that use valley foothill riparian include rose mallow, pallid bat, and yellow-billed magpie.
>
> In determining the areal extent and spatial configuration of valley foothill riparian natural community to be conserved, the following factors were considered: spatial and functional needs

of covered and other riparian species, including genetic exchange; current extent of protected riparian natural community in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for covered riparian species; and the amount of riparian area available that can reasonably be protected in targeted conservation areas. The HCP/NCCP will focus protection in the Lower Cache Creek (PU 7) and Lower Putah Creek (PU 9) planning units. With the achievement of this objective 30 percent of the valley foothill riparian natural community in the Plan Area will be conserved in Category 1 and 2 public and easement lands (3,632 acres conserved out of 12,565 acres in the Plan Area: Table 5-4, *Natural Community Benefits and Net Effects*). Conservation Measure 1, *Establish Reserve* System, describes how the HCP/NCCP will achieve this objective through land acquisitions based on reserve design criteria.

Objective NC-VFR1.2: Restore and manage 608 acres of valley foothill riparian natural community. Site the restoration to improve connectivity among patches of existing valley foothill riparian vegetation within the Cache Creek and Putah Creek corridors and the Sacramento River. Widen the riparian zones along creek corridors wherever feasible, creating larger nodes of valley foothill riparian natural community along narrow riparian stretches.

Rationale: Restoring valley foothill riparian provides a spatial and temporal framework for ensuring that life history requisites for associated covered and other native species are maintained and that connectivity among patches of valley foothill riparian is maintained and improved. Covered activities will result in loss of up to 608 acres of this natural community, and restoration will result in no net loss of this natural community. Restoration of valley foothill riparian along Cache Creek and Putah Creek and the Sacramento River will contribute towards achieving the establishment of habitat corridors under Objectives L-1.4, L-1.5, and L-1.6. Creating wide nodes of riparian vegetation along the existing narrow corridors will increase opportunities for occupation for species such as western yellow-billed cuckoo that require relatively large habitat patches. The HCP/NCCP will achieve this objective by applying restoration techniques and criteria described in Conservation Measure 2, *Restore Natural Communities.*

6.3.3.4 Alkali Prairie Natural Community

6.3.3.4.1 How Achieving the Landscape Objectives Will Benefit the Alkali Prairie Natural Community

Achieving Objective L-1.3 will increase the size and connectivity of the reserve system by acquiring lands adjacent to Category 1 public and easement lands, also known as baseline protected lands (see Table 6-1(a)). The manner in which this objective will be achieved specifically for the alkali prairie natural community is described under Objective NC-AS1.1.

Achieving Objective L-2.1 will maintain or increase native biodiversity in alkali seasonal wetlands, and minimize adverse effects of invasive plants. Increasing the cover of native alkali prairie plants relative to invasive species will minimize competition posed by invasive plants to native plant species, and improve overall habitat suitability for native plants. Invasive species can alter important ecological processes in wetlands such as nutrient cycling, hydrological cycles, sediment deposition, and erosion. Invasive species will be managed in the alkali prairie natural community through implementation of Conservation Measure 3, *Manage and Enhance the Reserve System*.

6.3.3.4.2 Alkali Prairie Natural Community Goals and Objectives

The landscape-level biological goals and objectives, and associated conservation measures, discussed above, are expected to contribute to the conservation of the alkali prairie natural community within the reserve system. The goal and objectives below address additional needs specific to this natural community that will not otherwise be met at the landscape level.

Goal NC-AP1: A reserve system that protects the habitat values of the remaining alkali prairie natural community in the Plan Area.

Objective NC-AP1.1: Protect 33 acres of alkali prairie natural community on the Woodland Regional Park prior to any loss of this natural community as a result of covered activities (Figure 6-4, *Alkali Prairie Natural Community and Baseline Public and Easement Lands*).

Rationale: The alkali prairie natural community was once common in the Central Valley and in portions of the Plan Area; however, the conversion of land to agriculture, livestock grazing (unmanaged for natural communities), commercial uses, and urban uses has reduced the extent and degraded the condition of this community throughout much of its historical range. In addition, the alkali prairie natural community has been subject to fragmentation, hydrologic alteration, and invasion by nonnative species. The decline in the extent, distribution, and condition of this community has reduced the diversity of native plant species uniquely associated with alkali soils and lowered the habitat functions for native wildlife. The small proportion of the historical extent of alkali prairie remaining in the Plan Area has been substantially degraded in its ecological function as habitat for native species and covered species adapted to alkali conditions. Remaining alkali prairie with the highest ecological function is found on only two small sites in the Plan Area: the Alkali Grasslands Preserve (baseline public and easement lands, Category 1 [Table 6-1(a)], owned by the City of Woodland and a private landowner and managed by the Center for Natural Lands Management) and Woodland Regional Park, owned by the City of Woodland. These sites support the only known occurrences in the Plan Area of palmate-bracted bird's-beak, which is partially dependent on the roots of its host plant (e.g., saltgrass and alkali heath) for water and nutrients. The sites also support additional rare plant species including Heckard's peppergrass, brittlescale, pappose tarweed, saline clover, San Joaquin spearscale, and alkali milk-vetch. Achieving this objective will ensure that the largest, most intact block of alkali prairie that is yet unprotected and unmanaged, and the only unprotected area that supports palmate-bracted bird's beak, is protected in perpetuity, managed, and enhanced. The HCP/NCCP will achieve this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective NC-AP1.2: Implement management activities (primarily control of nonnative plants and human activities) within the Woodland Regional Park to reduce adverse effects on habitat conditions and enhance the functions of alkali prairie within the Reserve System as habitat for covered and other native species, such as saltgrass.

Rationale: Enhancement of habitat (e.g., active vegetation management) for palmate-bracted bird's beak and other rare plants in the alkali prairie natural community will help to ensure the long-term survival of their populations in the Plan Area. Landscape-level processes such as the construction of Monticello Dam and flood protection channels have permanently altered the hydrological regimes that once supported the alkali prairie natural community. Development immediately adjacent to sites where remaining alkali prairie is found, such as storm water detention ponds, have likely negatively affected local hydrological processes that support alkali

prairie. Additionally, all of the sites where alkali prairie currently exists have been altered by agricultural development to some degree. An important management action for alkali prairie is the control of exotic invasive plant species such as Italian ryegrass and perennial pepperweed. Management of these invasive species should significantly improve the function and quality of protected alkali prairie as habitat for covered and other native species, especially saltgrass, which likely serves as an important role as host plant for palmate bracted bird's beak, providing water and other nutrients through its roots. Additional measures to control undesired (e.g. trespass) human access and manage public access will be implemented at the Woodland Regional Park. The HCP/NCCP will achieve this objective as described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.3.5 Fresh Emergent Wetland Natural Community

6.3.3.5.1 How Achieving the Landscape Objectives Will Benefit the Fresh Emergent Wetland Natural Community

Achieving Objective L-2.1 will reduce the introduction and proliferation of nonnative species in the fresh emergent wetland natural community. Consistent with this objective, nonnative invasive plants and wildlife will be managed and controlled as needed to sustain native biodiversity and protect covered species. Nonnative fish and other invasive predators will be reduced as needed to protect populations of covered species. The HCP/NCCP will achieve this objective through management of invasive species in fresh emergent wetland as described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.3.5.2 Fresh Emergent Wetland Natural Community Goals and Objectives

The landscape-level biological goals and objectives, and associated conservation measures, discussed above, are expected to provide for the conservation of the fresh emergent wetland natural community within the reserve system. The goal and objectives below address additional needs specific to this natural community that will not otherwise be met at the landscape level.

Goal NC-FEW1: Functional fresh emergent wetland natural community that benefits covered species and promotes native biodiversity in the Plan Area.

Objective NC-FEW1.1: Protect and manage 500 acres of freshwater emergent wetland.

Rationale: The fresh emergent wetland natural community provides essential foraging and breeding habitat for covered species, including tricolored blackbird, western pond turtle, and giant garter snake. In determining the areal extent and spatial configuration of fresh emergent wetland to be conserved, the following factors were considered: spatial and functional needs of covered and other fresh emergent wetland species, including genetic exchange; current extent of protected fresh emergent wetlands in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for covered fresh emergent wetland species; and the amount of fresh emergent wetland available that can reasonably be protected in targeted conservation areas. Covered activities will result in the permanent loss of up to 88 acres of fresh emergent wetland natural community. With the achievement of this objective, 59 percent of the fresh emergent wetland in the Plan Area will be conserved under Category 1 and 2 public and easement lands (15,461 acres conserved out of 26,309 acres total in the Plan Area) (Table 5-4, *Natural Community Benefits and Net Effects*). Conservation Measure 1, *Establish*

Reserve System, describes how the HCP/NCCP will achieve this objective through land acquisitions based on reserve design criteria.

Objective NC-FEW1.2: Restore 88 acres of fresh emergent wetland natural community.

Rationale: In addition to the protection, management, and enhancement of this natural community provided under Objectives NC-FEW1.1 and NC-FEW1.2, the Conservancy will restore this natural community to replace fresh emergent wetlands removed by the covered activities.

Objective NC-FEW1.3: Enhance the functions of protected fresh emergent wetland as habitat for covered (e.g., giant garter snake) and other native species.

Rationale: Habitat functions of fresh emergent wetland include providing food, thermoregulation, and cover from predators and nesting/seasonal habitat for a variety of vertebrate and invertebrate covered and native wildlife species (e.g., waterfowl, herons, rails, marsh wren, song sparrow, red-winged blackbird). The vegetation composition and functions of fresh emergent wetland are maintained by hydrologic conditions that support saturated soil and ponded water conditions. Maintaining hydrologic conditions that support protected fresh emergent wetland will ensure the maintenance of their functions as habitat for covered and other native species. The HCP/NCCP will achieve this objective through management of hydrologic conditions in fresh emergent wetland as described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.3.6 Lacustrine and Riverine Natural Community

6.3.3.6.1 How Achieving the Landscape Objectives Will Benefit the Lacustrine and Riverine Natural Community

Landscape-level biological goals and objectives integral to the conservation strategy for the lacustrine and riverine natural community are stated below.

Achieving Objectives L-1.4 and L-1.5 will protect the Cache Creek and Putah Creek riverine systems and associated vegetation to provide an intact and functioning ecosystem for western pond turtle and other native aquatic and semiaquatic species.

Achieving Objective L-2.1 will increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species. Consistent with this objective, nonnative invasive plants and wildlife will be managed and controlled as needed to sustain native biodiversity and protect covered species in the lacustrine and riverine natural community. Nonnative fish and other invasive predators will be reduced as needed to protect populations of covered species. The HCP/NCCP will achieve this objective through management of invasive species in the lacustrine and riverine natural community as described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.3.6.2 Lacustrine and Riverine Natural Community Goals and Objectives

The landscape-level biological goals and objectives, and associated conservation measures, discussed above, are expected to contribute to the conservation of the lacustrine and riverine natural community within the reserve system. The goal and objectives below address additional needs specific to this natural community that will not otherwise be met at the landscape level.

Goal NC-LR1: Functional lacustrine and riverine natural community that benefits covered species and promotes native biodiversity in the Plan Area.

Objective NC-LR1.1: Protect, manage, and enhance 600 acres of lacustrine and riverine natural community providing habitat for covered and other native species.

Rationale: The lacustrine and riverine natural community includes ponds that provide aquatic habitat for California tiger salamander, and streams and other open water areas that provide habitat for western pond turtle and giant garter snake. In determining the areal extent and spatial configuration of lacustrine and riverine natural community to be conserved, the following factors were considered: spatial and functional needs of covered and other lacustrine and riverine species, including genetic exchange; current extent of protected lacustrine and riverine natural community in the Plan Area; mitigation and conservation needs for covered lacustrine and riverine species; and the amount of lacustrine and riverine natural community available that can reasonably be protected in targeted conservation areas. Covered activities will result in the loss of 236 acres of the lacustrine and riverine natural community. With the achievement of this objective, 16 percent of the lacustrine and riverine natural communities in the Plan Area will be conserved in Category 1 and 2 public and easement lands (2,147 acres conserved out of 13,493 acres in the Plan Area; Table 5-4, *Natural Community Benefits and Net Effects*). The species-specific objectives for California tiger salamander and giant garter snake provide additional specificity as to the location and types of lacustrine and riverine natural community to be protected. Conservation Measure 1, *Establish Reserve System*, describes how the HCP/NCCP will achieve this objective through land acquisitions based on reserve design criteria.

Objective NC-LR1.2: Restore 236 acres of lacustrine and riverine natural communities.

Rationale: Objective NC-LR1.2 will ensure covered activities do not result in a net loss of lacustrine and riverine natural communities; however, covered activities will avoid removal of these water bodies consistent with Chapter 4, *Application Process and Conditions on Covered* Activities. Conservation Measure 2, *Restore Natural Communities*, describes how the HCP/NCCP will meet these objectives.

6.3.4 Covered Species Biological Goals and Objectives

This section describes the biological goals and objectives that guide the Yolo HCP/NCCP conservation strategies for covered species. For each covered species, this section first lists landscape-level and natural community goals and objectives that will benefit the species, with descriptions of how achieving the objectives would benefit the species. It then lists species-specific biological goals and objectives, followed by descriptions of the rationale with which they were established. Conservation measures designed to meet all objectives are found in Section 6.4, *Conservation Measures*.

For a complete description of status, range, life history, threats, and modeled habitat for each covered species, see Appendix A, *Covered Species Accounts*.

6.3.4.1 Palmate-Bracted Bird's Beak

6.3.4.1.1 How Achieving the Landscape Objectives Will Benefit Palmate-Bracted Bird's Beak

Achieving Objective L-1.3 will increase the size and connectivity of the reserve system by acquiring lands adjacent to baseline protected lands, also known as Category 1 baseline public and easement lands (see Table 6-1(a)). The manner in which this objective will be achieved specifically for palmate-bracted bird's beak is described in Section 6.3.3.4.2, *Alkali Prairie Natural Community Goals and Objectives,* for Objective NC-AS1.1.

Achieving Objective L-2.1 will maintain or enhance palmate-bracted bird's beak habitat, and minimize adverse effects of invasive plants. This will minimize competition for resources with palmate-bracted bird's beak, and improve overall habitat suitability for the species. Enhancement of palmate-bracted bird's-beak's native host plants (e.g., saltgrass and alkali heath), will be a critical management tool. Invasive species will be managed in palmate-bracted bird's beak habitat through implementation of Conservation Measure 3, *Manage and Enhance the Reserve System*. Other management will occur to enhance palmate-bracted bird's beak habitat.

6.3.4.1.2 How Achieving the Natural Community Objectives Will Benefit Palmate-Bracted Bird's Beak

Achieving Objective NC-AP1.1 will result in the protection of palmate-bracted bird's beak habitat at the Woodland Regional Park in a perpetual conservation easement. Achieving Objective NC-AP1.2 will result in the enrollment of baseline protected habitat at the Alkali Grasslands Preserve into the reserve system as pre-permit reserve lands. These are the only sites with known occurrences of palmate-bracted bird's beak in the Plan Area. The alkali prairie natural community, which is habitat for palmate bracted bird's-beak, was once common in the Central Valley and in portions of the Plan Area; however, conversion of land to agriculture, livestock grazing (unmanaged for natural communities), commercial uses, and urban uses has reduced the extent and degraded the condition of this community throughout much of its historical range. Protection of suitable habitat at Woodland Regional Park will ensure long-term protection and management of the remaining habitat. This habitat protection will complement and expand on the existing protected palmate-bracted bird's-beak habitat at Alkali Grasslands Preserve. This complex of adjacent reserve lands specifically managed for palmate-bracted bird's-beak offers the best chance for long-term survival of the species in the Plan Area.

Achieving Objective NC-AP1.3 will result in the management and enhancement of habitat functions for palmate-bracted bird's beak on lands incorporated into the reserve system. The major stressors of palmate-bracted bird's beak in the Plan Area have been habitat fragmentation, hydrologic alteration, and invasion by nonnative species. Enhancing the habitat to reduce or offset these stressors is expected to help facilitate the long-term survival of palmate-bracted bird's-beak in the reserve system.

6.3.4.1.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, and associated conservation measures, discussed above, are expected to contribute to the conservation of palmate-

bracted bird's beak. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape or natural community levels.

Goal PBBB1: Provide for the conservation of palmate-bracted bird's beak in the Plan Area.

Objective PBBB1.1: Increase the 10-year running average of the size of the palmate-bracted bird's beak population on Woodland Regional Park by 10%, by managing and enhancing habitat.

Rationale: Expectations as to what the HCP/NCCP may feasibly achieve on the Woodland Regional Park are based, in part, on the results of population monitoring and management by CNLM on the Alkali Grasslands Preserve (Figure 6-4). Over the period that the population has been monitored on the Alkali Grassland Preserve (~1981-2015), the size of the palmate-bracted bird's beak population has varied annually from fewer than 100 plants to over 10,000 plants, most likely in response to annual variation in rainfall (U.S. Fish and Wildlife Service 2009, CNLM 2015). Portions of the population on the Alkali Grasslands Preserve have increased in recent years. Managing the habitat for palmate-bracted bird's-beak on these lands has likely helped to stabilize the population and facilitated the species' ongoing existence in the face of future changes in environmental conditions (e.g., climate change). Currently, its relatively small population size leaves the species vulnerable to demographic, genetic, and stochastic (chance environmental) events.

Because of the dramatic year-to-year variation in size of the palmate-bracted bird's beak population on the Alkali Grasslands Preserve that may be largely a reflection of direct and indirect effects of weather, any effects of management are difficult to detect. Although nonnative plant species have been managed in recent years through herbicide application and grazing, the recently increased population size on the Alkali Grasslands Preserve is within the historical size variation and could be attributable to drought conditions.[4] This suggests that rainfall (and perhaps other weather components) may be the most important determinant of population size. Management may, for example, be providing a relatively small impact but perhaps buffering from reaching critically low populations sizes during unfavorable years. With more information, management practices may be able to mitigate further some of these effects. The population on Woodland Regional Park in 2015 was 10 plants, and no plants were observed in 2016. Given the amount of habitat available for enhancement on this site, it is reasonable to expect that habitat enhancement can result in a 10-year running average population size increase of at least 10%. The baseline will be the 10-year running average from 2015 through 2025. The objective will have been met if the population increases by at least 10% based on a 10-year running average after 2025. As described in Conservation Measure 3, *Manage and Enhance the Reserve System,* and Section 6.5, *Monitoring and Adaptive Management*, the Conservancy will monitor palmate-bracted bird's beak populations, identify stressors on the population, and manage the protected lands to reduce these stressors.

6.3.4.2 Valley Elderberry Longhorn Beetle

6.3.4.2.1 How Achieving the Landscape Objectives Will Benefit the Valley Elderberry Longhorn Beetle

Achieving Objective L-1.3 will provide for reserve system connectivity. The valley elderberry longhorn beetle has a limited ability to disperse through unsuitable habitat (Collinge et al. 2001), therefore habitat connectivity is vital for this species.

[4] Personal communication, Catherine Little, Center for Natural Lands Management. May 14, 2015.

Achieving Objectives L-1.4, L-1.5, and L-1.6 will provide contiguous blocks of riparian natural community along Cache and Putah Creeks and/or along the Sacramento River. This species has distinct, relatively isolated populations in individual drainages, most likely due to the beetle's limited dispersal capability (Collinge et al. 2001). The species is unlikely to colonize unoccupied drainages, even if suitable habitat is present. It is therefore important to protect habitat in drainages where the species is known to occur, such as along the Putah and Cache Creek drainages.

Achieving Objective L-2.1 in riparian areas will reduce the risk of invasive plants outcompeting elderberry shrubs, which are necessary for the valley elderberry longhorn beetle's survival. This objective will be achieved through riparian management as described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.4.2.2 How Achieving the Natural Community Objectives Will Benefit the Valley Elderberry Longhorn Beetle

Achieving Objectives NC-VFR1.1 and NC-VFR1.2 will result in the protection of 1,600 acres of unprotected valley foothill riparian natural community, primarily in the Cache Creek and Putah Creek planning units, and additional riparian restoration at a ratio of one acre restored for each acre lost as a result of covered activities. Valley elderberry longhorn beetle occurs primarily in the valley foothill riparian natural community, and the Cache Creek and Putah Creek planning units are known to support valley elderberry longhorn beetle populations. As described above, this species has distinct, relatively isolated populations in individual drainages, and the species is unlikely to colonize unoccupied drainages, even if suitable habitat is present (Collinge et al. 2001). Protection of habitat in occupied drainages is therefore vital. Only those portions of valley foothill riparian natural community that include elderberry shrubs, however, are capable of supporting the valley elderberry longhorn beetle. Therefore, it is necessary to include species-specific objectives (Objective VELB-1.1 and Objective VELB-1.2) to ensure that the protected and restored valley foothill riparian natural community provides suitable habitat for valley elderberry longhorn beetle.

6.3.4.2.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, as well as the associated conservation measures in Section 6.4, *Conservation Measures,* are expected to contribute to the conservation of the valley elderberry longhorn beetle. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape or natural community level.

Goal VELB-1: Provide for the conservation of valley elderberry longhorn beetle in the Plan Area.

> **Objective VELB-1.1:** Within the 1,600 acres of protected valley foothill riparian natural community (Objective NC-VFR-1.1), prioritize protection of valley elderberry longhorn beetle populations along Lower Cache Creek and Lower Putah Creek and the Sacramento River, and adjacent lands to provide for valley elderberry longhorn beetle population expansion.
>
> **Rationale:** Cache and Putah Creeks and the Sacramento River are known to support populations of valley elderberry longhorn beetle. Although the landscape and natural community objectives provide for protection of valley foothill riparian natural community along these two drainages, only those portions of the valley foothill natural community that support elderberry shrubs are capable of supporting this species. Furthermore, due to the species' limited dispersal capability, it has a low likelihood of occupying areas far from existing populations. It is therefore important

to protect occupied habitat, and lands adjacent to occupied habitat, to provide for population expansion. Yolo County's implementation of the CCRMP has resulted in the establishment of thousands of elderberry shrubs along the Cache Creek corridor. The Yolo HCP/NCCP will build on this effort to provide large, contiguous patches of valley elderberry longhorn beetle habitat in this area as well as other areas.

Objective VELB-1.2: Within the restored valley foothill riparian natural community (Objective NC-VFR1.2), establish elderberry shrubs and associated riparian plant species, and prioritize lands adjacent to existing populations to provide for population expansion.

Rationale: Restoring valley foothill riparian forest with the beetle's elderberry host plant will expand the availability of suitable habitat for valley elderberry longhorn beetle. This net increase in beetle habitat is expected to result in a net population increase in valley elderberry longhorn beetle. This restoration will result in a wider and less fragmented distribution of the species if valley elderberry longhorn beetles colonize these restored areas because the riparian natural community will be restored to fill in gaps between existing riparian areas.

6.3.4.3 California Tiger Salamander

6.3.4.3.1 How Achieving the Landscape Objectives Will Benefit the California Tiger Salamander

Landscape-level biological goals and objectives integral to the conservation strategy for California tiger salamander are stated below.

Achieving Objective L-1.3 will provide for reserve system connectivity. An interconnected reserve system is important to allow for dispersal and genetic exchange within the California tiger salamander population in the Plan Area.

Achieving Objective L-2.1 will increase native species diversity and relative cover in California tiger salamander habitat. Increasing native vegetative cover has been shown to increase pond hydroperiod (Marty 2005), thus making aquatic habitat more suitable for California tiger salamander breeding. Additionally, consistent with this objective, the introduction and proliferation of nonnative bullfrogs and other nonnative aquatic wildlife that prey on California tiger salamanders will be reduced. Bullfrogs and predatory fish are a primary source of mortality for this species (Fisher and Shaffer 1996). As described in Conservation Measure 3, *Manage and Enhance the Reserve System*, nonnative aquatic predators that threaten California tiger salamander populations will be removed from ponds and other aquatic habitat, as needed, to sustain the California tiger salamander population in the reserve system.

6.3.4.3.2 How Achieving the Natural Community Objectives Will Benefit the California Tiger Salamander

Natural community biological goals and objectives integral to the conservation strategy for the California tiger salamander are stated below.

Achieving Objective NC-G1.1 will result in the protection of at least 3,000 acres of grassland in the Dunnigan Hills planning unit. This planning unit provides the most California tiger salamander habitat in the Plan Area and includes a known population and critical habitat for this species.

Achieving Objective NC-G1.2 will increase the value of grassland for California tiger salamander by increasing the abundance of native rodents and reducing the relative cover of invasive plants that reduce habitat value for this species. California tiger salamanders use rodent burrows for cover, and a targeted reduction of invasive plants will increase the species' ability to move through the landscape. This objective will be met through measures described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.4.3.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, and associated conservation measures, discussed above, are expected to contribute to the conservation of California tiger salamander. The goal and objectives below address additional needs specific to this species that would not otherwise be met at the landscape and natural community levels.

Goal CTS1: Provide for the conservation of California tiger salamander in the Plan Area.

Objective CTS1.1: Within the 3,000 acres of protected grassland in the Dunnigan Hills planning unit (Objective NC-G1.1), include at least 2,000 acres of modeled upland habitat within 1.3 miles of aquatic habitat for California tiger salamander and prioritize protection in designated critical habitat.

Rationale: Modeled upland habitat for California tiger salamander consists of grassland within 1.3 miles of modeled aquatic breeding habitat. In determining the areal extent of California tiger salamander habitat to be conserved, the following factors were considered: spatial and functional needs of the species, including genetic exchange; current extent of protected habitat in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for the species; and the amount of habitat available that can reasonably be protected in targeted conservation areas. Based on the proportion of modeled upland habitat within grassland in the Dunnigan Hills planning unit, it is reasonable to expect that at least 2,000 acres out of the 3,000 acres protected can be sited within 1.3 miles of modeled California tiger salamander aquatic breeding habitat. Covered activities will result in the loss of 398 acres of upland habitat for this species. Protection of at least 2,000 acres of high quality upland habitat will therefore exceed typical mitigation standards (often 3:1 for upland habitat) and will provide for the conservation of the species in the Plan Area. With this protection, 11 percent of the modeled California tiger salamander upland habitat in the Plan Area will be protected, and the protected lands will be concentrated in the most valuable habitat area for the species, including designated critical habitat.

Objective CTS1.2: Within the 600 acres of protected lacustrine and riverine natural community (Objective NC-LR1.1), protect at least 36 acres of aquatic habitat. Restore or create 36 acres of aquatic habitat. Within the protected and restored aquatic habitat, include at least five California tiger salamander breeding pools that are found to support all life stages of the salamander through all water year types consistent with the occupancy commitment for this species in Table 6-2(c).

Rationale: Protection of aquatic breeding habitat is necessary to ensure the ongoing reproduction of California tiger salamander in currently occupied habitat and that sufficient unoccupied aquatic breeding habitat is protected to accommodate any future expansions in its distribution and abundance. Up to 12 acres of modeled aquatic California tiger salamander habitat may be lost as a result of covered activities (these areas are likely not occupied by the

species): the restoration or creation of one acre for each acre lost will result in no net loss of aquatic habitat. Protection of 36 acres and restoration of another 36 acres of aquatic habitat within the dispersal range of occupied ponds will exceed the standard 3:1 mitigation ratio and will provide for the conservation of California tiger salamander in the Plan Area.

The HCP/NCCP may achieve the occupancy standard for this objective either by protecting occupied breeding pools or protecting unoccupied breeding pool habitat that later becomes occupied. For protected unoccupied habitat, the Conservancy will undertake habitat enhancement actions designed to encourage use by breeding California tiger salamander (e.g., controlling nonnative predators, improving hydrologic conditions).

Conservation Measure 1, *Establish Reserve System*, describes how the Conservancy will design the reserve system to achieve the protection component of this objective. Conservation Measure 2, *Restore Natural Communities*, describes how the Conservancy will restore or create ponds for California tiger salamander. Conservation Measures 1 and 2 describe how the Conservancy will configure the protected and restored habitat within protected upland habitat to achieve needs for the species. Conservation Measure 3, *Manage and Enhance the Reserve System,* describes habitat enhancement measures to encourage occupation by California tiger salamander.

Objective CTS1.3: If California tiger salamander is present or assumed to be present at the site of a covered activity, the covered activity will not remove aquatic habitat until at least four new occupied breeding pools are discovered or established in the Dunnigan Hills area and protected in the Dunnigan Hills area, with sufficient surrounding uplands to support the individuals using the protected aquatic habitat. After the four new pools are protected and with concurrence of USFWS and CDFW, up to three occupied breeding pools discovered may be removed.

Rationale: This objective will limit the take of California tiger salamander breeding pools and ensure the Conservancy protects at least as many breeding pools as are affected by covered activities. . California tiger salamander breeding pools are rare in the Plan Area, which includes critical habitat for the species; therefore, the Conservancy must protect breeding pools before the Conservancy allows the removal of breeding pools.

6.3.4.4 Western Pond Turtle

6.3.4.4.1 How Achieving the Landscape Objectives Will Benefit the Western Pond Turtle

Achieving Objective L-1.3 will provide for reserve system connectivity. An interconnected reserve system is important to allow for dispersal and genetic exchange within the western pond turtle population in the Plan Area.

Achieving Objectives L-1.4 and L-1.5 will provide contiguous riparian areas along Cache and Putah Creeks. This will provide aquatic and upland habitat for western pond turtle and allow for dispersal and genetic exchange along the Cache Creek and Putah Creek corridors.

6.3.4.4.2 How Achieving the Natural Community Objectives Will Benefit the Western Pond Turtle

Achieving Objective NC-CL1.2 will result in protection of at least 2,800 acres of rice. Rice provides aquatic habitat for western pond turtle.

Achieving Objective NC- G1.1 will result in protection of at least 4,430 acres of unprotected grassland in the Conservation Reserve Area. Some of this natural community will be adjacent to aquatic western pond turtle habitat and will provide upland habitat for the species.

Achieving Objective NC-VFR1.1 will result in protection of at least 1,600 acres of valley foothill riparian. Protection of these acres will provide upland habitat for western pond turtle.

Achieving Objectives NC-FEW1.1 and NC-FEW1.2 will result in protection of 500 acres of freshwater emergent wetland, and additional restoration of this natural community to achieve no net loss. These actions will provide aquatic habitat for western pond turtle.

Achieving Objectives NC-LR1.1 and NC-LR1.2 will result in protection of 600 acres of lacustrine and riverine natural community, and additional restoration of this natural community to achieve no net loss. These actions will provide aquatic habitat for western pond turtle. Some of the lacustrine habitat protected for California tiger salamander will also benefit western pond turtle.

6.3.4.4.3 Species-Specific Goals and Objectives

Objective WPT1.1: Within protected and restored lacustrine and protected and enhanced riverine natural communities, add logs, rocks, and/or emergent vegetation for basking sites and other western pond turtle habitat features, and meet the occupancy commitment for this species in Table 6-2(c).

Rationale: Western pond turtles spend much of the warmer months in aquatic habitats throughout their range. Aquatic habitat provides favorable environments for foraging, mating, basking, and predator avoidance (Vander Haegen, Clark, Perillo, Anderson, & Allen 2009). Access to high-quality, disturbance-free basking sites is crucial in determining the overall health of a western pond turtle population because such sites allow the species to carry out activities necessary for survival and reproduction (Germano & Rathbun 2008). Emergent basking sites are usually composed of exposed logs, rocks, and emergent vegetation, which can be affected by altered flow regimes from dams. Conservation Measure 3, *Manage and Enhance the Reserve System*, describes habitat management and enhancement measures to achieve this objective for western pond turtle.

6.3.4.5 Giant Garter Snake

6.3.4.5.1 How Achieving the Landscape Objectives Will Benefit the Giant Garter Snake

Achieving Objective L-1.3 will result in a large, interconnected reserve system. Habitat connectivity is vital to sustain populations of giant garter snake, for the purposes of genetic exchange, dispersal, and daily movement.

Achieving Objective L-2.1 will increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative species. While nonnative aquatic plants such as water primrose provide cover for the giant garter snake, they can impede snake movement if they become too dense. Nonnative wildlife species such as bullfrog and largemouth bass prey on young giant garter snakes and may threaten local populations. Consistent with this objective, nonnative invasive plant species that degrade giant garter snake habitat or nonnative wildlife species that prey on the giant garter snake will be controlled if monitoring determines that

giant garter snake populations in the reserve system are threatened by these factors. Reduction of the introduction and proliferation of nonnative species potentially harmful to giant garter snake and its habitat will be achieved through implementation of management and enhancement actions described in Conservation Measure 3, *Manage and Enhance Natural Communities.*

6.3.4.5.2 How Achieving the Natural Community Objectives Will Benefit the Giant Garter Snake

Achieving Objective NC-CL1.2 will result in the protection of 2,800 acres of rice that provide habitat value for covered and other native species. This will provide aquatic habitat for the giant garter snake as well as rice checks and field borders that provide adjacent upland movement and overwintering habitat.

Achieving Objective NC-G1.1 will result in the protection of 4,430 acres of grassland. A portion of this is expected to provide upland habitat for the giant garter snake.

Achieving Objective NC-G1.2 will enhance the functions of protected grassland in the reserve system. This will include enhancement to increase the abundance of burrowing rodents, thus providing burrows for giant garter snakes to seek cover and overwinter. Enhancement actions to encourage burrowing rodents and improve giant garter snake upland habitat are described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

Achieving Objectives NC-FEW1.1 and NC-FEW1.2 will result in protection of 500 acres of freshwater emergent wetland and additional restoration of this natural community. This will provide aquatic habitat for giant garter snake.

Achieving Objectives NC-LR1.1 and NC-LR1.2 will result in protection of 600 acres of lacustrine and riverine natural community, and additional restoration of this natural community to achieve no net loss as a result of covered activities. A portion of this will provide aquatic habitat for giant garter snake.

6.3.4.5.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, as well as associated conservation measures discussed above, will provide for the conservation of giant garter snake in the Plan Area. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape and natural community levels.

Goal GGS1: Provide for the conservation of giant garter snake in the Plan Area, including the Willow Slough/Yolo Bypass subpopulation and a segment of the Colusa Basin subpopulation, and connectivity between the two subpopulations.

> **Objective GGS1.1:** Protect and manage the 2,800 acres of protected rice land (Objective NC-CL1.2) in modeled giant garter snake habitat. Suitable emergent marsh can be substituted for rice land.
>
> **Rationale:** This objective ensures the entire 2,800 acres of conserved rice lands will provide habitat for giant garter snake. In determining the areal extent of rice to be conserved for giant garter snake, the foll owing factors were considered: spatial and functional needs of the giant garter snake, including genetic exchange; current extent of protected habitat in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for

this species; and the amount of rice land available that can reasonably be protected in targeted conservation areas. Covered activities will result in the removal of 87 acres of rice habitat for giant garter snake: protection of 2,800 acres of rice will mitigate this effect and further provide for the conservation of the species in the Plan Area. Some of the 2,800 acres of rice lands can be substituted for appropriate wetlands, subject to the wildlife agencies review and approval. Rice, upland, and lacustrine/riverine elements will be protected within an interconnected matrix to provide all the life history needs of the giant garter snake. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System.*

Objective GGS1.2: Protect and manage 1,160 acres of upland natural communities (Objective L-1.1) to provide active season upland movement habitat and at least 2,315 acres to provide overwintering habitat for giant garter snake.

Rationale: This objective provides for the protection of uplands necessary for the giant garter snakes to move between sites, bask, and seek refuge in terrestrial burrows during the active season, and to seek refuge in burrows during their dormant period in the winter.

Objective GGS1.3: Protect, restore, and manage the 500 acres of fresh emergent wetland natural community (Objective NC-FEW1.1), at least 420 acres of the lacustrine/riverine natural community (Objective NC-LR.11), the restored fresh emergent wetland (Objective NC-FEW1.2), and sufficient restored lacustrine and riverine natural community (Objective NC-LR1.2) to conserve the giant garter snake. Ensure at least 80 percent of the aquatic habitat is perennial, and the remainder provides aquatic habitat for the giant garter snake during the active season at least through July of each summer.

Rationale: This objective is necessary to ensure the protected fresh emergent wetland provides suitable habitat for giant garter snake. In determining the areal extent of fresh emergent wetland to be protected for the giant garter snake, the following factors were considered: spatial and functional needs of the giant garter snake, including genetic exchange; current extent of protected habitat in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for this species; and the amount of fresh emergent wetlands available that can reasonably be protected in targeted conservation areas.

Achieving Objectives GGS1.1 through GGS1.3 will result in the protection of 2,800 of rice, 420 acres of aquatic habitat, 500 acres of fresh emergent wetland, and 1,160 acres of active upland season movement habitat (i.e., uplands within 200 feet of rice, aquatic, and fresh emergent wetland habitat). The USFWS typically treats rice, aquatic, and fresh emergent wetland habitats as *aquatic* habitat for giant garter snake, and treats all uplands within 200 feet of giant garter snake aquatic habitat as upland habitat for this species. USFWS typically applies a standard mitigation ratio of 3:1 for *aquatic* habitat and uplands within 200 feet of *aquatic* habitat (that is, all aquatic habitat types plus lands categorized as active season upland movement habitat in the giant garter snake model). Covered activities will result in the loss of 713 acres of giant garter snake habitat that is typically mitigated at a 3:1 ratio (i.e., aquatic habitat and uplands within 200 feet of aquatic habitat; 713 acres X 3 = 2,139 acres).[5] The Yolo

[5] The species model also includes lands that are greater than 200 feet from aquatic habitat (termed *overwintering habitat*). Although the 713 acres includes uplands *within* 200 feet of aquatic habitat (termed *active season upland habitat*), it does not include overwintering habitat. The wildlife agency standard for giant garter snake is to mitigate at a 3:1 ratio for aquatic habitat and uplands within 200 feet of aquatic habitat.

HCP/NCCP will protect at least 4,880 acres of this habitat, which will exceed the typical mitigation standard and further contribute to the conservation of giant garter snake. Additionally, the Conservancy will restore an estimated 109 acres of aquatic and 76 acres of fresh emergent wetland habitat for giant garter snake.

Although giant garter snakes are reliant on mostly perennial aquatic habitat, providing the species' life history needs during its entire active season (approximately May through October), seasonal wetlands can be beneficial for the species if they provide nursery habitat for the young in July. Seasonal aquatic habitat is less likely than perennial aquatic habitat to support aquatic predators that normally prey on young giant garter snakes, such as bullfrogs and predatory fish.[6]

Objective GGS1.4: In addition to the newly protected and restored giant garter snake habitat (Objectives GGS1.1, GGS1.2, and GGS1.3), enroll at least 2,910 acres of giant garter snake habitat on eligible baseline public and easement lands into the reserve system as pre-permit reserve lands.

Rationale: Baseline public and easement lands in the Plan Area (Table 6-1(a), *Baseline Public and Easement Lands*) currently support giant garter snake habitat. By enrolling these lands into the reserve system as pre-permit reserve lands, their management and monitoring for this species will be improved and raised to the standards of the Yolo HCP/NCCP conservation strategy. This will increase their conservation value to giant garter snake by helping to meet the HCP/NCCP biological goals and objectives. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective GGS1.5: Meet the occupancy commitment for giant garter snake in Table 6-2(c).

Rationale: This objective ensures that occupied giant garter snake habitat will be protected, and that sites will be monitored and adaptivement managed to ensure benefits to the giant garter snake population.

6.3.4.6 Swainson's Hawk

6.3.4.6.1 How Achieving the Landscape Objectives Will Benefit the Swainson's Hawk

Achieving Objective L-1.3 will result in a large, interconnected reserve system. Although the Swainson's hawk is a mobile species and not severely affected by habitat fragmentation, there are energetic costs associated with traveling across unsuitable areas to nesting or foraging habitat that could diminish the species' reproductive success. An interconnected reserve system is therefore likely to benefit this species.

6.3.4.6.2 How Achieving the Natural Community Objectives Will Benefit the Swainson's Hawk

Achieving Objective NC-CL1.1 and NC-G1.1 will result in protection of at least 18,685 acres of non-rice cultivated lands (14,362 acres) and grassland (4,430 acres). Objective SH1.1 and SH1.2 will ensure that these lands are within modeled foraging habitat for the Swainson's hawk.

[6] Personal communication, Eric Hansen, herpetologist. 2014.

Achieving Objective NC-CL1.2 will result in the enrollment of 3,600 acres of baseline public and easement lands supporting cultivated lands into the reserve system as pre-permit reserve lands. Objective SW1.4 will ensure that this is within modeled foraging habitat for the Swainson's hawk.

Achieving Objectives NC-CL1.4 and NC-G1.2 will result in the maintenance and enhancement of Swainson's hawk habitat in the reserve system to maintain or increase the abundance of their native rodent species that provide prey for this species. The HCP/NCCP will meet this objective through implementation of Conservation Measure 3, *Manage and Enhance the Reserve System*.

Achieving Objectives NC-VFR1.1 and NC-VFR1.2 will result in protection of 1,600 acres of valley foothill riparian natural community, and additional restoration of this natural community to provide no net loss of acres as a result of covered activities. This natural community will provide nesting habitat for Swainson's hawk. The areas targeted for riparian protection along Cache and Putah Creeks and along the Sacramento River are in close proximity to surrounding foraging habitat and they support Swainson's hawk nest trees.

6.3.4.6.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, and associated conservation measures, discussed above, are expected to provide for the conservation of the Swainson's hawk. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape and natural community level.

Goal SH1: Provide for the conservation of Swainson's hawk in the Plan Area.

Objective SH1.1: Within the 14,362 acres of protected cultivated land natural community (Objective NC-CL1.1), maintain crop types that support Swainson's hawk foraging habitat.

Rationale: The suitability of Swainson's hawk foraging habitat within the cultivated landscape is highly variable and dependent in part on each crop's vegetation structure and the planting and harvesting regime, both of which determine the ability of foraging Swainson's hawks to see and capture prey. Crop types that maintain a relatively low vegetation profile, like alfalfa and other hay crops, or those that are harvested during the breeding season, such as tomatoes and wheat, are suitable foraging habitats for this species. Those that maintain a relatively tall and dense vegetation structure throughout the breeding season, such as corn, sunflower and safflower, have significantly less foraging value. All cultivated habitats that are seasonally or annually rotational, however, are considered suitable foraging habitat for Swainson's hawk. Foraging use of the cultivated landscape changes seasonally and annually in response to the location and related farming activities of each crop type within the overall agricultural matrix, although in general the entire annually cultivated portion of the landscape has foraging value. Perennial cultivated lands (i.e., those that are not seasonally or annually rotated) and that restrict access to prey, including orchards and vineyards, are considered unsuitable for Swainson's hawk foraging.

Urban development and conversion to unsuitable crop types have been important factors diminishing Swainson's hawk availability in the Central Valley. Conversion from an annually rotated agricultural matrix to one dominated by orchards and vineyards removes foraging habitat for long periods. A secondary effect of orchard conversion is removal of nesting habitat: nest trees that are within or border newly converted orchards are removed at a greater frequency than those associated with hay, row, and grain crops. Crop conversion to

orchards may be the single-most important factor reducing Swainson's hawk nesting and foraging throughout the species' Central Valley range (Estep 2015).

Conservation easements on Swainson's hawk habitat in the reserve system will protect valuable habitat for Swainson's hawk and eliminate the primary threats to the species on these lands by prohibiting development or conversion to unsuitable or very low value crops such as orchards, vineyards, or nursery crops. Corn, safflower, and sunflower (low value crops) will be allowed on only a limited basis as part of normal rotation practices. The protection of 14,300 acres of Swainson's hawk cultivated lands foraging habitat will mitigate the loss of 9,399 acres of cultivated lands habitat for this species resulting from covered activities, and will further provide for the conservation of the species in the Plan Area. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective SH1.2: Site the 4,430 acres of grassland natural community protection (Objectives NC-GRL1.1) to ensure it provides modeled Swainson's hawk foraging habitat in the Conservation Reserve Area.

Rationale: The inclusion of 4,430 acres of grassland foraging habitat for Swainson's hawk in the reserve system will further provide for the conservation of this species. The protection of cultivated lands and grassland combined will provide 18,730 acres of Swainson's hawk foraging habitat in the reserve system. This will mitigate the loss of 10,806 acres of total foraging habitat resulting from covered activities, and will further provide for the conservation of the species in the Plan Area. In determining the areal extent of Swainson's hawk foraging habitat to be conserved, the following factors were considered: spatial and functional needs of the species; current extent of protected habitat in the Plan Area and conservation gaps in ecologically important areas; mitigation and conservation needs for the species; and the amount of habitat available that can reasonably be protected in targeted conservation areas. With full HCP/NCCP implementation, 11 percent of the Swainson's hawk agricultural foraging habitat and 25 percent of the Swainson's hawk natural foraging habitat in the Plan Area will be protected and managed. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System.*

Objective SH1.3: Protect and maintain at least 20 unprotected Swainson's hawk nest trees that have been active within the last five years, within the reserve system, consistent with the occupancy commitments for this species in Table 6-2(c).

Rationale: The number of nest trees targeted for conservation is based upon the density of nest trees in suitable habitat in the Plan Area, and the acres of Swainson's hawk habitat targeted for conservation. This will ensure the density of nest trees protected in the reserve system is representative of the Plan Area. There are approximately 300 Swainson's hawk nesting pairs in the Plan Area, and an estimated 278,114 acres of nesting habitat, representing a density of 0.0012 nest occurrence per acre. Protection of 18,685 acres of Swainson's hawk habitat[7] at an average density of nest sites is expected to result in the protection of approximately 20 nest sites (18,685 X 0.0012). Protection of 20 nest sites will require the Conservancy to protect Swainson's hawk habitat with a density of nest sites at or slightly higher than the average density of nest trees in Swainson's hawk habitat in the Plan Area.

[7] 18,685 acres = 14,362 acres of non-rice cultivated lands + 4,430 acres of grassland.

Objective SH1.4: In addition to protection of newly protected lands (Objectives SH1.1, SH1.2, and SH1.3), enroll at least 4,580 acres of baseline public and easement lands into the reserve system as pre-permit reserve lands providing foraging habitat.

Rationale: Baseline public and easement lands in the Plan Area currently support Swainson's hawk habitat, including an estimated 3,600 acres of cultivated lands and 980 acres of grassland that provide foraging habitat. By enrolling these lands into the reserve system as pre-permit reserve lands, their management and monitoring for this species will be improved and raised to the standards of the Yolo HCP/NCCP conservation strategy. This will increase their conservation value to Swainson's hawk by helping to meet the HCP/NCCP biological goals and objectives. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective SH1.5: In addition to restoration of riparian natural community (Objective NC-VFR1.2), ensure a minimum density of one tree suitable for Swainson's hawk nesting (native trees at least 20 feet in height, particularly valley oaks if conditions are suitable) per 10 acres in cultivated lands in the reserve system. Where existing protected trees do not meet that minimum requirement, plant suitable nest trees to meet this density requirement.

Rationale: This objective will ensure that suitable nesting habitat is provided throughout the Swainson's hawk foraging habitat in the reserve system. Although this objective is already met in some parts of the Plan Area, there are some areas, such as the Delta and the northern part of the Plan Area, where this objective may not be met.[8] Details regarding the placement of nest trees to meet this objective are provided in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.4.7 White-Tailed Kite

6.3.4.7.1 How Achieving the Landscape Objectives Will Benefit the White-Tailed Kite

Achieving Objective L-1.3 will result in a large, interconnected reserve system. Although the white-tailed kite is a mobile species and not severely affected by habitat fragmentation, there are energetic costs associated with traveling across unsuitable areas to nesting or foraging habitat that could diminish the species' reproductive success. An interconnected reserve system is therefore likely to benefit this species.

6.3.4.7.2 How Achieving the Natural Community Objectives Will Benefit the White-Tailed Kite

Achieving Objective NC-CL1.1 and NC-G1.1 will result in protection of at least 18,685 acres of non-rice cultivated lands and grassland. This will provide foraging habitat for the white-tailed kite. Additionally, achieving Objectives NC-CL1.4 and NC-G1.2 will result in the maintenance and enhancement of white-tailed kite foraging habitat in the reserve system to maintain or increase the abundance of the native rodent species that provide prey for this species. Objective NC-CL1.2 will result in protection of 2,800 of rice, which may provide stubble during winter for white-tailed kite foraging (Dunk 1995). The 500 acres of fresh emergent wetland protected under Objective NC-FEW1.1 may also provide foraging habitat for white-tailed kite (Dunk 1995).

[8] Personal communication, Jim Estep, wildlife biologist. 2015.

Achieving Objectives NC-VFR1.1 and NC-VFR1.2 will result in protection of 1,600 acres of valley foothill riparian natural community, and additional restoration of this natural community to provide no net loss of acres as a result of covered activities. This natural community will provide nesting habitat for white-tailed kite.

6.3.4.7.3 Species-Specific Goals and Objectives

The landscape and natural community-level objectives will result in the protection, management, and enhancement of 16,310 acres of foraging habitat and 1,600 acres of nesting habitat for this species. This will mitigate the loss of 12,052 acres of foraging habitat and 1,078 acres of nesting habitat for white-tailed kite, and will provide for the conservation of the species in the Plan Area.

Goal WTK1: Provide for the conservation of white-tailed kite in the Plan Area.

Objective WTK1.1: Meet the occupancy commitment for white-tailed kite in Table 5-2(c).

Rationale: The objective will ensure that occupied white-tailed kite habitat is protected. The Conservancy will protect at least 2 nesting nest trees in the reserve system (a nest tree is a tree that has been occupied within at least one of the previous five years). Estep (2008) found 13 nest sites in the Plan Area. The reserve system will include nine percent of the total nesting habitat acres. Two nest sites would be 15 percent of known nest sites in the Plan Area, so the reserve system would have a higher density than typical for this species.

6.3.4.8 Western Yellow-Billed Cuckoo

6.3.4.8.1 How Achieving the Landscape Objectives Will Benefit the Western Yellow-Billed Cuckoo

Achieving Objectives L-1.4 and L-1.5 will provide habitat corridors supporting valley riparian natural community along the Cache Creek and Putah Creek corridors. Contiguous habitat is important for the western yellow-billed cuckoo, which nests in patches greater than 25 acres in size (Gaines 1974).

Achieving Objective L-2.1 will increase native biodiversity and reduce invasive nonnative plant species in the riparian natural community. The western yellow-billed cuckoo requires structural diversity in its breeding habitat. Large, monotypic stands of invasive plants can diminish this structural diversity and render habitat unsuitable for the western yellow-billed cuckoo. The nonnative invasive Himalayan blackberry, for example, often invades riparian restoration sites and does not provide the same habitat structural complexity as other riparian plant species: this invasive species may inhibit establishment of other understory species that form important structural components of western yellow-billed cuckoo habitat (Hammond 2011). Reserve management will seek to control invasive plants such as Himalayan blackberry (Conservation Measure 3, *Manage and Enhance the Reserve System*).

Achieving Objective L-2.3 will allow for natural fluvial processes of rivers within the reserve system. Western yellow-billed cuckoos prefer cottonwood-willow plant associations that require active hydrodynamics in flood basins and floodplains or along river channels (Greco 2013).

6.3.4.8.2 How Achieving the Natural Community Objectives Will Benefit the Western Yellow-Billed Cuckoo

Achieving Objectives NC-VFR1.1 and NC-VFR1.2 will result in the protection of 1,600 acres of valley foothill riparian natural community, and additional restoration to result in no net loss of this natural community as a result of covered activities. The western yellow-billed cuckoo is a riparian obligate species (requires riparian habitat), and is therefore expected to benefit from the protection of existing valley riparian natural community. Only limited areas in the Plan Area, however, provide potentially suitable breeding habitat for this species. The yellow-billed cuckoo prefers large patches of mature, gallery forests,[9] often associated with open water and oxbows (Greco 2013). These conditions are present in the Cache Creek Settling Basin and Putah Creek sink (in Yolo Basin), as well as the Sacramento River, all of which are proposed for protection under Objective NC-VFR1.1. Substantial restoration, however, is likely necessary to establish a breeding population in the Plan Area (Greco and Larsen 2014).

Conservation Measure 1, *Establish Reserve System*, describes how the HCP/NCCP will meet this objective. It includes a minimum 25-acre patch size for valley foothill riparian protection: this will increase the potential for valley foothill riparian natural community in the reserve system to support western yellow-billed cuckoo.

6.3.4.8.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, as well as associated conservation measures discussed above, are expected to provide for the conservation of the western yellow-billed cuckoo in the Plan Area. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape and natural community level.

Goal WYBC1: Western yellow-billed cuckoo habitat sufficient to provide opportunities for migration and breeding in the Plan Area.

> **Objective WYBC1.1:** Within the 1,600 acres of protected valley-foothill riparian natural community (Objectives NC-VFR1.1), site as least 500 acres in modeled western yellow-billed cuckoo habitat, and design at least 60 acres of the restored valley foothill riparian (Objective NC-VFR1.2) to provide suitable habitat for this species.
>
> **Rationale:** Riparian habitat loss and fragmentation is a key factor in the decline of the western yellow-billed cuckoo (78 FR 61622: October 13, 2013). As a result, this species currently breeds in scattered locations where fragmented suitable habitat remains. Protecting western yellow-billed cuckoo habitat will help ensure the availability of foraging habitat necessary to support migrant western yellow-billed cuckoo using the Plan Area. This will also provide nesting habitat to accommodate the potential reestablishment of a breeding population in the Plan Area.
>
> An estimated 31 percent (3,868/12,565 acres) of the riparian natural community in the Plan Area consists of modeled western yellow-billed cuckoo habitat. The Conservancy will focus on protection of large, interconnected patches of riparian natural community when siting the

[9] Gallery forests are forests that form as corridors along rivers or wetlands and project into landscapes that are otherwise only sparsely treed such as grassland. Gallery forests are able to exist where the surrounding landscape does not support forests.

protection of riparian tol ensure that at least 31 percent of the protected riparian natural community will provide habitat for this species. Covered activities will result in the loss of 60 acres of modeled habitat for western yellow-billed cuckoo. The protection of 500 acres, in addition to restoration to achieve no net loss, will mitigate this loss and further provide for the conservation of western yellow-billed cuckoo.

6.3.4.9 Western Burrowing Owl

6.3.4.9.1 How Achieving the Landscape Objectives Will Benefit the Western Burrowing Owl

Achieving Objective L-1.3 will result in a large, interconnected reserve system. This will provide large areas consisting of both nesting and foraging habitat for the species.

6.3.4.9.2 How Achieving the Natural Community Objectives Will Benefit the Western Burrowing Owl

Natural community biological goals and objectives integral to the conservation strategy for western burrowing owl are stated below.

Achieving Objective NC-CL1.1 will result in the protection of at least 14,362 acres of non-rice within the cultivated lands natural community that provide habitat value for covered and other native species in the Conservation Reserve Area. Objective WBO1.2 will ensure that at least 3,000 acres of the protected cultivated lands is suitable for western burrowing owl. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Achieving Objective NC-CL1.3 will increase the conservation value of at least 3,649 acres of cultivated lands natural community on baseline public and easement lands through enrolling these lands into the reserve system as pre-permit reserve lands. By enrolling baseline public and easement lands supporting western burrowing owl into the reserve system as pre-permit reserve lands, the lands will be monitored and adaptively managed consistent with the Yolo HCP/NCCP conservation strategy to increase their conservation value for western burrowing owl by meeting the HCP/NCCP biological goals and objectives. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Achieving Objective NC-G1.1 will result in protection of at least 4,500 acres of grassland in the Conservation Reserve Area. Objective WBO1.1 ensures that at least 3,000 acres of this will consist of modeled western burrowing owl habitat. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Achieving Objectives NC-CL1.4 and NC-G1.2 will increase the functions of the cultivated lands and grassland natural communities in the reserve system to maintain or increase the abundance of the native rodent species that provide prey and burrows for western burrowing owl. The HCP/NCCP will meet this objective as described in Conservation Measure 3, *Manage and Enhance the Reserve System*.

6.3.4.9.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, as well as associated conservation measures discussed above, are expected to provide for the conservation of the western

burrowing owl. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape and natural community level.

Goal WBO1: Provide for the conservation of western burrowing owl in the Plan Area.

Objective WBO1.1: Of the 4,430 acres of protected grassland natural community (Objective NC-G1.1), site at least 3,000 acres in modeled western burrowing owl habitat.

Rationale: Grassland provides primary habitat for western burrowing owl. Protecting modeled western burrowing owl primary habitat will help maintain or increase western burrowing owl nesting success by maintaining nesting habitat and prey availability necessary to rear and fledge young. Out of 80,896 acres of grassland in the Plan Area, 37,690 acres (47 percent) provide primary habitat for western burrowing owl. By ensuring that at least 3,000 acres of protected grassland provide suitable habitat for burrowing owl, grassland protection will be focused in areas suitable for western burrowing owl. Covered activities will result in the loss of 3,172 acres of modeled western burrowing owl habitat, of which 861 acres is primary habitat. Protection of 3,000 acres of primary burrowing owl habitat will mitigate this loss and further provide for the conservation of the species in the Plan Area. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective WBO1.2: Of the 14,362 acres of protected non-rice cultivated lands (Objective NC-CL1.1), provide at least 2,500 acres of modeled western burrowing owl habitat.

Rationale: This commitment is based on the amount of secondary burrowing owl habitat (primarily cultivated lands, defined in Appendix A, *Covered Species Accounts*) that can reasonably be expected to occur in the cultivated lands targeted for protection. This objective will provide 2,500 acres of modeled secondary burrowing owl habitat to mitigate the loss of 2,311 acres of modeled secondary habitat and, along with Objective WBO1.1, will collectively provide 5,500 acres of newly protected modeled burrowing owl habitat. The protection, management, and enhancement of primary and secondary habitat will mitigate the loss of 3,172 acres (861 acres of primary habitat and 2,311 acres of secondary habitat) that will result from covered activities and further provide for the conservation of western burrowing owl in the Plan Area. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective WBO1.3: Maintain a minimum of two active burrowing owl nesting sites within the reverse system, and maintain two active nesting sites in the reserve system for each nesting pair displaced by covered activities and maintain one active nesting site or single owl site in the reserve system for each non-breeding single owl displaced by covered activities.

Rationale: Burrowing owls could be subject to displacement during the permit period if they are found to occur within covered activity work areas. There are currently no active or recently active burrowing owl sites that correspond with the covered activities footprint. Neither of the primary breeding areas (Davis area and southeast panhandle) correspond with any covered activities. The projected take of western burrowing owl, defined as the exclusion and displacement of owls from covered activity work areas (no burrowing owl mortality will be allowed or is expected) is therefore expected to be low and be restricted primarily to single burrowing owl breeding or non-breeding occurrences that may opportunistically inhabit covered activity work areas in the future. Typically unsustainable in the long term due to the temporary nature of onsite conditions, the displacement of these isolated sites represents the

primary potential take of burrowing owls from covered activities, which is estimated to not exceed four occupied sites. While burrowing owls are expected to continue to occur outside of the preserve network and indirectly benefit from implementation of the burrowing owl strategy, this commitment to maintain breeding pairs on preserve network lands is designed to specifically address incidental take of burrowing owls as described and defined above.

Objective WBO1.4: Prioritize the acquisition of habitat protected under Objectives WBO1.1 and WBO1.2. The first priority is to identify and preserve occupied habitats in the Yolo Bypass and adjacent lands (Planning Units 16 and 18). This is the portion of the Plan Area that supports the greatest potential for long-term sustainability of breeding colonies. The second priority is to identify and preserve habitat adjacent to occupied sites that have enhancement potential. The third priority will focus on modeled habitat in the Plan Area with historic records of burrowing owl occupancy and lands that are capable of supporting nesting activity through management and enhancement actions.

Rationale: Results of surveys by the Burrowing Owl Preservation Society indicate that the western burrowing owl population in Yolo County has declined dramatically. They found 15 nesting pairs of western burrowing owls in Yolo County in 2014, as compared with 63 pairs that were counted in Yolo County in 2007, as part of the Institute for Bird Populations' statewide survey. Although these were not comprehensive surveys, they suggest the species is declining in the Plan Area (see Appendix A, *Species Accounts*, for more information on the local and rangewide populations of this species).

Over the last several decades, occupied burrowing owl habitat has been concentrated in two primary areas in Yolo County, 1) within and in the immediate vicinity of Davis, and 2) in the southeastern panhandle including lands within the Yolo Bypass and immediately west of the bypass. The majority of other occurrence records are smaller, long-abandoned breeding colonies (e.g., Yolo County Airport) or single pairs of burrowing owls. The two primary occupied sites in the Davis area, Wildhorse Agricultural Buffer and Mace Ranch Preserve are already protected sites. Additional acquisition opportunities to support these sites, which are adjacent to urban areas and subject to substantial disturbance, is limited. The largest populations have been reported from the southeastern panhandle where land use, mainly in areas of open pasture and grassland cover types, and the presence of relatively large populations of ground squirrels is more conducive to sustainable burrowing owl breeding colonies. Prioritizing conservation activities in this portion of the Plan Area will have the greatest potential for the protection of occupied habitat and the long-term conservation of burrowing owls. The availability of potential acquisition sites that support occupied habitat, however, is limited and highly uncertain. The overall strategy, therefore, also includes habitat management and enhancement elements designed to protect and enhance populations.

Focusing acquisition on other suitable landscapes that have supported or are capable of supporting burrowing owls through management and enhancement can also contribute to burrowing owl conservation. Suitable grassland habitats that occur in portions of the Dunnigan Hills and along the western edge of the Plan Area provide opportunities for more sustainable expansion of burrowing owl populations. There may also be opportunities within the cultivated landscape in the interior of the Plan Area to enhance habitat capable of supporting burrowing owls.

Objective WBO1.5: Implement management and enhancement practices to encourage burrowing owl occupancy on preserve lands. Management practices include maintaining appropriate vegetation height, prohibiting rodenticides, minimizing the spread of invasive weed species, and encouraging the presence of ground squirrels. Enhancement practices include the installation of artificial burrows to augment natural burrows where they are lacking, creating berms as future burrowing sites, and creation of debris piles to enhance prey populations. These actions are designed to maintain existing populations and encourage the expansion of nesting populations in the Plan Area.

Rationale: Since impacts to active nest sites and potential take of individuals are most likely to be associated with opportunistic nesting rather than established and traditional nesting colonies, estimating impacts and take becomes problematic and unpredictable. The loss of habitat is estimated based on the removal of modeled habitat (most or all of which is likely to be unoccupied), which then forms the basis of the habitat-based conservation objectives. To address the potential for taking of burrowing owls (the displacement of active sites if they occur within a covered activity work area), in addition to the commitment to maintain burrowing owls within the Reserve System (WBO1.3) and to prioritize the acquisition and protection of occupied habitat (WBO1.4), the strategy also includes the implementation of enhancement practices to encourage the expansion of burrowing owl populations.

Burrowing owls have very specific habitat requirements in order to successfully nest, hunt, and avoid predation. Vegetation height and presence of potential burrows are essential elements of burrowing owl occupancy. If modeled habitat does not meet these requirements, burrowing owls are less likely to occur. Management and in some cases, enhancements on lands within the Reserve System, are therefore important to ensure that lands protected for burrowing owls are actually providing conditions that meet habitat requirements. The HCP/NCCP will meet this objective as described in Conservation Measure 3, *Manage and Enhance Natural Communities*. Vegetation management around occupied and potentially occupied burrows is key to maintaining suitable habitat conditions. The minimum acreage requirement (400 acres) was derived by multiplying the maximum recorded number of occupied owls sites in the Plan Area (63) by an approximately 300-foot radius around each burrow (or about 6.5 acres). This management is designed to enhance vegetation conditions in the immediate vicinity of nesting burrows in order to maintain and encourage occupancy. It does not represent the total foraging area typically used by burrowing owls. Among the enhancement practices is the creation of artificial nest sites and debris piles. These practices, along with habitat management, are designed to encourage owl occupancy by augmenting natural habitat elements. The objective is to maintain and expand burrowing distribution and abundance in the Plan Area.

6.3.4.10 Least Bell's Vireo

6.3.4.10.1 How Achieving the Landscape Objectives Will Benefit the Least Bell's Vireo

Achieving Objectives L-1.4 and L-1.5 will provide habitat corridors that support the valley riparian natural community along the Cache Creek and Putah Creek corridors. Connected riparian corridors will increase the opportunity for breeding least Bell's vireo to become established in these areas.

Achieving Objective L-2.1 will increase native biodiversity and reduce invasive nonnative plant species in the riparian natural community. The least Bell's vireo requires structural diversity in its breeding habitat. Large, monotypic stands of invasive plants can diminish this structural diversity and render habitat unsuitable for the species. Invasive nonnative species that diminish structural diversity and degrade least Bell's vireo habitat conditions include giant reed (*Arundo donax*) and tamarisk (*Tamarix chinensis*) (Riparian Habitat Joint Venture 2004). Invasive plants such as these will be controlled as part of Conservation Measure 3, *Manage and Enhance the Reserve System*. Control of invasive species and maintenance of native vegetation diversity will maintain and enhance least Bell's vireo habitat.

This objective also addresses the potential need to control nonnative brown-headed cowbird populations. Brown-headed cowbirds are nest parasites that lays their eggs in the nests of least Bell's vireos and have been a major factor contributing to the species' decline. As described in Conservation Measure 3, *Manage and Enhance the Reserve System*, the Conservancy will implement a cowbird control program if monitoring determines that a breeding population of least Bell's vireo has become established in the Plan Area, but is being adversely affected by cowbird parasitism.

Achieving Objective L-2.3 will allow natural fluvial processes of rivers within riparian corridors. This is expected to benefit least Bell's vireo by contributing to regular disturbances that promote early successional riparian vegetation, which is favorable for this species.

6.3.4.10.2 How Achieving the Natural Community Objectives Will Benefit the Least Bell's Vireo

Achieving Objectives NC-VFR1.1 and NC-VFR1.2 will result in the protection of 1,600 acres of valley foothill riparian natural community, and additional restoration to result in no net loss of this natural community as a result of covered activities. Least Bell's vireo is a riparian obligate species and will therefore benefit from these objectives.

6.3.4.10.3 Species-Specific Goals and Objectives

The landscape and natural community biological goals and objectives, and associated conservation measures, discussed above, are expected to provide for the conservation of the least Bell's vireo. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape and natural community level.

Goal LBV1: Provide sufficient habitat area to support least Bell's vireos that migrate through the Plan Area and to support potential future reestablishment of a nesting population in the Plan Area.

> **Objective LBV1.1:** Of the 1,600 acres of newly protected valley foothill riparian (Objective NC-VFR1.1), site at least 600 acres in modeled least Bell's vireo habitat, and design the restored valley foothill riparian (Objective NC-VFR1.2) to provide suitable habitat for this species.
>
> **Rationale:** The least Bell's vireo is an obligate riparian breeder that typically inhabits structurally diverse woodland containing dense cover within three to six feet of the ground for nesting, and a dense stratified canopy for foraging. The least Bell's vireo has been extirpated from the Plan Area as a nesting species; however, it is expanding its nesting range northward and has recently been observed in the Plan Area during the breeding season (although there are no documented breeding records yet). Protecting and restoring least Bell's vireo habitat will help ensure the availability of foraging habitat necessary to support migrant least Bell's vireo

using the Plan Area and the availability of nesting habitat to accommodate the potential reestablishment of breeding in the Plan Area.

6.3.4.11 Bank Swallow

6.3.4.11.1 How Achieving the Landscape Objectives Will Benefit the Bank Swallow

Achieving Objective L-1.4 will provide a corridor along Cache Creek, which will include the floodplain and support natural erosional and fluvial process. These erosional and fluvial processes are necessary to sustain bank swallow nesting habitat.

Achieving Objective L-2.1 will increase diversity and relative cover of native plant species in grassland. Bank swallows forage over open grassland, and the Bank Swallow Technical Advisory Committee recommends control of invasive plants in grassland as one of the enhancement techniques for this species (Bank Swallow Technical Advisory Committee 2013). The HCP/NCCP will achieve this objective through grassland management as described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

Achieving Objective L-2.3 will allow natural fluvial processes of rivers within the reserve system. This will allow actively eroding reaches of the stream system, which are necessary to sustain bank swallow nesting habitat (this habitat and locations of nest sites will be monitored during annual walk-through surveys along Cache Creek, to be conducted under the CCRMP).

6.3.4.11.2 How Achieving the Natural Community Objectives Will Benefit the Bank Swallow

Achieving Objective NC-G1.1 will result in protection of at least 4,500 acres of grassland in the Conservation Reserve Area. Only those grassland along the floodplains, however, are expected to provide foraging habitat for bank swallow.

6.3.4.11.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, and associated conservation measures, discussed above, are expected to provide for the conservation of the bank swallow. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape and natural community levels.

Goal BS1. Provide for the conservation of bank swallow in the Plan Area.

Objective BS1.1: Protect 50 acres of unprotected bank swallow habitat on a site occupied by this species in planning unit 7.

Rationale: Bank swallows depend on floodplains, which provide foraging habitat and actively erode to form steep cut-banks, the nesting habitat for nest cavity construction. Protecting channel banks from anthropogenic alterations (predominantly bank stabilization and rip-rapping) ensures that natural processes of bank habitat creation continue and bank swallow nesting habitat is maintained. Habitat formation and degradation is a natural process of stream bank cutting and channel erosion and deposition. Including channel banks that support suitable bank swallow nesting substrate and channel banks that are actively eroding within the reserve system will help ensure the continued availability of nesting

habitat to support the existing breeding population. Covered activities will avoid bank swallow nests. The protection of 50 acres of bank swallow habitat, including existing occupied colonies will mitigate the loss of up to 37 acres of bank swallow habitat resulting from CCRMP operations and maintenance activities, and further provide for conservation of the species in the Plan Area.

Objective BS1.2: Manage the 50 acres of protected bank swallow habitat (Objective BS1.1) to enhance bank swallow foraging habitat values by promoting open grass and forb vegetation and controlling invasive plant species.

Rationale: Achieving the objective will improve bank swallow foraging habitat on the Cache Creek floodplain. The Bank Swallow Technical Advisory Committee recommends management of floodplains supporting bank swallow to promote open grass and forb vegetation, including management actions that stimulate new plant growth and reduce invasive plant species to enhance production of insects that provide high-value food for bank swallows (Bank Swallow Technical Advisory Committee 2013). The HCP/NCCP may achieve this objective within the 50 acres of habitat protected under Objective BS1.1. The HCP/NCCP will achieve this objective as described in Conservation Measure 3, *Manage and Enhance the Reserve System.*

6.3.4.12 Tricolored Blackbird

6.3.4.12.1 How Achieving the Landscape Objectives Will Benefit the Tricolored Blackbird

Achieving Objective L-1.3 will result in a large, interconnected reserve system. This will minimize tricolored blackbird habitat fragmentation and provide for the maintenance of habitat areas large enough to support sustainable populations of tricolored blackbird, including the provision of nesting habitat adjacent to foraging habitat. Conservation Measure 1, *Establish Reserve System*, describes reserve design principles and criteria the Conservancy will apply to meet this objective.

6.3.4.12.2 How Achieving the Natural Community Objectives Will Benefit the Tricolored Blackbird

Achieving Objectives NC-CL1.1 and NC-CL1.2 will result in the protection of 17,162 acres of cultivated lands. Tricolored blackbirds forage in areas that provide abundant insects, including pastures, dry seasonal pools, agricultural fields such as alfalfa and rice, feedlots, and dairies. Protecting suitable foraging habitat will help ensure the availability of foraging habitat necessary to support wintering and breeding tricolored blackbirds using the Plan Area.

Achieving Objective NC-FEW1.1 will result in the protection of 500 acres of fresh emergent wetland, and Objective NC-FEW1.2 will result in the restoration of additional fresh emergent wetland to provide no net loss of this natural community. The HCP/NCCP will meet this objective as described in Conservation Measure 2, *Restore Natural Communities*.

6.3.4.12.3 Species-Specific Goals and Objectives

The landscape and natural community-level biological goals and objectives, and associated conservation measures, discussed above, are expected to provide for the conservation of the tricolored blackbird. The goal and objectives below address additional needs specific to this species that will not otherwise be met at the landscape level.

Goal TRBL1: Provide for the conservation of tricolored blackbird in the Plan Area.

Objective TRBL1.1: Within the 500 acres of protected fresh emergent wetland natural community (Objective NC-FEW1.1), site at least 200 acres in modeled tricolored blackbird nesting habitat.

Rationale: Tricolored blackbirds are well adapted to rapidly changing environments where the locations of secure nesting habitat and rich insect food supplies fluctuates (Orians 1961; Collier 1968; Payne 1969). One of the stressors for tricolored blackbirds is the loss of suitable breeding sites that provide the required combination of tall emergent vegetation above standing water connected to highly productive foraging areas with high densities of arthropods. Sites with tall emergent vegetation over standing water may become increasingly unviable for tricolored blackbirds, however, because they are often subject to severe predation by black-crowned night herons. Protecting a sufficient amount of habitat to support tricolored blackbird will ensure that nesting colonies and their surrounding foraging habitat will be protected across a wide portion of the Plan Area and across fluctuating foraging conditions from year to year. Covered activities will result in the loss of 86 acres of tricolored blackbird nesting habitat. The protection of 200 acres of suitable habitat for this species will mitigate this loss and further provide for the conservation of tricolored blackbird in the Plan Area.

Objective TRBL1.2: Enroll at least 4,000 acres of tricolored blackbird foraging habitat and 150 acres of tricolored blackbird nesting habitat on baseline public and easement lands into the reserve system as pre-permit reserve lands.

Rationale: By enrolling these baseline public and easement lands that support tricolored blackbird habitat into the reserve system as pre-permit reserve lands, they will be monitored and adaptively managed consistent with the Yolo HCP/NCCP conservation strategy to increase their conservation value by meeting the HCP/NCCP biological goals and objectives. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*.

Objective TRBL1.3: Maintain at least two tricolored blackbird nesting colonies in the reserve system and prioritize newly protected nesting habitat in additional occupied areas as they are found. To avoid intensive disturbances (e.g., heavy equipment operation associated with construction activities) or other activities that may cause nest abandonment or forced fledging, include a buffer zone of at least 250 feet around protected active breeding colonies. This minimum buffer may be reduced in areas with dense trees, buildings, or other habitat features between potential nearby disturbances and the protected nest colonies or where there is sufficient topographic relief to protect the colonies from excessive noise or visual disturbance, as determined by a qualified biologist, with concurrence from the wildlife agencies.

Rationale: Protecting and managing at least two tricolored blackbird nesting colonies will provide a substantial increase in tricolored blackbird colonies conservation in the reserve system, while covered activities are not supposed to result in loss of any tricolored blackbird colonies. The tricolored blackbird colonies targeted for including in the reserve system is the only known large, stable population in the Plan Area. Prioritizing newly protected nesting habitat in additional occupied areas where they are found will further conserve the species and allow the Conservancy to establish the reserve system to benefit the tricolored blackbird based on the best available information during HCP/NCCP implementation. The species shows annual site fidelity (Beedy and Hamilton 1997), which may be the result of adequate site availability or protected habitat resources. The HCP/NCCP will meet this objective as described in Conservation Measure 1, *Establish Reserve System*. Management and enhancement of the site will be necessary as described in Conservation Measure 3, *Manage and Enhance the Reserve System,* to ensure optimal conditions for breeding each year.

Objective TRBL1.4: Maintain at least 300 acres, consisting of at least 150-acre blocks, of tricolored blackbird foraging habitat in the reserve system without pesticides.

Rationale: Central Valley populations of tricolored blackbirds demonstrate chronic poor reproductive success relative to populations in other portions of the species' range, and this is correlated with low insect abundance. The low reproductive success in the Central Valley may be the result of the widespread use of neonicoinoid insecticides (Meese 2014). Providing foraging habitat free of insecticides for the tricolored blackbird will help reduce this potential threat on the species.

Objective TRBL1.5: Manage and enhance protected tricolored blackbird nesting habitat to maintain habitat value for this species.

Rationale: High-value breeding habitat for the tricolored blackbird is represented by suitable nesting substrate, such as cattail/bulrush emergent wetland, in close association with highly productive foraging areas that support abundant insect prey, such as grasslands, seasonal wetlands, pasture lands, alfalfa and other hay crops, and some croplands. Tricolored blackbirds are highly dependent on disturbance events to maintain suitable nesting conditions at nesting colony sites. Ideal nesting substrate is represented by young, actively growing stands of bulrush/cattail emergent vegetation. As stands age, they develop an abundance of dead and dying stems and leaves, and become less attractive to the species for nesting. Under natural conditions, periodic disturbance from flooding, alluvial scouring, wildfire, and other landscape altering events serve to rejuvenate aging stands. Since much of the Plan Area is isolated from the floodplain and unlikely to experience natural disturbances, active management is likely needed to sustain suitable nesting habitat characteristics for tricolored blackbirds (Kyle 2011). Therefore, mechanical habitat manipulation as described in Conservation Measure 3, Manage and Enhance the Reserve System may be used to sustain nesting substrate for tricolored blackbirds in areas targeted to conserve this species as deemed necessary depending on habitat conditions. Maintenance of cattails at Conaway Ranch is a high conservation priority for tricolored blackbirds.

6.4 Conservation Measures

This section describes the conservation actions that the Conservancy will implement or cause to have implemented to meet the biological goals and objectives described in Section 6.3, *Biological Goals and Objectives*. These conservation actions are grouped into three conservation measures, as follows:

- Conservation Measure 1, *Establish Reserve System.* This conservation measure provides conservation actions related to reserve design, land acquisition, and enrollment of baseline public and easement lands into the reserve system as pre-permit reserve lands to create the reserve system for the Yolo HCP/NCCP;
- Conservation Measure 2, *Restore Natural Communities*. This conservation measure provides conservation actions related to the restoration of three natural communities and their covered species habitat. The measure includes restoration siting and design measures, and restoration techniques; and
- Conservation Measure 3, *Manage and Enhance the Reserve System*. This conservation measure provides conservation actions related to managing and enhancing the reserve system consistent with reserve management plans.

The purpose of these conservation measures is to achieve the biological goals and objectives. Each conservation measure includes a table that describes how the conservation measure will meet or helps to meet the relevant biological goals and objectives.

6.4.1 Conservation Measure 1: Establish Reserve System

6.4.1.1 Introduction

This conservation measure describes how the Yolo HCP/NCCP reserve system will be established to benefit the covered species, natural communities, and ecosystem of the Plan Area. Reserve system assembly is described in terms of land acquisition procedures, land acquisition methods, and land selection criteria. These components, applied as described in this measure, will ensure the reserve system meets applicable biological goals and objectives related to the acreage, configuration, and quality of lands. The reserve system will include all lands the Conservancy places under a conservation easement or protects in fee title (with a conservation easement), in perpetuity, to meet the biological goals and objectives of the Yolo HCP/NCCP. The reserve system will also include baseline public and easement lands the Conservancy enrolls into the reserve system as pre-permit reserve lands, to be monitored and adaptively managed consistent with the Yolo HCP/NCCP conservation strategy. The Conservancy will assemble the reserve system over the term of the Yolo HCP/NCCP Permits on a schedule that is consistent with the stay-ahead provision described in Section 7.5.3, *Stay-Ahead Provision*, to meet the conservation commitments provided in Tables 6-2a, *Newly Protected Lands Commitments* and 6-2b, *Pre-permit Reserve Lands Commitments*.

- Section 6.4.1.2, *Purpose,* describes the purpose of this conservation measure, and provides a table indicating how the conservation measure will achieve each of the relevant biological goals and objectives;
- Section 6.4.1.3, *Land Protection Mechanisms,* describes the mechanisms by which the Conservancy will protect lands for the reserve system;

- Section 6.4.1.4, *Reserve System Assembly,* provides the broad reserve design assembly principles the Conservancy will apply when establishing the reserve system, and provides specific siting and reserve design criteria that the Conservancy will apply to land acquisitions;
- Section 6.4.1.5, *Land Acquisition Requirements,* describes specific reserve system design requirements for meeting the biological goals and objectives;
- Section 6.4.1.6, *Preacquisition Assessments,* describes the preacquisition surveys and evaluations the Conservancy will conduct to determine whether lands targeted for potential acquisition meet the reserve design assembly principles and siting and design criteria; and
- Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands,* describes the criteria that baseline public and easement lands must meet for the Conservancy to enroll them into the reserve system as pre-permit reserve lands.

6.4.1.2 Purpose

This conservation measure provides guidance for meeting the biological objectives presented in Section 6.3, *Biological Goals and Objectives* as they relate to establishment of the reserve system. Table 6-4 lists the biological goals and objectives relevant to this conservation measure, and describes how this conservation measure will contribute toward each relevant biological objective.

Table 6-4. Biological Goals and Objectives Associated with Conservation Measure 1

Biological Goal or Objective	How Conservation Measure 1 (CM1) Helps to Achieve a Biological Objective
Landscape-level Biological Goals and Objectives	
Objective L-1.1: Conserve 32,406 acres of natural communities and covered species habitats in the Conservation Reserve Area, including 24,406 acres of newly protected lands and 8,000 acres of additional pre-permit reserve lands enrolled into the reserve system. Restore or create 956 acres of wetlands and riparian natural community. On a case-by-case basis, lands outside the Conservation Reserve Area may be enrolled if they benefit the covered species and would be subject to review and approval by the wildlife agencies.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Objective L-1.2: Include a variety of environmental gradients (e.g., hydrology, elevation, soils, slope, and aspect) within and across a diversity of protected and restored natural communities within the Plan Area.	CM1 includes reserve design concepts to achieve this objective (Section 6.4.1.4, *Reserve System Assembly*).
Objective L-1.3: Increase the size and connectivity of the network of protected lands in the Plan Area by acquiring newly protected lands for the reserve system adjacent to and between baseline protected lands.	CM1 includes reserve design concepts to achieve this objective (Section 6.4.1.4, *Reserve System Assembly*).
Objective L-1.4: Prioritize land acquisition and natural community restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation, where it can be sustained by natural flows, within the Cache Creek floodplain and extending the length of Cache Creek from the west boundary of planning unit 7 to the Cache Creek Settling Basin exclusive of existing and potential aggregate mining areas (Figure 6-3, *Ecological Corridors*).	CM1 includes reserve design requirements to achieve this objective (Sections 6.4.1.4, *Reserve System Assembly,* and 6.4.1.5, *Land Acquisition Requirements*).
Objective L-1.5: Prioritize land acquisition and restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation within the Putah Creek floodplain extending the length of Putah Creek in planning units 8 and 9 (Figure 6-3, *Ecological Corridors*).	CM1 includes reserve design requirements to achieve this objective (Section 6.4.1.5, *Land Acquisition Requirements*). Although the Conservancy or its partners may acquire or restore riparian on either side of Putah Creek, within the Plan Area, to meet this objective, acquisition or restoration in the extended Plan Area (in Solano County) is not required for meeting this objective.
Objective L-1.6: Prioritize land acquisition and restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation along the Sacramento River and Yolo Bypass in planning units 12, 14, 15, and 21 (Figure 6-3, *Ecological Corridors*).	CM1 includes reserve design requirements to achieve this objective (Section 6.4.1.5, *Land Acquisition Requirements*).

Biological Goal or Objective	How Conservation Measure 1 (CM1) Helps to Achieve a Biological Objective
Natural Community Level Biological Goals and Objectives	
Cultivated Land Seminatural Community	
Goal NC-CL1: Cultivated lands that support habitat for covered and other native wildlife species.	
Objective NC-CL1.1: Protect at least 14,362 acres of non-rice that provides habitat value for covered and other native species. Field borders mapped as *Semiagricultural/Incidental to Agriculture* that provide habitat for covered species will count towards this requirement. Some of these lands may be substituted for grassland habitat upon approval by the wildlife agencies.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Objective NC-CL1.2: Protect at least 2,800 acres of unprotected flooded rice that provides habitat value for covered and other native species. If these fields cannot be flooded due to drought or market conditions, ensure water remains in conveyance channels. This acreage can be substituted for wetlands that provide habitat for the covered species.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Objective NC-CL1.3: Enroll at least 5,424 acres of cultivated lands natural community on baseline public and easement lands into the reserve system as pre-permit reserve lands.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(b), *Pre-permit Reserve Lands Commitments,* through baseline public and easement lands enrollment as described in Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands*.
Grassland Natural Community	
Goal NC-G1: Large, contiguous patches of grassland, and smaller patches within a mosaic of other natural community types, to sustain and enhance the distribution and abundance of associated covered and other native species in the Conservation Reserve Area.	
Objective NC-G1.1: Protect 4,430 acres of unprotected grassland, including at least 3,000 acres in the Dunnigan Hills planning unit (PU 5).	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Valley Foothill Riparian Natural Community	
Goal NC-VFR1: Functional valley foothill riparian natural community that benefits covered species and promotes native biodiversity in the Plan Area.	
Objective NC-VFR1.1: Protect, manage, and enhance 1,600 acres of unprotected valley foothill riparian distributed primarily in planning units 7 and 9.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.

Biological Goal or Objective	How Conservation Measure 1 (CM1) Helps to Achieve a Biological Objective
Alkali Prairie Natural Community	
Goal NC-AP1: A reserve system that protects the habitat values of the remaining alkali prairie natural community in the Plan Area.	
Objective NC-AP1.1: Protect 35 acres of alkali prairie natural community on the Woodland Regional Park prior to any loss of this natural community as a result of covered activities (Figure 6-4, *Alkali Prairie Natural Community and Baseline Public and Easement Lands*).	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*. The entire Woodland Regional Park site will be protected in a conservation easement, with allowances for trails and interpretive facilities, placement of which will be subject to wildlife agency approval.
Fresh Emergent Wetland Natural Community	
Goal NC-FEW1: Functional fresh emergent wetland natural community that benefits covered species and promotes native biodiversity in the Plan Area.	
Objective NC-FEW1.1: Protect and manage 500 acres of fresh emergent wetland.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Lacustrine and Riverine Natural Community	
Goal NC-LR1: Functional lacustrine and riverine natural community that benefits covered species and promotes native biodiversity in the Plan Area.	
Objective NC-LR1.1: Protect, manage, and enhance 600 acres of lacustrine and riverine natural community providing habitat for covered and other native species.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Covered Species Biological Goals and Objectives	
Valley Elderberry Longhorn Beetle	
Goal VELB1: Provide for the conservation of elderberry longhorn beetle in the Plan Area.	
Objective VELB1.1: Within the 1,600 acres of protected valley foothill riparian natural community (Objective NC-VFR1.2), prioritize protection of populations of valley elderberry longhorn beetle along Lower Cache Creek, Lower Putah Creek, and Sacramento River and adjacent lands to provide for population expansion consistent with the occupancy commitment for valley elderberry longhorn beetle in Table 6-2(c).	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.

Biological Goal or Objective	How Conservation Measure 1 (CM1) Helps to Achieve a Biological Objective
California Tiger Salamander	
Goal CTS1: Provide for the conservation of California tiger salamander in the Plan Area.	
Objective CTS1.1: Within the 3,000 acres of protected grassland in the Dunnigan Hills planning unit (Objective NC-G1.1), include at least 2,000 acres of modeled upland habitat within 1.3 miles of aquatic habitat for California tiger salamander and prioritize protection in designated critical habitat.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*. The configuration of these lands will be as described in Section 6.4.1.8.4, *California Tiger Salamander.*
Objective CTS1.2: Within the 600 acres of protected lacustrine and riverine natural community (Objective NC-LR1.1), protect at least 36 acres of California tiger salamander aquatic habitat. Restore or create 36 acres of aquatic habitat. Within the protected and restored aquatic habitat, include at least five California tiger salamander breeding pools that are each found to support all life stages of the salamander through all water year types, consistent with the occupancy commitment for this species in Table 6-2(c).	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*. The configuration of these lands will be as described in Section 6.4.1.8.4, *California Tiger Salamander.*
Objective CTS1.3: If California tiger salamander is present or assumed to be present at the site of a covered activity, the covered activity will not remove aquatic habitat until at least four new occupied breeding pools are discovered or established in the Dunnigan Hills area and protected in the Dunnigan Hills area, with sufficient surrounding uplands to support the individuals using the protected aquatic habitat. After the four new breeding pools are protected and with concurrence of USFWS and CDFW, up to three occupied breeding pools discovered may be removed.	CM1 will meet this objective by focusing acquisition on lands with California tiger salamander occurrences.
Giant Garter Snake	
Goal GGS1: Provide for the conservation of giant garter snake in the Plan Area, including the Willow Slough/Yolo Bypass subpopulation and a segment of the Colusa Basin subpopulation, and connectivity between the two subpopulations.	
Objective GGS1.1: Protect and manage the 2,800 acres of protected rice land (Objective NC-CL1.2) in modeled giant garter snake habitat. Suitable emergent marsh can be substituted for rice land.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*. The configuration of these lands will be as described in Section 6.4.1.8.3, *Giant Garter Snake*.
Objective GGS1.2: Protect and manage 1,160 acres of upland natural communities (Objective L-1.1) to provide active season upland movement habitat and at least 2,315 acres to provide overwintering habitat for giant garter snake.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*. The configuration of these lands will be as described in Section 6.4.1.8.3, *Giant Garter Snake*.

Biological Goal or Objective	How Conservation Measure 1 (CM1) Helps to Achieve a Biological Objective
Objective GGS1.3: Protect, restore, and manage the 500 acres of fresh emergent wetland natural community (Objective NC-FEW1.1), at least 420 acres of the lacustrine/riverine natural community (Objective NC-LR.11), the restored fresh emergent wetland (Objective NC-FEW1.2), and restored lacustrine and riverine natural community (Objective NC-LR1.2) to conserve the giant garter snake. Ensure at least 80% of the aquatic habitat is perennial, and that the remainder provides aquatic habitat for the giant garter snake during the active season at least through July of each summer.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*. The configuration of these lands will be as described in Section 6.4.1.8.3, *Giant Garter Snake*.
Objective GGS1.4: In addition to the newly protected and restored giant garter snake habitat (Objectives GGS1.1, GGS1.2, and GGS1.3), enroll at least 2,910 acres of giant garter snake habitat on eligible baseline public and easement lands into the reserve system as pre-permit reserve lands.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(b), *Pre-permit Reserve Lands Commitments,* through Public and Easement Lands enrollment as described in Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands*.
Swainson's Hawk	
Goal SH1: Provide for the conservation of Swainson's hawk in the Plan Area.	
Objective SH1.1: Within the 14,362 acres of protected non-rice cultivated land natural community (Objective CL1.1), maintain crop types that support Swainson's hawk foraging habitat.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3. The configuration of these lands will be as described in Section 6.4.1.8.2, *Swainson's Hawk*. CM3, *Manage and Enhance Natural Communities*, describes crop restrictions.
Objective SH1.2: Protect and manage the 4,430 acres of grassland natural community (Objectives NC-GR1.1) to ensure that it provides modeled Swainson's hawk foraging habitat.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*. The configuration of these lands will be as described in Section 6.4.1.8.2,
Objective SH1.3: Protect and maintain at least 20 unprotected Swainson's hawk nest trees (active within the last five years at the time tree is protected) within the reserve system, consistent with the occupancy requirements for this species in Table 5-2(c).	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Objective SH1.4: In addition to newly protected unprotected lands (Objectives SH1.1, SH1.2, and SH1.3), enroll at least 4,580 acres of baseline public and easement lands into the reserve system as pre-permit reserve lands foraging habitat.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(b), *Pre-permit Reserve Lands Commitments,* through baseline public and easement lands enrollment as described in Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands*.

Biological Goal or Objective	How Conservation Measure 1 (CM1) Helps to Achieve a Biological Objective
Western Yellow-Billed Cuckoo	
Goal WYBC1: Provide sufficient western yellow-billed cuckoo habitat to provide opportunities for migration and breeding in the Plan Area.	
Objective WYBC1.1: Of the 1,600 acres of protected valley-foothill riparian natural community (Objectives NC-VFR1.1), site as least 500 acres in modeled yellow-billed cuckoo habitat, and design at least 60 acres of the restored valley foothill riparian (Objective NC-VFR1.2) to provide suitable habitat for this species.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Western Burrowing Owl	
Goal WBO1: Provide for the conservation of western burrowing owl in the Plan Area.	
Objective WBO1.1: Of the 4,430 acres of protected grassland natural community (Objective NC-G1.1), site at least 3,000 acres in modeled western burrowing owl habitat.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Objective WBO1.2: Of the 14,362 acres of protected non-rice cultivated lands (Objective NC-CL1.1), provide at least 2,500 acres of western burrowing owl habitat.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Objective WBO1.3: Maintain two active nesting sites in the reserve system for each nesting pair displaced by covered activities and maintain one active nesting site or single owl site in the reserve system for each non-breeding single owl displaced by covered activities.	Section 6.4.1.8.1, *Western Burrowing Owl,* describes how lands will be prioritized for acquisition to meet this objective. The STAC will evaluate and prioritize lands subject to acquisition. Land acquisitions are subject to wildlife agency approval as described in Section 7.5.2, *Acquisition Process.*
Objective WBO1.4: Within the habitat protected under Objectives WBO1.1 and WBO1.2, prioritize acquisition. The first priority is to identify and preserve occupied habitats in the Yolo Bypass and adjacent lands (southeastern panhandle). This is the portion of the Plan Area that supports the greatest potential for long-term sustainability of breeding colonies. The second priority is to identify and preserve habitat adjacent to occupied sites that have enhancement potential. The third priority will focus on modeled habitat in the Plan Area with historic records of burrowing owl occupancy and lands that are capable of supporting nesting activity through management and enhancement actions. Protect sufficient habitat surrounding occupied and potentially occupied burrows to sustain the breeding pairs, consistent with *Staff Report on Burrowing Owl Mitigation* (CDFG 2012)	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*, and Section 6.4.1.8.1, *Western Burrowing Owl.* The STAC will evaluate and prioritize lands subject to acquisition. Land acquisitions are subject to wildlife agency approval as described in Section 7.5.2, *Acquisition Process.*

Biological Goal or Objective	How Conservation Measure 1 (CM1) Helps to Achieve a Biological Objective
Least Bell's Vireo	
Goal LBV1. Provide sufficient habitat area to support least Bell's vireo that migrate through the Plan Area and to support potential future reestablishment of nesting populations in the Plan Area.	
Objective LBV1.1: Of the 1,600 acres of newly protected valley foothill riparian (Objective NC-VFR1.1), site at least 600 acres in modeled least Bell's vireo habitat, and design the restored valley foothill riparian (Objective NC-VFR1.2) to provide suitable habitat for this species.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Bank Swallow	
Goal BS1. Provide for the conservation of bank swallow in the Plan Area.	
Objective BS1.1: Protect 50 acres of unprotected modeled bank swallow habitat on a site occupied by this species in planning unit 7 or along the Sacramento River.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Tricolored Blackbird	
Goal TRBL1: Provide for the conservation of tricolored blackbird in the Plan Area.	
Objective TRBL1.1: Within the 500 acres of protected fresh emergent wetland natural community (Objective NC-FEW1.1), site at least 200 acres in modeled tricolored blackbird nesting habitat.	CM1 will achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3, *Land Protection Mechanisms*.
Objective TRBL1.2: Enroll at least 4,000 acres of tricolored blackbird foraging habitat and 150 acres of tricolored blackbird nesting habitat on baseline public and easement lands into the reserve system as pre-permit reserve lands.	CM1 will achieve the protection component of this objective by meeting the conservation commitments provided in Table 6-2(b), *Pre-permit Reserve Lands Commitments,* through baseline public and easement lands enrollment as described in Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands*.
Objective TRBL1.3: Maintain at least two tricolored blackbird nesting colonies in the reserve system and prioritize newly protected nesting habitat in additional occupied areas as they are found. To avoid intensive disturbances (e.g., heavy equipment operation associated with construction activities) or other activities that may cause nest abandonment or forced fledging, include a buffer zone of at least 250 feet around protected active breeding colonies. This minimum buffer may be reduced in areas with dense trees, buildings, or other habitat features between potential nearby disturbances and the protected nest colonies or where there is sufficient topographic relief to protect the colonies from excessive noise or visual disturbance, as determined by a qualified biologist, with concurrence from the wildlife agencies.	CM1 may achieve this objective by meeting the conservation commitments provided in Table 6-2(a), *Newly Protected Lands Commitments,* through land protection mechanisms described in Section 6.4.1.3. Alternatively, CM1 may achieve this objective by enrolling baseline public and easement lands supporting a tricolored blackbird nesting colony into the reserve system as pre-permit reserve lands, as described in Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands*. The 250-foot buffer will be maintained as described in the objective, during the nesting season.

The NCCPA requires that a system of habitat reserves or equivalent conservation be described in an NCCP:

> The plan provides for the protection of habitat, natural communities, and species diversity on a landscape or ecosystem level through the creation and long-term management of habitat reserves or other measures that provide equivalent conservation of covered species appropriate for land, aquatic, and marine habitats within the Plan Area. [Section 2820(3)]

The purpose of this conservation measure is to define the process that Conservancy will apply to build the Yolo HCP/NCCP reserve system consistent with NCCPA requirements.

6.4.1.3 Land Protection Mechanisms

Lands may be acquired for the purpose of achieving the conservation acreages provided in Table 6-2(a), *Newly Protected Lands Commitments,* through the following mechanisms:

- Purchase in fee title by the Conservancy or a Permittee and put under a conservation easement consistent with the requirements in this Plan (see Section 7.5.5, *Conservation Easements*);
- Acquisition of conservation easements on private lands by the Conservancy, a Permittee, or a state or federal agency that meets Yolo HCP/NCCP habitat protection requirements (see Section 7.5.5, *Conservation Easements*);
- Conservation easement and/or fee title acquisition by conservation organizations (e.g., land conservancies and land trusts) that protect and manage lands in conformance with Yolo HCP/NCCP requirements; and
- Purchase of mitigation credits from private mitigation or conservation banks approved by USFWS and CDFW, within the Plan Area, and meeting the protection and management requirements of the Yolo HCP/NCCP.

The Conservancy may also use mitigation receiving sites for assembling the reserve system. A mitigation receiving site is property encumbered by a conservation easement for the purpose of providing mitigation credits to offset the impacts of future development. Section 7.5.8, *Land Dedication In Lieu of HCP/NCCP Fee*, describes how the Conservancy will use these sites during Yolo HCP/NCCP implementation.

The Conservancy is expected to use conservation easements[10] more frequently than other acquisition methods to protect the working landscape of agricultural lands and natural lands in the Plan Area. In general, lands the Conservancy acquires through fee title will be lands intended for substantial changes in land use for habitat improvement, such as habitat restoration, or that have significant habitat value and purchase of an easement is not possible. Use of conservation easements is the preferred habitat protection method for cultivated lands on which the ongoing agricultural use supports achieving the Yolo HCP/NCCP biological goals and objectives.

[10] See Appendix D, *Glossary*, for the definition of the term "conservation easement" as it is used in this document and Section 7.5.5.3, *Conservation Easement Minimum Requirements*, for a description of the minimum requirements for conservation easements under the NHP.

Procedures and requirements for conservation easements are described in Section 7.5.5, *Conservation Easements*. Sections 7.5.9, *Use of Mitigation Banks,* and 7.5.8*, Land Dedication In Lieu of HCP/NCCP Fee*, describe how and when the Conservancy, other Permittee, or project proponent may use a mitigation bank or mitigation receiving site in lieu of acquiring land or conservation easements. The Conservancy may acquire reserve system lands in partnership with other government entities or conservation organizations, or through grants of land from participating or other entities where such lands will serve to achieve the Yolo HCP/NCCP biological goals and objectives.

6.4.1.4 Reserve System Assembly

The Conservancy and its implementation partners will assemble the Yolo HCP/NCCP reserve system during the permit term. Table 6-2(a*), Newly Protected Lands Commitments,* provides the quantitative requirements for each natural community to establish the reserve system. The schedule for this assembly is based on the stay-ahead provision described in Section 7.5.3, *Stay-Ahead Provision.*

The NCCPA describes the following findings related to the assembly of reserve system lands that must be made by CDFW before approving an NCCP:

- The plan provides for the protection of habitat, natural communities, and species diversity on a landscape or ecosystem level through the creation and long-term management of habitat reserves or other measures that provide equivalent conservation of covered species appropriate for land, aquatic, and marine habitats within the Plan Area;
- The development of reserve systems and conservation measures in the Plan Area provides all of the following:
    a. Conserving, restoring, and managing representative natural and seminatural landscapes to maintain the ecological integrity of large habitat blocks, ecosystem function, and biological diversity;
    b. Establishing one or more reserves or other measures that provide equivalent conservation of covered species within the Plan Area and linkages between them and adjacent habitat areas outside of the Plan Area;
    c. Protecting and maintaining habitat areas that are large enough to support sustainable populations of covered species;
    d. Incorporating a range of environmental gradients (such as slope, elevation, aspect, and coastal or inland characteristics) and promoting high habitat diversity to provide for shifting species distributions due to changed circumstances; and
    e. Sustaining the effective movement and interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the habitat areas within the Plan Area.[11]

    The Yolo HCP/NCCP reserve system assembly principles described below are consistent with and designed to ensure the assembled reserve system achieves these required NCCPA criteria.

[11] California Fish and Game Code § 2820(a).

6.4.1.4.1 Reserve System Design Criteria

The Conservancy will use the following reserve system design criteria to guide decisions regarding the acquisition of reserve lands, along with the STAC evaluation criteria provided in Appendix F. Over the course of implementing the Yolo HCP/NCCP, the Conservancy may revise these assembly priority principles and the STAC evaluation criteria, consistent with new scientific information and subject to review and approval of USFWS and CDFW, to improve their effectiveness in achieving the Yolo HCP/NCCP biological goals and objectives.

Contribution to Biological Goals and Objectives

- Select lands that contribute to the biological goals and objectives described in Section 6.3, *Biological Goals and Objectives*; and
- Prioritize lands with ecological functions that will serve to achieve multiple biological objectives (e.g., lands that support habitat for multiple covered species).

Presence of Occupied or Suitable Habitat

- Prioritize lands known to be occupied by covered species or that support suitable habitat that is contiguous with occupied habitat.

Information on known occurrences is particularly important in selecting reserve system lands for species whose occupied habitats are not easily predicted by existing habitat suitability models, such as the valley elderberry longhorn beetle, western burrowing owl, and California tiger salamander. Lands currently known to be occupied by covered species are described in Appendix A, *Covered Species Accounts*, but the Conservancy will use the most current CNDDB database and other applicable data, as well as pre-acquisition assessments (Section 6.4.1.6, *Pre-Acquisition Assessments*) to identify lands occupied by covered species. Over the term of the Yolo HCP/NCCP, new information on species occurrences will guide land conservation decisions. Land acquisitions are subject to wildlife agency approval as described in Section 7.5.2, *Acquisition Process*.

Ecological Gradients

- Design reserves to include a range of contiguous ecological gradients such as such as slope, elevation, or aspect; and
- Design reserves to include high habitat diversity.

NCCPs are required to incorporate a range of environmental gradients and high habitat diversity to provide for shifting species distributions due to changed circumstances (California Fish and Game Code 2820(a)(4)(D)). The Conservancy will assemble the reserve system to complement existing public and easement lands in the Plan Area and lands that have been prioritized for acquisition through the Local Conservation Plan to collectively encompass continuous connections across elevation ranges and capture the diversity of natural communities and habitats that result from differences in rainfall and temperature as well as the effects of topographic relief, soil conditions, and other factors. Ensuring a broad array of elevation ranges within the reserve system is more likely to support future upslope migration of communities and species in response to climate change.

Protection of natural habitat diversity contributes to maintaining the abundance and distribution of associated covered and other native species. Actively selecting reserve system lands that protect, or

contribute to the protection of a high diversity of natural communities, habitats, vegetation types, and species confers the conservation benefit of a diverse mosaic of physical and vegetative structure and composition that protects biodiversity. For example, the presence of riparian or lacustrine and riverine natural communities (either existing or sites suitable for restoration or creation), which enhances the value of adjacent uplands for many species and contributes to overall habitat diversity, will be given high consideration in selecting reserve system lands.

Connectivity

- Provide connectivity between natural communities inside and outside the Plan Area. Figure 6-3, *Ecological Corridors,* shows key connections for the Plan Area, including Essential Connectivity Areas identified as a component of the California Essential Connectivity Project (Spencer et al. 2010);
- Maximize connections between HCP/NCCP reserve system lands and with other baseline public and easement lands (particularly Categories 1 and 2) in and adjacent to the Plan Area;
- Provide connectivity between habitat types that support different life history functions for covered species (e.g., acquire Swainson's hawk riparian nesting habitat that is located within the foraging flight distance of Swainson's hawk to foraging habitat areas); and
- Prioritize acquisition of lands within the dispersal distance of occupied covered species habitat.

Size

- Design reserves of sufficient size to ensure the intended conservation benefits for the target covered species,
- Design reserves of sufficient size and configuration to ensure that they can be effectively managed given site constraints, and
- Where feasible, build on baseline protected lands and management systems to increase management efficiency, connectivity, and patch size.

Protecting land in large units contributes to achieving a variety of conservation goals and objectives. Larger land areas provide for species with more extensive home range sizes (tens to hundreds of acres, depending on the species), such as large mammals and raptors, and also tend to protect a diverse array of species habitats at varied elevations. Selection of larger land areas also provides more interior land area that protects conservation resources from potential detrimental effects of adjacent land uses, minimizing potential conflicts between conservation management activities and other uses on adjacent lands. The Conservancy will use minimum covered species habitat patch size requirements for covered species listed in Table 6-5, *Covered Species Habitat Acquisition Patch Size, Configuration, and Habitat Connectivity Considerations*, to guide acquisition of reserve system lands. Adjacent protected lands will count toward the total patch size for meeting minimum patch sizes.

Natural communities within the Conservation Reserve Area are either remnants of natural communities that existed before large-scale agricultural conversion altered the landscape, or areas that were restored back to natural communities. Protecting the largest examples of these remnant habitats is important to maximize species diversity and the population sizes of species. Larger land units in this landscape unit may retain more varied ecological conditions and associated diversity, including enhanced ecological functions such as pollination, than smaller areas. Large units are often more buffered from adjacent land use disturbance (for example, developed uses) and can be managed more efficiently and effectively. Notwithstanding the importance of protecting larger units, many key

natural communities and habitats in the Conservation Reserve Area consist mainly of smaller units, such as remnant alkali prairie natural community that supports palmate-bracted bird's beak and valley oak woodland that supports Swainson's hawk and valley elderberry longhorn beetle.

Table 6-5. Covered Species Habitat Acquisition Patch Size, Configuration, and Habitat Connectivity Considerations

Covered Species[a]	Minimum Patch Size/Configuration Considerations[b]	Habitat Connectivity Considerations[c]
Invertebrates		
Valley elderberry longhorn beetle	Minimum habitat patch size for a beetle is a single shrub. USFWS guidelines for replacing habitat for a single removed elderberry shrub require 1,800 square feet of area for restoration (USFWS 1999).	Focus preservation on areas that provide a gradient of habitat conditions that support elderberry extending from woody riparian to adjacent valley oak woodland.
Amphibians		
California tiger salamander	At the end of the 50-year permit term, California tiger salamander protected habitat patches will be at least 1,000 acres in size with multiple breeding ponds, as recommended by Penrod et al. (2013) to support a viable California tiger salamander population. A protected habitat patch will include lands enrolled into the HCP/NCCP, and may also include other lands protected and managed for California tiger salamander with wildlife agency-approved management plans and perpetual conservation easements that include the wildlife agencies as third-party beneficiaries. Configuration should follow geographical features (i.e., draws) that are more likely to be used as movement corridors.	Habitat lands must include both breeding ponds and suitable and adjacent upland grassland habitat and should be contiguous with other protected lands to allow for dispersal and other possible movement corridors.
Reptiles		
Western pond turtle	Minimum patch size is 2.5 acres. Average home range size for adult male is 2.5 acres (Bury 1972). Average nesting distance from water is approximately 100 feet and average distance to upland refugia is 164 feet (Rathbun et al. 2002). Minimum patch size should be 2.5 acres of suitable aquatic habitat (perennial streams, large water conveyance canals, or large ponds) with a minimum 200-foot buffer of upland grassland or other uncultivated habitats around the perimeter.	Reserve system lands along stream courses should have sustainable permanent water flows and be free of significant upstream disturbances including toxins, streamside development, and other sources of potential upstream habitat degradation. Pond or lake reserve system lands should be contiguous with open grassland or other natural land habitats to facilitate dispersal.

Covered Species[a]	Minimum Patch Size/Configuration Considerations[b]	Habitat Connectivity Considerations[c]
Giant garter snake	Minimum patch size is 320 acres. Wylie et al. (2002) reported home ranges ranging from 17 to 234 acres in Colusa County. E. Hansen in: ICF Jones & Stokes (2008) reports annual movements of between 0.42 to 0.78 mile along canals in the Natomas Basin. For this species, home range size is less relevant than connectivity of suitable aquatic habitat, which is essential. Minimum patch size should be 320 acres (using a movement distance of 0.5 mile (0.5 mile squared = 320 acres)) and should include suitable linear aquatic habitat with connectivity throughout the larger region and adjacent suitable habitat, particularly rice fields. Note that suitable linear aquatic habitat with connectivity is not present on rice farms west of Plainfield Ridge.	Connectivity of aquatic habitats (e.g., streams or canals) is essential to sustaining populations. Suitable upland over-wintering habitat is required immediately adjacent to aquatic habitat (banks, levees, edges, or open uncultivated lands). Adjacency with rice lands or wetlands is needed.
Birds		
Swainson's hawk	A contiguous area of 830 acres represents the smallest home range size of recorded home ranges in the Sacramento Valley (Estep 1989); however, Swainson's hawks will use, for foraging, patches that are smaller in size within the agricultural matrix as long as they are not permanently fragmented by unsuitable land uses. A minimum patch size of 80 acres (unless contiguous with other Swainson's hawk preserves) of suitable habitat for foraging is recommended to account for rotational crop patterns within preserves. Swainson's hawks will use a variety of nesting conditions from dense riparian forest to a single isolated tree. Therefore, there is no minimum patch size recommended for Swainson's hawk nesting habitat.	Give priority to foraging habitat areas that are within one mile of nesting habitat. This roughly corresponds to the minimum home range size (830 acres); however, Swainson's hawks regularly travel to more distant foraging habitats depending on seasonal changes in prey availability and accessibility (Estep 1989). Reserve system lands should be contiguous with other suitable agricultural lands at a minimum of 2,760 acres, the mean home range size of Swainson's hawks in the Sacramento Valley (Estep 1989). Focus on preserving lands that include potential nesting habitat (e.g., woodland patches, riparian, tree rows, isolated trees) or have potential for enhancement of both nesting and foraging values.
White-tailed kite	Minimum patch size of 80 acres, (unless contiguous with other preserves) of suitable foraging habitat (seasonally or annually rotated) cropland, hay crops, irrigated or dry pastures, seasonal wetlands, and grassland. This roughly corresponds to average territory size (Dunk 1995).	Prioritize preservation of foraging habitat that includes or is adjacent to riparian nesting habitat, followed by areas located within 0.5 mile of nesting habitat. Reserve system lands should be contiguous with other suitable agricultural lands, grassland, or seasonal wetland habitats at a minimum of 300 acres to correspond with larger territory sizes (Henry 1983) and to accommodate multiple pairs.

Covered Species[a]	Minimum Patch Size/Configuration Considerations[b]	Habitat Connectivity Considerations[c]
Western yellow-billed cuckoo	Minimum patch size is at least 25 acres (Gaines 1974) of mature cottonwood/willow riparian forest in a linear configuration along drainages, unless contiguous with other suitable preserved riparian forest. Habitat patches should be at least 330 feet wide and at least 990 feet long (Gaines 1974), with preservation priority given to patches greater than 50 acres and with widths over 660 feet (defined as suitable habitat by Laymon and Halterman [1989]).	Protected habitat should be located within drainages that generally provide continuous canopy cover along its length to promote movement. Does not require continuous breeding habitat but at least cover and roosting habitat.
Western burrowing owl	No minimum patch size. See Section 6.4.1.8.1, *Western Burrowing Owl.*	Give priority to occupied habitats and grassland habitats that support healthy ground squirrel populations. Protect burrowing owl habitats adjacent to existing habitat areas.
Least Bell's vireo	Minimum patch size is 1.5 acres of dense and structurally diverse riparian forest unless contiguous with other suitable preserved riparian habitat. This corresponds with the average territory size of least Bell's vireo, which is between 1.5 and 2.5 acres (USFWS 1998).	Give priority to riparian habitats with significant willow (*Salix* sp.) or low strata dense herbaceous component. Protected sites should be contiguous with other protected riparian habitats and occur within a grassland/wetland or agricultural landscape and not near developed areas.
Bank swallow	At least 17 feet of open, vertical, and erodible channel bank supporting soils that provide suitable nesting substrate (Garrison 1989).	Focus preservation within channel reaches that currently or historically supported nesting colonies and that continue to support suitable habitat condition to provide for the ongoing replacement of existing nesting habitat that is lost as channels meander and erode.
Tricolored blackbird	Patches of emergent wetland including tule/cattail or riparian scrub (e.g., blackberry brambles) of at least 0.5 acre in size (Beedy 1989).	Protect habitat areas within 75 feet of a water source and 0.5 mile of wetland, irrigated pasture, alfalfa, or other land cover types that produce large numbers of insects.

Notes:

a. Palmate-bracted bird's beak is not included in this table because its mapped habitat is extremely limited and highly fragmented within the Plan Area, and all mapped habitat except that to be lost due to covered activities will be protected under the HCP/NCCP. Consequently, patch size, configuration, and habitat connectivity considerations do not apply to this species.

b. Minimum patch size/shape that should be preserved to provide meaningful habitat value for the species.

c. Connectivity requirements such as proximity to other patches of species habitat, proximity to other patches of specific land cover types, movement corridors.

Value

- Protect the highest-value natural communities and covered species habitats available, and
- Include lands that support smaller patches of remnant habitats important for maintaining the abundance and distribution of dependent native species (e.g., patches of natural lands on cultivated land properties).

Efforts to conserve lands in the Plan Area will emphasize those areas with greatest overall value to covered species and natural communities, with priority given to occupied habitat. High-value lands are those with the highest densities and productivities for covered and other native species, and are therefore most likely to contribute to long-term conservation. High-value lands include lands with (1) the highest current habitat value for covered species and/or (2) the highest potential for enhancement of habitat values for the covered and other native species associated with the natural communities.

The species habitat models (Appendix A, *Covered Species Accounts*) identify lands with highest values for covered species, based on known species occupancy and modeled distribution of each species' habitat. The Conservancy will use these models, along with other tools the Conservancy may develop, to help identify potential reserve system lands during HCP/NCCP implementation. The Conservancy will, however, base selection of reserve system lands for acquisition on site-specific ecological evaluations (Section 6.4.1.6, *Pre-Acquisition Assessments*) to ensure that the lands under consideration are suitable for achieving the biological goals and objectives. Areas the Conservancy identifies as priority reserve system lands will include those that support the rarest covered species, combined occurrences of covered species, or larger areas of relatively high-value habitat.

Hydrology

Select lands that support the most reliable hydrology for maintaining protected natural communities and habitats into the future (i.e., lands that protect wetlands, ponds, and streams and their supporting watersheds). For cultivated lands, especially rice, select lands that are most likely to have a sustainable irrigation supply and that have secured water rights.

Surrounding Land Use

Select lands with surrounding land uses that are compatible with the reserve. For example, a reserve to protect Swainson's hawk nesting habitat should not be placed adjacent to a wind farm.

6.4.1.4.2 Reserve System Prioritization Guidelines

The Conservancy developed the following reserve system prioritization guidelines to most effectively meet conservation objectives and the habitat needs of all covered species. The Conservancy intends to use these guidelines to guide the process of landowner participation in the reserve system by prioritizing the acquisition process based on habitat quality, connectivity, location, acreage objectives, and other site-specific and landscape attributes to maximize value, enhance management, and facilitate active communication and cooperation with the agricultural community within the Plan Area to meet HCP/NCCP goals and objectives. The Conservancy intends for these guidelines to be flexible through time to provide for a changing landscape and so that the Conservancy and wildlife agencies can explore opportunities for acquisition that may appear to be inconsistent with the priority criteria but that otherwise meet conservation objectives. All land acquisition is subject to wildlife agency approval as described in Section 7.5.2, *Acquisition Process*. To achieve benefits for the covered species, acquisitions will be limited primarily to the Conservation Reserve Area shown in Figure 6-5, *Conservation Reserve Area and Covered Species Occurrences*. To ensure connectivity of the reserve system, the Conservancy will prioritize acquisition in areas shown in Figure 6-6, *Priority Acquisition Areas,* unless new information indicates that an alternative design would better meet the biological goals and objectives (subject to wildlife agency approval). The STAC will use Figure 6-6 and the guidelines below to guide reserve land acquisition decisions but will evaluate individual lands with on-site visits ("on-the-ground"

verification process) to determine whether they meet Priority 1 acquisition criteria. (Some priority acquisition areas shown in Figure 6-6 may not meet all the Priority 1 acquisition criteria, and some lands outside the priority acquisition areas in Figure 6-6 may meet the Priority 1 criteria.) In identifying sites outside the Figure 6-6 priority acquisition areas, the STAC will consider reserve system connectivity needs and the need for the Yolo HCP/NCCP to meet all of its biological goals and objectives for multiple species.

Figure 6-5. Conservation Reserve Area and Covered Species Occurrences

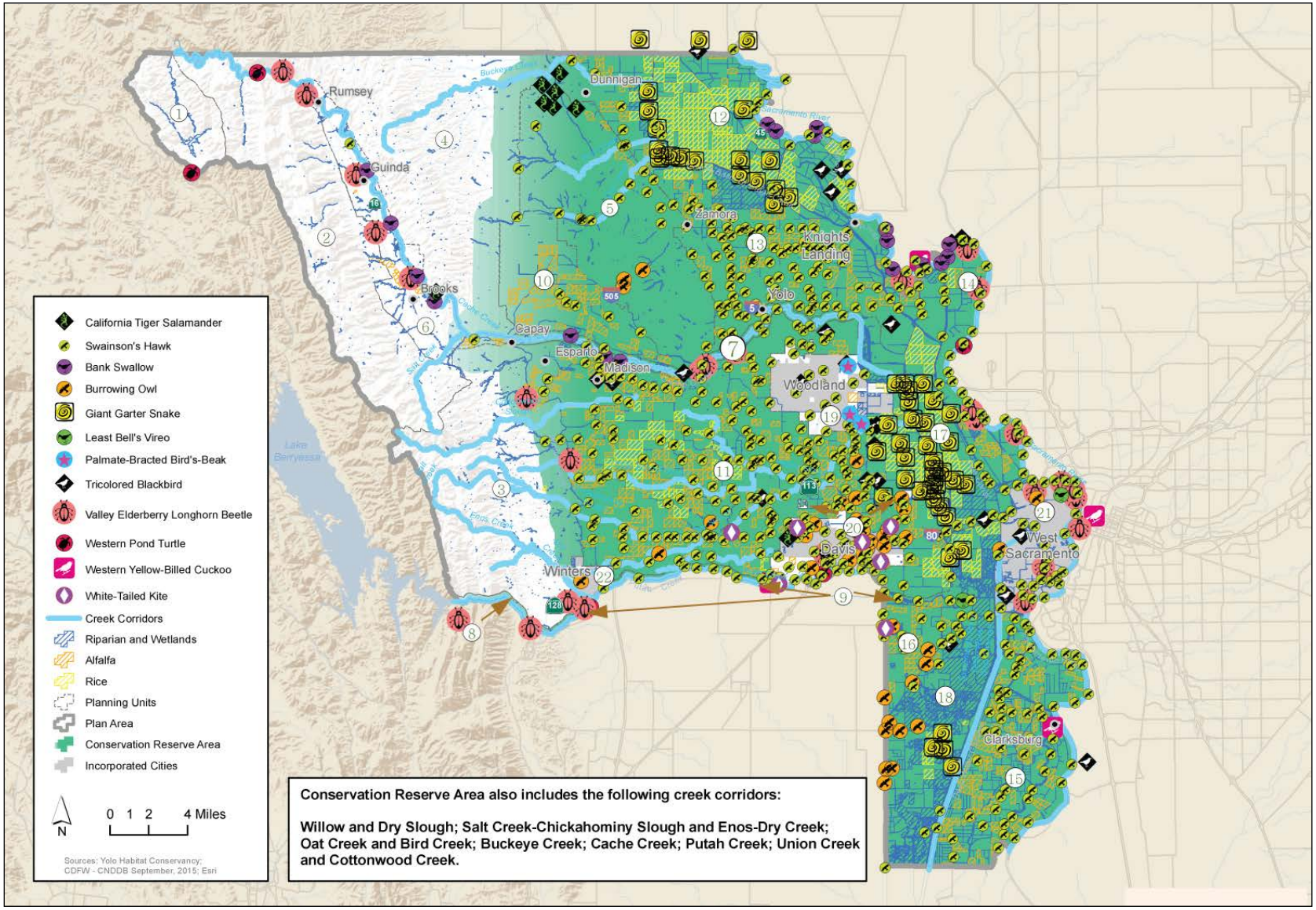
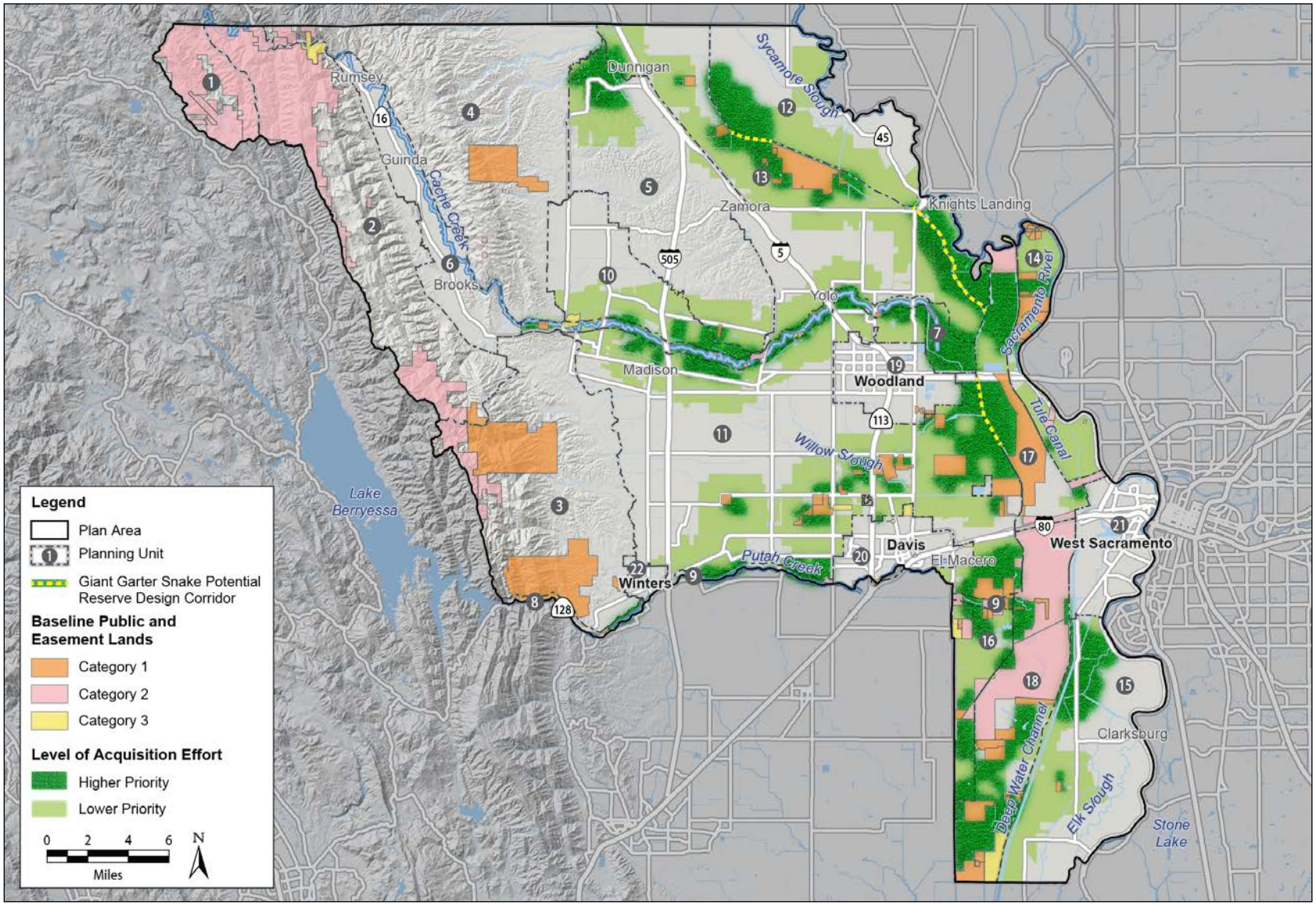


Figure 6-6. Priority Acquisition Areas



See Table 6-1(a) for definitions of Categories 1 – 3 lands

Newly protected lands will have **all** the following attributes:

1. The property is not currently in a protected land status (i.e., it does not have a habitat conservation easement. Lands with an agricultural conservation easements may be protected by placing habitat conservation easements on these lands to prevent orchard and vineyard conversion);
2. The property is within the Conservation Reserve Area, unless the land is adjacent to the Conservation Reserve Area (Figure 6-5, *Conservation Reserve Area and Species Occurrences*) and approved by the wildlife agencies; and
3. The property is not in urban planning units 19, 20, 21, and 22 unless necessary to protect a western burrowing owl colony.

The Conservancy will prioritize land acquisitions consistent with the following guidelines. With wildlife agency approval, the Conservancy may prioritize lands that do not meet the following guidelines as necessary to meet the specific acquisition criteria (Section 6.4.1.8, *Species-specific Acquisition Requirements*) for western burrowing owl, Swainson's hawk, giant garter snake, or California tiger salamander or as determined on a case-by-case basis for other lands having a high acquisition priority based on the HCP/NCCP's conservation commitments and biological goals and objectives.

A property has Priority 1 acquisition priority if it has at least one of the following seven attributes:

1.1 Includes two or more of the following and is also adjacent to Category 1 or Category 2 baseline public and easement lands (Table 6-1(a)):

- Swainson's hawk habitat in planning units 10, 11, 13, 15, or 16;
- Giant garter snake habitat;
- California tiger salamander habitat in planning unit 5;
- Western burrowing owl occurrences and western burrowing owl habitat in planning units 16 and 18; or
- Valley foothill riparian in planning units 7, 9, 11, 13, and 15.

1.2 Includes Swainson's hawk habitat in planning units 11 or 13, and is adjacent to Category 1 or Category 2 baseline public and easement lands (Table 6-1(a));

1.3 Includes grassland or lacustrine/riverine within the California tiger salamander critical habitat unit;

1.4 Includes palmate bird's beak habitat on the Woodland Regional Park site;

1.5 Includes giant garter snake habitat in planning units 11, 12, 13, 16, 17, or 18, and is adjacent to Category 1 or Category 2 baseline public and easement lands (Table 6-1(a);

1.6 Contains valley foothill riparian in planning units 7 and 9; and

1.7. Includes portions of "Giant Garter Snake Potential Reserve Design Corridor" (Figure 6-6, *Priority Acquisition Areas*).

A property has Priority 2 acquisition priority if it is outside but adjacent to Priority 1 lands, and has at least one of the following attributes:

2.1 Two or more of the following:

- Swainson's hawk habitat in planning units 10, 11, 13, 15, or 16;
- Giant garter snake habitat;
- California tiger salamander habitat in planning unit 5;
- Western burrowing owl occurrences;
- Valley foothill riparian in planning units 7 or 9;

2.2 Giant garter snake habitat in planning units 11, 12, 13, 17, 18; and

2.3 Swainson's hawk habitat in planning units 11 and 13.

6.4.1.5 Land Acquisition Requirements

In addition to applying the reserve design principles and concepts described above to build the reserve system, the Conservancy will meet the following requirements for the reserve system:

- Protect and enroll lands at the required acreages and locations provided in Table 6-2(a), *Newly Protected Lands Commitments,* and 6-2(b), *Pre-permit Reserve Land Commitments*;
- Contribute to the establishment of a corridor composed of patches of woody and herbaceous riparian vegetation within the Putah Creek floodplain, extending the length of Putah Creek in planning units 8 and 9 but focusing on planning unit 9 (Figure 6-3, *Ecological Corridors*). Prioritize acquisition of riparian areas with high vegetative structural diversity;
- Contribute to the establishment of a corridor comprised of patches of woody and herbaceous riparian vegetation within the Cache Creek floodplain and extending the length of Cache Creek from the west boundary of planning unit 7 to the Cache Creek Settling Basin exclusive of existing and potential aggregate mining areas (Figures 6–3, *Ecological Corridors*). Prioritize acquisition of riparian areas with high vegetative structural diversity;
- Contribute to the establishment of a corridor comprised of patches of woody and herbaceous riparian vegetation along the Sacramento River (Figures 6–3, *Ecological Corridors*). Prioritize acquisition of riparian areas with high vegetative structural diversity;
- Within the 1,600 acres of protected valley foothill riparian natural community (Objective NC-VFR1.2), prioritize protection of populations of valley elderberry longhorn beetle along Lower Cache Creek, Lower Putah Creek, and Sacramento River, and adjacent lands to provide for population expansion;
- Protection of fresh emergent wetlands, foothill riparian natural community, and ponds must ensure sufficient watershed lands are present to support hydrologic requirements. For giant garter snake, many of the fresh emergent wetlands are expected to consist of managed wetlands that will require an artificial water supply. The Conservancy will choose sites for giant garter snake that have sufficient available water to meet the needs of this species; and
- Protection of rice land, restored fresh emergent wetland, and protected and restored giant garter snake habitat must include securing (e.g., via water rights and/or contracts) the artificial water sources supporting these habitats.

6.4.1.6 Pre-Acquisition Assessments

The STAC evaluation criteria (Appendix F) include a process for assessing physical and biological resources and infrastructure present on lands the Conservancy is considering for acquisition to determine the degree to which they are suitable for achieving the Yolo HCP/NCCP biological goals and objectives, and consistent with the reserve design principles, concepts, and requirements described above. Qualified biologists (Section 4.4, *Qualified Biologist*) will conduct pre-acquisition assessments. Surveys will assess relevant physical and biological attributes of the lands consistent with the reserve system assembly criteria (Section 6.4.1.4, *Reserve System Assembly*) and reserve design requirements (Section 6.4.1.5, *Land Acquisition Requirements*).

6.4.1.7 Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands

In addition to protection of currently unprotected lands to meet the conservation acreage requirements provided in Table 6-2(a), *Newly Protected Lands Commitments,* the Conservancy will enroll baseline public and easement lands into the reserve system to meet the acreage requirements provided in Table 6-2(b), *Pre-permit Reserve Lands Commitments*. Baseline public and easement lands are defined in Table 6-1(a), *Baseline Public and Easement Lands*; they include lands in public ownership and other lands that are protected under existing conservation easements. Table 6-6, *Pre-permit Reserve Lands, Enrollment Requirements*, describes the enrollment requirements for different types of pre-permit reserve lands.

The Conservancy may enroll Category 2 baseline public and easement lands (as defined in Table 6-1(a), *Baseline Public and Easement Lands*) into the reserve system if a conservation easement is placed on the land, it contributes to the biological goals and objectives of the Yolo HCP/NCCP, and other conditions apply, per below**.** Once enrolled, these lands become *pre-permit reserve lands.* Pre-permit reserve lands must conduct their management and monitoring according to the requirements and guidelines outlined in this chapter, or in a manner that is consistent with the HCP/NCCP biological goals and objectives as agreed upon by the wildlife agencies. Monitoring and managing pre-permit reserve lands consistent with this chapter will standardize management and monitoring to provide a cohesive reserve system throughout the Plan Area, and ensure consistent management and monitoring in perpetuity. This upgrade and standardization of management and monitoring on existing open space therefore constitutes an important part of this conservation strategy that will benefit the covered species.

The Conservancy may enroll Category 1 baseline public and easement lands as defined in Table 6-1(a), *Baseline Public and Easement Lands*, also known as baseline protected lands, into the reserve system if the land contributes to the conservation strategy consistent with the biological goals and objectives, includes CDFW and/or USFWS as a third party beneficiary in the conservation easement, and is managed to conserve Yolo HCP/NCCP natural communities and covered species.

Table 6-6. Pre-permit Reserve Lands, Enrollment Requirements

Pre-permit Reserve Lands	Enrollment Requirements
Swainson's hawk easements and mitigation receiving sites with sold credits[a]	One management plan will be prepared for all of these properties. The plan will be subject to wildlife agency approval prior to completion.
Mitigation banks	Entities operating mitigation banks will send the Conservancy annual monitoring reports. Only acres sold prior to HCP/NCCP approval will count toward the pre-permit reserve lands commitment. Credits sold after the HCP/NCCP is in place to fulfill HCP/NCCP commitments will count toward the newly protected lands commitment (as mitigation lands).
Conaway Ranch conservation easements[b] (excluding the 4,000 acre Conaway flood easement)	The management plan will stipulate that these lands will be managed for HCP/NCCP covered species occurring on these lands.
Other Category 1 and 2 baseline public and easement lands	The Conservancy will coordinate with the wildlife agencies during implementation to enroll these lands consistent with conservation strategy criteria.
Yolo Bypass Wildlife Area	CDFW will assess management and monitoring goals on Yolo Bypass Wildlife Area and Yolo HCP/NCCP goals and objectives, to determine whether they are compatible: if so, these lands may be added as pre-permit reserve lands. Based on a January 2015 assessment by CDFW, the Conservancy anticipates approximately 200 acres of giant garter snake habitat and 500 to 700 acres of Swainson's hawk habitat to be eligible for enrollment in this area.

Note:

a. See glossary for *Mitigation Receiving Sites*.

b. These lands are not covered by an endowment at the time of this writing. The Conservancy and wildlife agencies have agreed that ongoing management is the responsibility of Conaway Ranch and will not be a cost attributable to the Conservancy. Biological monitoring would, however, be funded by the Conservancy.

To enroll baseline public and easement lands into the reserve system as pre-permit reserve lands, the Conservancy will undertake the following actions:

- The Conservancy will coordinate and may enter into agreements (e.g., memoranda of agreement, memoranda of understanding, and cooperative management agreements) with federal and state agencies, land trusts, and other organizations and individuals that manage baseline public and easement lands that meet the criteria provided above to implement additional or adjust existing management actions, if needed, to maintain or benefit these resources;
- The Conservancy will coordinate with and enter into agreements with Permittees (e.g., City and County agencies) to manage the proposed pre-permit reserve lands under their jurisdiction to similarly benefit these resources;
- Preparatory to entering into agreements, the Conservancy will coordinate with entities having jurisdiction over the proposed pre-permit reserve lands to (a) gather relevant available information and, if appropriate, conduct surveys necessary to determine the presence and status of the covered species resources listed above on baseline public and easement lands, and

(b) gather information necessary to describe the range of land management practices that are permissible on these lands;

- Based on information collected, the Conservancy in coordination with the landowner/land manager will identify the need for adjustments in land management practices to maintain or improve the covered species resources listed above and, if needed, identify new or revised management actions the Conservancy will work with the landowner/land manager to implement;
- For lands that are protected under existing conservation easements and for which the Conservancy proposes modifications to existing land use practices, the Conservancy will coordinate with the easement holders and the landowners to seek modifications to the conservation easements necessary to implement any changes in land use practices; and
- In certain instances the Conservancy may provide funding necessary to implement prescribed management actions on the pre-permit reserve lands.

6.4.1.8 Species-specific Acquisition Requirements

In addition to meeting the prioritization guidelines in Section 6.4.1.4.2, *Reserve System Prioritization Guidelines*, the STAC will evaluate each prospective reserve system land based on species-specific criteria. These criteria include habitat suitability (including patch size), landscape, and land management attributes (Appendix F, *STAC Evaluation Criteria*). The STAC will evaluate and score each property based on the evaluation criteria. The STAC will then make a recommendation to the Executive Director of the Conservancy based on the site evaluation and the extent to which the property is consistent with meeting biological goals and objectives. The Executive Director will in turn make a recommendation to the Conservancy Board. Land acquisitions are also subject to wildlife agency approval as described in Section 7.5.2, *Acquisition Process*.

6.4.1.8.1 Western Burrowing Owl

Consistent with Objectives WBO1.3 and WBO1.4, the Conservancy will prioritize acquisition of occupied western burrowing owl habitat. The highest priority will be assigned to occupied habitats where established western burrowing owl colonies are present. The potential for acquiring occupied habitats is highly uncertain, so lands that support suitable habitat and are adjacent to occupied habitat will be considered as a second priority, and lands that support suitable habitat and that are appropriate for management and enhancement actions will be considered as a third priority. The distribution of burrowing owls in the Plan Area has been relatively consistent over the years with the main population areas in the vicinity of Davis and in the southeastern panhandle (Yolo Bypass and adjacent lands). Most other recent occurrences are of single pairs of owls, which have been reported primarily from between Davis and Woodland, and the grassland habitats of the Dunnigan Hills and the western edge of the valley. Population size has been variable with a reported high of 63 pairs in 2007, the majority occurring in the southeastern panhandle and the Davis area. Occupied lands available for acquisition are likely to be highly limited, therefore the strategy prioritizes acquisition based on occupied habitat but does not restrict acquisition to occupied habitat. Instead, the three-tiered priority for acquisition outlined in WBO1.4 along with management and enhancement practices is expected to protect the existing population to the extent possible and to expand the burrowing owl population onto currently unoccupied habitat.

The Conservancy will protect sufficient habitat surrounding occupied burrows to sustain the breeding pairs, consistent with *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). The 2012 CDFG report recommends determining the acreage needed around burrowing owl burrows to sustain breeding pairs based on site specific conditions and information on the species' natural history. Gervais et al. (2003) suggests that burrowing owls concentrate foraging efforts within 600 meters of a nest burrow. Based on this information, protected burrowing owl occurrences should include 600 meters of foraging habitat surrounding the nesting burrows. A different configuration may be protected, however, if the STAC determines, based on site-specific information and the best available scientific information on the species, that sufficient habitat is protected surrounding the burrows to sustain the breeding pairs of western burrowing owl. Land that is disked for fire control or other purposes will not count toward the acreage commitments for western burrowing owl.

6.4.1.8.2 Swainson's Hawk

In addition to the acquisition prioritization and species-specific evaluations described in Section 6.4.1.4.2, *Reserve System Prioritization Guidelines*, the Conservancy will also consider the distribution of reserve system lands in the Plan Area to ensure that reserve system lands meet the habitat needs of the Swainson's hawk, which is wide ranging across the Plan Area landscape and not highly dependent on habitat connectivity. Consistent with *A Proposed Conservation Strategy for the Swainson's Hawk in Yolo County* (Estep 2015), the Conservancy will strategically acquire conservation easements to maintain blocks of contiguous Swainson's hawk foraging habitat throughout the portion of the Conservation Reserve Area that supports the bulk of the nesting population. For example, dividing the 18,792 newly protected acres into 300-acre habitat blocks, there are approximately 62 individual habitat blocks that can be placed strategically throughout the agricultural landscape. These newly protected lands can be consolidated and form larger contiguous blocks or can be a series of separate, smaller blocks scattered throughout each planning unit. Acquisition of newly protected lands for the Swainson's hawk should focus on planning units 5, 10, 11, 13, 15, and 16, but can include others as determined by the STAC. At least 3,000 acres of the modeled Swainson's hawk habitat to be protected will consist of grassland in Dunnigan Hills (PU 5): while this is not a high priority area for the Swainson's hawk because there is no alfalfa in this area, it does provide foraging value for Swainson's hawk, is comparable to an estimated 15 percent of the Swainson's hawk foraging habitat to be lost (i.e., natural lands foraging habitat rather than cultivated lands), and is a priority area for multiple species benefits (particularly for California tiger salamander). Table 6-7 shows an example of how 62 blocks of Swainson's hawk habitat of 300-acres each could be distributed among the planning units based on their size and the distribution and abundance of Swainson's hawk nesting territories.

Table 6-7. Example Distribution within the Reserve System of 62 Blocks of Swainson's Hawk Habitat of 300 acres each, by Planning Unit

Planning Unit	Number of Blocks in the Reserve System (total of blocks in planning unit)
11	17 (5,100 acres)
13	15 (4,500 acres)
5	10 (3,000 acres)
15	8 (2,400 acres)
16	6 (1,800 acres)
10	6 (1,800 acres)
Total	**62 (18,600 acres)**

Since the majority of the nesting population and available nesting habitat occurs within planning units 10, 11, 13, 15, and 16, strategically placing reserves as described will maintain or enhance habitats nearest the majority of nesting habitats in the Plan Area. Protecting grassland habitat in planning unit 5 will benefit Swainson's hawk by providing natural habitat for this grassland species (Dechant et al. 2000). Historically, Swainson's hawk occupied large grassland and shrubstep habitats in California (Woodbridge 1998); protecting this natural habitat will provide Swainson's hawk foraging habitat in the Plan Area that is not subject to variation as a result of changing agricultural crop patterns.

Modeled habitat for other covered species present on these reserve system lands will count toward the total modeled habitat acre commitments for those species.

6.4.1.8.3 Giant Garter Snake

The Conservancy will focus Giant garter snake conservation in planning units 11, 12, 13, 17, and 18 within four giant garter snake *habitat units* (Figure 6-12): The Yolo Bypass, West of the Yolo Bypass (lands west of the Yolo Bypass within the Conaway Ranch and Davis Wetlands), the Colusa Basin, and the Colusa Drain (lands west of the Colusa Basin along the west side of the Colusa Drain). Individual habitat units are delineated as areas with similar water and land management practices, a lack of land use conversion, and that support contiguous and connected large blocks of suitable giant garter snake habitat in the form of rice lands, wetlands, and surface water conveyance systems. The entirety of each of these habitat units fall within the geographic boundaries of the Yolo Basin Recovery Unit and Colusa Basin Recovery Unit as defined in the *Draft Giant Garter Snake Recovery Plan* (USFWS, 2015). The habitat units are further confined to the geographical extent of suitable giant garter snake habitat and species occurrences documented within the Plan Area. These boundaries ensure that the Conservancy will acquire conservation land and conduct wetland restoration to support giant garter snake in areas that are either occupied by the species or very likely to be occupied once habitat is enhanced or restored. All giant garter snake habitat acquired for the reserve system that will count toward the achievement of the Yolo HCP/NCCP biological goals and objectives (Objectives GGS1.1, GGS1.2, and GGS1.3) will be occupied as defined below.

While each habitat unit supports extensive and connected habitat for giant garter snake, not all areas of each habitat unit are currently known to be occupied by the species based on existing data. To ensure that land acquisition is focused on parcels that are occupied, the Plan prioritizes the acquisition of parcels that are within *occupied habitat units* that occur within the habitat units. The initial configuration of these occupied habitat units (Figure 6-12) are defined based on

concentrations of occurrence records available prior to Plan implementation and the life history of the species. Giant garter snakes have been reported to move than 800 meters (2,625 feet), or approximately 0.5 miles (Hansen, 1993). This distance from documented occurrences, with modifications to account for barriers, unsuitable land uses, and property lines, was used to delineate portions of the habitat units that the Plan defines as occupied at the time of initial Plan implementation (i.e., the occupied habitat units).

For the first five years of Plan implementation, the occupied habitat units in Figure 6-12 are assumed to be occupied during that time period. After that, the Conservancy will verify giant garter snake occupancy over time within each occupied habitat unit that contains reserve lands using the methods described in Section 6.5.6.3.5, *Giant Garter Snake*. If occupancy cannot be verified within an occupied habitat unit that contains reserve lands, Section 6.5.6.3.5 describes a contingency process.

An occupied habitat unit (including any reserve lands within it) will be considered occupied for the purposes of this Plan as long as the Conservancy or others document both male and female individuals in both adult and juvenile age classes during at least two out of every five consecutive calendar years. As additional surveys are conducted within the habitat units and giant garter snakes are consistently documented in new areas, the Conservancy may propose based on this new data to change the boundaries of occupied habitat units or add additional occupied habitat units, with wildlife agency approval.

In order for land acquisition and restoration activities for giant garter snake to count towards Plan requirements, the associated parcels must also meet habitat suitability requirements for the species. Parcels that count as reserve lands will support suitable wetland or rice land habitats and will be interconnected by suitable aquatic habitat or upland habitat (movement or overwintering habitat) or through a surface water conveyance system to the larger habitat unit. The STAC will assess and document specific habitat parameters on each candidate parcel as described in Section 6.5.6.3.5, *Giant Garter Snake*. Based on this assessment, the STAC will then make a recommendation regarding the addition of a parcel to the reserve system. These suitable habitat parameters must be measured periodically to ensure that that suitable habitat is maintained on each reserve lands site, or improved.

It is important to note that all parcels located within occupied habitat units are either identified as Yolo HCP/NCCP Priority 1 or Priority 2 Acquisition Areas or are Category 1 or Category 2 baseline public and easement lands (See Table 6-1(a) for definitions). This parcel configuration will help ensure that sufficient contiguous habitat is protected to support GGS populations utilizing each occupied habitat unit.

6.4.1.8.4 California Tiger Salamander

The Conservancy will avoid acquisition of California tiger salamander reserve lands within 1.3 miles (California tiger salamander dispersal distance) of cultivated lands acquired for the reserve system unless pre-approved by the wildlife agencies. This will minimize chances of California tiger salamander occurrence on cultivated lands in the reserve system, thereby minimizing conflicts between agricultural practices and conservation of covered species in the reserve system.

Yolo HCP/NCCP will prioritize protection and restoration of California tiger salamander habitat that contributes toward achievement of the following reserve system design, based on the USFWS's recovery plan for this species (USFWS 2017a). Baseline public and easement lands, newly protected lands, pre-permit reserve lands, and lands protected and restored through

mechanisms other than the Yolo HCP/NCCP will all count toward completing this reserve design. Conservancy's acreage commitments will contribute toward achieving this reserve design, but the Conservancy's acreage commitments will not increase beyond those specified in the biological goals and objectives.

- Protection of 13,592 acres of California tiger salamander habitat located in the Dunnigan Hills area;
- Within the 13,592 acres, include three or four preserves, each at least 3,398 acres in size;
- *Breeding habitat* – On each reserve, include at least four ponds totaling eight acres of breeding pool area; and
- *Upland habitat* – Upland habitat will contain at least one moderately-sized burrowing mammal colony [as defined by having at least 50 active burrow entrances within a 656-foot radius that occurs within the average dispersal distance of the salamander of each breeding pond. Land that is disked for fire control or other purposes will not count toward the acreage commitments for California tiger salamander.

Modeled habitat for covered species other than California tiger salamander that may be present on reserve system lands will count toward the total modeled habitat acre commitments for those species.

6.4.2 Conservation Measure 2: Restore Natural Communities

6.4.2.1 Introduction

This conservation measure describes the natural community restoration and creation actions that the Conservancy will apply to ensure the Yolo HCP/NCCP reserve system meets applicable biological goals and objectives related to the natural community and covered species habitat restoration and creation. The restoration will occur prior to natural community loss, consistent with the stay-ahead provision described in Chapter 7, Section 7.5.3, *Stay-Ahead Provision,* to meet the biological objectives provided in Table 6-8.

Natural community restoration is defined as the manipulation of the physical, chemical, or biological characteristics of a site, with the goal of returning natural or historic functions to a site that historically supported such functions but no longer does because of the loss of one or more required ecological factors or as a result of past disturbance. Restoration typically involves altering the soil or other substrate to improve a site's ability to support the historic land cover types, although it may also include physical manipulation to restore specific ecological function in a site where that function has been lost (e.g., removal of hardscape in a stream channel and revegetation with riparian plantings). In contrast to enhancement (defined in Conservation Measure 3, *Natural Communities Management and Enhancement*), restoration results in the re-establishment of ecological function, value, *and* acreage of a natural community or land cover type. For example, valley foothill riparian natural community could be restored to stream reaches that historically supported it. In the Yolo HCP/NCCP, habitat restoration is allowed only in those land cover types for which techniques are generally successful and where restoration would substantially enhance habitat for covered species and native biological diversity. Restoration actions must also incorporate the best available science.

Natural community restoration may not restore all functions of natural communities. For example, recent studies of wetland restoration projects indicate that many of them fail to meet success criteria or lack important functions of natural reference sites (National Research Council 2001). The conservation strategy takes this uncertainty into account by relying primarily on habitat preservation and by requiring habitat restoration to be completed and meet success criteria prior to project impacts. The Conservancy will site restoration projects in areas where soil, hydrologic, and other conditions are conducive to restoration success. Also, uncertainty is taken into account by the adaptive management strategy (see Chapter 7, *Plan Implementation*).

Although the Yolo HCP/NCCP conservation strategy focuses on natural community restoration, it also includes limited natural community creation. *Natural community creation* is the manipulation of the physical, chemical, or biological characteristics present to develop a land cover type in an area that did not previously support it. Similar to restoration, creation results in establishment of new ecological function, value, and acreage of a natural community or land cover types. The only habitat creation proposed under the Yolo HCP/NCCP is for ponds that will be created as breeding habitat for California tiger salamander in areas that did not previously support ponds (Section 6.4.2.6.1, *Lacustine*). The Conservancy will prioritize restoration over creation for California tiger salamander ponds.

Table 6-8. Biological Goals and Objectives Associated with Conservation Measure 2

Biological Goal or Objective	Restoration Commitment	How Conservation Measure 2 (CM2) Advances a Biological Objective
Landscape-Level Biological Goals and Objectives		
Goal L-1: Large interconnected landscapes within the range of physical and biological attributes (e.g., slope, soils, hydrology, climate, and plant associations) in the Plan Area to support the distribution and abundance of covered species and their habitats, provide for the movement and genetic interchange among populations of covered species, and conserve native biodiversity.		
Objective L-1.1: Conserve 32,406 acres of natural communities and covered species habitats, including 24,406 acres of newly protected lands and 8,000 acres of additional pre-permit reserve lands enrolled into the reserve system. Restore or create 956 acres of wetlands and riparian natural community.	912 acres dependent on effect[a] 44 acres independent of effect[b]	CM2 will achieve the restoration component of this objective as described throughout this conservation measure.
Objective L-1.4: Prioritize land acquisition and natural community restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation, where it can be sustained by natural flows, within the Cache Creek floodplain and extending the length of Cache Creek from the west boundary of planning unit 7 to the Cache Creek Settling Basin exclusive of existing and potential aggregate mining areas (Figure 6–3, *Ecological Corridors*).	N/A	CM2 will achieve this objective as described in Section 6.4.2.4, *Valley Foothill Riparian Natural Community*.

Biological Goal or Objective	Restoration Commitment	How Conservation Measure 2 (CM2) Advances a Biological Objective
Objective L-1.5: Prioritize land acquisition and natural community restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation, where it can be sustained by natural flows, within the Putah Creek floodplain and extending the length of Putah Creek from the west boundary of planning unit 9 to the Putah Sinks exclusive of existing and potential aggregate mining areas (Figure 6-3, *Ecological Corridors*).	N/A	CM2 will achieve this objective as described in Section 6.4.2.4, *Valley Foothill Riparian Natural Community*.
Objective L-1.6: Prioritize land acquisition and restoration to support a corridor comprised of patches of woody and herbaceous riparian vegetation along the Sacramento River and Yolo Bypass in planning units 12, 14, 15, and 21 (Figure 6-3, *Ecological Corridors*).	N/A	
Valley Foothill Riparian Natural Community		
Goal NC-VFR1: Functional valley foothill riparian natural community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-VFR1.2: Restore and manage 608 acres of valley foothill riparian natural community. Site the restoration to improve connectivity among patches of existing valley foothill riparian vegetation within the Cache Creek, and Putah Creek corridors and the Sacramento River. Widen the riparian zones along creek corridors wherever feasible, creating larger nodes of riparian natural community along narrow riparian stretches.	588 acres dependent on effect 20 acres independent of effect	CM2 will achieve this objective as described in Section 6.4.2.4, *Valley Foothill Riparian Natural Community*.
Fresh Emergent Wetland Natural Community		
Goal NC-FEW1: Functional fresh emergent wetland natural community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-FEW1.2: Restore 88 acres of fresh emergent wetland natural community.	88 acres dependent on effect 0 acres independent of effect	CM2 will achieve this objective as described in Section 6.4.2.5, *Fresh Emergent Wetland Restoration Criteria and Techniques*.
Lacustrine and Riverine Natural Community		
Goal NC-LR1: Functional lacustrine and riverine community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-LR1.2: Restore or create 236 acres of lacustrine and riverine natural community.	236 acres dependent on effect. 24 acres independent of effect.[c]	CM2 will achieve this objective as described in Section 6.4.2.6, *Lacustrine and Riverine Restoration Criteria and Techniques*.

Biological Goal or Objective	Restoration Commitment	How Conservation Measure 2 (CM2) Advances a Biological Objective
Valley Elderberry Longhorn Beetle		
Goal VELB1: Provide for the conservation of valley elderberry longhorn beetle in the Plan Area.		
Objective VELB1.2: Within the restored valley foothill riparian natural community (Objective NC-VFR1.2), establish elderberry shrubs and associated riparian plant species, and prioritize lands adjacent to existing populations to provide for population expansion.	N/A	CM2 will achieve this objective as described in Section 6.4.2.4.1, *Valley Elderberry Longhorn Beetle.*
California Tiger Salamander		
Goal CTS1: Provide for the conservation of California tiger salamander in the Plan Area.		
Objective CTS1.2: Within the 600 acres of protected lacustrine and riverine natural community (Objective NC-LR1.1), protect at least 36 acres of California tiger salamander aquatic habitat. Restore or create 36 acres of aquatic habitat. Within the protected and restored aquatic habitat, include at least five California tiger salamander breeding pools that are each found to support all life stages of the salamander through all water year types consistent with the occupancy commitment for this species in Table 6-2(c).	12 acres dependent on effect 24 acres independent of effect	CM2 will achieve the restoration/creation component of this objective as described in Section 6.4.2.6.1, *Lacustrine.*
Giant Garter Snake		
Goal GGS1: Provide for the conservation of giant garter snake in the Plan Area, including the Willow Slough/Yolo Bypass subpopulation and a segment of the Colusa Basin subpopulation, and connectivity between the two subpopulations		
Objective GGS1.3: Protect, restore, and manage the 500 acres of fresh emergent wetland natural community (Objective NC-FEW1.1), at least 420 acres of the lacustrine/riverine natural community (Objective NC-LR.11), the restored fresh emergent wetland (Objective NC-FEW1.2), and restored lacustrine and riverine natural community (Objective NC-LR1.2) to conserve the giant garter snake. Ensure at least 80% of the aquatic habitat is perennial, and that the remainder provides aquatic habitat for the giant garter snake during the active season at least through July of each summer.	N/A	CM2 will achieve the restoration component of this objective as described in Section 6.4.2.5, *Fresh Emergent Wetland Restoration Criteria and Techniques*.

Notes:

a. "Dependent on effect" means that an acre will be restored or created for each acre of this natural community lost as a result of covered activities.

b. "Independent of effect" means that these acres will be restored or created regardless of how many acres are lost as a result of covered activities. This includes 24 acres of California tiger salamander aquatic habitat and 20 acres of riparian natural community.

c. The 24 acres independent of effect are for California tiger salamander habitat. They may, however, be subsumed within the total 236 acres of lacustrine and riverine natural community restored, and are not in addition to the 236 acres.

Section 6.4.2.2 describes the purpose of this conservation measure, and provides a table indicating how the conservation measure will achieve each of the relevant biological goals and objectives.

Section 6.4.2.3 describes general restoration requirements that apply to all natural communities and covered species habitats. Sections 6.4.2.4 through 6.4.2.6 provide restoration criteria and techniques for each of the natural community types to be restored or created.

6.4.2.2 Purpose

This conservation measure provides guidance for meeting the biological objectives presented in Section 6.3, *Biological Goals and Objectives,* as they relate to natural community and covered species habitat restoration. Table 6-8 lists the biological goals and objectives relevant to this conservation measure, and describes how this conservation measure will contribute toward each relevant biological objective.

6.4.2.3 General Restoration and Creation Requirements

6.4.2.3.1 Siting Restoration Projects

The Conservancy will identify and select potential restoration sites on the basis of their physical processes and hydrologic, geomorphic, and soil conditions to ensure successful restoration can occur and be self-sustaining. Such an approach increases the likelihood of successful restoration and reduces long-term management and maintenance costs. Restoration site selection will be subject to wildlife agency approval as for all reserve system acquisitions, consistent with Section 7.5.2, *Acquisition Process*.

The Conservancy will also select restoration sites on the basis of their ability to support covered species, support implementation of species-specific conservation actions, and meet species-specific biological goals and objectives. For example, sites that have been designed to support tricolored blackbird will be located a sufficient distance away from black-crowned night-heron rookeries to minimize predation on tricolored blackbirds; sites that have been designed to support breeding habitat for covered amphibians must have adequate nearby upland habitat.

The Conservancy will restore natural communities only in areas where there is evidence that the natural community was previously present. Creation (i.e., establishment in areas where the natural community did not previously occur) is allowed only for ponds to support California tiger salamander (Section 6.4.2.6.1, *Lacustrine*). The Conservancy will not adversely affect rare natural communities or habitat types while restoring natural communities.

The Conservancy will choose restoration and creation locations based on the reserve design principles and concepts described in *Conservation Measure 1*, *Establish Reserve System* (Section 6.4.1.4, *Reserve System Assembly*). The Conservancy will site and design natural community restoration projects to contribute to a variety of environmental gradients (e.g., hydrology, elevation, soils, slope, and aspect) within and across a diversity of natural communities. The Conservancy will permanently protect the restoration and creation sites in conservation easements, as described in Section 6.4.1.3, *Land Protection Mechanisms,* including a sufficient amount of surrounding upland area to support the hydrology of restored and created wetlands. The Conservancy will incorporate these lands into the reserve system and manage and enhance them consistent with *Conservation Measure* 3, *Manage and Enhance Natural Communities*.

6.4.2.3.2 Restoration Plans

The Conservancy will prepare, or require project proponents to prepare, detailed restoration plans prior to implementing restoration projects. These will include plans and specifications and be developed for individual sites or stream reaches according to specific geomorphic, hydraulic, and hydrologic conditions; the extent and quality of existing habitats; existing wildlife use; and the potential for adverse effects (e.g., disturbance and/or removal of existing habitat or wetlands). These plans will be consistent with the reserve management plan for the site,[12] described in Section 6.4.3.3, *Management Plans*. Restoration plans will satisfy the requirements listed below.

- Define restoration goals and objectives, performance indicators, and success criteria;
- Collect and analyze baseline data (e.g., soil type and suitability for riparian planting, low-flow conditions, past land use history/alterations);
- Identify suitable/feasible restoration measures;
- Describe how site conditions (e.g., soil, hydrology) are appropriate for supporting the natural community or covered species habitat to be restored;
- Develop conceptual restoration designs;
- After the conceptual restoration design is complete, develop detailed restoration designs (plans and specifications) that identify and describe construction methods, planting areas and methods, planting species (including collection and propagation methods, using native seeds and plants from Sacramento Valley origin), and maintenance requirements; and
- Prepare an adaptive management and monitoring plan according to the guidelines in Chapter 7, including descriptions of responsible parties, monitoring methods and schedule, indicators (e.g., vegetative cover), success criteria (e.g., 20 percent cover by Year 5), and adaptive management measures (e.g., replanting with different species).

6.4.2.4 Valley Foothill Riparian Natural Community

The Conservancy will restore 20 acres of riparian natural community and at least one additional acre for each acre lost as a result of covered activities. The Conservancy will incorporate valley oaks into the mix of planted riparian species when site conditions are favorable to support this species. The restoration will be sited primarily in areas that improve connectivity among patches of existing valley foothill riparian vegetation in the Cache Creek and Putah Creek corridors (planning units 7 and 9). The restoration will be sited in areas with soil, hydrology, and other conditions that are favorable for successful restoration. The CCRMP and/or the LPCCC may implement the restoration of 20 acres independent of effect, in coordination with the Conservancy.

Activities necessary to restore the riparian natural community may involve, depending on site-specific conditions, the following actions:

- Site clearing of debris and existing vegetation;
- Site grading to improve micro-habitat conditions, hydrology, and planting/seeding conditions;
- Planting and seeding of native plants;

[12] Site restoration plans on newly protected lands may be prepared prior to or concurrent with the reserve unit management plan.

- Irrigation of sufficient duration to establish riparian vegetation; and
- Control of weeds and herbivory of sufficient duration to establish riparian vegetation.

The Conservancy will apply the best available scientific and technical information and guidance to riparian restoration projects. The riparian restoration handbooks and guidance used in developing and implementing riparian restoration plans may include the *California Riparian Restoration Handbook* (Riparian Habitat Joint Venture 2009) as well include additional guidelines as they become available during the term of the Yolo HCP/NCCP.

Restoration will be sited in locations most likely to benefit the covered species. For example, if cottonwood trees can be permitted to grow or are planted in a large block through a restoration effort in the Yolo Bypass, especially in the area near the Putah Creek Sinks, or in the Cache Creek Settling Basin, these areas would provide prime locations for future yellow-billed cuckoo reproduction and foraging (Greco and Larsen 2014).

6.4.2.4.1 Valley Elderberry Longhorn Beetle

The Conservancy will prioritize riparian plantings on lands adjacent to existing valley elderberry longhorn beetle populations to provide for population expansion opportunities. Within the restored valley foothill riparian natural community, the Conservancy will establish elderberry shrubs and associated riparian plant species at an amount proportional to the amount of elderberry stems over one inch in diameter removed as a result of covered activities, and the presence of valley elderberry longhorn beetle exit holes in the affected stems. Consistent with USFWS standards (1999), each elderberry stem measuring 1.0 inch or greater in diameter at ground level that is adversely affected (transplanted or destroyed) by covered activities will be replaced with elderberry seedlings or cuttings at a ratio ranging from 1:1 to 8:1 (new plantings to affected stems). Table 6.9 provides these ratios. Stock of either seedlings or cuttings will be obtained from local sources, including but not limited to the Lower Putah Creek Coordinating Committee's plant nursery. Cuttings may be obtained from plants to be transplanted if the affected site is in the vicinity of the restoration site.

Since studies have found that the beetle is more abundant in dense native plant communities with a mature and a mixed understory, a mix of native plants associated with the elderberry plants will be planted at ratios ranging from 1:1 to 2:1 (native tree/plant species to each elderberry seedling or cutting), consistent with Table 6-9, *Valley Elderberry Longhorn Beetle Habitat Planting Ratios*. Stock of saplings, cuttings, and seedlings will be obtained from local sources. The site will also be planted with native herbaceous species if conditions are suitable.

The restoration area will provide at least 1,800 square feet for each transplanted elderberry plant. Up to 10 plantings (*i.e.*, elderberry cuttings or seedlings and/or associated native plants) may be planted within the 1,800 square foot area with each transplanted elderberry. An additional 1,800 square feet shall be provided for every additional 10 conservation plants. Each planting will have its own watering basin measuring approximately three feet in diameter. Watering basins will be constructed with a continuous berm measuring approximately eight inches wide at the base and six inches high.

Table 6-9. Valley Elderberry Longhorn Beetle Habitat Planting Ratios

Location of Affected Plants	Stems (maximum diameter at ground level)	Exit Holes on Shrub (Yes/No)[a]	Elderberry Seedling Ratio[b]	Associated Native Plant Ratio[c]
Non-riparian	Greater than or equal to one inch, less than three inches	No	1:1	1:1
		Yes	2:1	2:1
	From three to five inches	No	2:1	1:1
		Yes	4:1	2:1
	Greater than or equal to five inches	No	3:1	1:1
		Yes	6:1	2:1
Riparian	Greater than or equal to one inch, less than three inches	No	2:1	1:1
		Yes	4:1	2:1
	From three to five inches	No	3:1	1:1
		Yes	6:1	2:1
	Greater than or equal to five inches	No	4:1	1:1
		Yes	8:1	2:1

Notes:

a. Presence or absence of exit holes indicating presence of valley elderberry longhorn beetle. All stems measuring one inch or greater in diameter at ground level on a single shrub are considered occupied when exit holes are present *anywhere* on the shrub.

b. Ratios in this column correspond to the number of cuttings or seedlings to be planted per elderberry stem (one inch or greater in diameter at ground level) affected by a covered activity.

c. Ratios in this column correspond to the number of associated native species to be planted per elderberry seedling or cutting planted.

6.4.2.5 Fresh Emergent Wetland Restoration Criteria and Techniques

The Conservancy will restore an acre of fresh emergent wetland for each acre removed as a result of covered activities. The Conservancy will site and design the restored fresh emergent wetland to provide aquatic habitat for the giant garter snake.

The primary natural habitat of giant garter snake is comprised of permanent wetland,[13] which typically supports substantially higher densities of giant garter snake than rice land (Wylie et al. 2010). The Conservancy will restore fresh emergent wetlands to achieve the following conditions:

- Flooded from early spring through mid-fall;
- Minimum patch size of 10 acres;
- Restored within a matrix of open water (lacustrine) and upland habitat (existing or restored) suitable for giant garter snake to create a mosaic of open water, fresh emergent wetland, and upland;
- Located in or adjacent to, and hydrologically connected to rice land or existing wetlands that are occupied by giant garter snake;
- Include or be connected, to habitat corridors that support movement among existing and restored habitat areas;

[13] NHP land cover types that support giant garter snake aquatic breeding and movement habitat are described in Appendix A, *Covered Species Accounts*.

- Supported by surface streams or by surface and subsurface hydrology associated with agricultural and flood control practices that maintains ponding and soil saturation at a frequency and duration sufficient to support hydrophytic vegetation typical of permanent emergent wetlands that support giant garter snake; and
- Designed to allow for rapid drawdown of water if needed to control mosquitoes or nonnative invasive species.

Giant garter snake habitat will likely be restored primarily on rice lands or managed wetlands that could be occupied by giant garter snake. To minimize the potential for injury or mortality of giant garter snake as a result of operating restoration-related equipment, the Conservancy will only conduct habitat restoration activities during the giant garter snake active period.

Activities necessary to restore fresh emergent wetland and giant garter snake habitat may involve, depending on site-specific conditions, the following actions:

- Site clearing of debris and existing vegetation;
- Site grading to improve micro-habitat conditions, hydrology, and planting/seeding conditions;
- Erosion control measures;
- Collection of native emergent plant species rhizomes and other propagules for establishment in restoration sites;
- Planting and seeding of native emergent wetland and aquatic plants;
- Plant protection and ground cover manipulation; and
- Installation or modification of water irrigation and drainage infrastructure, including wells, pumps, water control structures and irrigation ditches.

The wetlands will be designed in conjunction with restored or protected uplands to meet giant garter snake habitat requirements, as follows:

- The restored nontidal marsh should be characterized by sufficient water during the giant garter snake's active summer season (March–October) to supply constant, reliable cover and sources of food such as small fish and amphibians;
- The restored nontidal marsh should consist of still or slow-flowing water over a substrate composed of soil, silt, or mud characteristic of those observed in marshes, sloughs, or irrigation canals;
- Designs will not create large areas of deep, perennial open water that would support nonnative predatory fish. The restored marsh should be characterized by a heterogeneous topography providing the range of depths and vegetation profiles consisting of emergent, herbaceous aquatic vegetation required to provide suitable foraging habitat and refuge from predators;
- Site topography will include areas of terrestrial refuge (grassland, as specified in Objectives NC G-1.1 and NC G-1.2) with ample exposure to sunlight to facilitate snake thermoregulation, and with low vegetation, bankside burrows, holes, and crevices providing critical shelter for snakes throughout the day. Terrestrial features will be sited fewer than 200 feet from aquatic foraging habitats;
- Aquatic margins or shorelines will transition to uplands consisting of grassy banks, with the dense grassy understory required for sheltering. These margins should consist of approximately 200 feet of high ground or upland habitat above the annual high water mark to provide cover and refugia from floodwaters during the dormant winter season; and

- Through the monitoring and adaptive management process, the Conservancy may choose to increase fresh emergent wetland restoration in exchange for reducing upland habitat acreage to benefit the giant garter snake population based on the best available information, and subject to wildlife agency approval.

6.4.2.6 Lacustrine and Riverine Restoration Criteria and Techniques

6.4.2.6.1 Lacustrine

The Conservancy will restore or create one acre of lacustrine natural community, in-kind, for each acre removed as a result of covered activities. *In-kind* is the establishment of the same wetland type as that lost to the covered activity, and that would establish the same type of ecological functions over time. For example, creating a pond with species similar to those found in a naturally occurring pond that is removed by covered activities would be in-kind creation. Creating open-water lacustrine habitat within a mosaic of fresh emergent wetland to replace loss of lacustrine natural community associated with giant garter snake habitat would also be in-kind.

The Conservancy will restore lacustrine areas in association with fresh emergent wetlands and uplands to replace loss of open water (lacustrine) habitat for giant garter snake or western pond turtle. Section 6.4.2.5, *Fresh Emergent Wetland Restoration Criteria and Techniques,* provides the requirements for lacustrine restoration as a component of giant garter snake habitat.

The Conservancy will restore or create ponds suitable for supporting California tiger salamander to replace loss of California tiger salamander aquatic habitat. This restoration will occur in the Dunnigan Hills area, and sites within the critical habitat unit will be prioritized. Pond creation will occur in damaged or disturbed areas to minimize the loss of existing habitats by the creation of new ones. The Conservancy may create ponds along streams or drainages provided this does not impair the hydrologic function of the stream. California tiger salamander ponds should not be created near streams where highflow events occur, as these ponds become inhabited by aquatic predators. The Conservancy may also create ponds in other appropriate areas away from streams or drainages as long as there is normally enough water, or a water source may be established (e.g., installation of a spring box or a well) to adequately maintain the necessary inundation schedule for the California tiger salamander.

The Yolo HCP/NCCP assumes that California tiger salamander ponds will be created rather than restored (i.e., development of the pond land cover type in an area that did not previously support it). If an existing or historic pond is degraded to the point that it lacks certain ecological functions that are essential to support covered species (e.g., a pond is filled with sediment and no longer holds water), then restoration of a pond may be counted toward the Yolo HCP/NCCP creation requirements for ponds.

The Conservancy will site new ponds to improve habitat connectivity for California tiger salamander. The Conservancy will identify gaps between occupied ponds that are greater than 1.3 miles (typical dispersal distance for this species) but short enough such that the creation of a pond may bridge the gap.

Where feasible, created ponds will rely on passive management (e.g., they will dry on their own periodically) to minimize the need for artificial draining. The Conservancy will design ponds so that they either do not retain water long enough to support establishment of bullfrogs, nonnative fish, or other predators of California tiger salamander, or can be artificially drained to deter such

establishment (described in Section 6.3.2, *Landscape-Level Biological Goals and Objectives*). Pond size will vary depending on the availability of water and site and watershed conditions. Pond depth will be sufficient to provide suitable breeding habitat for tiger salamanders and to preclude dense growth of emergent aquatic vegetation. The Conservancy will plant native emergent and aquatic vegetation in ponds to provide suitable breeding habitat for California tiger salamander.

6.4.2.6.2 Riverine

The Conservancy will restore one mile of riverine natural community (stream) for each mile removed as a result of covered activities. Stream restoration will occur primarily within the Cache Creek and Putah Creek corridors, Iin planning units 7 and 9.

Unlike other natural communities for which restoration is required, streams are unique—restoration occurs within the footprint of existing streams, rather than creating new wetland footprints. Stream restoration is defined as any substantial physical alteration to stream systems to return them to natural or seminatural conditions and to restore specific ecological function in a site where that function has been lost. For example, stream restoration includes removing hardscape features from concrete-lined or rip-rapped stream banks or restoring earthen or otherwise engineered channels to a more natural condition that allows for water infiltration, percolation, and groundwater recharge. Restoration may also include stabilizing stream banks to manage fine sediment inputs and preventing excessive erosion.

Stream restoration will be accomplished according to the level of effects on streams. One mile of stream will be restored for every mile of stream permanently affected by covered activities. Stream restoration will occur within the reserve system, or outside of the reserve system in partnership with private and public landowners. The Conservancy will conduct additional site assessments during implementation to identify specific restoration project areas based on the site selection guidelines described below.

Stream restoration may entail direct restoration (reconstruction of a channel) or incremental process restoration (installation of a natural structural feature to induce change in a channel), consistent with the guidelines of the *California Salmonid Stream Habitat Restoration Manual* (Flosi et al. 1998). Stream restoration can also be used to restore bank stability and reduce bank erosion; such restoration may improve aquatic habitat and water quality. Stream restoration techniques may affect the local slope, length, sinuosity, and dimensions of the channel, as well as alter basic channel processes related to sediment transport, and are very useful for treating the underlying causes of habitat degradation. Stream restoration under the Yolo HCP/NCCP will only be considered as a potential solution where there are chronic anthropogenic problems. In implementation, the effects of restoration on local channel geometry will be carefully considered and proper hydraulic analysis performed (Flosi et al. 1998).

6.4.3 Conservation Measure 3: Manage and Enhance the Reserve System

6.4.3.1 Introduction

This conservation measure describes the actions the Conservancy will apply to ensure the Yolo HCP/NCCP reserve system meets applicable biological goals and objectives related to natural community and covered species habitat management and enhancement. The management and enhancement will occur throughout the term of the Yolo HCP/NCCP Permits to meet the biological

objectives provided in Table 6-10, *Biological Goals and Objectives Associated with Conservation Measure 3.* The management actions described in this measure may be modified during the permit term based on results of monitoring and the best available scientific and technical information, as described in Section 6.5, *Monitoring and Adaptive Management.*

Natural Community Management is defined as the maintenance of ecological conditions and values within a natural community to prevent its degradation. Examples of natural community management include livestock grazing to prevent further spread of invasive species and maintaining water sources supporting covered species aquatic habitat.

Natural Community Enhancement is defined as manipulation of the physical, chemical, or biological characteristics of a land cover type to heighten, intensify, or improve one or more specific existing ecological function(s). Enhancement results in the gain of selected existing ecological function(s), but may also lead to a decline in other ecological function(s). Natural community enhancement implemented in the reserve system will result in an increase or improvement in specific ecological function without a change in the amount of land cover types. Examples of ecological functions include native species richness, species diversity, native vegetative cover, and wildlife habitat. An example of natural community enhancement is a substantial reduction in the density or biomass of invasive species (including their eradication, as described in Section 6.4.3.4.1, *Invasive Species Control Program*). Another example of natural community enhancement is planting valley oaks and other native trees in cultivated lands to provide nesting opportunities for Swainson's hawk and white-tailed kite. Most of the newly protected lands in the reserve system (about two-thirds of the newly protected lands) will remain as working agricultural landscapes where the private landowner retains responsibility for land management. The Conservancy will hold conservation easements that specify the terms related to habitat conservation, consistent with the Yolo HCP/NCCP's biological goals and objectives. The responsibilities of the Conservancy staff (or contractor) include monitoring reserve lands annually, thereby ensuring that the landowner's management is in compliance with the terms of the conservation easements.

Section 6.4.3.2 describes the purpose of this conservation measure, and provides a table indicating how the conservation measure will achieve each of the relevant biological goals and objectives. Section 6.4.3.3, *Management Plans,* describes the requirements for preparing reserve management plans for the reserve system. Section 6.4.3.4 describes landscape–level management and enhancement actions that will be implemented across the entire reserve system, including invasive species control, maintenance and enhancement of connectivity, and implementation of the pollinator strategy. Section 6.4.3.5 describes management actions specific to each natural community.

6.4.3.2 Purpose

This conservation measure provides guidance for meeting the biological objectives presented in Section 6.3, *Biological Goals and Objectives,* as they relate to management and enhancement. Table 6-10 lists the biological goals and objectives relevant to this conservation measure, and describes how this conservation measure will contribute toward each relevant biological objective.

6.4.3.3 Management Plans

The Conservancy will prepare and implement reserve management plans for protected natural communities and covered species habitats supported by those communities in the reserve system, as follows.

- Prepermit reserve land cultivated lands management plan. A single management plan will apply to all cultivated lands easements included in the HCP/NCCP as pre-permit reserve lands.
- Site-specific management plans. The Conservancy will also develop an individual management framework for each reserve property that is consistent with their associated reserve unit management plan. Appendix Q provides a template for these management plans. The Conservancy will provide an initial version of each site-specific management plan to the wildlife agencies for review and approval. Subsequent minor changes or updates to site-specific management plans require approval from both the landowner and the Conservancy, but do not require approval from wildlife agencies as long as the modifications are consistent with the reserve unit management plan (Section 7.3.6, *Reserve Management and Monitoring*, describes the specific conditions under which wildlife agency approval is required, and the process). Requested modifications to a site-specific management plan that are not consistent with the reserve unit management plan are considered a major modification and require that the proposed modification undergo a wildlife agency review and approval process.
- Reserve unit management plans. The Conservancy will also prepare reserve unit management plans that will guide management of the reserve as a whole. The Conservancy will update these reserve unit management plans every five years. The Wildlife Agencies will approve the reserve unit management plan updates.

Table 6-10. Biological Goals and Objectives Associated with Conservation Measure 3

Biological Goal or Objective	How Conservation Measure 3 (CM3) Advances a Biological Objective	Monitoring and Adaptive Management
Landscape-Level Biological Goals and Objectives		
Goal L-2: Ecological processes and conditions that sustain and reestablish natural communities and native species.		
Objective L-2.1: Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative plant and animal species.	CM3 will meet this objective as described in Section 6.4.3.4.1, *Invasive Species Control Program;* 6.5.8.1.1, *Cache Creek Resources Management Plan,* and 6.5.8.1.2, *Lower Putah Creek Coordinating Committee*.	Monitor invasive species consistent with Section 6.5.6.1.4, *Track Invasive Species.* Use monitoring information to target areas for invasive species removal and to assess the effectiveness of removal efforts. Adjust eradication and control techniques as needed to achieve objective. Also see species-specific sections of Section 6.5.6.3, *Species-Level Actions,* for monitoring invasive animals that adversely affect covered species, and monitoring species responses. Nonnative animal control programs will focus on nonnative species determined to adversely affect covered species populations and native biodiversity.
Objective L-2.2: Increase the abundance of native insect pollinators that support reproduction of native plant species and long-term production of agricultural crops that support habitat for covered and other native wildlife species.	CM3 will meet this objective as described in Section 6.4.3.4.3, *Pollinator Strategy*.	Coordinate with the NRCS, local, state, and federal land managers, and other entities to secure grants and other funding to monitor the results of pollinator conservation programs consistent with Appendix G, *Pollinator Conservation Strategy,* and to implement this monitoring.
Objective L-2.3: Allow for natural fluvial processes (erosion, deposition, meandering channels) along river reaches within the reserve system, consistent with goals of the Cache Creek Resources Management Plan and other relevant creek management plans that balance the need for natural fluvial processes with flood and erosion control needs.	The CCRMP and LPCCC will manage the stream systems to allow for natural fluvial processes consistent with their management plans.	Visually evaluate the extent to which stream reaches are allowing natural fluvial processes within protected riparian areas throughout the Plan Area, and areas outside the reserve system along Cache Creek and Putah Creek.

Biological Goal or Objective	How Conservation Measure 3 (CM3) Advances a Biological Objective	Monitoring and Adaptive Management
Cultivated Lands Seminatural Community		
NC-CL1: Cultivated lands that support habitat for covered and other native wildlife species.		
Objective NC-CL1.4: Maintain or enhance the habitat value of the cultivated lands natural community in the reserve system for raptors.	CM3 will meet this objective as described in Section 6.4.3.5.1, *Cultivated Lands Seminatural Community*.	Monitor cultivated lands consistent with *Section 6.5.6.2.1, Cultivated Lands Monitoring Actions* and the species-specific monitoring sections for covered species using cultivated lands, to assess the use of cultivated lands by covered species and identify potential adjustments in management practices; identify and prioritize areas for enhancement; and adjust enhancement techniques (e.g., configuration, type, or maintenance of hedgerows) based on monitoring and the best available information.
Grassland Natural Community		
Goal NC-G1: Large, contiguous patches of grassland, and smaller patches within a mosaic of other natural community types, to sustain and enhance the distribution and abundance of associated covered and other native species in the Conservation Reserve Area.		
Objective NC-G1.2: Maintain and enhance the functions of protected grassland in the reserve system as habitat for covered and other native species by increasing burrow availability for burrow-dependent species, and increasing prey abundance and accessibility for grassland-foraging species.	CM3 will meet this objective as described in Section 6.4.3.5.2, *Grassland Natural Community*.	Monitor cultivated lands consistent with *Section 6.5.6.2.2, Grassland Monitoring Actions.* Evaluate the use of grassland by covered species and identify and monitor indicators to evaluate the effectiveness of management; identify and prioritize areas for enhancement; adjust enhancement techniques based on monitoring and best available information.
Valley Foothill Riparian Natural Community		
Goal NC-VFR1. Functional valley foothill riparian natural community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-VFR1.1: Protect, manage, and enhance 1,600 acres of unprotected valley foothill riparian distributed primarily in planning units 7 and 9.	CM3 will meet this objective as described in Section 6.4.3.5.3, *Valley Foothill Riparian Natural Community*.	Monitor consistent with Section 6.5.6.2.5, *Valley Foothill Riparian Monitoring Actions,* Section 6.5.6.3.2, *Valley Elderberry Longhorn Beetle,* Section 6.5.6.3.8, *Western Yellow-billed Cuckoo, and* Section 6.5.6.3.10, *Least Bell's Vireo,* to inform the use of various alternative management tools described in this Conservation Measure.

Biological Goal or Objective	How Conservation Measure 3 (CM3) Advances a Biological Objective	Monitoring and Adaptive Management
Alkali Prairie Natural Community		
Goal NC-AP1: A reserve system that protects the habitat values of the remaining alkali prairie natural community in the Plan Area.		
Objective NC-AP1.3: Implement management activities (primarily control of nonnative plants and human activities) within the Woodland Regional Park to reduce adverse effects on habitat conditions and enhance the functions of alkali prairie within the Reserve System as habitat for covered and other native species, such as saltgrass.	CM3 will meet this objective as described in Section 6.4.3.5.4, *Alkali Prairie Natural Community*.	Monitor consistent with Section 6.5.6.3.1, *Palmate-bracted Bird's Beak*. Evaluate effectiveness of enhancement actions in terms of palmate-bracted bird's beak populations and adjust actions as needed to improve results.
Fresh Emergent Wetland Natural Community		
Goal NC-FEW1: Functional fresh emergent wetland natural community that benefits covered species and promotes native biodiversity in the Plan Area.		
Objective NC-FEW1.3: Enhance the functions of protected fresh emergent wetland as habitat for covered and other native species.	CM3 will meet this objective as described in Section 6.4.3.5.5, *Fresh Emergent Wetland Natural Community/Lacustrine and Riverine Natural Community*.	Monitor consistent with Section 6.5.6.2.4, *Fresh Emergent Wetland Complex Monitoring Actions.* Evaluate effectiveness of monitoring actions to inform use of the various management tools described in this Conservation Measure.
Palmate-bracted Bird's Beak		
Goal PBBB1: Provide for the conservation of palmate-bracted bird's-beak in the Plan Area.		
Objective PBBB1.1 Increase the 10-year running average of the size of the palmate-bracted bird's beak population on Woodland Regional Park by 10%, by managing and enhancing habitat.	CM3 will meet this objective as described in Section 6.4.3.5.4, *Alkali Prairie Natural Community.*	Monitor populations consistent with section 6.5.6.3.1, *Palmate-bracted Bird's Beak.* Identify stressors and adjust the management approach as needed to reduce stressors if feasible. If conditions beyond the Conservancy's control such as persistent drought and climate change lead to population decline, implement changed circumstances provisions (Chapter 7).

Biological Goal or Objective	How Conservation Measure 3 (CM3) Advances a Biological Objective	Monitoring and Adaptive Management
California Tiger Salamander		
Goal CTS1: Provide for the conservation of California tiger salamander in the Plan Area.		
Objective CTS1.2: Within the 600 acres of protected lacustrine and riverine natural community (Objective NC-LR1.1), protect at least 36 acres of California tiger salamander aquatic habitat. Restore or create 24 acres of aquatic habitat, and restore or create an additional acre of aquatic habitat for each acre lost as a result of covered activities. Within the protected and restored aquatic habitat, include at least five California tiger salamander breeding pools that are each found to support all life stages of the salamander through all water year types consistent with the occupancy commitment for this species in Table 6-2(c).	The Conservancy will manage and enhance grassland and aquatic habitat for California tiger salamander as described in Section 6.4.3.5.2, *Grassland Natural Community*, and Section 6.4.3.5.5, *Fresh Emergent Wetland Natural Community/Lacustrine and Riverine Natural Community,* to achieve favorable conditions for supporting California tiger salamander to meet this objective.	Monitor consistent with Section 6.5.6.3.3, *California Tiger Salamander,* including species surveys in breeding ponds to determine whether this objective is being met. Evaluate correlations between number of salamanders in breeding pools and surrounding land uses. Adjust management and enhancement techniques as needed based on monitoring and the best available information to meet the occupancy objective and maximize occupancy in breeding pools.
Western Pond Turtle		
Goal WPT1: Provide for the conservation of the western pond turtle population in the Plan Area.		
Objective WPT1.1: Within protected and restored lacustrine and protected and enhanced riverine natural communities, add logs, rocks, and/or emergent vegetation for basking sites and other WPT habitat features and meet the occupancy commitment for this species in Table 6-2(c).	The Conservancy add rocks and logs as needed to protected and restored fresh emergent wetlands and lacustrine and riverine natural communities, as described in Section 6.4.3.5.5, *Fresh Emergent Wetland Natural Community/Lacustrine and Riverine Natural Community.*	In annual reports, report the installation of logs or rocks or planting of emergent vegetation. Document species response to creation of basking sites. Document occupancy.
Giant Garter Snake		
Goal GGS1: Provide for the conservation of giant garter snake in the Plan Area, including the Willow Slough/Yolo Bypass subpopulation and a segment of the Colusa Basin subpopulation, and connectivity between the two subpopulations.		
Objective GGS1.1: Protect and manage the 2,800 acres of protected rice land (Objective NC-CL1.2) in modeled giant garter snake habitat. Suitable emergent marsh can be substituted for rice land.	CM3 will meet the management component of this objective as described in Section 6.4.3.6.4, *Giant Garter Snake*.	Monitor consistent with Section 6.5.6.3.5, *Giant Garter Snake*. Monitor populations and evaluate species responses to management and enhancement. Adjust management and enhancement techniques as needed based on monitoring results and the best available information. Monitor stressors on giant garter snake populations and adjust management to reduce stressors

Biological Goal or Objective	How Conservation Measure 3 (CM3) Advances a Biological Objective	Monitoring and Adaptive Management
Objective GGS1.2: Protect and manage 1,160 acres of upland natural communities (Objective L-1.1) to provide active season upland movement habitat and at least 2,315 acres to provide overwintering habitat for giant garter snake.	CM3 will meet the management component of this objective as described in Section 6.4.3.6.4, *Giant Garter Snake,* and Section 6.4.3.5.5, *Fresh Emergent Wetland Natural Community/Lacustrine and Riverine Natural Community.*	See above.
Objective GGS1.3: Protect, restore, and manage the 500 acres of fresh emergent wetland natural community (Objective NC-FEW1.1), at least 420 acres of the lacustrine/riverine natural community (Objective NC-LR.1.1), the restored fresh emergent wetland (Objective NC-FEW1.2), and restored lacustrine and riverine natural community (Objective NC-LR1.2) to conserve the giant garter snake. Ensure at least 80% of the aquatic habitat is perennial, and the remainder provides aquatic habitat for the giant garter snake during the active season at least through July of each summer.	CM3 will meet the management component of this objective as described and Section 6.4.3.5.5, *Fresh Emergent Wetland Natural Community/Lacustrine and Riverine Natural Community*.	See above.
Swainson's Hawk		
Goal SH1: Provide for the conservation of Swainson's hawk in the Plan Area.		
Objective SH1.5: In addition to restoration of riparian natural community (Objective NC-VFR1.2), establish trees suitable for Swainson's hawk nesting (native trees at least 20 feet in height, particularly valley oaks if conditions are suitable) within the cultivated lands reserve system to meet a density of at least one tree per 10 acres (protected existing trees count toward the density requirement). Riparian restoration adjacent to these community types will also count toward nesting tree establishment.).	CM3 will meet this objective as described in Section 6.4.3.6.1, *Swainson's Hawk and White-tailed Kite*.	Monitor consistent with Section 6.5.6.3.6, *Swainson's Hawk.* Evaluate locations of nest trees to identify areas for planting trees. Monitor protected and planted trees for Swainson's hawk nesting. Evaluate the need for tree planting and other management actions based on population trends and other relevant factors. If population is declining due to actions beyond the control of the Conservancy such as changing crop patterns, implement changed circumstances as described in Chapter 7.

Biological Goal or Objective	How Conservation Measure 3 (CM3) Advances a Biological Objective	Monitoring and Adaptive Management
Western Burrowing Owl		
Goal BO1: Provide for the conservation of burrowing owl in the Plan Area.		
Objective WBO1.5: Implement management and enhancement practices to encourage burrowing owl occupancy on preserve lands. Management practices include maintaining appropriate vegetation height, minimizing the spread of invasive weed species, and encouraging the presence of ground squirrels. Enhancement practices include the installation of artificial burrows where natural burrows are lacking, creating berms as future burrowing sites, and creation of debris piles to enhance prey populations. These actions are designed to maintain existing populations and encourage the expansion of nesting populations in the Plan Area.	CM3 will achieve this objective by meeting the conservation commitments described in Section 6.4.3.6.5, *Western Burrowing Owl.*	Monitor consistent with Section 6.5.6.3.9 *Western Burrowing Owl*. Monitor for occupancy and status of breeding pairs. Evaluate each property to ensure appropriate management of vegetation and condition of enhancements including nest boxes, perches, and debris piles.
Bank Swallow		
Goal BS1: Provide for the conservation of bank swallow in the Plan Area.		
Objective BS1.2: Manage the 50 acres of protected bank swallow habitat (Objective BS1.1) to enhance bank swallow foraging habitat value by promoting open grass and forb vegetation, and controlling invasive plant species.	CM3 will meet this objective as described in Section 6.4.3.6.2, *Bank Swallow*.	Monitor consistent with Section 6.5.6.3.11, *Banks Swallow,* to assess bank swallow population trends and evaluate correlations with habitat conditions, and adjust management techniques as needed based on monitoring results and the best available information.
Tricolored Blackbird		
Goal TRBL1: Provide for the conservation of tricolored blackbirds in the Plan Area.		
Objective TRBL1.4: Maintain at least 300 acres, consisting of at least 150-acre blocks, of tricolored blackbird foraging habitat in the reserve system without pesticides.	The Conservancy will establish 300 acres of conservation easements that include pesticide restrictions for tricolored blackbird.	Monitor compliance with conservation easement restrictions.
Objective TRBL1.5: Manage and enhance protected tricolored blackbird nesting habitat to maintain habitat value for this species.	The Conservancy will manage and enhance protected tricolored blackbird nesting habitat as described in Section 6.4.3.6.3, *Tricolored Blackbird.*	Monitor habitat conditions and occupancy.

Management plans will provide the information necessary to guide habitat enhancement and management actions to achieve the biological objectives established for the conserved lands addressed by each plan. The Conservancy will initiate the baseline surveys as soon as feasible after acquisition. Within two years of acquisition of conserved parcels, the Conservancy will complete baseline ecological surveys to collect the information necessary to assess the level of ecological condition and function of conserved species habitats and supporting ecosystem processes, and the functional connectivity of conserved lands within and among habitats.[14] This will be added to the data collected during preacquisition assessments. Section 6.5, *Monitoring and Adaptive Management,* provides more detail on baseline ecological surveys. The collected information will also establish the baseline ecological conditions from which the effectiveness of enhancement and management measures can be evaluated through subsequent effectiveness monitoring and the adaptive management program (Section 6.5, *Monitoring and Adaptive Management*). Management plans will include avoidance measures to implement prior to completion of baselines surveys, to ensure management actions do not adversely affect areas where covered species are likely to occur.

Management plans will include all the information specified in a wildlife agency approved management plan template. Based on the assessment of existing site conditions (e.g., soils, hydrology, vegetation, occurrence of covered species) and site constraints (e.g., size, infrastructure, adjacent land uses), and depending on biological objectives of the conserved lands, management plans will specify measures for enhancing and maintaining habitat as appropriate.

The Conservancy will periodically update management plans to incorporate changes in maintenance, management, and monitoring requirements based on new knowledge gained through the adaptive management program over the term of the Yolo HCP/NCCP.

6.4.3.4 Landscape Level Management and Enhancement

6.4.3.4.1 Invasive Species Control Program

The Conservancy will develop a plan for the control of invasive animal and plant species that could substantially degrade the functions of protected natural communities as habitat for covered and other native species in the reserve system.

Nonnative invasive plant species currently of highest concern in the Plan Area include giant reed, ravenna grass, tamarisk, Himalayan blackberry, eucalyptus, perennial pepperweed, Italian ryegrass, barbed goatgrass, medusahead grass, yellow starthistle, and parrot feather. These species dominate or are a significant component of some mapped patches of grassland and riparian natural communities and have the potential to spread to other sites in the Plan Area.

The invasive species control program will identify protocols for evaluating known and identifying new occurrences of disruptive invasive species on reserve system lands. The program will identify protocols for the Conservancy or landowners to assess and treat invasive species that are disruptive to ecosystems and habitat values for covered species. The Conservancy will coordinate development and implementation of the control program with governmental agency control programs and efforts

[14] Note that pre-acquisition assessments are required for all properties that are brought into the reserve system, but such surveys serve a different purpose (to determine suitability for acquisition) and are not necessarily of the same type or level of detail as baseline surveys.

of other conservation programs. Monitoring and control requirements for specific reserve system lands will be incorporated into the management plans (Section 6.4.3.3, *Management Plans*).

Elements of the invasive species control plan will include the following:

- Protocols for periodically surveying for and assessing the abundance of nonnative predators and competitors on reserve system lands,
- Protocols for periodically surveying for and assessing the occurrence and abundance of invasive nonnative plants on reserve system lands,
- A brown-headed cowbird monitoring and control program (see discussion below),
- Methods for assessing the degree of biological effect nonnative plant and animal species have on covered and other native species within the reserve system,
- Methods for assessing the threat of nonnative plant and animal species from adjacent lands becoming established on reserve lands,
- Methods for assessing the threat of spread of nonnative plants and animals from reserve system lands onto adjacent lands,
- A decision-making process for determining the need for implementing management actions to control nonnative species,
- A description of potential nonnative species control methods,
- A process for developing and implementing monitoring necessary to assess the effectiveness of implemented control methods, and
- Develop a set of protocols and techniques for controlling and eliminating invasive species (hand removal, depredation, etc.).

Invasive Nonnative Plants. Specific elements of the control program for invasive plant species will include the following:

- Gathering and maintaining information regarding locations of large scale infestation by nonnative vegetation types, including giant reed, tamarisk, Himalayan blackberry, and eucalyptus woodland within the Plan Area;
- Methods for assessing degree of biological effect of nonnative plant species on covered and other native species within the reserve system to set priorities for and guide control efforts. The evaluation process should consider potential benefits provided by nonnative communities to covered species, such as the use of Himalayan blackberry stands by tricolored blackbird for breeding and the use of eucalyptus groves by Swainson's hawk and white-tailed kite for nesting;
- Methods for assessing threats from the spread of nonnative plants from reserve system lands to adjacent lands and vice versa; and
- Methods for removing invasive plant species.

Nonnative Aquatic Vertebrates. Several nonnative vertebrates, including various fish species, bullfrog, and turtles may compete with or prey upon covered species in aquatic habitats, including the California tiger salamander, western pond turtle, and giant garter snake. Control of nonnative fish and aquatic amphibians and reptiles on reserve system lands includes measures to modify habitat conditions to encourage native aquatic species and discourage nonnatives, and to directly

control invasive species populations (e.g., capture and removal, temporary dewatering of impoundments) if they become a threat to covered species on the reserve system lands.

Brown-Headed Cowbird. The brown-headed cowbird poses a threat to the conservation of least Bell's vireo and other native riparian bird species. The brown-headed cowbird is a native North American species that has expanded its range into central California in response to the conversion of the landscape to livestock grazing and agriculture over the last 150 years. The cowbird is an obligate brood parasite that suppresses the productivity of host species by laying its eggs in the host species' nests and the cowbird young competing with or displacing the host bird's young. The cowbird is a primary direct cause for the near elimination of the least Bell's vireo from the Central Valley (see Appendix A, *Covered Species Accounts*).

The cowbird is nearly ubiquitous in the Plan Area, while the least Bell's vireo is highly localized and not known to be regularly established as a breeding species in the Plan Area. Therefore, it is not necessary or practical to conduct large-scale control or population reduction of the cowbird. Rather, control efforts will apply only to the immediate vicinity of known least Bell's vireo nesting localities or as adaptive management experiments at removing cowbirds from areas to encourage establishment of least Bell's vireo nesting. Measures to control brown-headed cowbird include the following:

- Cowbird surveys, cowbird habitat suitability assessments, and covered species reproductive monitoring on Yolo HCP/NCCP reserve system lands that are occupied or become occupied by the least Bell's vireo to assess risks of parasitism to covered host species;
- Localized, seasonal, brown-headed cowbird control on reserve system lands occupied by the least Bell's vireo where cowbirds may pose a threat to reproduction, using methods approved by USFWS and CDFW; and
- Modification of habitat conditions that may be encouraging cowbird use on reserve system lands occupied by least Bell's vireo.

6.4.3.4.2 Management and Enhancement of Connectivity

The Conservancy will identify and delineate areas among lands addressed under each management plan where connectivity among existing habitats is low, and where habitat enhancement and management actions would bolster the viability of existing habitat patches supporting a metapopulation of covered species. The Conservancy will include provisions on managing gaps and barriers between habitat patches in management plans and will design habitat enhancement methods that support connectivity at the landscape level.

Examples of actions to enhance gap permeability include growing of vegetation (e.g., selecting restoration and enhancement sites to increase connectivity) and ceasing or reducing mowing or other vegetation management practices to increase habitat permeability for a variety of terrestrial species. Where possible, surface roads on conservation lands will be minimally maintained and will be allowed to develop vegetated shoulders and center strips to reduce their fragmenting effect on small terrestrial species (e.g., rodents, amphibians, reptiles). Other measures, such as removal of fences and barriers, ceasing bank vegetation management, and allowing revegetation of denuded or altered areas also support connectivity between habitat patches.

6.4.3.4.3 Pollinator Strategy

As grant funding becomes available, the Implementing Entity will undertake the following types of actions to support implementation of the recommended conservation actions identified in the Pollinator Conservation Strategy (see Appendix G, *Pollinator Conservation Strategy*).

Communicate and Coordinate with Plan Area Agricultural Programs

The Conservancy will maintain ongoing communications with the Natural Resources Conservation Service (NRCS), Yolo County Farm Bureau, Yolo County Agriculture Department and local landowners to identify and develop opportunities and incentives for implementation of Pollinator Conservation Strategy conservation actions within the Plan Area.

Assist Plan Area Conservation and Agricultural Programs to Secure Funding

The Conservancy, where consistent with Yolo HCP/NCCP conservation objectives, will coordinate with the NRCS, local, state, and federal land managers, and other entities to secure grants and other funding for implementation of Pollinator Conservation Strategy conservation actions.

Assist with Public Outreach

The Conservancy will coordinate with local conservation and agricultural programs to develop and disseminate information regarding the importance of native insect pollinators to Plan Area ecosystems and economy. Technical information will be disseminated, describing conservation actions that can be implemented by landowners to improve native insect pollinator habitat conditions and sources of funding to assist with their implementation.

6.4.3.5 Natural Community Management and Enhancement

6.4.3.5.1 Cultivated Lands Seminatural Community

Landowners will manage protected HCP/NCCP cultivated lands to maintain or increase the habitat functions they support for covered and other native wildlife species that use cultivated lands. Depending on site-specific conditions, appropriate management actions on permanently protected cultivated lands may include the following:

- Cultivation of crop types that provide foraging habitat for covered species (see Section 6.4.3.6, *Covered Species Level Management*, for species-specific foraging habitat needs), inclusive of crop types of lesser foraging value that must be grown in rotation to maintain long-term viability for cultivation of the targeted crop types (orchards or vineyards will not be planted on HCP/NCCP lands, as these crops have no habitat value for the covered species);
- Planting of cover strips and hedgerows (to include valley oaks and elderberry shrubs where conditions are favorable for these species) to provide rodent habitat to increase prey abundance for covered species and other raptors, and additional covered species nesting opportunities;[15]

[15] The cost analysis assumed planting an estimated 1.21 acres of hedgerows per acre of non-rice cultivated land, with hedgerow widths of 20 feet. The actual amount of hedgerows will depend on site conditions on the reserve lands. Some sites may already have sufficient hedgerows, and conditions on other sites may be unfavorable for planting hedgerows.

- Planting native trees, particularly valley oaks, and shrubs to establish habitat for covered and other native wildlife species (e.g., Swainson's hawk and white-tailed kite nesting habitat, raptor hunting perches);
- Maintaining water in canals and ditches during the active period (early spring through mid-fall) for the giant garter snake, western pond turtle, and other native wildlife species; and
- Modifying ditch configurations within rice growing areas to increase basking and nursery habitat for the giant garter snake.
- Voluntary pesticide use reduction, consistent with Policy CO-2.19 of the Yolo County 2030 General Plan, which supports the use of sustainable farming methods that minimize the use of pesticides. (Pesticide use is not a covered activity under the HCP/NCCP, therefore pesticide use must avoid take of Covered Species.)

Agricultural conservation easement requirements related to allowable farming practices on Yolo HCP/NCCP agricultural lands are described in Section 7.5.5, *Conservation Easements.*

6.4.3.5.2 Grassland Natural Community

Landowners will manage the protected grassland natural community to maintain and enhance functions for California tiger salamander, giant garter snake, white-tailed kite, Swainson's hawk, western burrowing owl, and tricolored blackbird. Landowners will also manage grassland to benefit native species diversity and general ecosystem function.

A key goal of management of grassland will be to increase the availability of fossorial rodents, especially ground squirrels, to provide prey for covered raptors and burrows for amphibians (including California tiger salamander) and burrowing owls. Depending on site-specific conditions, appropriate management actions may include the following:

- Prohibiting rodenticides activities on conservation lands, except where required for public safety or to protect key resource values or important infrastructure (rodenticides are only allowed on reserve system lands upon wildlife agency approval);
- Creating debris piles to provide habitat for small mammals and birds; and
- Managing grazing to improve the abundance of fossorial mammals.

Other habitat enhancement and management actions to improve the functions of protected grassland land cover types as habitat for covered species, depending on site-specific conditions, could include the following actions:

- Managing grazing to achieve desired habitat conditions for targeted covered species;
- Use of fire, managed grazing, or other vegetation management techniques to influence vegetation structure or composition, or increase the absolute cover and diversity of native plant species and to control undesirable nonnative plant species;
- Installation of fencing, water sources, or other livestock management improvements to improve control of livestock in key habitat areas and effects of livestock grazing across the landscape;
- Installing artificial nesting burrows for western burrowing owl to facilitate use of unoccupied areas where burrows are scarce;

- Localized application of herbicides to remove heavy infestations of nonnative plants. Herbicide use is not a covered activity under the Yolo HCP/NCCP; and
- Reseeding of native plant species.

6.4.3.5.3 Valley Foothill Riparian Natural Community

The Conservancy or landowners will manage and enhance protected and restored riparian habitats to maintain and enhance this natural community and habitat functions for valley elderberry longhorn beetle, western pond turtle, Swainson's hawk, white-tailed kite, western yellow-billed cuckoo, and least Bell's vireo.

Depending on site-specific conditions, appropriate management actions for protected valley foothill riparian habitats may include the following:

- Managing livestock grazing to maintain favorable habitat conditions for covered species,
- Controlling nonnative predators and invasive plant species,
- Modifying vegetation management measures along canals and sloughs to encourage development of woody and herbaceous riparian vegetation that is compatible with water management programs, and
- Planting native species to improve habitat structure and species composition.

The Conservancy will coordinate enhancement and management of Yolo HCP/NCCP protected and restored valley foothill riparian natural community with existing riparian habitat management and restoration programs and plans, including but not limited to:

- Willow Slough Watershed Integrated Resources Management Plan (Jones & Stokes Associates, Inc. 1996),
- Yolo County Oak Woodland Conservation and Enhancement Plan (Yolo County Planning, Resources, and Public Works Department 2007), and
- Capay Valley Conservation and Restoration Manual, 2nd edition (Yolo County Resource Conservation District 2002).

Riparian management and enhancement carried out by the Lower Putah Creek Coordinating Committee (LPCCC) and through the Cache Creek Resources Management Plan (CCRMP) will contribute toward achieving the Yolo HCP/NCCP biological goals and objectives. The LPCCC will monitor and manage invasive species, propagate and plant riparian species in disturbed areas, and restore stream banks within the lower section of Putah Creek. The LPCCC has a native plant nursery that will serve as a source for local plant species to be used in riparian enhancement and restoration projects for the Yolo HCP/NCCP. Through the CCRMP, Yolo County will track and manage invasive species, remedy off-road vehicle damage, and plant shrubs and native trees in disturbed areas within the riparian natural community along Cache Creek Corridor.

6.4.3.5.4 Alkali Prairie Natural Community

The Conservancy will coordinate enhancement and management of Yolo HCP/NCCP protected alkali prairie natural community with existing alkali prairie natural community management and restoration programs and plans, as well as existing conservation easement requirements and prohibitions, including:

- *Alkali Grasslands Adaptive Management Plan* (CNLM 2006); and
- *(Revised) Five-year (2014-2019) Management Plan – Alkali Grasslands Preserve (N024)* (CNLM 2014).

The Conservancy will manage and enhance the alkali prairie natural community on the Woodland Regional Park (Figure 6-4, *Alkali Prairie Natural Community and Baseline Public and Easement Lands*). Management and enhancement activities will have the specific goal of improving habitat for palmate-bracted bird's-beak and increasing the population by at least 10%. All recreational uses on the site will avoid the alkali prairie natural community.

The Conservancy will prepare a management plan that will guide management and enhancement activities for alkali prairie natural community. It will focus specifically on controlling Italian ryegrass and other invasive species, and maintaining adjacent habitat for pollinators, but may also include hydrologic modifications and other enhancement identified during the monitoring and adaptive management process. The Conservancy will monitor the enhanced sites to assess the effectiveness of these actions toward improving habitat for palmate-bracted bird's beak and increasing the palmate-bracted bird's-beak population.

6.4.3.5.5 Fresh Emergent Wetland Natural Community/Lacustrine and Riverine Natural Community

The fresh emergent wetland natural community and the lacustrine and riverine natural community are addressed together in this section, because these natural communities co-occur and their management and enhancement needs are similar. Fresh emergent wetlands and lacustrine (open water) areas such as ponds will be managed to maintain and enhance wetland function and hydrogeomorphic processes through site-specific management practices. Covered species using these natural communities include giant garter snake, tricolored blackbird, and western pond turtle. California tiger salamanders use ponds that are typically seasonal, and are not expected to co-occur with giant garter snake, tricolored blackbird, and western pond turtle. Many of the management and enhancement needs, however, are similar.

Depending on site-specific conditions, management practices will include the following:

- Controlling nonnative plant species and restoring native plant species;
- Increasing relative cover of native vegetation;
- Increasing logs and rocks as basking sites for western pond turtle;
- Managing livestock grazing to maintain favorable habitat conditions for covered species;
- Managing water sources supporting wetlands;
- Erosion control;
- Maintaining or enhancing adjacent upland habitats to support upland transitions;
- Maintaining sufficient water levels and water quality throughout the year to support emergent vegetation, aquatic food webs, and diverse aquatic habitat structure;
- Protecting upland basking and overwinter/hibernation sites, including rodent burrows;
- Planting emergent vegetation along pond margins to increase habitat functions for breeding California tiger salamander, western pond turtle, giant garter snake, and tricolored blackbird;

- Maintaining and improving pond water control structures and water supplies;
- Controlling nonnative predators in ponds (e.g., bullfrog); and
- Increasing or decreasing ponding (duration and frequency) to improve wetland functions and to control nonnative invasive species.

The Conservancy or landowners will manage protected and restored giant garter snake habitat to provide water over the course of the giant garter snake's active season at suitable elevations and depths. Water levels will be managed to ensure that hibernacula burrows will not be flooded during winter. The Conservancy and landowners will adaptively manage drawdown of water levels during winter to ensure residual habitat for prey species. In addition, the Conservancy will monitor bullfrog abundance in restored and protected wetlands and the Conservancy or landowners will control them if necessary to substantively improve juvenile giant garter snake survival rates by reducing the predation loss. Habitat restoration designs will incorporate upland habitat areas that support movement and aestivation habitat. The Conservancy or landowners will manage uplands near protected and restored emergent wetlands to provide small mammal burrows and soil crevices located above prevailing flood elevations throughout its winter dormancy period (USFWS 2006c). Adequate burrows are typically located in sunny exposures along south and west facing slopes.

Vegetation Management

Vegetation management is a critical component of optimizing the habitat function of ponds for covered species. Vegetation management will involve several techniques, often used in concert, to achieve the species composition and habitat structure necessary to benefit covered and other native species.

To support successful reproduction for the California tiger salamander, ponds providing its aquatic habitat must remain inundated long enough to support successful metamorphosis, which is typically December through May (U.S. Fish and Wildlife Service 2010). The California tiger salamander typically use ponds free of emergent vegetation. Aquatic vegetation can be compatible, especially submerged vegetation, but salamander breeding appears to be rare with moderate levels of emergent vegetation. Allowing limited livestock access to a ponds providing habitat for California tiger salamander will help maintain their usefulness as habitat value by preventing excessive plant growth that can lead to rapid sedimentation (U.S. Fish and Wildlife Service 2002). Seasonally limited grazing can be effective at reducing competition from nonnative plant species in seasonal wetlands (Marty 2005).

Vegetation management for covered species in and around ponds can involve increasing or decreasing vegetation, as follows.

- Increasing vegetative cover: Some existing ponds or wetlands and all created ponds or restored wetlands will be planted with native vegetation appropriate for the surrounding natural communities for replacement of lost ecological services and function.
    - Planting of tall emergent vegetation such as bulrushes or willows in ponds that lack vegetation can improve breeding habitat and cover for western pond turtle and giant garter snake. Further, tall emergent vegetation, such as bulrushes, can provide roost and nest sites for tricolored blackbirds where the ponds are located near foraging habitat.
    - Ponds with adjacent grassland will benefit from selective seeding of native forbs or grasses in uplands surrounding the pond fringe.

- Tall emergent vegetation will not be established in California tiger salamander breeding pools as this encourages nonnative species establishment, and pools that support emergent vegetation usually hold water too long to support a healthy population of California tiger salamander.

- Decreasing vegetative cover: Vegetation may have to be removed from ponds where little open water remains, to improve conditions for California tiger salamander, western pond turtle or giant garter snake. Vegetation removal can be accomplished through grazing, selective herbicide application using label-approved application techniques and in calm winds, or mechanical means. Vegetation removal will follow these guidelines:
  - Prescribed burns may be used to control nonnative vegetation around ponds and wetlands and within pond or wetland complexes. To prevent impacts on giant garter snake, prescribed burns would occur during timeframes where giant garter snake are (1) underground and insulated (requires burning during winter [December through February]), and/or (2) fully active above ground or in water (May 1 through October 1, avoiding the transitional periods when giant garter snake are on the surface basking but are not at optimal active temperatures [spring and fall]), capable of escaping the brief burst of heat without injury.
  - Mechanical removal of vegetation would occur after the breeding season for wetland- and pond-dependent wildlife, including nesting migratory birds, to minimize impacts.
  - In cases where covered species are dependent on nonnative vegetation (e.g., tricolored blackbirds nesting in Himalayan blackberry) the removal of nonnative vegetation will be undertaken in phases over a three to four-year period and replaced with the appropriate native vegetation. Livestock grazing will be introduced or continued at some wetlands and ponds to eliminate or reduce cover of exotic plants and to maintain ponds by preventing excessive plant growth when such a technique is consistent with maintaining values for covered species. Grazing rotation and fencing can also reduce the erosive impacts described above. Ford et al. (2012) provide details about pond habitat quality for the California tiger salamander. The period of a pond's inundation is critical to habitat value as well as the livestock operation that is associated with the pond's establishment and maintenance. Ponds that draw down in the late spring or early summer can become unsuitable for livestock use due to lack of water and dangerous muddy banks.

Overgrazing by cattle can cause trampling of vegetation, soil compaction, development of "cow contours," and bank destabilization. Fencing ponds and wetlands has been shown to be a rapid, successful, and cost-effective method of enhancing some wetlands. After fencing, vegetation cover and wetland species diversity can increase substantially in stock ponds and other permanent or near-permanent freshwater wetlands that have been degraded by cattle grazing (Contra Costa Water District 2002). In this HCP/NCCP, fencing locations and specifications will depend on several factors, including site-specific conditions and the biological objectives the actions are addressing. Fencing wetlands may not be appropriate in locations where retaining open water for species such as western pond turtle and California tiger salamander is an objective. In such cases, fencing half of a pond or wetland (split fencing) may accommodate the needs of multiple covered species (U.S. Fish and Wildlife Service 2002).

Fresh emergent wetland may need to be actively managed to maintain breeding colonies of tricolored blackbird. Tricolored blackbirds need large, continuous stands of bulrush/cattail that are at least 30 to 45 feet wide to provide adequate space for breeding as well as protection from

predators. A 50:50 to 60:40 ratio of bulrush/cattail marsh to open water should be maintained in areas intended to support tricolored blackbird nesting. Tricolored blackbirds need young, lush vegetation rather than senescent stands of vegetation. To maintain these conditions, it may be necessary to burn, mow, or disc bulrush/cattail vegetation every 2 to 5 years, to remove dead growth and encourage the development of new vegetative structure.

Water and Other Management

Repairs could be made to improve water retention in ponds created as stock ponds that are not retaining water due to leaks and, as a result, not functioning properly as habitat for covered species. Additionally, pond capacity and water duration can be increased (e.g., by raising spillway elevations) to support covered species populations.

To retain the habitat quality of ponds and wetlands over time, occasional sediment removal may be needed to address the buildup of sediment that results from adjacent land use or upstream factors. Dredging will be conducted during the non-breeding periods of covered and other native species.

The Conservancy will also work with private landowners who own key ponds to secure funding to improve and maintain their ponds and wetlands within the reserve system as habitat for covered species (e.g., tricolored blackbird, California tiger salamander, giant garter snake, or western pond turtle). The Conservancy will help landowners apply for existing grants to enhance ponds and freshwater emergent wetlands on their land (e.g., North American Wetlands Conservation Act Small Grants Program [USFWS], or Environmental Quality Incentives Program of the Farm Bill [USDA Natural Resources Conservation Service]). The Conservancy will work closely with existing organizations that have strong relationships with private landowners such as the Natural Resources Conservation Service, the Yolo Resource Conservation District, and the California Cattlemen's Association. A program could be developed in the Plan Area modeled after the successful Alameda County Conservation Partnership in Alameda County. This program provides technical assistance, funding, and permit streamlining to private landowners wishing to maintain and enhance stock ponds to benefit endangered species.

Coarse woody debris or anchored basking platforms will be installed in ponds to improve habitat for western pond turtles (Hays et al. 1999). This modification will increase the habitat value in locations with existing western pond turtles. These structures may also enhance habitat for native amphibian species.

Nonnative Wildlife Management

The Conservancy or landowners will work to reduce and, where possible, eradicate nonnative exotic species that adversely affect native pond and wetland species. These efforts will include prescribed methods for removal of bullfrogs, mosquitofish, and nonnative predatory fish from stock ponds and wetlands within the reserve system.

6.4.3.6 Covered Species Level Management and Enhancement

Almost all of the management and enhancement actions that benefit covered species are provided through actions described in Section 6.4.3.4, *Landscape-level Management and Enhancement,* at the landscape level and Section 6.4.3.5, *Natural Community Management and Enhancement,* at the natural community level. This section describes species-specific management and enhancement needs that are not provided in the proceeding sections.

6.4.3.6.1 Swainson's Hawk and White-tailed Kite

Managing Cultivated Lands for Foraging Habitat

As described in Section 6.4.3.5.1, *Cultivated Lands Natural Community*, cultivated lands in the reserve system will be planted with cover strips and hedgerows to provide rodent habitat to increase prey abundance for raptors, including Swainson's hawk and white-tailed kite. Protected Swainson's hawk and white-tailed kite foraging habitat on cultivated lands will be planted with crop types that provide foraging habitat value for these species, inclusive of crop types of lesser foraging value that must be grown in rotation to maintain long-term viability for cultivation of the targeted crop types (orchards and vineyards do not have habitat value for these species and will not be planted in the reserve system). Where possible, priority will be given to lands that are regularly planted in high and very high value crop types, as defined below. The foraging habitat values of various crop types (excluding natural lands) for Swainson's hawk and white-tailed kite are as follows (Estep 1989, 2008, 2009; Swolgaard et al. 2008; Woodbridge 1998).

- Very high value: Alfalfa.
- High value: Pasture, clover.
- Medium value: Tomatoes, beets, wheat, oats, grain and hay.
- Low value: Broccoli, sudan, dry beans, field crops, asparagus, green beans, carrots, melons/squash/ cucumbers, onions/garlic, peppers, lettuce truck/nursery/ berry crops, miscellaneous field.
- Marginal value: Safflower, corn, grain sorghum, sunflower.

Planting of Nest Trees

The Conservancy or landowners will establish trees suitable for Swainson's hawk nesting (native trees at least 20 feet in height) within the cultivated lands reserve system to meet a density of at least one tree per 10 acres (protected existing trees count toward the density requirement). Valley oaks will be planted to meet this requirement where conditions are favorable for this species. Within each 300-acre block of the preserve system, there will be at least one tree per 10 acres. For example, a 5,000-acre block of habitat would consist of 16 300-acre units, and each unit would have at least one tree per ten acres. This will ensure that the trees are fairly evenly distributed across the landscape. To implement this conservation measure, the Conservancy or landowners will undertake the following actions:

- Evaluate existing information and conduct surveys if needed to identify specific locations where sufficient Swainson's hawk foraging habitat is available to support nesting, nest trees are lacking, and soil and hydrologic conditions are suitable for the establishment of nest trees;
- Prepare and protect nest tree establishment sites (e.g., clearing of existing vegetation, placement of herbivory protection fencing or other structures, installation of irrigation system);
- Plant seedlings/saplings of nest tree species on suitable reserve system lands. Conduct weed control, irrigation, and fence repair as needed until nest trees are established; and
- Monitor tree condition, growth, and use by Swainson's hawk and other native raptors.

During HCP/NCCP implementation, the monitoring and adaptive management program will determine if newly established trees are utilized. Based on that information, improvements may be made in locating and establishing new nest tree sites.

6.4.3.6.2 Bank Swallow

The Conservancy, CCRMP, or landowners will manage bank swallow foraging habitat in the reserve system, within the Cache Creek floodplain, to promote open grass vegetation within the floodplain. The Conservancy will apply the best available scientific and technical information to protocols that stimulate new native plant growth and reduce invasive plant species in the floodplain, to promote insect populations that can serve as prey for bank swallows.

6.4.3.6.3 Tricolored Blackbird

Nesting Habitat

Management and enhancement of tricolored blackbird nesting habitat will be consistent with the recommendations provided by Kyle (2011). The following criteria will guide management of emergent wetland habitat to benefit tricolored blackbird.

- Burn, mow, or disc bulrush/cattail vegetation every 2 to 5 years as needed to remove dead growth and encourage the development of new vegetative structure.
- Maintain large continuous stands of bulrush/cattail that are at least 30 to 45 feet wide to provide adequate space for breeding as well as protection from predators.
- Provide a 50:50 to 60:40 ratio of bulrush/cattail marsh to open water in areas intended to support tricolored blackbird nesting.

Foraging Habitat

Consistent with Objective TRBL1.4, the Conservancy will maintain at least 300 acres of tricolored blackbird foraging habitat in the reserve system free of pesticides. The 300 acres will consist of blocks of tricolored blackbird foraging habitat of at least 150 acres each.

As described in Section 6.4.3.5.1, *Cultivated Lands Natural Community*, cultivated lands in the reserve system will be planted with cover strips and hedgerows to provide habitat to increase prey abundance for covered species, including insects for tricolored blackbird. Protected tricolored blackbird foraging habitat on cultivated lands will be planted with crop types that provide foraging habitat value for this species, inclusive of crop types of lesser foraging value that must be grown in rotation to maintain long-term viability for cultivation of the targeted crop types (orchards and vineyards do not have habitat value for this species and will not be planted in the reserve system). Where possible, priority will be given to lands that are regularly planted in high and very high value crop types, as defined below. Crop types have foraging habitat values for tricolored blackbird as follows (natural lands are not listed below) (Meese, pers. comm. 2013):

- Very high value: Native pasture.
- High value: Rice, sunflower, alfalfa, mixed pasture.
- Medium value: Fallow lands cropped within three years, new lands prepped for crop production.
- Low value: Mixed grain any hay crops.
- Marginal value: Rice.

6.4.3.6.4 Giant Garter Snake

As described in Conservation Measure 1, the Conservancy will select giant garter snake sites that are expected to be able to maintain water conveyance to properly manage sites that provide aquatic habitat for this species during its active season, from late spring to early fall. Fresh emergent wetlands and natural aquatic habitat for this species will be managed as described in Section 6.4.3.5.5, *Fresh Emergent Wetland Natural Community/Lacustrine and Riverine Natural Community.* The Conservancy will encourage management of rice fields that involves leaving some vegetation on the banks and in the ditches for giant garter snake cover, and leaving space between the channel and the rice crop to provide upland habitat for giant garter snake. If there are years when fields cannot be planted in rice, the channels will be required to maintain water during the giant garter snake's active season in order to support the species. Where there is not sufficient upland adjacent to aquatic habitat on giant garter snake reserves, the Conservancy or landowner may, if feasible, build mounds to provide upland refugia (Greco and Larsen 2014).

6.4.3.6.5 Western Burrowing Owl

As described in Conservation Measure 1, the Conservancy will prioritize the selection of burrowing owl sites based on the availability of occupied sites. Unoccupied sites will also be selected if occupied sites are not available and to provide habitat with the intent of expanding the distribution of the species in the Plan Area. The following management and enhancement actions will be applied as needed to each property managed for burrowing owls.

- Maintain Suitable Vegetation Conditions. Grass height will be maintained consistently at <6 inches in height. This can be accomplished through mowing or grazing.
- Control Invasive Weed Infestations. Treat as needed to minimize infestations of invasive weeds.
- Burrow Management: maintain appropriate grassland vegetation around nesting burrows. Key to continued occupancy is the maintenance of grassland vegetation within an acre around the burrow, or as defined in the site-specific management plan. Grassland vegetation height will be maintained at less than 6 inches in height within this area.
- Install Artificial Nest Boxes. Where ground squirrel burrows or other potential nesting opportunities are lacking, artificial burrows will be installed. Up to 60 artificial burrows will be installed during the permit period using the most up-to-date techniques and information regarding design and location.
- Install Perches. Install perches designed based on the best available information to avoid predation. Perches are important for visibility and nest defense.
- Create Debris Piles. These are piles of soil combined with rocks and planted with grass or shrubs. Up to 15 debris piles will be created. These facilitate use by burrowing owl prey, particularly small reptiles and rodents and can provide additional nesting and perching opportunities.
- Hedgerows/Vegetated Buffers. Native California prairie plantings within hedgerows and vegetated agricultural buffers may also be used to benefit western burrowing owls by creating cover and food supply for rodent and insect prey.

6.5 Monitoring and Adaptive Management

6.5.1 Introduction

This chapter describes the monitoring and adaptive management program for the Yolo HCP/NCCP. This program will:

- Ensure compliance with the Yolo HCP/NCCP requirements; assess the status of covered and other native species, natural communities, and ecosystem processes within the reserve system[16] and in certain cases outside of the reserve system; and
- Measure the effectiveness of the conservation strategy in achieving the biological goals and objectives (Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring*).[17]

The Conservancy[18] will integrate adaptive management and monitoring into one cohesive program where monitoring will inform and change management actions to continually improve outcomes for covered and natural communities. An overview of the program, monitoring and management actions, and data and reporting requirements are described below.

6.5.1.1 Regulatory Context

By regulation, an HCP must incorporate monitoring of conservation measures and the response of covered species to these measures (50 CFR 17.22[b][1][iii] and 50 CFR 222.22[b][5][iii]). An adaptive management strategy is an important and required component of HCPs, especially those with data gaps that would substantively affect how the species is managed and monitored in the future (65 FR 35242). The USFWS Five-Point Policy (65 FR 35242) describes adaptive management as an integrated method for addressing uncertainty in natural resource management and states that management must be linked to measurable biological goals and monitoring. To that end, Tables 6.4, *Biological Goals and Objectives Associated with Conservation Measure 1,* 6.6, *Biological Goals and Objectives Associated with Conservation Measure 2,* and 6.8*, Biological Goals and Objectives Associated with Conservation Measure 3,* integrate biological goals and objectives, conservation actions, and monitoring actions to ensure the program evaluates the conservation measures and assesses the implementation of the biological goals and objectives.

An NCCP must include both a monitoring program and an adaptive management program (California Fish and Game Code Section 2820[7] and [8]). An NCCP also must integrate adaptive management strategies that are periodically reviewed and modified on the basis of the results of monitoring efforts and other sources of new information (California Fish and Game Code Section 2820[a][2]).

[16] In general conservation actions and monitoring take place within the reserve system (i.e., lands acquired, managed, and monitored by the Conservancy to benefit covered species under this Plan). Monitoring for Swainson's hawk, burrowing owl, and tricolored blackbird will extend beyond the reserve system boundaries. Monitoring outside of the reserve system will still occur within the Plan Area.

[17] The biological goals and objectives conform to the guidance provided by the Five Point Policy as much as feasible, given the scope of the conservation strategy and the fact that the reserve lands have not yet been acquired. In some cases, the narrative text of the conservation strategy provides details on the indicator, location, timeframe, etc. In other cases, the Conservancy will develop these details during early implementation because on-the-ground information can better inform specific management actions for specific parcels. The Conservancy will integrate these details into the reserve management plans.

[18] Throughout Section 6.5, *Conservancy* refers to the Conservancy or its contractors.

The monitoring and adaptive management program described in this chapter is intended to fulfill HCP and NCCP requirements to monitor covered species, natural communities, and species response to management activities. This program will continually incorporate recommendations for monitoring and adaptive management based on the most recent guidelines for regional HCPs and NCCPs provided by the USGS Biological Resources Division, CDFW, and USFWS (Atkinson et al. 2004). This program is also consistent with 2009 guidelines for federal agencies on adaptive management (see http://www.doi.gov/initiatives/AdaptiveManagement/documents.html).

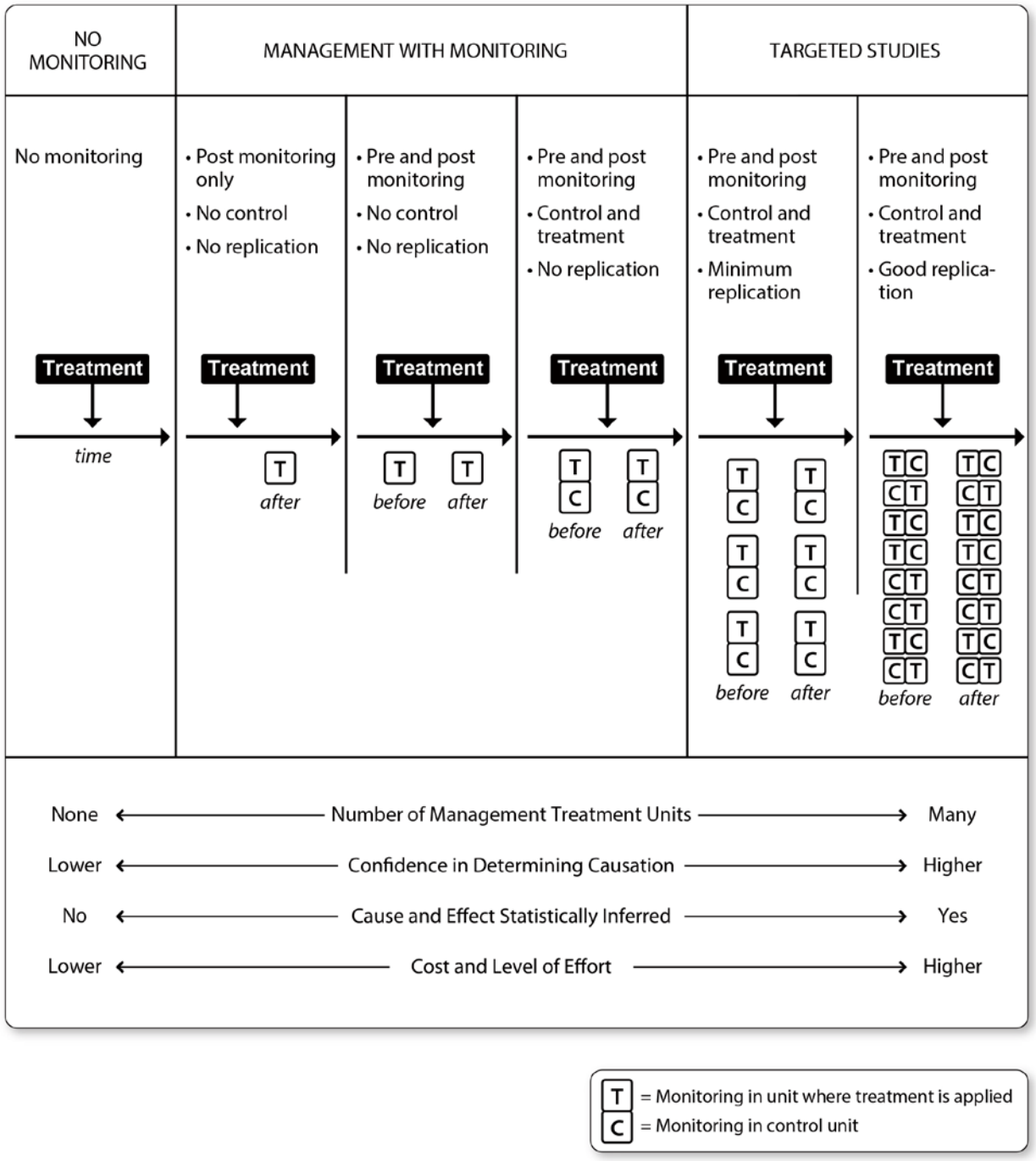
6.5.1.2 Adaptive Management

Adaptive management is a decision-making process promoting flexible management such that actions can be adjusted as uncertainties become better understood or as conditions change (Figure 6-7, *Continuum of Experimental Management*). Monitoring the outcomes of management is the foundation of an adaptive approach, and thoughtful monitoring can both advance scientific understanding and modify management actions iteratively (Williams et al. 2007).

Adaptive management is necessary because of the degree of uncertainty and natural variability associated with ecosystems and their responses to management. Based on the best scientific information currently available, it is expected the Yolo HCP/NCCP's conservation actions will effectively achieve the biological goals and objectives described in Section 6.3, *Biological Goals and Objectives*; however, there are varying degrees of uncertainty associated with the management techniques and conditions within and outside the Plan Area. In addition, the status of covered species and natural communities may change in unexpected ways during HCP/NCCP implementation. It is possible that additional and different management measures will be identified in the future and more effectively implement the conservation strategy than those currently implemented. Results of monitoring may also indicate some management measures are less effective than anticipated. To address these uncertainties, the Conservancy will use an adaptive approach to inform management and design the monitoring program to support this adaptive approach.

The cornerstone of the monitoring and adaptive management program is an experimental approach in which monitoring will yield scientifically valid results that inform management decisions (Figure 6-7, *Continuum of Experimental Management*). The Conservancy will use information collected through monitoring and other experiments to manage reserve system lands and protect covered and other native species habitat and natural communities. The Conservancy will also coordinate and share the results of monitoring and targeted studies, as appropriate, with other regional restoration and management programs and among the other Permittees and the wildlife agencies. A well-coordinated and scalable monitoring program will enable the Conservancy the wildlife agencies and others to measure and evaluate change in resources and threats within individual reserves, across the entire Plan Area. Such coordination requires standardization of protocols, sampling design, and training of personnel, as well as integrative data analysis.

Figure 6-7. Continuum of Experimental Management



Adapted from Elzinga et al. 1998.

Another important component of the adaptive management process is outside review by scientists. Science and technical advisors will evaluate the effectiveness of existing or proposed management actions (Section 7.2.4.2, *Science and Technical Advisory Commitee*). The Conservancy will incorporate recommendations provided by these reviews, where appropriate, and agreed to by the wildlife agencies into Yolo HCP/NCCP implementation.

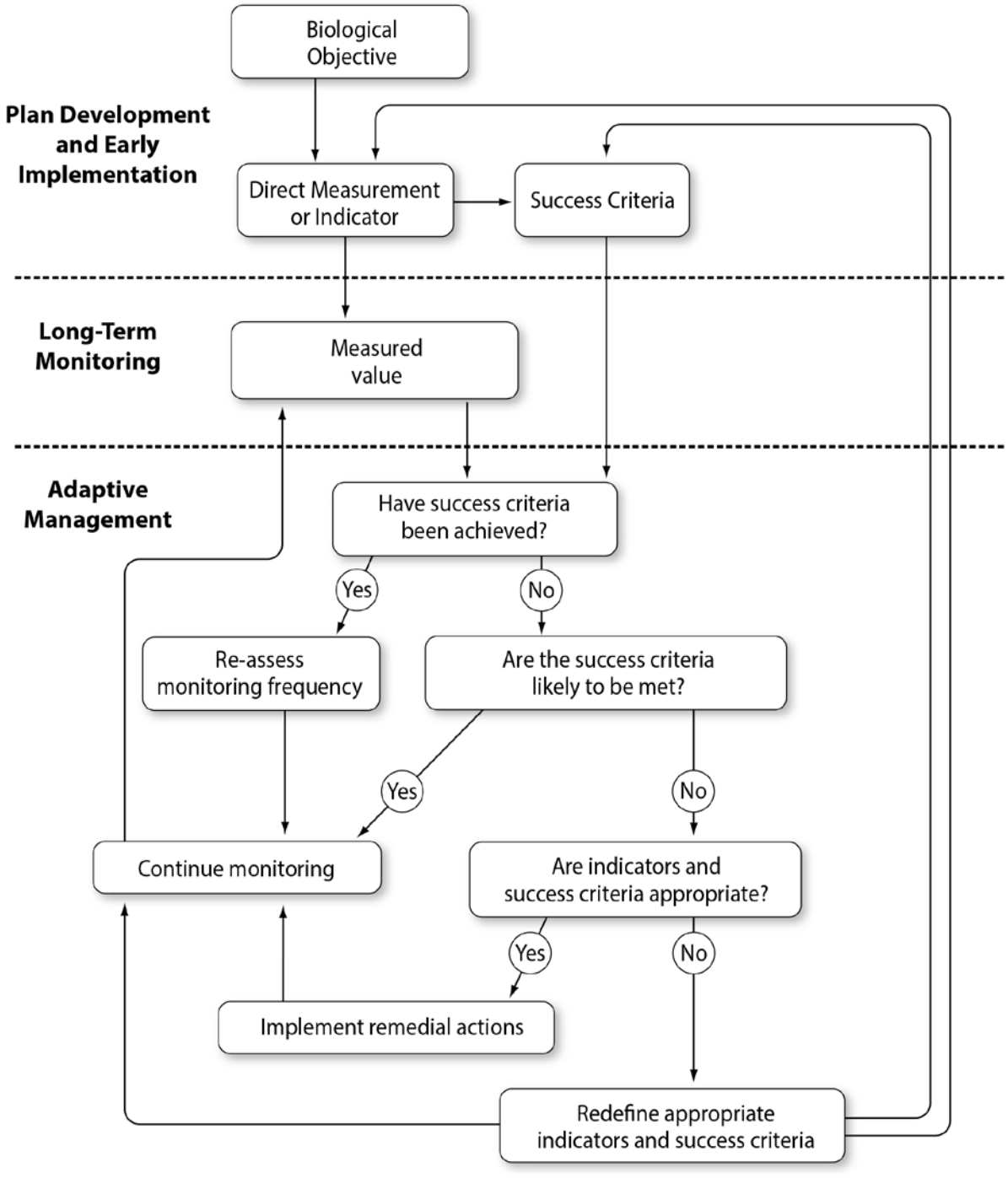
Integrating adaptive management and monitoring is critical to the successful implementation of the conservation strategy. Monitoring is the foundation of an adaptive approach, and adaptive management actions are developed, in part, from the results of monitoring. In the Yolo HCP/NCCP, the two components are integrated into a single program.

The monitoring and adaptive management program will inform reserve managers and other decision makers of the status of covered species and natural communities, and essential ecological processes such that management actions can be revised when necessary to meet the biological goals and objectives of the HCP/NCCP. The Conservancy will evaluate effectiveness of conservation efforts following the model outlined in Figure 6-8, *Flowchart of the Adaptive Management Process*. This figure illustrates how the Conservancy will develop indicators and success criteria and how the Conservancy will use monitoring to ensure the effectiveness of the Plan. The use of conceptual ecological models will also guide monitoring and adaptive management. Conceptual models will help frame questions for monitoring, and results will help guide future management and monitoring efforts while simultaneously informing updates to the models (Figure 6-9, *Adaptive Management Feedback Loop*). Figure 6-10, *Example Stress-Response Model,* provides an example of this from another conservation plan. Using monitoring to provide information for adaptive management actions will require a framework for measuring responses (Figure 6-10, *Continuum of Experimental Management*). In its simplest form, monitoring that happens immediately after management actions occur will inform future efforts. As Figure 6-10 illustrates, however, the Conservancy must develop management actions in concert with monitoring objectives such that increased certainty regarding the significance of the results can be obtained. Pilot projects will be carried out (Section 6.5.4.2, *Targeted Studies Phase*), whereby management actions will be treated as experiments, and monitoring will be used to evaluate each action. This will allow management to proceed without complete knowledge of the needs of the species or ecological processes. All of these components are described more fully in the following sections.

In summary, adaptive management is the land manager's response to new information. Adaptive management actions will likely take place at the following junctures:

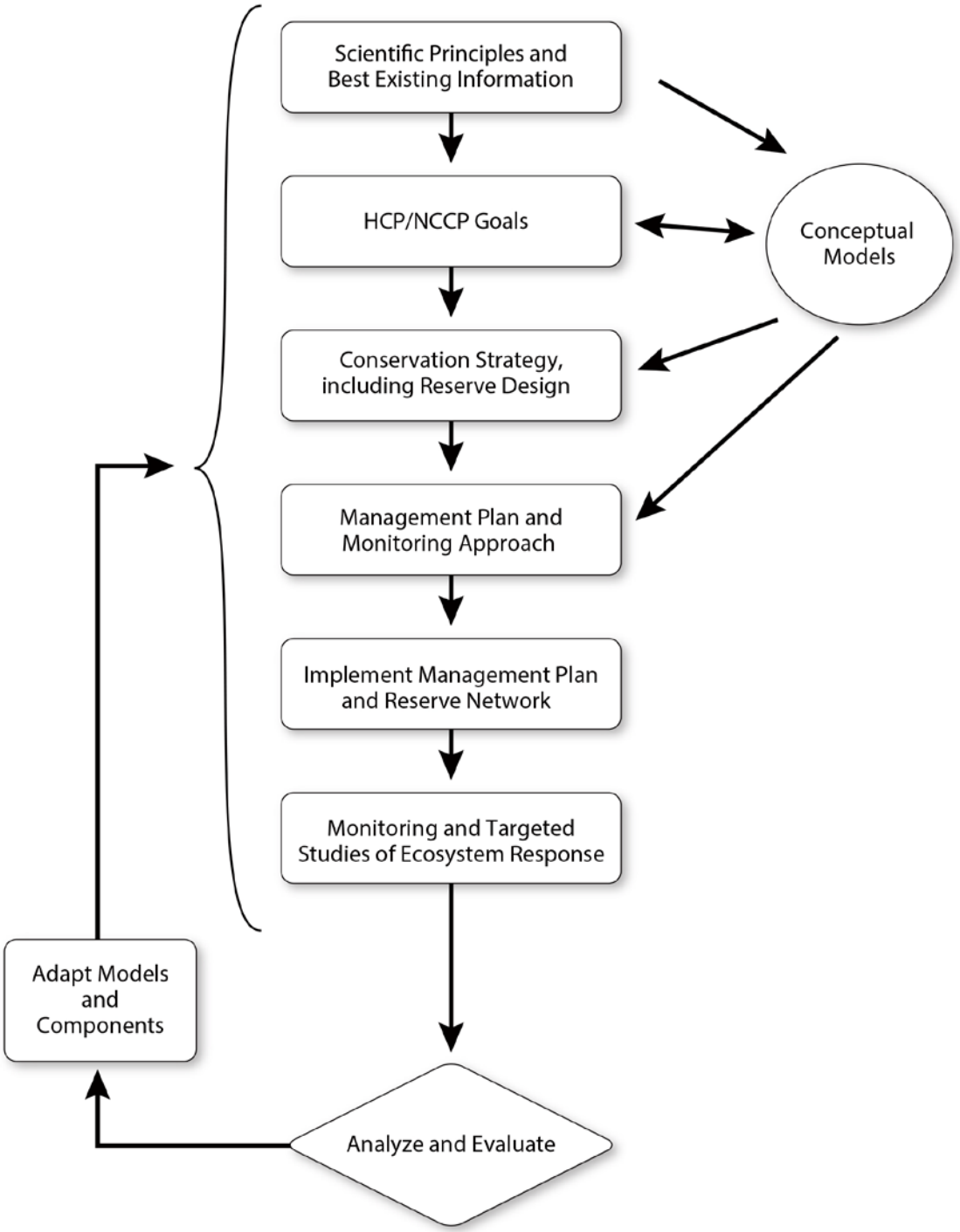
- In response to the results of targeted studies including pilot projects,
- In response to downward trends in the status of covered species or key natural-community variables,
- When new information from the literature or other relevant research indicates that a feasible and superior alternative method for achieving the biological goals and objectives exists,
- When monitoring indicates that the expected or desired result of a management action did not take place, and
- Proactively, when the Conservancy identifies threats through the ongoing development of conceptual models or through other monitoring efforts in the Plan Area.

Figure 6-8. Flowchart of the Adaptive Management Process



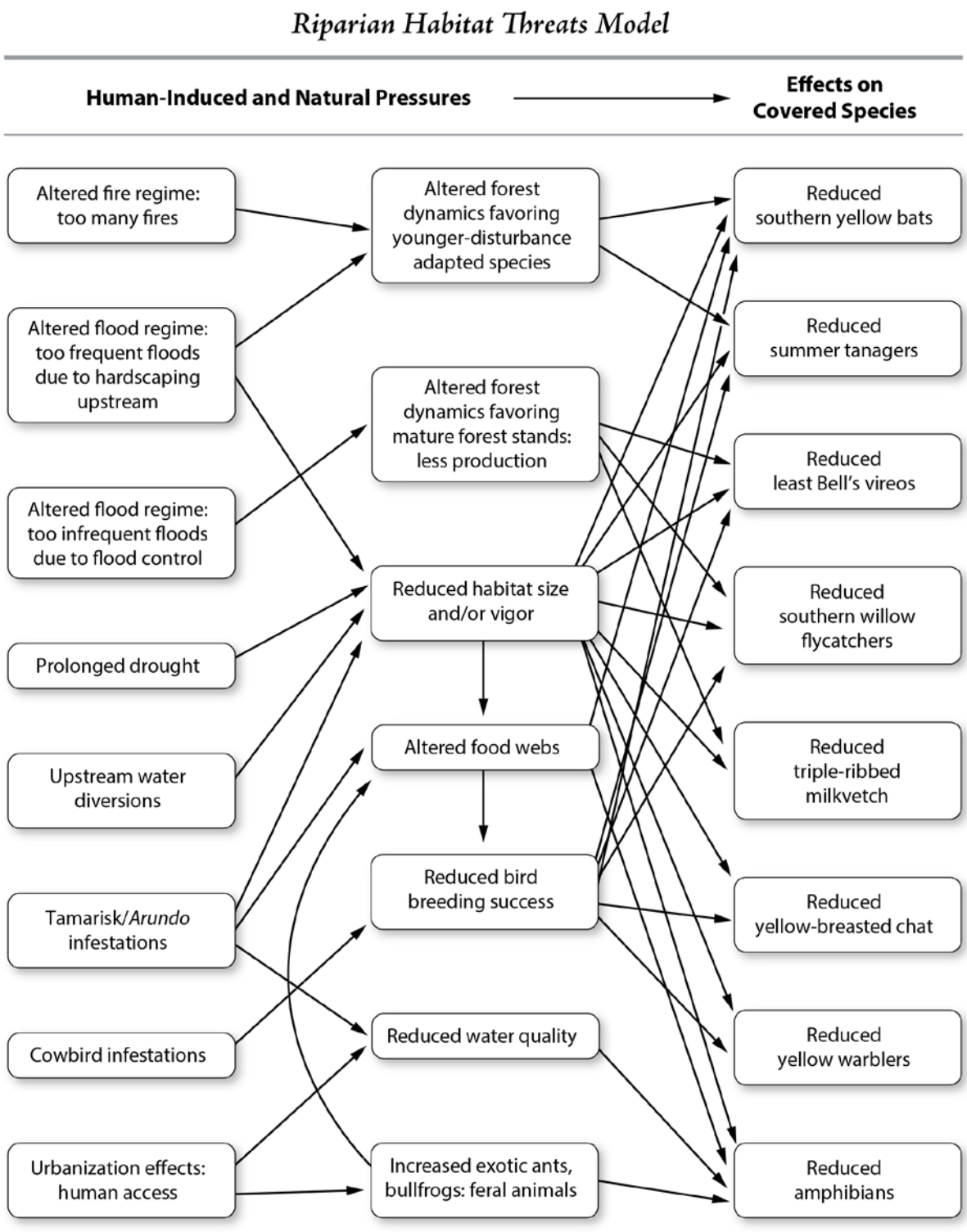
Adapted from Draft Guadalupe River Project, Downtown San Jose, California, Mitigation Monitoring Report (Jones & Stokes 2002)

Figure 6-9. Adaptive Management Feedback Loop



Excerpted from Atkinson et al. 2004.

Figure 6-10. Example Stress-Response Model 1



Adapted from Coachella Valley Multiple Species Habitat Conservation Plan.

Most adaptive management measures will occur when conservation actions do not produce the desired outcome or when covered species /natural-community trends decrease. In these cases, the Conservancy will implement new actions to try and improve the outcome for species and communities. Such actions include, but are not limited to, the following:

- Alter the timing, location, intensity or type of grazing;
- Reduce, increase or otherwise change the pattern of prescribed burning;
- Re-evaluate and, if necessary, alter avoidance and minimization measures;
- Modify age, timing, location, or type of seedling transplantation for natural-community restoration;
- Prioritize or de-emphasize one aspect of noxious weed control such as targeted pesticide use; and
- Increase, decrease or desist species-specific conservation actions such as translocation of individuals based on experimental results.

Alternatively, the Conservancy may in some cases cease enhancement activities if the desired outcome has been achieved, or discontinue particular management actions if they are deemed to be no longer necessary to maintain the desired state. The Conservancy can modify the conservation actions in response to new information following the principles of adaptive management.

6.5.2 Program Objectives

The overarching objective of the monitoring and adaptive management program is to ensure that the HCP/NCCP is achieving the biological goals and objectives (Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring*). This chapter presents a foundation for accomplishing this task. The Conservancy will submit the reserve management plans, which will include monitoring and adaptive management components, to the wildlife agencies for review and approval within five years of the acquisition of the first parcel of each reserve management unit. The Conservancy will update these reserve management plans every five years.

Objectives of the monitoring and adaptive management program are listed below.

- Provide an organizational framework and decision-making process for evaluating monitoring, targeted studies, and other data to adjust management actions;
- Document the baseline condition of biological resources in the reserve system and other key habitat outside of the reserve system using existing data, modeling, and the results of ongoing field surveys;
- Develop conceptual models for natural communities and covered species, if applicable, that the Conservancy can use as a basis for collecting information, verifying hypotheses, and designing and changing management practices;
- Incorporate hypothesis testing and experimental management, including targeted studies to address key uncertainties and to improve management and monitoring efforts;
- Develop and implement scientifically valid monitoring protocols at multiple levels to ensure that data collected will inform management and integrate with other monitoring efforts; and
- Ensure that monitoring data are collected, analyzed, stored, and organized so the data are accessible to the Conservancy and other Permittees, the wildlife agencies, scientists and, as appropriate, the public.

6.5.2.1 Program Scope

This chapter provides a framework, guidelines, and specific recommendations to help the Conservancy develop a detailed monitoring component for their reserve management plans. Upon permit approval, the Conservancy will compile information from ongoing monitoring efforts conducted by the Permittees and others throughout the Plan Area.

The Conservancy will develop conceptual models for covered species (Section 6.5.4.2.1, *Develop Conceptual Models*) and initiate baseline surveys for newly acquired parcels. If restoration actions are proposed before the reserve management plan is in place, a design plan, including experimental design, monitoring actions and adaptive management, will be developed specific to that action. Table 6-10, *Biological Goals and Objectives Associated with Conservation Measure 3,* provides a summary of monitoring tasks throughout the HCP/NCCP permit and beyond. Detailed information of monitoring tasks by program phase is found in Section 6.5.5, *Guidelines for Monitoring*.

It is beyond the scope of this HCP/NCCP to develop a comprehensive monitoring program at this time. Rather, the goal of Section 6.5, *Monitoring and Adaptive Management,* is to provide sufficient guidance to ensure the monitoring program designed during implementation will meet regulatory standards. Since the location and condition of the reserve system, as well as all target areas for monitoring outside the reserve system are not known at this time, it would be difficult or impossible to develop detailed monitoring requirements including protocols, thresholds, triggers, and other key variables. Furthermore, some of the components of this monitoring program will be new and will therefore require extensive field testing (see Section 6.5.4.2 *Targeted Studies Phase*, below) before the Conservancy can implement them on a large scale.

The scope of the monitoring and adaptive management program is limited by the assurances provided by the wildlife agencies to the Permittees and described in Chapter 7, *Plan Implementation*. These assurances include the commitment by the wildlife agencies that if unforeseen circumstances arise (as defined in Chapter 7), the Permittees will not be required to provide additional land, water, or financial compensation beyond the obligations of the HCP/NCCP.

Despite the assurances provided by the wildlife agencies, the monitoring program is designed to be somewhat flexible. Since the HCP/NCCP seeks to balance the requirements of management with the need to learn more about the ecological system through monitoring, the amount of funding allocated to monitoring can vary during the permit term. The Conservancy can shift funding within the HCP/NCCP to respond to the changing needs of the monitoring and adaptive management program at its discretion. The scope of the monitoring and adaptive management program is further defined below.

6.5.2.2 Geography

The Conservancy will determine the geographic scope of the monitoring and adaptive management program by the lands acquired and/or managed for the reserve system and other lands managed and enhanced for the conservation benefit of covered species as described in Section 6.4, *Conservation Measures*. Since the Conservancy will assemble the reserve system over the course of the permit term, the exact configuration of the reserve system is unknown. The general location of acquisition priorities, however, has been defined as the Conservation Reserve Area (Figure 6-5, *Conservation Reserve Area and Covered Species Occurrences*). As the reserve system grows, the

monitoring program will also grow. Monitoring of streams and select covered species[19] will occur within and outside the geographic border of the reserve system. The Conservancy will consider the regional context of species and natural communities when designing and implementing monitoring and adaptive management.

6.5.2.3 Levels of Monitoring

Since the conservation strategy functions at multiple levels, the monitoring and adaptive management program must collect information at these multiple levels. The program described in this chapter details the framework for a three-tiered approach that consists of landscape-, natural community-, and species-level monitoring.

Landscape-level monitoring is designed to detect large-scale changes, such as changes in ecosystem processes, shifts in natural community distribution, and the integrity of landscape linkages. Community-level monitoring is designed to detect changes in the composition and function of natural communities, populations of key predator or prey populations, invasive species, and other important habitat factors for covered species. Species-level monitoring measures the effects of management actions on covered species and tracks the abundance, distribution, and other variables of covered species in the reserve system and the Plan Area.

6.5.2.4 Coordination with Other Programs

Monitoring already occurs throughout the Plan Area to varying degrees on public and private lands. Long-term monitoring and scientific experiments are conducted at several sites, for example, including locations along Cache Creek and Putah Creek. The HCP/NCCP's monitoring program will utilize these existing programs where appropriate. During the inventory phase, the Conservancy will consult with the proponents of these monitoring programs to learn the latest protocols and determine what aspects of their monitoring overlap with the Plan's requirements. There may also be opportunities to conduct joint monitoring efforts to meet the needs of both projects.

The Conservancy will also coordinate and share monitoring and other experimental results with other regional restoration and management programs. A well-coordinated and scalable monitoring program design will enable the Conservancy and others to measure and evaluate change in resources and threats in individual reserves, across the entire Plan area, and within the covered species range. Such coordination requires standardization of protocols, sampling design, and training of personnel, as well as integrative data analyses

6.5.2.5 Take Authorization during Monitoring

Some monitoring activities may require handling or disturbing state or federally listed species; such activities may constitute take. The monitoring method is optimal when both the quality of information and the effect on the species is assessed. The monitoring program will consider the effect on the species, particularly in cases of very low population numbers. Take of covered species during monitoring activities is authorized providing that all of the following conditions are met:

- The take occurs in association with activities described in Section 6.5 of this HCP/NCCP, or a reserve management plan approved by the wildlife agencies;

[19] Burrowing owl and tricolored blackbird. See species-specific monitoring discussion later in this chapter.

- The take occurs in the Plan Area, during the permit term, for activities conducted by the Permittees, the Conservancy, or any person acting under the direct guidance or authority of these entities;
- The person(s) undertaking such activities is qualified and can carry out their duties in conformance with the protocols and procedures specified in the monitoring chapter and the reserve management plan (Section 4.4, *Qualified Biologist*); and
- The activity is consistent with the HCP/NCCP's monitoring and adaptive management program.

To meet federal and state requirements, monitors will report the amount and extent of take in accordance with the Permits. Monitors will report occurrences of all special status species within the reserve system to the California Natural Diversity Database (CNDDB).

6.5.3 Types of Monitoring

In addition to the levels of scale (i.e., landscape, community, and species), three main types of monitoring are specified: compliance monitoring, effectiveness monitoring, and targeted studies. A description of each of these types is provided below.

6.5.3.1 Compliance Monitoring

Compliance monitoring tracks the status of HCP/NCCP implementation and documents that the HCP/NCCP is meeting all its requirements. Compliance monitoring verifies the Permittees are carrying out the terms of the HCP/NCCP, Permits, and Implementation Agreement (IA). It is also known as implementation monitoring. The Conservancy will track and ensure compliance monitoring internally and provide results to the wildlife agencies, which will ensure that the Permittees remain in compliance with the Permits, IA, and HCP/NCCP. As defined by the Yolo HCP/NCCP, compliance monitoring will be composed of the components listed below, based on templates developed for the Santa Clara HCP/NCCP.

- Tracking loss of natural communities and covered species to ensure take limits are not exceeded and to ensure compliance with the stay-ahead requirements described in Chapter 7, *Plan Implementation*;
- Tracking implementation of acquisition, restoration, and creation actions (Section 7.5.3, *Stay-Ahead Provision*, and Table 7-2, *Key Deadlines for HCP/NCCP Compliance*);
- Tracking implementation of other conservation actions on and off the reserve system;
- Tracking implementation of avoidance and minimization requirements (Chapter 4, *Application Process and Conditions on Covered Activities*); and
- Tracking and reporting of management and monitoring activities.

6.5.3.2 Effectiveness Monitoring

Effectiveness monitoring assesses the biological success of this HCP/NCCP—specifically, it evaluates the implementation and success of the conservation strategy described in this chapter. Effectiveness monitoring includes monitoring the effects of management activities. An important component of this monitoring is determining patterns within the reserve system relative to the baseline status and trends of biological resources. The Conservancy will design, conduct and report on the results of effectiveness monitoring. Wildlife agencies will have approval authority on the proposed

effectiveness monitoring and the STAC will have an opportunity to provide input on any proposed effectiveness monitoring and its results (Section 6.5.5, *Guidelines for Monitoring*). Effectiveness monitoring includes both status and trends monitoring and effects monitoring, which are described below.

6.5.3.2.1 Status and Trends

The Conservancy will monitor indicators of the status and trends of covered species and natural communities to provide data regarding the increase or decrease of these resources in the Plan Area. The Conservancy will first collect baseline data to provide a temporal snapshot of the status of these resources at the first year of monitoring: this is a metric against which to compare future data. Status and trends monitoring will include quantitative data on covered species (population size, distribution), land cover, and modeled habitat as well as nonnative invasive species and other known threats. Additionally, historical data on population size or distribution can be relevant to understanding the current condition. For species or natural communities that go through natural fluctuations or variations, historical trends are more important than single year surveys. Qualitative assessments of vegetative structure and/or habitat quality will also be a component of status and trends monitoring. Examples of status and trends monitoring include quantitative data on covered species numbers, acres of land cover types in the Plan Area, occurrences of invasive plant populations, and incidences of natural disturbance (e.g., fire, flood).

6.5.3.2.2 Effects of Management

Understanding the effects of management actions is a critical component of the monitoring and adaptive management program. The purpose of effects monitoring is to ascertain the success of management in achieving desired outcomes, to provide information and mechanisms for altering management if necessary, and to evaluate whether the conservation strategy described in this chapter was successful.

The preliminary or initial component of effects monitoring will include the development and assessment of performance criteria for management actions such as shown in Table 6-11, *Example Success Criteria for Monitoring Effectiveness of Selected Management Actions*. Where they exist, the biological goals and objectives will determine the form that performance criteria take. Once success criteria are developed, effects monitoring will include monitoring these criteria as well as assessing the effects of management on covered species. Finally, the effects of threat-abatement activities (e.g., density of nonnative invasive plants) will be evaluated to determine the effects of management. Management actions will be conducted using an experimental approach when feasible (Figure 6-7, *Continuum of Experimental Management*).

Table 6-11. Example Success Criteria for Monitoring Effectiveness of Selected Management Actions[a]

Objective	Management Tools	Performance Period[b]	Example Success Criteria	
			Example Minimum Value[c]	**Example Target Value[d]**
Objective L-2.1: Increase native species diversity and relative cover of native plant species, and reduce the introduction and proliferation of nonnative plant and animal species.	See Section 6.4.3.4.1, *Invasive Species Control Program*	__ years following acquisition of each property	*Nonnative aquatic predators:* • Maintain __% of all wetlands free of nonnative aquatic predators in any given year	*Nonnative aquatic predators:* • Maintain all wetlands free of nonnative fish aquatic predators annually
			Percent native plant cover: • Demonstrate an upward trend in % native plant cover relative to condition at time of acquisition	*Percent native plant cover:* • Increase native plant cover by __% relative to condition at time of acquisition
Objective NC-CL1.4: Maintain or enhance the habitat value of the cultivated lands natural community in the reserve system for raptors.	See Section 6.4.3.5.1, *Cultivated Lands Seminatural Community*	__ years following acquisition of each property	*Non-rice habitat value:* • Value of non-rice cultivated lands for raptors is maintained from baseline conditions, in terms of crop types, cover strips, hedgerows, and/or hunting perches.	*Non-rice habitat value:* • Value of non-rice cultivated lands for raptors is improved from baseline conditions, in terms of crop types, hedgerows, and/or hunting perches.
			Rice habitat value: • Value of rice lands for giant garter snake and western pond turtle is maintained from baseline conditions, in terms of water regime in canals and ditches, and ditch configuration (to provide basking and nursery habitat).	*Rice habitat value:* • Value of rice lands for giant garter snake and western pond turtle is improved from baseline conditions, in terms of water regime in canals and ditches, and/or ditch configuration (to provide basking and nursery habitat).

Objective	Management Tools	Performance Period[b]	Example Success Criteria	
			Example Minimum Value[c]	**Example Target Value[d]**
Objective NC-G1.2: Maintain and enhance the functions of protected grassland in the reserve system as habitat for covered and other native species by increasing burrow availability for burrow-dependent species, and increasing prey abundance and accessibility for grassland-foraging species.	See Section 6.4.3.5.2, *Grassland Natural Community*	__ years following initiation of preserve-wide management of grassland	*Burrow availability:* • Burrow abundance is maintained on protected grassland. *Raptor prey abundance:* • Raptor prey abundance is maintained on protected grassland.	*Burrow availability:* • Burrow abundance is increased on protected grassland. *Raptor prey abundance:* • Raptor prey abundance is increased on protected grassland.
Objective NC-VFR1.1: Protect, manage, and enhance 1,600 acres of unprotected valley foothill riparian distributed primarily in planning units 7 and 9.	See Section 6.4.3.5.3, *Valley Foothill Riparian Natural Community*	__ years following initial treatments	*Relative native tree canopy cover:* • Demonstrate an upward trend in native plant diversity *Relative native shrub canopy cover*: • Demonstrate an upward trend in native plant diversity	*Relative native tree canopy cover:* • Increase relative native tree canopy cover by at least __% *Relative native shrub canopy cover*: • Increase relative native shrub cover by at least __%
Objective NC-FEW1.3: Enhance the functions of protected fresh emergent wetland as habitat for covered and other native species.	See Section 6.4.3.5.5, *Fresh Emergent Wetland/Lacustrine and Riverine Natural Community*.	__ years following acquisition of each property.	*Hydrology:* • Maintain wetlands year-round in normal rainfall years[e] • Maintain emergent vegetation along pond margins for California tiger salamander, western pond turtle, giant garter snake, and tricolored blackbird.	*Hydrology:* • Maintain wetlands year-round in dry rainfall years[e] • Increase emergent vegetation along pond margins for California tiger salamander, western pond turtle, giant garter snake, and tricolored blackbird.

Objective	Management Tools	Performance Period[b]	Example Success Criteria	
			Example Minimum Value[c]	**Example Target Value[d]**
Objective NC-LR1.1: Protect, manage, and enhance 800 acres of lacustrine and riverine natural community providing habitat for covered and other native species in the Conservation Reserve Area.	See Section 6.4.3.5.5, *Fresh Emergent Wetland/Lacustrine and Riverine Natural Community*.	__ years following acquisition of each property.	*Lacustrine Hydrology:* • Increase or decrease ponding (duration and frequency) as needed to improve wetland functions and to control nonnative invasive species. *Riverine Hydrology:* • Maintain existing natural fluvial processes in streams.	*Lacustrine Hydrology:* • Increase or decrease ponding (duration and frequency) as needed to improve wetland functions and to control nonnative invasive species. *Riverine Hydrology:* • Restore or improve natural fluvial processes in streams.
Objective SH1.5: In addition to restoration of riparian natural community (Objective NC-VFR1.2), establish trees suitable for Swainson's hawk nesting (native trees at least 20 feet in height) within the cultivated lands to meet a density of at least one tree per 10 acres (protected existing trees count toward the density requirement). Riparian restoration adjacent to these community types will also count toward nesting tree establishment.).	See Section 6.4.3.6.1, *Swainson's Hawk and White-tailed Kite*.	__ years following acquisition of each property.	*Nest trees:* • Native trees at least 20 feet in height within the cultivated lands reserve system to meet a density of at least one tree per 10 acres (protected existing trees count toward the density requirement). Riparian restoration adjacent to these community types will also count toward nesting tree establishment.	*Nest trees:* • Native trees at least 20 feet in height within the cultivated lands reserve system to meet a density of at least one tree per 10 acres (protected existing trees count toward the density requirement). Riparian restoration adjacent to these community types will also count toward nesting tree establishment.

Objective	Management Tools	Performance Period[b]	Example Success Criteria	
			Example Minimum Value[c]	**Example Target Value[d]**
Objective BS1.2: Manage the 50 acres of protected bank swallow habitat (Objective BS1.1) to enhance bank swallow foraging habitat value by promoting open grass and forb vegetation, and controlling invasive plant species.	See Section 6.4.3.6.2, *Bank Swallow*.	__ years following acquisition of each property.	*Grassland and forbs in floodplain* • Maintain existing grassland and forbs in protected bank swallow foraging habitat.	*Grassland and forbs in floodplain* • Increase grassland and forbs in protected bank swallow foraging habitat to promote insect prey.

Notes:

a. This table provides a framework for evaluating the success of management. The Conservancy will develop values for assessing success during the Inventory and Targeted Studies phases of implementation

b. The estimated period during which performance standards should be achieved.

c. The example minimum value is the minimum measured value for each success criterion to be achieved during the performance period.

d. The example target value represents the optimal desired value for each performance indicator and the design and management objectives. If performance criteria are not achieved, adaptive management actions may be triggered.

e. Normal rainfall years are defined as within one standard deviation of the annual average rainfall as measured at the California Irrigation Management Information System (CIMIS) __ rain gauge over the hydrologic record of the gauge (October–September). Dry years are defined as less than one standard deviation from the annual mean.

6.5.3.3 Targeted Studies

The Yolo HCP/NCCP includes three types of targeted studies, which fulfill three major objectives, as follows:

1. Methods testing. The objective of methods testing is to identify the best methodologies for monitoring;
2. Pilot projects. The objective of pilot projects is to provide information about the efficacy of management techniques; and
3. Directed studies. The objective of directed studies is to resolve critical uncertainties allowing for improved management of systems and covered species.

6.5.3.3.1 Method Testing

Method testing is designed to evaluate alternative monitoring protocols and sampling designs and to select the best technique for obtaining the desired information. For example, if the objective is to enhance the palmate-bracted bird's beak population, methods testing might compare the use of different vegetation sampling techniques. The results of method testing would then be used to develop a long-term monitoring protocol.

6.5.3.3.2 Pilot Projects

Pilot projects will be used during implementation to ascertain, on a small scale, which management actions may ultimately yield the desired conservation gains prior to initiating a long-term project. Pilot projects are also a cost-effective way to test management actions. Pilot projects can and should be used during the early phases of HCP/NCCP implementation to field test different management actions (see Figure 6-7 for a Continuum of Experimental Management).

6.5.3.3.3 Directed Studies

Critical uncertainties are key questions relating to an ecological system and how that system might be managed to better function for covered species. Since natural systems are complex and dynamic, varying degrees of uncertainty are associated with conserving and managing these systems. Typically, management proceeds absent a full understanding of the components that affect a natural community or a species. The outcome of these management actions are carefully monitored and refined in acknowledgement of the high level of uncertainty. Directed studies are used to reduce the levels of uncertainty related to achieving biological goals and objectives. These uncertainties are generally related to the factors listed below.

- The ecological requirements of covered species, and
- The likely response of covered species and natural communities to implementation of conservation actions within the reserve system.

Directed studies will be carried out to gain insights into key questions identified in the conservation strategy and during HCP/NCCP implementation. Results of directed studies conducted under the Yolo HCP/NCCP will inform management and ensure attainment of the biological goals and objectives. The Conservancy will prioritize proposed directed studies during implementation, and carry them out based on their priority ranking.

The Conservancy may carry out or fund directed studies, but the Conservancy may also utilize graduate students, university researchers, or other scientists whose project goals inform critical uncertainties and further the biological goals and objectives of the HCP/NCCP. In addition, directed studies may be funded by outside sources if the work carried out on reserve system lands furthers the Conservancy's understanding of covered species and natural communities.

Long-term directed studies, identified during HCP/NCCPP implementation, will be conducted by or in partnership with outside scientists from academic institutions, consulting firms, and nonprofit organizations. It is anticipated that funding provided by the Conservancy for directed studies could be matched or supplemented by other entities to increase the level of investigation and to achieve results that integrate with broader issues in the scientific community. In addition to the directed studies undertaken to answer critical uncertainties, it is expected that the Conservancy will develop partnerships with academic institutions (e.g., undergraduate student projects, master's theses, Ph.D. dissertations) to help address broader scientific interests within the reserve system that will nonetheless inform and improve management and monitoring techniques. As an early implementation action, the Conservancy will develop a formal partnership with UC Davis to further research studies. Funding for this and other programs is described in more detail in Chapter 8, *Costs and Funding*.

6.5.4 Program Phases

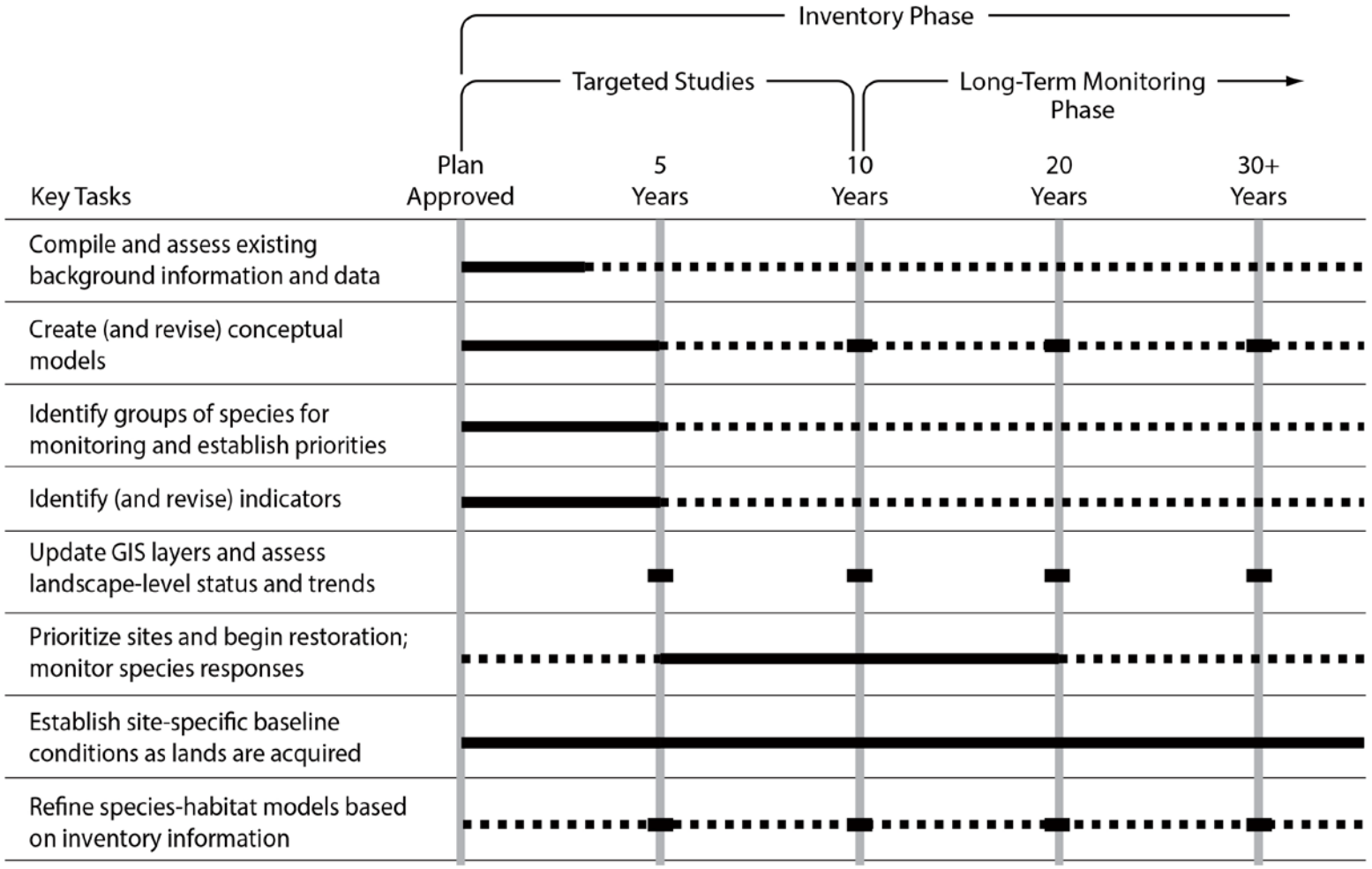
The HCP/NCCP organizes essential elements of the monitoring and adaptive management program into three main phases: inventory, targeted studies, and long-term monitoring and adaptive management.

Key tasks in each phase are described below. In general, activities in the inventory phase will occur during the first five years of HCP/NCCP implementation and thereafter as parcels are added to the reserve system. For individual sites, the inventory phase will begin immediately after land acquisition. Most targeted studies will be concentrated in the first five years of HCP/NCCP implementation, but they will likely continue throughout implementation as the Conservancy identifies and resolves management uncertainties. Activities in the long-term monitoring phase will begin on each site after the inventory phase is complete. Since the Conservancy will create the reserve over several decades, there will likely be extensive overlap between activities in each phase during the first 10–20 years of HCP/NCCP implementation (Figure 6-11, *Timing of Monitoring Phases*). Also, see Table 6-10, *Biological Goals and Objectives Associated with Conservation Measure 3,* for a summary of monitoring tasks throughout the permit term that are related to habitat management and enhancement.

The Conservancy is currently coordinating with the California Habitat Exchange[20] to explore options for using quantitative models to measure habitat enhancement on reserve lands, and to assess the potential for enhancement. The Conservancy will continue this coordination throughout the early program phases to assess the usefulness of these models, and incorporate them into the monitoring and adaptive management process if desired.

[20] https://www.edf.org/ecosystems/central-valley-habitat-exchange

Figure 6-11. Timing of Monitoring Phases



Note: Density of line indicates intensity of work.

Adapted from Atkinson et al. 2004.

6.5.4.1 Inventory Phase

The initial inventory phase of monitoring occurs following permit approval and continues as new parcels are acquired and added to the reserve system or new conservation actions are initiated outside the reserve system, primarily along Cache Creek and Putah Creek. Baseline information collected during the inventory phase (baseline surveys) will lay the foundation of the overarching monitoring and adaptive management program. Inventories will need to occur over multiple seasons to ensure that all species present are identified. Under normal conditions, the initial inventory at a site will take place within three years of acquisitions for each site. The Conservancy will inventory and assess landscapes, natural communities, and species, as appropriate, within the reserve system. This information will build largely on the data collected during pre-acquisition assessments and will be supplemented by post-acquisition monitoring.

In addition to baseline surveys and the acquisition of baseline information, the inventory phase will focus on the identification of key relationships between species, habitats, and processes; the prioritization of project implementation and the selection of biotic and abiotic indicators for evaluating ecosystem condition. Information collected during the inventory phase will build on species information (Appendix A, *Covered Species Accounts*) as well as other data sources (e.g., historical ecology reports).

6.5.4.1.1 Document Baseline Conditions

Baseline conditions within the reserve system need to be documented to enable management planning and to serve as a comparison point for all future monitoring. Baseline data will include the results of pre-acquisition assessments and results of baseline surveys during the first few years after acquisition. Accordingly, natural communities and covered species that occur on a site need to be documented and mapped. Documenting baseline conditions will consist of the following tasks:

- Update GIS land cover layer with existing aerial photographs, satellite imagery, and other relevant data sources at the outset of implementation;
- Inventory and document resources and improve mapping as the reserve system is assembled. The results of the assessments for land acquisition (i.e., pre-acquisition assessment) will be the first source of baseline data. The Conservancy will standardize data-collection methodologies and nomenclature to facilitate sharing of information;
- Research and document historical data and trends;
- Use baseline data to validate and refine covered species habitat models as lands are surveyed and acquired (the Conservancy will evaluate species models periodically, no less frequently than every five years, and will update species models as needed, consistent with new survey data collected, from land cover mapping provided by project applicants, and from other relevant sources). Any modifications on these models, however, will be reviewed and approved by the wildlife agencies;
- Conduct post-acquisition biological inventories. Additional surveys will be needed to supplement data gathered in pre-acquisition assessments;
- Use aerial photos and ground surveys, as needed, to assess quality and location of local and regional landscape linkages between unprotected natural areas and adjacent protected lands; and
- Collect additional baseline data needed to refine conceptual models.

6.5.4.1.2 Initiate Management Planning

Management planning will consist of the following tasks:

- Prioritize implementation of conservation actions to best achieve biological objectives;
- Develop reserve management plans (described in Section 6.4.3.3, *Management Plans*);
- Refine the monitoring schedule;
- Identify biotic and abiotic indicators (see section on indicators for description) for testing during the targeted studies phase;
- Select monitoring protocols and identify sampling design for status and trends and effects monitoring. Test experimental designs during the targeted studies phase, as necessary;
- Develop criteria for measuring success of enhancement, restoration, and creation efforts (see example criteria in Table 6-11, *Examples of Success Criteria for Monitoring Effectiveness of Selected Management Actions*); and
- Develop criteria to assess effectiveness of conditions on covered activities (described in Chapter 4, *Application Process and Conditions on Covered Activities*).

Upon HCP/NCCP implementation, the Conservancy will document baseline conditions along with survey methods and monitoring schedules based on the guidelines for monitoring described below. These protocols and schedules will provide the overarching framework that the Conservancy will implement in each management unit. The Conservancy will draw from relevant and established protocols (e.g., wildlife agency and CNPS survey protocols) and will adapt them throughout the permit term to incorporate the best available scientific data.

For each reserve management plan, the Conservancy will develop a monitoring component that identifies protocols, indicators, monitoring schedule, and success criteria. The Conservancy will revise this component to include information from methods testing, pilot projects and directed studies as results become available. Before the reserve unit management plan for a given reserve is complete, monitoring on lands in the reserve system will consist of baseline inventories, pilot projects to test monitoring methods, and directed studies.

6.5.4.2 Targeted Studies Phase

The targeted studies phase of monitoring follows permit approval and will continue as long as critical uncertainties persist (Figure 6-11, *Timing of Monitoring Phases*). Most targeted studies will take place within the first five to 10 years of HCP/NCCP implementation, such that results can inform long-term management. The Conservancy will develop conceptual models for key natural communities and covered species that identify critical management uncertainties (Section 6.5.4.2.1, *Develop Conceptual Models*); design and initiate pilot projects to test management and monitoring methods; develop and initiate experiments that resolve critical uncertainties; and begin pretreatment monitoring of sites considered for enhancement, restoration, or creation.

6.5.4.2.1 Develop Conceptual Models

Conceptual models are a key element of environmental monitoring programs. They integrate current understanding of system dynamics, identify important processes, facilitate communication of complex interactions, and illustrate connections between indicators and ecological states or

processes (Gross 2003). These models will inform the monitoring program by identifying relationships between ecosystem components and by identifying management assumptions. As the monitoring program collects additional data, these "living" models will serve as a framework for management decisions and will function as reference points for the Conservancy's understanding of the relationship between management and natural communities and/or covered species within the reserve system. In addition, species conceptual models that identify threats, management and monitoring for species will be developed.

6.5.4.2.2 Test and Refine Monitoring Protocols

In the targeted studies phase, the Conservancy will conduct methods testing (described above) to develop, test, and refine monitoring protocols. The Conservancy will develop monitoring protocols for natural communities, and covered species. The purpose of this testing is to identify the best and most cost-effective monitoring methodologies to derive the desired information.

In some cases, there is little distinction between pilot projects and long-term monitoring. During the targeted studies phase, the Conservancy will implement and experimentally evaluate different management techniques. In some cases, restoration, enhancement, and monitoring methods are not known or have not been successfully reproduced on a large scale by land managers or the scientific community. Before restoration or enhancement through management can occur successfully, these methodologies need to be tested on a smaller scale. These pilot projects, designed to test the effectiveness of restoration and enhancement, are necessarily long-term (i.e., 5–10 year) endeavors; they may inform short-term management but will be included as part of the long-term management program. Results from these early studies will guide future efforts in the reserve system. This feedback will increase the efficiency with which reserve system lands can be managed and the overall success rate of management activities. Testing the use of indicators for natural communities or covered species; refining monitoring protocols; establishing control plots for long-term management; and reviewing the literature for guidance on sampling, experimental design, and management will all be a part of the targeted studies phase of implementation.

6.5.4.2.3 Develop Experiments to Resolve Critical Uncertainties

A final element of the targeted studies phase of implementation is the development of experiments that resolve critical uncertainties. The Conservancy will identify critical uncertainties as the Conservancy develops conceptual models In addition, the Conservancy will work with other individuals and organizations (e.g., local universities) to facilitate targeted studies on the reserve system and areas outside the reserve system along Cache Creek and Putah Creek that will improve management.

6.5.4.3 Long-Term Monitoring and Adaptive Management Phase

Both the inventory phase and the targeted studies phase will be followed by long-term monitoring to determine the status and trends of natural communities, and covered species, and the effectiveness of the reserve system management in achieving the HCP/NCCP biological goals and objective (Figure 6-11, *Timing of Monitoring Phases*). Monitoring that does not depend on the results of targeted studies will occur as soon as the reserve management plans have been reviewed and approved by the wildlife agencies and baseline studies are complete (inventory phase) or sooner, if appropriate. Long-term monitoring will use the framework developed during the inventory phase to carry out effectiveness monitoring and to implement adaptive management.

The long-term monitoring phase includes the following tasks:

- Update GIS land cover layer with aerial photographs, satellite imagery, and other relevant data sources at least every five years. Assess status and trends at the natural community levels;
- Monitor covered species response to enhancement, restoration, and habitat creation;
- Monitor restoration sites for success; remediate sites if initial success criteria are not being met. The reserve management plan will identify triggers for remediation;
- Monitor covered species using methodologies developed in targeted studies phase. Assess status and trends of covered species by monitoring covered species populations over time;
- Assess status and trends of palmate-bracted bird's beak that may have been partially or temporarily affected by covered activities to ensure that plant protection in the reserve system adequately offsets adverse effects; and
- When enhancement and restoration projects are complete and have met final success criteria, scale back monitoring effort (i.e., frequency, extent) but continue to adaptively manage these sites.

In addition to long-term monitoring, this phase will include steps to adaptively manage the reserve system to implement the conservation strategy. Adaptive management tasks are listed below.

- Evaluate efficacy of monitoring protocols. During this phase, the Conservancy will evaluate the results of pilot projects and incorporate them into long-term monitoring efforts;
- Incorporate best available scientific information into management. Regular reviews of literature as well as interaction with the STAC and the wildlife agencies will ensure that new understanding of the species or monitoring approaches is incorporated into the monitoring and adaptive management program;
- Evaluate and refine conceptual models. The Conservancy will develop conceptual models for each species and for natural communities. As more information becomes available and as assumptions evolve, the models will reflect changes and continue to provide guidance for future monitoring efforts;
- Review any unexpected or unfavorable results and test hypotheses to achieve desired outcome. The Conservancy will examine unexpected results or results suggesting that the conservation actions will not likely meet the conservation strategy commitments described in this chapter to understand the cause or source of the result. The Conservancy will test hypotheses about management outcomes;
- Adjust management actions and monitor; and
- Adjust success criteria and conservation actions, if necessary. The success criteria and conservation actions developed for the Plan will be adjusted if they have been determined to be inappropriate indicators of success (too high or too low, based on biological information), if more cost-effective but equally successful conservation actions are developed and agreed upon by the wildlife agencies, or if they are inadequately conserving species or communities. The magnitude of the change to the success criteria will be based on best available scientific information. New or different conservation actions may be implemented through time, as long as they fulfill the conservation strategy commitments described in this chapter. Section 6.4, *Conservation Measures*, describes conservation actions, and Table 6-11, *Example Success Criteria for Monitoring Effectiveness of Selected Management Actions*, provides example success criteria.

The Conservancy will develop operational success criteria during the Targeted Studies phase of implementation. Changes to success criteria and conservation actions will be discussed with and not implemented until approved by the wildlife agencies. For significant changes, a permit amendment may be necessary.

6.5.5 Guidelines for Monitoring

Adaptive management, and the design of targeted studies, will be driven by hypotheses about key factors for the natural community, and/or covered species for which the management is applied. For example, if the goal of management is to increase populations of small mammals to serve as a prey base for certain covered species (e.g., Swainson's hawk), land managers must develop hypotheses about what controls small mammal abundance and distribution. Adaptive management actions and monitoring will be directed toward confirming or disproving those hypotheses. Directed studies will be conducted on a small scale using an experimental design that will yield statistically valid results to address critical uncertainties. Ultimately, if small mammal availability limits the abundance of covered species, increasing the prey base may increase the survival and fitness of covered species. If the prey base increases and the covered species do not respond, then other factors apparently limit their abundance.

In addition to the scientific guidelines described above, the following steps will be included in the experimental design;

1. **Define the question.** Monitoring strategies will be designed to address specific hypotheses. Conceptual, statistical, or spatially explicit models will define those hypotheses;
2. **Determine what to measure.** Establish the attributes or variables that the monitoring will measure to answer the question defined above. This step includes the development of measurable success criteria for evaluating creation, restoration and enhancement actions;
3. **Develop monitoring protocols.** Questions to be answered by the monitoring program will be at the species, natural community, and landscape level. Monitoring protocols will vary with level and with the target of the monitoring. The Conservancy will develop monitoring protocols in accordance with the guidelines provided below in Section 6.5.6.3;
4. **Use indicator species, if appropriate.** In some cases, groups of species or indicator species will streamline monitoring. Indicators are selected because they are easy to survey and provide usable information on the species or system in question. Indicators need not be species, but may be ecological variables or structure-based characteristics such as diameter and age class of trees, interpatch distances between habitat, or key structural features of certain habitat types (e.g., snags or downed logs in forests, woody debris in rivers) (Noss 1999; Lindenmayer et al. 2000). Guidelines for selecting and using indicators are described in detail below; and
5. **Consider sampling design.** Sampling design needs to be a consideration prior to initiating the experiment. The experimental management approach of the HCP/NCCP requires that questions of site selection, statistical power, and significance be incorporated, as much as possible, into the monitoring and adaptive management program. Sampling design is described in detail below.

6.5.5.1 Indicators

In cases where an indicator species is used to monitor an ecosystem or natural community (health indicator species), the Conservancy will use conceptual models to help identify an appropriate

indicator species or variable (Section 6.5.4.2.1, *Develop Conceptual Models*). Table 5-11, *Example Success Criteria for Monitoring Effectiveness of Selected Management Actions,* provides example performance indicators for natural community enhancement, restoration, and creation measures. Indicators, in general, are easy to monitor and demonstrate changes or trends that are quantifiable. Indicators need not be species, but may be ecological variables or structure-based characteristics such as diameter and age class of trees, interpatch distances between habitat, or key structural features of certain habitat types (e.g., snags or downed logs in forests, woody debris in rivers) (Noss 1999; Lindenmayer et al. 2000). Effective indicators (or variables) have some or all of the following characteristics (Carignan and Villard 2002; Atkinson et al. 2004):

- They are relevant to program goals and objectives and can be used to assess the program performance at the appropriate spatial and temporal levels;
- They are sensitive to changes in the ecosystem, providing early warning of response to environmental or management impacts;
- They indicate the cause of change, not just the existence of change;
- They provide a continuum of responses to a range of stressors such that the indicator will not quickly reach a minimum or maximum threshold;
- They have known statistical properties, with baseline data, references, or benchmarks available; and
- They are technically feasible, easily understood, and cost effective to measure by all personnel involved in the monitoring.

The Conservancy will coordinate with existing programs to identify indicators or variables in use by other programs that are complementary to, and consistent with, the Yolo HCP/NCCP conservation strategy. The Conservancy will determine the following.

- "What" will be monitored,
- "Why" the monitoring is useful (i.e., the specific question the variable is designed to address),
- "When" will the variable be monitored and at what frequency,
- The conceptual ecological model underlying the selection of the monitoring variable,
- The geographical area where it will be monitored (e.g., transect locations, stream miles),
- The specific variable that will be measured and the protocol that will be used,
- The range of values the monitoring can produce and what these would mean,
- The expected response (as in response to management or outside pressures) and the magnitude of change expected, and
- The time frame and spatial scale over which change is expected to be demonstrated.

The monitoring component of each reserve management plan will clearly present the rationale for using indicators. Indicators must be applicable and appropriate measures of the biological goals and objectives. The recommendation of the STAC, as well as review from the wildlife agencies, will be sought when an indicator is used.

6.5.6 Monitoring Actions

6.5.6.1 Landscape-Level Actions

The Conservancy will direct landscape-level monitoring toward tracking large areas, landscape-level processes, and regional issues that affect the Plan Area. Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring*, correlates landscape-level monitoring actions with biological goals and objectives for landscapes. Table 6-10, *Biological Goals and Objectives Associated with Conservation Measure 3*, provides additional details related to monitoring for landscape-level management actions. The section below summarizes the specific monitoring actions the Conservancy will carry out to track environmental issues at the landscape level and ensure the Conservancy meets the landscape-level goals and objectives. Compliance monitoring is described above in Section 6.5.3.1, *Compliance Monitoring,* and will take place at all levels of monitoring, including the landscape level.

6.5.6.1.1 Assimilate Results of Pre-Acquisition Assessments

The Conservancy will collect information on landscape features through pre-acquisition assessments, including biological surveys, updated land cover mapping, assessments of habitat suitability for covered species, aerial photo interpretation, and the biological resources present or expected on-site, that provide information on the extent, quality, and distribution of land cover types in the reserve system (Section 6.4.1.6, *Pre-acquisition Assessments*). These data, in addition to data collected within the first few years after acquisition, will contribute to the baseline data and will be used to refine existing species habitat models and develop natural community conceptual models. Additionally, the Conservancy will combine this information with landscape-level information collected by other organizations or individuals in the region to provide resource managers, including the Conservancy, with an understanding of how critical biological resources are generally trending under the influence of HCP/NCCP implementation as well as under the influence of other human activities and other environmental factors (e.g., fire, drought, disease). The Conservancy will also collect annual information on precipitation and whether the Plan Area is experiencing a wet or dry rainfall year, to facilitate trends analysis and potential effects on baseline and results of surveys for covered species and natural communities.

6.5.6.1.2 Refine Land Cover Maps

At the landscape level, the Conservancy will monitor, using existing aerial photos or satellite imagery, the extent and distribution of land cover types within the Plan Area every five years. If feasible, this monitoring will occur at a more refined level following significant natural events that affect the reserve system (e.g., flood and wildfire). This effort will begin during the Inventory Phase but will continue throughout all phases of HCP/NCCP implementation. The Conservancy will verify land cover mapping in the field at sites where aerial photography interpretation is difficult or aerial photography is not available (The Conservancy will not conduct its own aerial photography). The Conservancy will improve species models, including maps, as new data become available.

6.5.6.1.3 Assess and Monitor Landscape Linkages

One of the goals of the conservation strategy is to sustain and enhance the effective movement and genetic exchange of native organisms within and between natural communities inside and outside the Plan Area. To monitor landscape linkages, the Conservancy will use a combination of compliance monitoring (to ensure that land acquisition requirements and Objectives L-1.3, L-1.4, L-1.5, and L-

1.6 are met) and effectiveness monitoring (to ensure that species utilize linkages effectively and that management actions to increase permeability or improve connectivity are successful).

The inventory phase of monitoring will prioritize acquisition of linkages, develop management protocols to enhance linkages, and develop success criteria for the effectiveness of linkages at sustaining movement and genetic exchange. The targeted studies phase will test methodologies for monitoring linkages. The objective of the targeted studies phase is to determine the most cost-effective and accurate way of evaluating whether landscape linkages are functioning within the context of the HCP/NCCP. The long-term monitoring phase will implement methodologies identified in the targeted studies phase.

6.5.6.1.4 Track Invasive Species

A primary goal of the HCP/NCCP is to enhance or restore representative natural landscapes to maintain or increase native biological diversity, consistent with Objective L-2.1 (Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures* and Table 6-10, *Biological Goals and Objectives Associated with Conservation Measure 3*). To that end, the conservation strategy proposes to reduce the cover, biomass, and distribution of targeted populations of nonnative invasive plants (Section 6.4.3.4.1, *Invasive Species Control Program*) in the reserve system. As part of this effort, the Conservancy will map occurrences of invasive nonnative plants in the reserve system.

The Conservancy will coordinate monitoring protocols for invasive plants with those of other local entities to ensure consistency with these programs and facilitate the sharing of monitoring results. The Conservancy will use this monitoring information to determine the need for management actions to control the spread of existing invasive plants as well as potential future invasions. The Conservancy will also review the effectiveness of control methods. The Conservancy will share this monitoring information with state and local land management agencies charged with the control of invasive plants.

During the inventory phase of monitoring, the Conservancy will identify and prioritize problems with invasive species in the reserve system; map occurrences of invasive plants in the reserve system, if possible; develop an exotic species control program for reserve lands; and develop success criteria for the effectiveness of eradication or reduction efforts. The targeted studies phase will develop protocols for invasive species monitoring and test methodologies for monitoring eradication efforts. The objective of the targeted studies phase is to determine the most cost-effective and accurate way of controlling invasive species. The long-term monitoring phase will entail implementation of methodologies identified in the targeted studies phase.

The Conservancy will also document occurrences of invasive animals in GIS, and develop management actions to prioritize and address nonnative wildlife that adversely affects covered species or Plan Area species diversity. The bullfrog, for example, is an invasive species of special concern because it competes with native amphibians for resources. During the targeted studies phase, the Conservancy will develop protocols to monitor the presence/absence of bullfrogs in covered species aquatic habitat within the reserve system over time. Monitoring will track the effectiveness of bullfrog control. These protocols will then be used as part of long-term monitoring for bullfrog control.

The Conservancy will monitor and report instances of disease, as they are discovered. The Conservancy will maintain a watchlist of dangerous diseases for the Plan Area, in coordination with other agencies that maintain similar watchlists for the area, and will periodically monitor animals

and plants, as part of species and natural community monitoring, to ensure the Conservancy identifies any occurrences of dangerous diseases in the reserve system or in areas that could affect the reserve system..

The Conservancy will track, on an annual basis, the status of diseases and nonnative invasive species to expeditiously initiate remedial actions described in Section 7.7.1, *Changed and Unforeseen Circumstances*.

6.5.6.2 Natural Community–Level Actions

The section below provides specific monitoring actions the Conservancy will carry out to track environmental issues at the natural-community level within the reserve system and ensure the HCP/NCCP is meeting natural-community-level goals and objectives. Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring*, correlates natural community-level monitoring actions with biological goals and objectives for natural communities. Table 6-10, *Biological Goals and Objectives Associated with Conservation Measure 3*, provides additional details related to monitoring for natural community-level management actions.

6.5.6.2.1 Cultivated Lands Monitoring Actions

The Conservancy will use the various management tools described in Section 6.4.3.5.1, *Cultivated Lands Seminatural Community* as needed to manage and enhance cultivated lands on the reserve system for covered species. Monitoring actions will evaluate the effectiveness of this management to provide habitat for target covered species, protect and improve water quality, enhance connectivity between natural communities, and buffer natural communities and other existing biological resources from urban/suburban development.

Assess Conditions of Natural Community

The Conservancy will monitor cultivated lands to document baseline conditions, evaluate community function, and identify enhancement and other management actions to improve community functions and habitat for covered species. These tasks include:

- Use pre-acquisition assessments, site inventories, and other surveys to identify the distribution of potential habitat for covered species and wildlife; the distribution of areas to be enhanced to improve community functions and to provide habitat and connectivity for covered species; and to inform the development of agricultural land management plans;
- Assess the use of cultivated lands in the reserve system by covered species and other wildlife. The Conservancy will use this information to assess the success of future agricultural uses and management practices in providing habitat for covered species;
- Develop a conceptual model for cultivated lands and identify indicators of community function;
- Prioritize habitats and other areas for enhancement (e.g., planting of nest trees for Swainson's hawk; planting hedgerows). The Conservancy will identify and select sites based on their potential to provide habitat for covered species and natural communities. The Conservancy will not enhance all cultivated lands in the reserve system, as the Conservancy expects some lands will have high habitat value initially and this value must only be managed, not enhanced;
- Identify areas the Conservancy will manage to provide habitat for covered species such as giant garter snake and tricolored blackbird;

- Identify suitable wildlife-compatible agricultural uses and management practices for the reserve system that are compatible with the biological goals and objectives of the HCP/NCCP, although the Conservancy expects that landowners will manage most cultivated lands within the reserve system and little management by the Conservancy will be required, other than tree planting and hedgerow establishment for Swainson's hawk and possibly some assistance with giant garter snake habitat management; and
- Begin pre-enhancement monitoring of sites considered for enhancement and develop criteria for evaluating success. These criteria will be suitable to evaluate whether management enhances habitat for target covered species and other wildlife and enhances target ecosystem services.

Monitor Use of Cultivated Lands by Covered Species

The following are specific monitoring tasks that will help the Conservancy determine whether it is maintaining or enhancing the value of cultivated lands for covered species:

- Develop criteria to evaluate the success of land management (e.g., leaving winter cover crops; depth of water and timing of flooding in rice lands) in enhancing habitat for covered species and natural communities,
- Monitor rice lands and other habitats (e.g., irrigation canals and other waterways) managed to provide habitat for giant garter snake and include monitoring to determine occurrence of giant garter snake, and
- Develop pilot projects that test the effects of different agricultural management techniques (e.g., different cover crops, crop harvest height) on use by target covered species.

6.5.6.2.2 Grassland Monitoring Actions

Assess Condition of Natural Community

The Conservancy will use the various management tools described in Section 6.4.3.5.2, *Grassland Natural Community,* as needed to manage and enhance grassland on the reserve system for covered species. Monitoring actions will evaluate the effectiveness of this management to provide habitat for target covered species, and enhance connectivity between natural communities. The Conservancy will conduct monitoring to assess the status and trends of species in the grassland community and to evaluate community function. If feasible, information on the historical ecology of grassland will help guide assessments. The Conservancy will carry out the tasks listed below to document the baseline conditions from which change will be measured.

- Use pre-acquisition assessments and site inventories to document the distribution and vegetation types of grassland;
- Develop a management-oriented conceptual model for grassland that includes important factors such as the effects of rainfall, temperature, fire, herbivory (i.e., grazing) and succession to woody communities (e.g., blue or valley oak woodland), and identify indicators for community function as well as any critical uncertainties that may require additional directed studies;
- Assess and monitor invasive nonnative plants. This task will entail developing maps and descriptions of the distribution and abundance of target invasive species; their known or potential effects on ecosystem function; native biological diversity; sensitive natural communities; covered species; and the means and risk of the spread of invasive species to other

areas within and outside the reserve system lands. Focus on species that have the greatest potential to threaten grassland such as yellow and purple star-thistle, barbed goat grass, teasel, and others;

- Assess the historic extent, conditions, and fire return interval of grassland within the Plan Area using aerial photographs and historic records;
- If prescribed burns are feasible and desirable, prepare burn plans that describe pre- and post-burn monitoring to determine effects;
- Assess grassland landscape connectivity between reserves; and
- Examine potential negative effects of grazing on sensitive areas and substrates such as rock outcrops and seeps.

Monitor Actions to Promote Native Plants and Reduce Invasive Species

As discussed in Section 6.4.3, *Conservation Measure 3, Manage and Enhance the Reserve System,* the conservation measures for grassland include implementation of management actions that will promote propagation of native plants, reduce and control invasive nonnative species, and encourage native biodiversity through the maintenance of dynamic mosaics of vegetation types and biological gradients. Specific tasks to further these goals and objectives are listed below.

- Develop success criteria for grassland enhancement and evaluate the success of management actions (i.e., mostly grazing) in reducing nonnative plants and promoting the extent and diversity of native plants;
- Develop guidance for grazing within the Plan Area and grazing plans for specific parcels, as applicable, using an experimental approach to achieve the biological goals and objectives; and
- Evaluate the success of any herbicide applications used to control nonnative plants in target areas.

Monitor Ground Squirrel Populations and Burrow Use

The Conservancy will monitor populations and/or burrow use and density on reserve lands because of the importance of small mammals as a prey base for some predatory covered species and the importance of burrows to provide refugia for some terrestrial covered species. The tasks necessary to carry out the goals and objectives pertaining to fossorial mammals are listed below.

- Monitor ground squirrels and/or populations of other small mammals to determine the abundance of prey and burrows for several covered species (e.g., western burrowing owl, California tiger salamander) and many common species, and
- Determine if ground squirrel burrows are being used by covered species.

6.5.6.2.3 Alkali Prairie Monitoring Actions

Enhancement activities at Woodland Regional Park will have the goal of improving the alkali prairie natural community. Monitoring and adaptive management for this natural community is described further, for palmate-bracted bird's beak, in Section 6.5.6.3.1, *Palmate-bracted Bird's Beak*.

6.5.6.2.4 Fresh Emergent Wetland Complex Monitoring Actions

The Conservancy will use the various management tools described in Section 6.4.3.5.5, *Fresh Emergent Wetland/Lacustrine and Riverine Natural Community,* as needed to manage and enhance these natural communities on the reserve system for covered species. Monitoring actions will evaluate the effectiveness of this management to provide habitat for target covered species, protect and improve water quality, and enhance connectivity between natural communities.

For the purpose of this HCP/NCCP, the monitoring and adaptive management of fresh emergent wetland complex includes the monitoring and adaptive management of lacustrine and adjacent upland land cover associated with the fresh emergent wetland natural community. The HCP/NCCP collectively refers to fresh emergent wetlands with associated lacustrine land cover and adjacent uplands as *fresh emergent wetland complex*.

Monitoring actions will evaluate the effectiveness of management to protect, restore, manage, and enhance fresh water emergent wetland complex by increasing native vegetative cover, biomass, and structural diversity within and around the margins of wetland areas. At the same time, the Conservancy will use monitoring actions to evaluate efforts to reduce the cover and biomass of nonnative invasive plants, access by feral and domestic mammals, and numbers of predatory wildlife and fish species. Monitoring actions will also track the response of covered species (e.g., giant garter snake, tricolored blackbird) to habitat management activities. The Conservancy will need a reasonable understanding of metapopulation dynamics in the vicinity of these management actions to determine whether the actions are causing the change in population level or the population is experiencing typical fluctuation.

Assess Condition of Natural Community

The Conservancy will conduct monitoring to assess the status and trends of the fresh emergent wetland complex and to evaluate community function. The Conservancy will conduct the tasks listed below to determine the baseline condition of fresh emergent wetland complex.

- Use pre-acquisition assessments, site inventories, and other surveys to determine the distribution and abundance of wetlands within and adjacent to the reserve system. Map the distribution and assess connectivity of wetlands and associated upland areas;
- Develop a conceptual ecological model for wetlands and identify indicators for community function as well as any critical uncertainties that may require additional directed studies;
- Prioritize restoration sites for fresh emergent wetland complexes, if restoration is required for implementation of the Yolo HCP/NCCP. The Conservancy will identify and select potential restoration sites on the basis of their physical processes and hydrologic, geomorphic, and soil conditions to ensure that successful restoration can occur and be self-sustaining;
- Identify wetlands with abundant nonnative predators or ponds where native species are affected by feral and domestic animal entry. Work with landowners to reduce nonnative species on these sites, if feasible;
- Assess nonnative invasive plants, including maps and descriptions of their distribution and abundance; their known or potential effects on ecosystem function, native biological diversity, sensitive natural communities, and covered species; and the means and risk of their spread to other areas inside and outside the reserve system; and

- Begin pre-treatment monitoring of sites considered for enhancement and develop criteria for evaluating success. These criteria will be suitable to evaluate if habitat management increases hydrogeomorphic and ecologic functions, improves habitat value, increases landscape connectivity, and enhances the habitats' ability to support existing and new populations of covered species.

Evaluate Restoration and Enhancement Activities

The Conservancy will conduct the tasks listed below to determine the response of restoration and enhancement actions on increasing native vegetative cover, biomass, structural diversity, and regional connectivity for the benefit of covered species.

- Determine indicator species for monitoring restoration and enhancement and develop success criteria;
- Initiate pilot projects to develop restoration, and enhancement measures for individual sites on the basis of hydrologic conditions; extent and quality of existing covered species habitats (e.g., percent native vegetation and presence/absence of exotic wildlife such as bullfrogs); existing wildlife use; and the potential for adverse effects (e.g., disturbance and/or removal of existing pond/wetland habitat). These measures will include descriptions of plant material requirements (e.g., collected and propagated from local sources); planting and construction methods; and adaptive management and monitoring requirements;
- Determine and quantify changes in habitat that result from restoration and enhancement actions;
- Survey wetland capacity and water duration and monitor to ensure that the ecological and hydrogeomorphic functions related to these parameters are maintained or improved; and
- Evaluate the use of fresh emergent wetland complexes (including adjacent uplands) by covered species.

Evaluate Efforts to Reduce Impacts associated with Livestock and Nonnative Plants and Animals

To monitor and evaluate the results of efforts to reduce impacts caused by livestock and nonnative species on wetland habitats in the reserve system, the Conservancy will conduct the following actions:

- Determine the effect on the vegetative community and the relative benefit to covered species of different management treatments on reserve lands, such as access/exclusion by livestock, and predator control;
- Monitor and record populations and incursions of nonnative predators in target wetlands; and
- Evaluate the success or potential adverse effects of any herbicide applications used to control nonnative plants in target areas within the reserve system. The use of herbicides and pesticides, however, is not a covered activity.

6.5.6.2.5 Valley Foothill Riparian Monitoring Actions

The Conservancy will use the various management tools described in Section 6.4.3.5.3, *Valley Foothill Riparian Community,* as needed to manage and enhance riparian lands on the reserve system for covered species. Monitoring actions will evaluate the effectiveness of this management to provide habitat for target covered species, protect and improve water quality, enhance connectivity

between natural communities, and buffer natural communities and other existing biological resources from urban/suburban development. Adaptive management of the riparian natural community is focused on the overall goal of promoting natural community functions and habitat heterogeneity and connectivity to benefit covered species and native biodiversity. For the purpose of this HCP/NCCP, monitoring and adaptive management of the valley foothill riparian natural community includes riverine components of the lacustrine/riverine natural community that are capable of supporting riparian vegetation along the banks.

Assess Condition of Natural Community

The Conservancy will conduct monitoring to assess the status and trends of the riparian and riverine natural community on the reserve system and to evaluate community function. The Conservancy will conduct the tasks listed below to determine the baseline condition of lacustrine/riverine complex.

- Conduct pre-acquisition assessments and site inventories to document and map the distribution and condition of lacustrine and riverine communities to verify and revise, if necessary, existing maps of land cover;
- Identify and prioritize sections of lacustrine and riverine habitat, within and outside of the reserve system, suitable for restoration and enhancement;
- Document and assess the connectivity of riverine corridors along the Sacramento River, Cache Creek and Putah Creek, and between reserve lands and other public lands, and prioritize key riverine and riparian sections for acquisition, restoration, and enhancement;
- Develop a management-oriented conceptual model of the lacustrine and riverine natural community, and identify ecological indicators for community function and uncertainties that may require directed studies; and
- Assess the distribution and relative abundance of targeted nonnative, invasive plant species, including threats to ecosystem processes, covered species, and biodiversity, and prioritize reserve lands on which to focus efforts to reduce nonnative species.

Monitor Stream Restoration Projects

Stream restoration and enhancement projects in the Plan Area, including actions carried out through the Cache Creek Resources Management Plan, will focus on removing channelization features, stabilizing banks, recreating natural stream features such as meanders, pools, runs, and riffles, and reconnecting the floodplain to the active channel. These projects will serve multiple purposes, including reducing sediment deposition, improving habitat for covered species including the western pond turtle and restoring ecological processes. The Conservancy will monitor, or work with partners to monitor, areas slated for stream restoration before restoration commences and after restoration is completed to assess the effectiveness of the restoration project. The monitoring program will focus on evaluating whether an enhancement or restoration project is achieving its goals and objectives. The Conservancy or its partners, such as the Lower Putah Creek Coordination Committee or the managers of the Cache Creek Resources Management Plan, will assess the restoration project by comparing the target of enhancement and restoration actions with success criteria. Success criteria will be project-specific, and will be established during the development of

reserve management plans. In addition, the Conservancy will conduct the following monitoring tasks to evaluate the efficacy of stream enhancement/restoration projects:

- Develop specific, measurable success criteria for restoration projects and monitor indicators in restored areas to assess the efficacy in restoring natural hydrogeomorphic and ecological processes, and improving habitat for covered species;
- Use data from previous monitoring efforts to assess whether populations of covered species are increasing in relation to stream enhancement and restoration efforts; and
- Monitor sediment loading rates pre- and post-project for projects designed to reduce sedimentation.

6.5.6.3 Species-Level Actions

The Conservancy will conduct monitoring to assess the status of covered species and to determine the extent to which the Conservancy is meeting the biological goals and objectives of the Yolo HCP/NCCP. Table 6-3, *Biological Goals and Objectives and Applicable Conservation Measures and Monitoring*, correlates species-level monitoring actions with biological goals and objectives for species. Table 6-10, *Biological Goals and Objectives Associated with Conservation Measure 3*, provides additional details related to monitoring for species-level management actions. The section below summarizes the specific monitoring actions that the Conservancy will carry out to track environmental issues at the species level and ensure the Conservancy is meeting species-level goals and objectives. Covered species monitoring will address the following issues relevant to the HCP/NCCP:

- Status and trends of covered species within the reserve system (i.e., status and trends monitoring),
- The response of covered species to HCP/NCCP species-specific conservation measures and adaptive management (i.e., effects-of-management monitoring), and
- Directed studies to resolve critical management uncertainties for some covered species.

The Conservancy will initiate baseline surveys for covered listed species within one year of the acquisition of lands potentially supporting this species. The Conservancy will initiate species-specific conceptual models for covered species within one year of HCP/NCCP implementation. Within that five years of implementation, the Conservancy will select monitoring variables and additional indicators (biotic or abiotic). The Conservancy will develop a survey schedule to ensure that species status is monitored at the appropriate seasonal periods within the year.

Initially, the Conservancy will monitor covered species on an annual basis; however, the Conservancy may adjust the frequency of monitoring on a species-by-species basis once the Conservancy establishes the status of species in the reserve system. Recommended annual monitoring is for species status monitoring only (i.e., not trends monitoring); however, monitoring frequency for species addressed in finalized USFWS recovery plans will not fall below the recommended frequencies in these plans.

Targeted studies and monitoring related to the effects of management actions will take place on a time schedule that is relevant to the specific effort at hand, and the Conservancy will develop a monitoring schedule for these activities on a case-by-case basis. The Conservancy will develop success criteria and

monitoring protocols to incorporate monitoring results into the adaptive management strategy. Finally, the Conservancy will identify and track additional threats to species survival.

6.5.6.3.1 Palmate-Bracted Bird's-Beak

Document and Monitor Status of Palmate-Bracted Bird's-Beak

The Conservancy will complete a comprehensive baseline survey of palmate-bracted bird's-beak on Woodland Regional Park to document the occurrence and relative abundance of the species and to acquire the baseline data necessary to evaluate long-term adaptive management and monitoring.

Botanists will carry out the survey by walking parallel transects spaced five to 10 meters (16 to 33 feet) apart throughout the entire habitat area of the site. If more than one botanist conducts the survey, it will include at least one member who has observed palmate-bracted bird's-beak growing in its natural habitat, who will train the other botanists to recognize palmate-bracted bird's-beak by observing the species in the portion of the reserve where it has been previously documented and mapped. The botanist will conduct the survey during the blooming period, when the plants are most evident and identifiable. The botanist(s) will record additional observations during the survey including the size and vigor of the plants, the presence of pollinators visiting the plants, and a list of all associated plant species, particularly palmate-bracted bird's-beak host plants. The botanist(s) will map all locations of palmate-bracted bird's-beak plants found during the survey using GPS data recorders, and enter the data into a GIS database.

The botanist(s) will document the results of the survey in a report that describes the survey methods, the area surveyed, dates of the survey, the observability and phenology of the species at that time, and the abundance and distribution of the species. The report will also discuss factors that may have affected the growth and vigor of the plants, including but not limited to the seasonal rainfall totals, disturbances, and the presence of invasive plants. The report will include a map showing the locations of the plants. The botanist(s) will perform the monitoring annually. The monitoring reports will also incorporate relevant information regarding monitoring and research activities managed by CNLM on adjacent lands, as such information becomes available.

Revised Management as Needed Based on Palmate-Bracted Bird's-Beak Monitoring

If the Conservancy does not meet the objective of a 10% increase in the 10-year running average population size of the palmate-bracted bird's-beak population on Woodland Regional Park, the Conservancy will coordinate with the wildlife agencies to develop adaptive management that will be incorporated to meet the objective, including protocols for palmate-bracted bird's-beak propagation and seeding in the appropriate habitat on the Woodland Regional Park. The Conservancy will maintain these seeded locations with supplemental water, weeding, and other management techniques to maximize the chances of successful establishment and natural reproduction. Also see Section 6.4.3.5.4, *Alkali Prairie Natural Community,* for management measures related to the alkali prairie natural community.

6.5.6.3.2 Valley Elderberry Longhorn Beetle

Document and Monitor Status of Valley Elderberry Longhorn Beetle

As the Conservancy acquires new reserves into the reserve system, it will survey potential habitat to document the occurrence and relative abundance of host elderberry plants and valley elderberry longhorn beetle and to prioritize sites for long-term adaptive management and monitoring.

The Conservancy will develop protocols and sampling methods for detecting and documenting occurrences and relative abundance of valley elderberry longhorn beetle (including timing of surveys and monitoring intervals) in coordination with USFWS and species experts to monitor distribution and relative abundance in the reserve system. The Conservancy may refine protocols to monitor status and trends by using methods testing.

On each reserve land where potential habitat for valley elderberry longhorn beetle occurs, the Conservancy will assess and document the following:

- The distribution and relative abundance of host plants (i.e., elderberry species),
- Relative health and age of the host plants,
- The distribution and relative abundance of valley elderberry longhorn beetle (e.g., as indicated by exit holes),
- The proximity to other habitats, and
- The presence of factors (threats) that could affect population stability (e.g., adjacent land use, pesticide-use).

The Conservancy will document occurrences in GIS and use this data to prioritize sites for enhancement and restoration and to identify potential factors that limit the distribution of valley elderberry longhorn beetle in the Plan Area. The Conservancy will also use this information to update the habitat model for valley elderberry longhorn beetle. At locations where potential habitat for valley elderberry longhorn beetle occurs, but where valley elderberry longhorn beetles are not found, the Conservancy will document the presence of factors that may be impeding use of the site. Based on the assessment data, if conditions are suitable, the Conservancy will develop a plan to enhance and/or restore riparian habitat for existing populations and transplant elderberry that are occupied by valley elderberry longhorn beetle from areas where they are removed as a result of covered activities into appropriate sites (project proponents need not transplant a shrub if they can demonstrate the shrub can be avoided, and indirect effects will not result in the death of stems or the entire shrub, as described in Section 4.3.4, *Covered Species*).

Evaluate Species Response to Enhancement and Restoration of Riparian Habitat

The Conservancy will monitor the response of valley elderberry longhorn beetle populations to enhancement or restoration actions designed to improve and restore habitat for valley elderberry longhorn beetle. One way to evaluate the success of restoration and enhancement actions and techniques is to compare the relative abundance of valley elderberry longhorn beetle individuals or exit holes before and after treatments. Valley elderberry longhorn beetle populations are likely to fluctuate regardless of management actions. Therefore, it may be necessary to compare the fluctuations that occur in the relative abundance of valley elderberry longhorn beetle at restoration and enhancement sites to the fluctuations that occur at reference sites.

The Conservancy will monitor patch occupancy and relative abundance in enhanced and restored sites to assess the effectiveness of enhancement and restoration actions implemented to improve and expand habitat for valley elderberry longhorn beetle. For example, if restoration actions such as re-vegetation with elderberry plants or invasive plant removal are implemented in an area—and if the relative abundance of valley elderberry longhorn beetle increases in that area over time—then some of that increased abundance could be attributed to the actions implemented. This would be especially true if the relative abundances at reference sites did not increase at the same rate. In such

cases, restoration actions would precede as before. If the relative abundance of valley elderberry longhorn beetle did not increase over time, however, or if the population in the habitat patch were extirpated, the restoration actions would be modified to achieve better results—or would be replaced with alternate restoration actions.

In addition, populations of elderberry plants may be monitored to determine whether the valley elderberry longhorn beetle host plants are abundant and healthy enough to support valley elderberry longhorn beetle populations. In some cases it may also be beneficial to monitor natural recruitment of elderberry plants to estimate whether elderberry populations are stable enough to support valley elderberry longhorn beetle populations over the long-term. Where elderberry re-vegetation is implemented, it will be necessary to monitor survival of transplants to guide propagation and outplanting procedures consistent with USFWS' latest adopted guidelines for valley elderberry longhorn beetle, and based on the best available information.

Monitor Potential Threats

Invasion by the exotic Argentine ant into riparian habitat may potentially threaten the survival of valley elderberry longhorn beetle (Huxel 2000). The severity, extent of impacts, and ecological relationships between Argentine ants and valley elderberry longhorn beetle are not well understood, however, and some studies have not found significant relationships between the presence of Argentine ants and valley elderberry longhorn beetle (Huxel et al. 2003). Argentine ants may colonize restored and native sites occupied by valley elderberry longhorn beetle on their own, or by being transported to restored sites in the soil of potted plants (Talley et al. 2006). Furthermore, irrigation may promote ideal conditions for the growth and survival of Argentine ants (Talley et al. 2006). The Conservancy will consider conducting directed studies to evaluate the effects of Argentine ants on populations of valley elderberry longhorn beetles on the reserve system if monitoring data indicate that valley elderberry longhorn beetles are declining or not successfully colonizing or establishing populations in restored or enhanced sites or if data in the scientific literature indicate that Argentine ants may be limiting the distribution and abundance of valley elderberry longhorn beetle. The Conservancy will monitor the distribution and relative abundance of Argentine ants at target sites on reserves that support habitat for valley elderberry longhorn beetle on a case-by-case basis. The Conservancy will monitor the scientific literature and regularly consult with scientific experts to remain current on new findings that further clarify the relationship between Argentine ants and valley elderberry longhorn beetle. The Conservancy will adapt future management (including conducting targeted studies) when necessary, based on new knowledge of threats to valley elderberry longhorn beetle.

6.5.6.3.3 California Tiger Salamander

Document and Monitor Species Status

During the breeding season, which begins soon after the first cool rains of late-fall and early winter, adult California tiger salamanders migrate to breeding pools. Before hatching and after larvae hatch out and are developing, the probability of detecting presence is highest. The Conservancy will conduct surveys during the breeding season that are accepted by USFWS and CDFW. The Conservancy will coordinate monitoring actions that take place under the HCP/NCCP with those of other local agencies to ensure that unnecessary redundancies are eliminated and that data can inform both processes.

During the non-breeding season, when individuals are underground in upland refugia, this species is more difficult to detect and methods to do so are often cost prohibitive. To determine quality and quantity of upland habitat for this species, surveys for California ground squirrel colonies and pocket gopher activity may serve as a surrogate. This is discussed further below. In general, the Conservancy will assume that if upland habitat is suitable and within the range of known dispersal distances from an observed breeding location, then the upland habitat is occupied as well. The Conservancy will extrapolate densities of adult salamanders using upland habitat in a given area from densities of adult and larval salamanders detected in breeding habitat through seining or other methods.

The Conservancy will conduct surveys of potential breeding habitat in lands acquired for the reserve system according to the survey schedule outlined above. Once the Conservancy has established that potential breeding adults are present, it will conduct a more in-depth survey during the breeding season, based on approved methodologies, to determine an estimate of the size of the breeding population and an estimate of breeding success. Potential breeding habitat is defined as seasonal and some perennial wetlands, including stock ponds. Some riparian areas within stream corridors could also support breeding tiger salamanders if there are adjacent wetlands or large, slow water areas (e.g., side channels or scour pools) and no predatory fish species. The Conservancy will use this information to document baseline levels for population monitoring during the permit term and beyond in areas where repeatable testing is appropriate. Baseline information will comprise the following:

- Ponds/wetlands occupied by tiger salamander larvae and/or breeding adults;
- Adult, larva, and egg mass numbers;
- Unoccupied breeding habitat that may have the potential to support breeding populations. This item will include an evaluation of the possible factors hindering successful breeding at that location;
- Assessment of upland habitat around occupied and potential breeding habitat;
- Presence of bullfrogs and predatory fish species in occupied or potential habitat;
- Signs suggesting presence of nonnative salamander alleles (hybrids);
- Presence of other factors (threats) that appear to affect breeding success at a given location where breeding is occurring; and
- Estimate of the distance between known or potential breeding sites to help guide creation or enhancement of more robust populations.

The Conservancy will document the information in GIS layers and use this data to prioritize areas for enhancement and restoration. The Conservancy will also describe management actions for target upland areas surrounding breeding habitat.

In years following baseline data collection, the Conservancy will conduct California tiger salamander population monitoring during each breeding season at the survey frequencies described above in the introduction to Section 6.5.6.3, *Species-Level Actions*. The Conservancy will use larval salamander numbers in select breeding pools to determine the local population of salamanders, within the known dispersal distance from the breeding pool, and to contribute to an overall population status and trends assessment across the reserve system. The reserve management plan will document

breeding pools the Conservancy will monitor, and will provide monitoring guidelines and population targets.

Additionally, the Conservancy will monitor upland habitat condition and use during the breeding season within 1.3 miles of a representative sample of known breeding pools. The Conservancy will base the evaluation of upland habitat condition on best available scientific information at the time including the Recovery Plan currently being prepared by USFWS. The Conservancy will correlate changes in salamander numbers in breeding pools with surrounding land uses. For example, if grazing is implemented as a management activity in an area where grazing previously did not occur, the Conservancy will discern the effect this has on habitat quality for tiger salamanders by determining how it affects the breeding activity at known breeding ponds in the area.

The Conservancy will develop monitoring protocols to assist in demonstrating compliance with species occupancy requirements described in Tables 6-2(a), *Newly Protected Lands Commitments* and 6-2(b), *Pre-permit Reserve Lands Commitments*.

Evaluate Covered Species Response to Habitat Enhancement, Restoration, or Creation

The Conservancy will monitor ponds or wetlands that are targeted for restoration, enhancement, or creation to determine the response of breeding tiger salamanders to habitat management. The Conservancy will correlate management activities with population numbers, and assess the relative success of different techniques on maintaining or increasing tiger salamander populations to guide future management efforts. The Conservancy will monitor newly created ponds and enhanced or restored wetlands and ponds for target species response, including presence/absence surveys for tiger salamander larvae and breeding adults.

In addition, the Conservancy will survey upland areas near created, enhanced, or restored breeding habitat for habitat suitability. While surveying for the presence of individuals can be cumbersome (e.g., scoping or excavating ground squirrel burrows) and time consuming, determining accessibility of upland habitat from breeding ponds and its suitability for non-breeding season use is a simpler undertaking. Surveyors will determine whether there are any barriers between breeding habitat and upland sites. Surveyors will also determine if there are sufficient underground refugia available for tiger salamanders during the non-breeding season. The Conservancy will correlate changes in this upland habitat availability and suitability with breeding population numbers. For example, if the size of a ground squirrel colony is reduced following a prescribed burn and the next year the California tiger salamander breeding population is substantially reduced, then the Conservancy might infer that prescribed burning had a negative effect on the tiger salamander population during this brief window.

Similarly, if the vegetative communities surrounding breeding habitat change due to restoration or enhancement (e.g., oak woodland planting, burning, grazing, tree thinning), the Conservancy will track the effects on the breeding tiger salamander population and infer its relationship with the management in these upland areas. In select instances, directed studies might be developed to better understand how complex management issues influence tiger salamander populations over time.

Evaluate Use of Burrows

The Conservancy will monitor habitat conditions in upland areas adjacent to a representative sample of occupied breeding habitat, and adjacent to unoccupied breeding habitat that is being

actively managed for California tiger salamander. Due to the importance of both breeding and upland habitat to the success of this species, the Conservancy will use this information to determine what the limiting biological factors are for unoccupied breeding habitat. Monitoring the size and burrow density of ground squirrel colonies adjacent to breeding habitat will be essential. Monitoring the response of ground squirrel colony size and burrow density to upland management techniques will be used as a proxy to determine the quality and quantity of upland habitat available for California tiger salamanders.

To develop more detailed information on how California tiger salamanders use underground refugia in upland habitat, the Conservancy can survey burrows and other refugia on the reserve system using a burrow probe (also known as a "digiscope"). This tool provides the means to confirm or deny occupancy of burrows in upland areas, though this method is not very cost effective for a large reserve system. Rather, the Conservancy can use this technique periodically to test the assumptions about upland habitat quality characteristics. In general, the Conservancy will assume that if breeding habitat is occupied then adjacent uplands within typical dispersal distance are being utilized as well.

Monitor Hybridization

California tiger salamander hybridization with nonnative salamanders is not known to occur in Yolo County. Hybridization, however, may become a problem in the Plan Area during the permit term. The Conservancy will conduct a study within five years of Yolo HCP/NCCP implementation to identify the distribution and level of hybridization in ponds, if any, and the presence of barred salamanders in the reserve system. These surveys will document presence of paedamorphs and identify nonnative alleles and the frequency of those alleles present in a representative sample of salamander populations within the reserve system. Future studies will focus on how each nonnative allele is physically expressed and the subsequent ecological impact of these alleles.

In years following baseline data collection, the Conservancy will monitor California tiger salamander level of hybridization annually for a representative sample of wetlands and ponds within the reserve system. Monitoring frequency can be modified with the approval of the wildlife agencies through the adaptive management process. The results of monitoring will inform future management decisions made by the Conservancy and the wildlife agencies.

Draining of ponds for the benefit of California tiger salamanders has the potential of affecting the feasibility of grazing some portions of the reserve system. If monitoring results indicate the hybrid management strategy for California tiger salamanders is adversely affecting the conservation strategy for other covered species, the Conservancy will modify the management plan through the adaptive management process with wildlife agency approval.

Evaluate Response of Predator Control Programs

During baseline surveys to document the status of native species populations, the Conservancy will also complete a description of breeding habitat that is occupied by bullfrogs and predatory fish species. These data will inform management actions within the reserve system. Subsequent surveys for bullfrogs and predatory fish will be conducted to determine the effectiveness of eradication efforts. This will also allow for an assessment of the response of native amphibian populations to nonnative species eradication efforts.

Monitor Additional Threats

The Conservancy will monitor for diseases including chytrid fungus and any other diseases harmful to covered species that are discovered in the reserve system during implementation. This monitoring will include assessing the effectiveness of any disease-control measures. Spread of these diseases becomes a concern when biologists access more than one breeding site in a short period of time. Biologists will utilize accepted antiseptic protocols during all aquatic survey work to minimize the potential for cross-contamination.

6.5.6.3.4 Western Pond Turtle

Document and Monitor Species Status

The Conservancy will conduct surveys of potential western pond turtle habitat on reserve lands to select sites for monitoring and document baseline population levels. The Conservancy will then revisit these sites and measure the population levels against the baseline to determine the effectiveness of management actions. Baseline surveys will entail an assessment of the characteristics listed below.

- Stream reaches, ponds, wetlands, or reservoirs occupied by western pond turtle adults;
- Unoccupied aquatic habitat with the potential to support populations (typically adjacent to occupied habitat);
- Basking sites that could be monitored repeatedly;
- Adjacent upland overwintering habitat;
- Adjacent upland nesting habitat, particularly in areas where nesting has been documented in the past;
- Presence of other factors (threats) seemingly affecting breeding success at a given location (e.g., adjacent land use); and
- Observations on size structure of the population to ensure that young turtles are present and that successful reproduction is occurring.

The Conservancy will document this information in GIS layers and use the data to prioritize areas for enhancement. The Conservancy will use this process to determine the potential for unoccupied breeding habitat to be enhanced to support western pond turtles in the future. It will also help predict how proposed restoration or enhancement of aquatic habitat and adjacent uplands might affect western pond turtle nest sites.

Western pond turtles can be observed year-round in perennial streams, ponds, and wetlands and on the fringes of reservoirs. The Conservancy may conduct surveys at times as early as March, but the highest probability of detection to determine presence of the species is during the summer months when individuals can be counted while basking during the middle of the day. The Conservancy will use repeated annual surveys of basking sites as an index for overall population numbers. This method will likely be more effective in ponds and wetlands, where aquatic habitat is well defined, than in streams or lakes where individuals are able to move greater distances through the water.

In many cases, it could be beneficial to install artificial basking sites in ponds or wetlands that the Conservancy would monitor every year. This would facilitate monitoring in areas where there are no basking sites or where sites are submerged during high-water periods. In streams and along

reservoir margins, existing information on species distribution and baseline survey data of suitable basking sites will provide an inventory of future survey sites. Once these basking sites are identified, the Conservancy will monitor them at the frequencies described above in the introduction to Section 6.5.6.3, *Species-Level Actions*, to estimate the number of individuals present. These results will be used to estimate the population level in the area and will allow for some analysis of population response to management actions.

Evaluate Species Response to Enhancement and Restoration of Aquatic Habitat

The Conservancy will monitor stream reaches, ponds, and wetlands that are targeted for restoration or enhancement to determine the response of western pond turtle populations to those activities. The Conservancy will assess relative success of different techniques for maintaining or increasing western pond turtle populations to guide future management efforts. The Conservancy will monitor enhancement or restoration of occupied habitat by assessing changes in the average number of individuals observed during basking site surveys. This method will only be useful at monitoring long-term trends, but it will give some sense of the population response to the change in habitat.

In areas where nesting is known to occur, the Conservancy will monitor the number of nesting attempts or the success rate of nests to determine how site-specific management prescriptions are affecting turtles during the nesting period. The opportunities to conduct this type of monitoring may be limited due to the number of known nesting areas and the difficult nature of monitoring nesting turtles without disturbing important nesting areas. The Conservancy will determine the best approach for monitoring western pond turtle once the Conservancy acquires reserve lands and the Conservancy develops individual and reserve unit management plans. Trapping or observations can provide information on the relative abundance of young (small) turtles as an index to reproductive success.

In some streams, alternate, off-stream water sources will be provided for livestock to discourage them from entering the stream. Some ponds will be partially fenced to exclude grazing and promote growth of emergent vegetation. The Conservancy will monitor western pond turtle populations and compare them to baseline conditions to determine if these methods improve habitat quality and increase numbers of turtles.

Additional habitat enhancements may be implemented in streams that support western pond turtle habitat. Monitoring by the Conservancy regarding how these flows affect habitat quality will be important. Changes to riverine systems, such as Cache Creek and Putah Creek, to conditions that are more natural will inherently benefit western pond turtles in the Plan Area.

Monitor Additional Threats

Nesting sites and nest success are thought to be the limiting factor for this species in the Plan Area. Identifying known or potential nest sites in the reserve system and along target streams will provide valuable information that informs efforts to conserve the species. Studies have shown that while western pond turtle populations can seem relatively stable due to the presence of adults, there may be minimal recruitment of juveniles into the population (Reese 1996). Focusing on aquatic habitats is important, but extending that focus to include adjacent uplands, where nesting could occur, is critical to guaranteeing the long-term stability of the populations.

6.5.6.3.5 Giant Garter Snake

Document and Monitor Status of Giant Garter Snake Habitat

Giant garter snake inhabits wetlands, rice lands, and associated waterways. These include sloughs, marshes, low-gradient streams, ponds, small lakes, irrigation and drainage canals, rice fields, and adjacent uplands (USFWS 1999). In order for land acquisition and restoration for giant garter snake to count towards Plan requirements, it must support suitable habitat for the species. To ensure this requirement is met, the Conservancy will monitor all reserve units that are intended to support giant garter snakes to ensure that giant garter snake habitat values remains consistently suitable. Periodic monitoring will track habitat performance and evaluate reserve management in order to meet the biological goals and objectives for the species. Reserve monitoring for giant garter snake habitat will include the following:

- characterize and assess aquatic habitat conditions (e.g., water depth, temperature, channel conditions and connectivity);
- characterize and assess vegetation and structure of physical substrate in aquatic and adjacent upland habitat;
- document percent cover of dominant plant species, bare ground, basking sites, and land use of adjacent upland habitat;
- document the presence of basking sites that could be monitored repeatedly;
- document the presence of prey species as detected incidentally on visual surveys and caught in traps; and
- assess the presence of small mammal burrows and suitable refugia on adjacent uplands.

Verify Giant Garter Snake Occupancy

The Conservancy will also monitor each occupied habitat unit (Figure 6-12) to determine whether they continue to be occupied as defined by the Plan in Section 6.4.1.8.3, *Giant Garter Snake*, and Table 6-2(c). The Conservancy may rely on other monitoring data collected in the Plan Area, if the data are consistent with the Yolo HCP/NCCP monitoring goals. If necessary, the Conservancy will use trapping surveys to verify species occupancy. If trapping is deemed necessary to augment existing survey data, the Conservancy will work with USFWS and CDFW to develop a trapping survey protocol. Trapping survey sites should be located along transects used for visual surveys and habitat assessments, so that trapping data can be compared with habitat assessments at each sample point. Floating traps, used in conjunction with mark-recapture techniques (e.g., Casazza et al. 2000), may be used to augment other surveys, to document presence, to verify the occupancy standard is met, and to document other population parameters as feasible.

The Conservancy will document location data using GIS and will use this data to prioritize sites for enhancement and restoration. The Conservancy will also use this information to update the habitat model for giant garter snake. The Conservancy will provide occurrence data to the wildlife agencies through the CNDDB database, or other protocol approved by the wildlife agencies.

Figure 6-12. Giant Garter Snake Occupancy Requirement: Habitat Units and Occupied Habitat Units

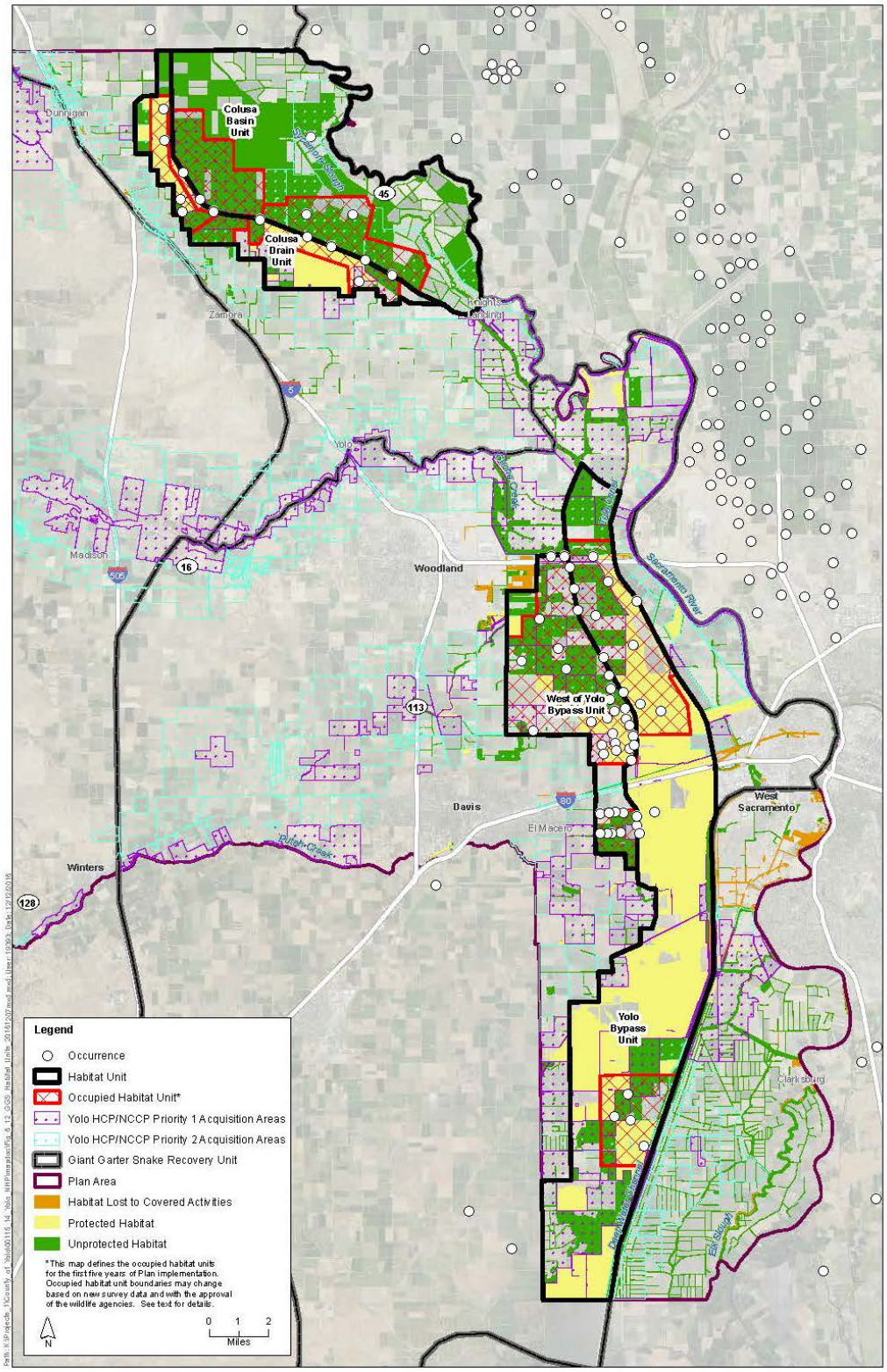


Figure 6-12
Giant Garter Snake Occupancy Requirement: Habitat Units and Occupied Habitat Units

As described in Section 6.4.1.8.3, *Giant Garter Snake*, and Table 6-2(c), a site within the reserve system will be considered occupied by giant garter snake if there is documented presence of both male and female individuals in both adult and juvenile age classes during at least two out of every five years within the associated occupied habitat unit. If such criteria cannot be met within an occupied habitat unit that contains reserve lands, the Conservancy will evaluate the conditions and potential causes for giant garter snake absence, and will implement measures addressing the causes. Adaptive management measures may include, but are not limited to, habitat enhancement, or removal of movement barriers between the site and surrounding occupied areas.

If the occupancy standard is not met for a 5-year period during the permit term, the Conservancy will meet and confer with the wildlife agencies within 30 days of the annual report to assess the need for further action. The wildlife agencies and the Conservancy will then will evaluate the conditions and potential causes for giant garter snake absence, and develop and implement a mutually agreeable plan of action to try to improve occupancy within the reserve system in the Plan Area. Remedies may include, but not be limited to, the following:

- Increase monitoring efforts or alter monitoring methods to improve detection probability of snakes.
- Revise management within the Reserve System to improve habitat conditions, if considered to be a factor affecting occupancy.
- Conduct additional restoration to improve habitat quality within the Reserve System.
- Determine whether connectivity is an issue affecting occupancy and if so, implement steps to improve connectivity between the habitat unit and occupied areas.
- Remove the previously occupied habitat unit from the collection of lands eligible to count towards Plan requirements for giant garter snake and shift future conservation efforts into other portions of habitat units known to be occupied.

Evaluate Species Response to Enhancement and Restoration of Aquatic and Upland Habitat

The Conservancy will restore, manage, and enhance fresh emergent wetland complexes, rice fields, associated waterways (e.g., canals) and adjacent upland habitat to provide habitat for giant garter snake. Habitat degradation and fragmentation are primary threats to giant garter snake (USFWS 1999, 2006c) and ultimately, habitat fragmentation may slow or limit the ability of giant garter snake to colonize habitat on the reserve system. Therefore, recently restored or enhanced sites, the success of restoration and management will be assessed based on habitat-based performance criteria (e.g., percent cover of emergent vegetation and basking sites, minimum density of small mammal burrows or other suitable refugia in adjacent uplands), rather than the relationship between presence (or abundance) of giant garter snake and enhancement actions. For example, the Conservancy may monitor wetland vegetation to determine whether the vegetative cover and plant composition of a site is at target levels. This will be especially important at sites where the Conservancy restores habitat. USFWS (1999) recommends that wetland vegetation be monitored to ensure that the cover measured on restored areas is 90 percent of the amount of cover on reference sites; that species composition of restored areas is 90 percent similar to that of reference sites; and that wetlands meet Corps jurisdictional criteria (USFWS 1999). The Conservancy should select reference sites from nearby sites that support relatively stable populations of giant garter snake. The presence and relative abundance (if data are available) of giant garter snake will be compared

amongst management treatments specific to that restored or enhanced reserve area to assess the relative success of different management techniques.

The Conservancy may also use visual surveys to supplement trapping surveys to evaluate species response to management and restoration actions. Visual surveys are less time and labor intensive and will be used initially to assess the status of giant garter snake on potential habitat, to assess habitat condition, and to prioritize sites for long-term management. Visual surveys are conducted when individuals can be counted while basking during the middle of the day during the peak of the snake's active season (April – August). The Conservancy will conduct visual surveys using the best available protocol for this species (e.g., USFWS 1999). The Conservancy will conduct these visual surveys systematically, along transects that run adjacent to potential aquatic habitat. Permanent transects should be established that can be used for future visual surveys, habitat assessments, and trapping surveys to facilitate long-term monitoring of giant garter snake. The Conservancy will use habitat assessments to guide management actions, and to assess the relationship between habitat characteristics, management actions, and occurrence of giant garter snake.

Monitor Potential Threats

The Conservancy will monitor the presence of nonnative predators and competitors in giant garter snake habitat. Nonnative species such as domestic cats may prey on giant garter snake. Domestic cats have been observed hunting and killing giant garter snakes (USFWS 1993, as cited in USFWS 2006), even as far away as two miles from the closest urban development. The Conservancy will develop and implement an invasive animal control program if monitoring data indicate that nonnative predators and/or competitors are threatening the persistence, or expansion, of giant garter snake in the reserve system.

6.5.6.3.6 Swainson's Hawk

Document and Monitor Species Status

The Conservancy will monitor the nesting population within the Plan Area at five-year intervals. Every five years, the Conservancy will evaluate the breeding population using a sampling methodology developed by a Swainson's hawk expert and approved by the wildlife agencies. The census will include identifying active nest sites, associated land uses, reproductive output, and possible threats. Trends in the nesting population will reveal the extent to which the Conservancy is meeting the goal to provide for the conservation of Swainson's hawk in the Plan Area. If the nesting population declines by more than 10 percent below the baseline number (300 pairs), this will initiate a meet and confer process with the wildlife agencies, as described in Section 7.7.1.2.8, *Regional Loss of Swainson's Hawk Habitat*. The Conservancy and the wildlife agencies will examine causes for population declines as needed to assess the extent to which the decline could be related to land use/habitat changes or other activities within the Plan Area or other range-wide causes.

In association with nesting population monitoring, the Conservancy will monitor land uses/crop patterns and the extent of nesting habitat within the Plan Area at five-year intervals. Using up-to-date aerial photos, the Conservancy will map the extent and type of each land use/crop type and suitable nest trees/habitat using GIS. The Conservancy will tally totals of each type and examine the data with regard to the extent of suitable foraging and nesting habitat for the Swainson's hawk. The Conservancy will conduct ground-truthing as needed. Trends in the extent of nesting and foraging habitat will reveal the extent to which habitat goals are being met in the Plan Area. Section 7.7.1.2.8,

Regional Loss of Swainson's Hawk Habitat, describes how the Conservancy will respond if the extent of suitable Swainson's hawk habitat in the Plan Area drops below a specified threshold.

Conservancy will annually monitor land uses/crop types to confirm each reserve land is meeting easement conditions regarding crop restrictions and management. Annual monitoring of each reserve land will require a site visit to examine and record conditions. If conditions are not being met, the Conservancy will intervene and notify the landowner to address deficiencies.

The Conservancy will annually monitor the extent of existing and future nesting habitat on the reserve system. The Conservancy will monitor the trend in the sustainability of trees that can provide habitat and actions taken to maintain or create new nesting habitat. The goal on each reserve land will be to increase the extent of nesting habitat by avoiding removal of trees, allowing for regeneration, and planting future nesting trees in hedgerows and other locations. The planting of new native trees will include determining success rates and remedial action.

Evaluate Species Response to Habitat Enhancement and Restoration

The Conservancy will monitor the success and condition of habitat enhancement actions, such as hedgerows and tree planting. The Conservancy will establish success rates and remedial actions to ensure that easement conditions for these elements are being met. The Conservancy will monitor management actions that are included in the easement conditions, such as postponing disking and bedding of harvested fields until later in the breeding season, leaving sufficient uncultivated space around mature trees, and restricting the use of rodenticides. If conditions are not being met, the Conservancy will intervene and notify the landowner to address deficiencies.

6.5.6.3.7 White-Tailed Kite

Document and Monitor Species Status

The Conservancy will monitor the nesting population of the white-tailed kite within the Plan Area at five-year intervals while searching for Swainson's hawk nests. Every five years, the Conservancy will evaluate the breeding population using a sampling methodology developed by a species expert and approved by the wildlife agencies. The census will include identifying active nest sites, associated land uses, reproductive output, and possible threats. The Conservancy will evaluate causes for population declines as needed to assess the extent to which the decrease could be related to land use/habitat changes or other activities within the Plan Area or other range-wide causes.

Evaluate Species Response to Habitat Enhancement and Restoration

The Conservancy will monitor the success and condition of habitat restoration actions, such as hedgerows and tree planting. Monitoring will occur in conjunction with Swainson's hawk monitoring as described above.

6.5.6.3.8 Western Yellow-Billed Cuckoo

Document and Monitor Species Status

The Conservancy will survey all suitable western yellow-billed cuckoo habitat within the reserve system, in accordance with the survey schedule described in the introduction to Section 6.5.6.3, *Species-Level Actions*, to document the baseline estimate of the population size within the reserve system. The Conservancy will monitor and evaluate the condition of yellow-billed cuckoo habitat in

the riparian woodland areas along, portions of the Sacramento River, Cache Creek and Putah Creek. Baseline information for the species will comprise the components listed below.

- Location of occupied habitat,
- Estimate of number of breeding pairs,
- Assessment of nesting habitat quantity and quality (e.g., percent of native and nonnative plants), and
- Assessment of any additional nearby threats (e.g., sources of noise or other disturbance).

Evaluate Species Response to Habitat Enhancement, Creation, or Restoration

Additional surveys conducted by the Conservancy will be focused along riparian corridors where riparian restoration and enhancement is expected to occur; for example, along Cache Creek.

Monitor Additional Threats

Studies to determine nest success will be conducted annually if nesting is detected in the Plan Area. The results of these studies will inform management decisions to increase nest success in the Plan Area. Potential management actions are listed below.

- Feral cat removal or relocation,
- Nonnative predator control, and
- Restricted public access to important breeding areas during the nesting season.

6.5.6.3.9 Western Burrowing Owl

Document and Monitor Species Status

The Conservancy will survey suitable western burrowing owl habitat during pre-acquisition assessments, during the breeding season, consistent with CDFW protocol (CDFW 2012). Sites occupied by breeding colonies will be prioritized for acquisition. The Conservancy will monitor and evaluate the condition of western burrowing owl habitat throughout the reserve system. Baseline information for the species will comprise the components listed below.

- Location of occupied habitat,
- Estimate of number of breeding pairs,
- Assessment of habitat quantity and quality, including vegetation height, and
- Degree of protection on adjacent land.
- Assessment of any additional nearby threats (e.g., sources of predators or disturbance).

Evaluate Management and Enhancement Actions

The Conservancy will monitor and evaluate the following management and enhancement activities: to ensure that habitat conditions and enhancement features are maintained within the habitat requirements of burrowing owls and to make necessary repairs or replacements.

- Vegetation structure and condition,
- Invasive weed infestations,

- Condition of artificial nest boxes and associated features, and
- Condition of installed berms and debris piles.

Evaluate Species Response to Habitat Management and Enhancement

The Conservancy will evaluate responses of western burrowing owl populations to management and enhancement actions such as vegetation control, encouraging establishment of ground squirrel burrows, or controlling threats such as predators. The Conservancy will adjust management and enhancement practices as needed to protect and maintain western burrowing owls within the reserve system, based on results of monitoring and the best available information.

6.5.6.3.10 Least Bell's Vireo

Document and Monitor Species Status

The Conservancy will conduct surveys of valley foothill riparian providing habitat for least Bell's vireo within the reserve system. Initially, the Conservancy will document any nesting activity in the Plan Area. Since least Bell's vireos have been documented potentially breeding at only one location in the recent past, the Conservancy may use other songbird species (e.g., song sparrow, common yellowthroat, black headed grosbeak) that nest in the understory of riparian woodland as indicators of habitat quality until least Bell's vireos are documented nesting in the Plan Area. The focus areas for least Bell's vireo will initially be the species' modeled habitat (Appendix A, *Covered Species Accounts*) within the reserve system. Surveys along these stream reaches will characterize the songbird communities (also part of natural community monitoring) and detect any least Bell's vireos present during the nesting season. Species status will be based on presence in the reserve system. The Conservancy will also monitor targeted sites outside the vireo's modeled habitat at least every five years to determine if habitat is expanding. Through adaptive management, the vireo model may change in the future due to new information.

Surveys will consist of either standard point count or area search methods (Ralph et al. 1993) depending on the terrain and size of the reach. The nesting season for riparian songbirds is typically April 15–July 31 in the Plan Area. The Conservancy will record locations of all singing males, nests, or other evidence of breeding activity using a GPS receiver. During baseline surveys, the Conservancy will revise the species habitat model as needed to reflect riparian habitat quality and actual nesting habitat within the reserve system. The Conservancy will focus subsequent surveys on those areas to monitor changes in the population.

Evaluate Species Response to Habitat Enhancement and Restoration

Additional surveys conducted by the Conservancy will be focused along riparian corridors outside the reserve system where enhancement and restoration activities will take place along portions of Sacramento River, Cache Creek and Putah Creek. Those alterations could change the riparian vegetation, making it more or less suitable for breeding least Bell's vireo. The Conservancy will assess actual effects by monitoring breeding least Bell's vireo populations along these stream reaches, should they be present or, in their absence, by monitoring breeding populations of other riparian understory obligates. Some modifications to land use, such as excluding livestock from stream corridors or stabilizing sources of sediment, could also change the vegetative structure along stream reaches. Monitoring least Bell's vireo and other riparian obligate songbird species will offer insight into how these changes affect the function of the riparian community.

Monitor Additional Threats

The Conservancy assumes that the distribution of the local population will continue to expand northward as it has in the recent past. Once a least Bell's vireo population is established in the Plan Area, there could be additional threats to nests and adults. Studies to determine nest success will be conducted annually once nesting is detected in the Plan Area. In addition to documenting nest success, these studies will document reasons for nest failure (such as insecticides, which may be a potential threat) and incidence of brown-headed cowbird parasitism (a major threat in established populations in southern California). The results of these studies will inform management decisions to increase nest success in the Plan Area. Potential management actions are listed below.

- Brown-headed cowbird control program,
- Feral cat removal or relocation,
- Native and/or nonnative predator control (e.g., red fox, raccoon, skunk), and
- Restricted public access to important breeding areas during the nesting season.

6.5.6.3.11 Bank Swallow

Document and Monitor Species Status

The Conservancy will monitor all suitable floodplain habitat within the reserve system in accordance with the survey schedule described in the introduction to Section 6.5.6.3, *Species-Level Actions*, to document the baseline estimate of the population size within the reserve system. The bank swallow is intimately tied to natural river processes. Since most colonies are located on eroding river banks, presence of this species in sustainable numbers is an indicator of the healthy riparian ecosystem that results from a river's lateral migration within its floodplain. The combination of hydrology, erosion, sediment deposition, river migration, and ecological disturbance and succession result in the physical and biological environment that provides essential habitat for the bank swallow. Baseline information for the species will comprise the components listed below.

- Location of active nest colonies;
- Estimated number of individuals and nests or actively used nest holes in the colony;
- Presence of apparently old colonies (i.e., old colony site no longer occupied) and the number of nest holes;
- Assessment of nesting habitat and riverine quality;
- Assessment of natural river processes, natural water flows, erosion, flooding, and sedimentation; and
- Assessment of additional nearby threats.

The Conservancy will document this information in GIS layers and use it to prioritize areas for protection and enhancement.

The Conservancy will survey potentially suitable habitat once every five years. If bank swallows are found nesting on reserve lands, colonies will be monitored annually to determine presence, estimate colony size, and assess potential threats to the colony.

The Conservancy will develop monitoring protocols to assist in demonstrating compliance with species occupancy requirements described in Table 6-2(a), *Newly Protected Lands Commitments*, and 6-2(b), *Pre-permit Reserve Lands Commitments*.

Additional surveys conducted by the Conservancy will be focused along riparian corridors where stream or riparian restoration activities, are expected to occur, such as along portions of Sacramento River, Cache Creek and Putah Creek. Potentially suitable habitat will be surveyed regularly, using the methods described above, to assess the use of restored and enhanced habitat by bank swallows and to inform future restoration and enhancement projects. Restoration and enhancement actions in or adjacent to nesting colonies will occur outside the breeding season.

Monitor Additional Threats

Bank swallow nesting habitat is naturally ephemeral, as natural river processes erode existing banks while creating new, suitable nesting habitat; therefore, the existing colony sites in the Plan Area are subject to erosive forces that may collapse the existing nest colony sites while potentially generating new, suitable habitat.

6.5.6.3.12 Tricolored Blackbird

Document and Monitor Species Status

The Conservancy will survey all suitable fresh emergent wetland and other appropriate nesting areas within the reserve system in accordance with the survey schedule described in the introduction to Section 6.5.6.3, *Species-Level Actions*, to document the baseline estimate of the population size within the reserve system. Baseline information for the species will comprise the components listed below.

- Location of occupied wetlands and hedgerows or other breeding sites,
- Estimate of number of birds in colony,
- Assessment of nesting habitat quantity and quality (e.g., percent of native and nonnative plants),
- Assessment of any additional nearby threats (e.g., heron rookeries, sources of noise or other disturbance), and
- Identification of nesting on agricultural lands where harvest will take place.

The Conservancy will document this information in GIS layers and use the data to prioritize areas for enhancement or restoration.

Once baseline data are collected, the Conservancy will conduct monitoring for tricolored blackbird colonies during the breeding season. The Conservancy will estimate population size of established colonies in the Plan Area. Tricolored blackbirds typically nest from early April through early July. Each colony should be visited twice during the breeding season, preferably 10–14 days apart, to determine a range of breeding individuals at the colony, by at least two observers on the same day. The mean number of birds estimated by the two observers can be used to determine the size of the breeding colony. The surveyor will observe the colony through binoculars or a spotting scope at a distance that will not change the behavior of the nesting birds. The Conservancy may revise these monitoring guidelines if better methodologies become available based on the best available scientific information during implementation.

Evaluate Species Response to Habitat Enhancement, Restoration, or Creation

The Conservancy will monitor enhanced or restored fresh emergent wetland areas in the reserve system twice from April to June to determine if a tricolored blackbird nesting colony is present or, if one is already established, to document the current population size. In habitat where tricolored blackbird colonies currently exist, the Conservancy will conduct all enhancement or restoration activities outside the nesting season. Following those management actions, the Conservancy will monitor tricolored blackbird colony size to determine the population response to the management actions. In target areas where tricolored blackbirds were not observed prior to management actions, subsequent surveys will document whether new colonies establish in the area.

Monitor Additional Threats

In instances where tricolored blackbirds are nesting in nonnative plants (e.g., Himalayan blackberry), there is the risk that nonnative species control could result in the loss of nesting habitat. Accordingly, the Conservancy will weigh the removal of nonnative plant species against the loss of important nesting habitat for this species. The Conservancy should attempt to transition the nonnative habitat to native habitat that will also support nesting tricolored blackbirds. The Conservancy will monitor colony response to those actions and the result will inform future management prescriptions for colony sites with nonnative plants.

In general, it is difficult to monitor nest success of tricolored blackbirds because while nesting they are very susceptible to disturbance. Some information about colony success can be gained through annual monitoring of colony size, but this approach often fails to identify specific stressors. Some species (e.g., feral cats) can have a deleterious effect on colonies. Native skunks and raccoons can have significant adverse effects on nesting birds. In general, control programs will not address native species. Targeted programs could be initiated, however, in response to observations of individuals taking nests, eggs, or nestlings.

6.5.7 Data and Reporting

Proper data management, analysis, and reporting are critical to the success of the monitoring and adaptive management program. Data on monitoring methods, results, and analysis must be managed, stored, and made available to Conservancy staff, decision makers, scientific advisors, wildlife agencies, and other interested government agencies, including the Corps and Regional Boards, and other appropriate persons. A database and clear reporting procedure are also required for permit compliance. The requirements for database development, maintenance, and data reporting for monitoring are described in Chapter 7, *Plan Implementation*. The reporting requirements for monitoring include the following (also found in Chapter 7):

- A description of the landscape-, natural community–, and species-level monitoring undertaken during the reporting period and a summary of monitoring results, including covered species status and trends;
- A description of the adaptive management process utilized during the reporting period (e.g., consultation with science advisors);
- A summary of the recommendations or advice provided by the wildlife agencies, science advisors, and the Independent Conservation Assessment Team (if applicable) regarding adaptive management and monitoring;

- A summary of the monitoring program objectives, techniques, and protocols including monitoring locations, variables measured, sampling frequency, timing, and duration, analysis methods, and who performed the analyses;
- An assessment of the efficacy of the monitoring and research program and recommended changes to the program based on interpretation of monitoring results and research findings;
- An assessment of the efficacy of habitat restoration and creation methods in achieving performance objectives and recommended changes to improve the efficacy of the methods;
- A description of all Yolo HCP/NCCP directed studies undertaken during the reporting period; a summary of study results; and a description of integration with monitoring, assessment, and compliance elements;
- An assessment of the appropriateness of performance indicators and objectives (see Table 6-11 for examples) based on the results of effectiveness monitoring, and recommended changes to performance indicators and objectives;
- A description of any actions taken or expected regarding changed circumstances, including remedial actions; and
- A description of any unforeseen circumstances that arose and responses taken.

6.5.8 Conservation and Monitoring and Adaptive Management Actions Conducted by Local Partners

Local partners will implement much of the conservation and monitoring and adaptive management actions described above. This section describes the two primary local partners involved in the Yolo HCP/NCCP, and describes the specific actions they will carry out to implement the Yolo HCP/NCCP.

6.5.8.1.1 Cache Creek Resources Management Plan

The County of Yolo adopted the Cache Creek Resources Management Plan (CCRMP) in 1996 and amended it in 2002. This plan eliminated in-channel commercial mining (i.e., mining inside of the Cache Creek channel) and established a program for implementing ongoing projects to improve channel stability and restore riparian habitat along Cache Creek. The CCRMP provides a policy framework for management, enhancement, and restoration of 14.5 miles of lower Cache Creek and includes specific implementation standards. The Cache Creek Improvement Program (CCIP), the implementation plan for the CCRMP, identifies specific categories of projects that include: bank stabilization, channel maintenance, revegetation, and habitat restoration. The CCIP provides the structure for the program and authority for a Technical Advisory Committee (TAC), the committee that defines the procedures and methodologies for stream monitoring and maintenance activities.

The CCRMP includes site specific recommendations for various reaches along Cache Creek to, among other things, remove invasive plant species and allow establishment of native vegetation, restore old existing in-channel mining pits, remove levees to allow natural channel processes, and encourage the use of riparian vegetation or other *soft engineering* for bank stabilization purposes. The plan calls for coordination with the Yolo County Flood Control and Water Conservation District, CDFW, USFWS, the U.S. Army Corps of Engineers, and other appropriate agencies and organizations to ensure that habitat restoration projects proposed by these and other entities are consistent with the plan.

The CCRMP recommends the establishment of a series of wildlife preserves to provide core areas for maximizing fish and wildlife habitat. It states that wildlife preserves should emphasize the preservation of high quality existing habitat, areas with high species diversity, areas supporting unique species or biotic communities, and habitat for rare, threatened, and endangered species.

The CCRMP seeks to restore, manage, and enhance riparian vegetation throughout the CCRMP Plan Area (Figure 6-3, *Ecological Corridors*) to create a continuous riparian and public open space corridor along the creek. This will contribute toward the achievement of Objective L-1.4 for Cache Creek, and Objective NC-VFR1.1 for riparian restoration. The Yolo HCP/NCCP incorporates the CCRMP restoration and enhancement actions into its conservation strategy to help meet these objectives which will in turn contribute to meeting objectives for covered species including western yellow-billed cuckoo (Objective WYBC1.1), least Bell's vireo (LBV1.1), and valley elderberry longhorn beetle (Objective VELB1.2). The CCRMP also seeks to maintain the creek and its floodplain, encouraging natural fluvial processes (erosion, deposition, meandering channels) along river reaches to promote structural diversity and provide habitat for a diversity of native species (Objective L-2.3) except in cases where erosion threatens off-channel infrastructure. This natural meandering channel and cut banks provides habitat for bank swallow, and CCRMP enhancement activities within the floodplain such as control of invasive species will benefit the bank swallow (Objectives BS1.1 and BS1.2). The creek also provides suitable habitat for western pond turtle, and CCRMP enhancement actions along the creek will benefit this species (Objective WPT1.1).

Yolo HCP/NCCP monitoring and adaptive management program will include monitoring to assess CCRMP progress toward meeting Yolo HCP/NCCP biological goals and objectives and benefitting the covered species. The following activities monitoring and adaptive management activities will continue to be conducted throughout the CCRMP program area:

- Monitor and adaptively manage invasive species. Yolo County will annually contract to manage invasive species, typically by spraying, throughout the 14.5 mile stretch of Cache Creek that is within the CCRMP program area. Tamarisk and giant reed will typically be the primary target species although other invasive species such as perennial pepperweed may also be recommended by a biologist.
- Monitor covered species and habitat conditions.
    - Yolo County will conduct elderberry shrub surveys within the CCRMP area. Transect surveys will be conducted annually to track species abundance, recruitment, and persistence in several areas within the Cache Creek corridor. Every five years a more extensive mapping survey will be conducted in which all elderberry shrubs within 700 feet of either side of the Cache Creek channel will be spatially mapped and surveyed for size class. Observations of valley elderberry longhorn beetle exit holes will be noted as part of surveying efforts in order to track relative abundance and distribution of valley elderberry longhorn beetle populations along Cache Creek.
    - Yolo County will annually conduct a creek walk through the 14.5-mile stretch within the CCRMP program area, with the assistance of the Cache Creek Technical Advisory Committee, to map changes in the creek morphology and vegetation, invasive species, and sensitive species habitat and presence.
- Aerial surveys. Yolo County will conduct aerial photography and GIS mapping to monitor and assess changes in riparian vegetation along Cache Creek. This effort involves documentation of native and nonnative species within the region.

- Off-highway vehicle (OHV) remediation. Yolo County will operate an OHV remedial program along Cache Creek that will aim to reduce habitat degradation and loss caused by OHV use. Activities under this program include fencing hot spots and habitat restoration.

6.5.8.1.2 Lower Putah Creek Coordinating Committee

The Lower Putah Creek Coordinating Committee (LPCCC) was created through a settlement to resolve a civil action brought by the Putah Creek Council, a nonprofit environmental organization, against Solano County Water Agency (SCWA) and the Solano Irrigation District. The LPCCC is composed of representatives of the Putah Creek Council, several water districts including the SCWA, the City of Winters, the City of Davis, and the campus of the University of California, Davis. The settlement requires annual expenditures by the SCWA for specified activities to protect and enhance the instream values associated with lower Putah Creek, including funding a streamkeeper position. The LPCCC has a number of duties including the monitoring of conditions in lower Putah Creek, undertaking restoration, enhancement, and maintenance measures, seeking grant funds, and overseeing the Streamkeeper. The LPCCC implements actions consistent with its Watershed Management Action Plan (EDAW 2005).

The LPCCC will restore and adaptively manage and enhance natural communities along the Putah Creek corridor (Figure 6-3, *Ecological Corridors*) to create a continuous riparian and public open space corridor along the creek.[21] The LPCCC will continue its existing area-wide efforts to restore degraded riparian vegetation along the Putah Creek corridor. In addition to invasive species removal, these activities include native vegetation propagation and planting as well as stream bank restoration. This will contribute toward the achievement of Objective L-1.5 for Putah Creek, and Objective NC-VFR1.1 for riparian restoration. The Yolo HCP/NCCP incorporates the LPCCC restoration and enhancement actions into its conservation strategy to help meet these objectives which will in turn contribute to meeting objectives for covered species including western yellow-billed cuckoo (Objective WYBC1.1), least Bell's vireo (LBV1.1), and valley elderberry longhorn beetle (Objective VELB1.2). The creek also provides suitable habitat for western pond turtle, and CCRMP enhancement actions along the creek will benefit this species (Objective WPT1.1).

The LPCCC has a plant nursery that they use to propagate native plants for restoration. Native specimens are gathered locally and propagated at the nursery in order to provide restoration projects in the area with locally sourced stock. LPCCC intends to continue to conduct these activities throughout the Putah Creek corridor and can additionally provide this service to HCP/NCCP related activities throughout the conservation reserve area.

The LPCCC also maintains a variety of restoration and invasive species management tools that may be made available for loan for HCP/NCCP related activities. The loan of some equipment may also involve the in-kind contribution of labor to move and operate equipment.

The LPCCC will continue to undertake the following monitoring and adaptive management activities funded by SWCA:

- Monitor and adaptively manage invasive species: The LPCCC will monitor and adaptively manage invasive species throughout the entire lower section of Putah Creek. They have GIS mapped 20 primary invasive species throughout Putah Creek. Of these invasive species, five are considered priority species for control and will be managed annually through a combination of

[21] For current details, see https://www.putahcreekcouncil.org/lower-putah-creek-restoration-planning

spraying and manual removal. These species include: Himalayan blackberry, giant reed, tamarisk, eucalyptus, and tree of heaven.

- Monitor species and habitat: The LPCCC will continue to contract with the UC Davis Museum of Wildlife and Fish Biology to conduct wildlife monitoring and assessment activities throughout the Putah Creek corridor. Monitoring activities will include bird, wildlife, and pollinator surveying and mapping.

These activities are consistent with Objectives L-1.3 and L-1.5 to increase the size and connectivity of the network of protected lands by creating a continuous riparian corridor along Putah Creek. They are also consistent with the broad Yolo HCP/NCCP goals of protecting native species diversity, and more specific goals of conserving covered species in the Plan Area. The Yolo HCP/NCCP incorporates the Lower Putah Creek program into its conservation strategy to help meet Objective L-1.5 and to benefit the valley foothill riparian natural community and covered species found in it including western yellow-billed cuckoo, least Bell's vireo, bank swallow, Swainson's Hawk, White-tailed Kite, and valley elderberry longhorn beetle. The Yolo HCP/NCCP monitoring and adaptive management program will include monitoring to assess the program's progress toward meeting Yolo HCP/NCCP biological goals and objectives and benefitting the covered species.

Although the Conservancy or its partners may acquire or restore riparian on either side of Putah Creek, within the Plan Area, to meet Objective L-1.5, acquisition or restoration in the extended Plan Area (in Solano County) is not required for meeting this objective. Prior to initiation of any easement acquisition that will contribute to the Yolo HCP/NCCP conservation strategy in Solano County, within the extended Plan Area on the south side of Putah Creek, the Conservancy will consult with Solano County. The purpose of any such easements will be to protect or restore and adaptively manage and enhance the riparian natural community along the Putah Creek corridor (Figure 6-3, *Ecological Corridors*) to create a continuous riparian and public open space corridor along the creek.[22] Post-Permit Conservation Requirements

After the permit term, the Permittees are obligated to continue to manage and maintain the reserve system. Land acquired for the reserve system must continue to be managed beyond the permit term to ensure it retains the biological values established during the permit term. Similarly, limited monitoring will continue beyond the permit term to ensure that management actions are effective. Other obligations, however, disappear after the permit term. Land acquisition, enhancement, restoration, and creation obligations will be completed prior to the end of the permit term and will not continue post-permit.

The Conservancy or its successor[23] will be responsible for ensuring the management of reserve system lands in perpetuity. All reserve system lands will be managed in perpetuity according to the applicable Reserve Management Plan.

Following the permit term, the Conservancy or its successor will continue to conduct effectiveness monitoring, though at a reduced scale from that required during the term of Permits. Compliance monitoring is not required after the Permits end (although monitoring for compliance with the

[22] For current details, see https://www.putahcreekcouncil.org/lower-putah-creek-restoration-planning

[23] The Conservancy may or may not exist after the permit term. Regardless, all Permittees have the obligation to maintain the reserve system after the permit term.

terms of the conservation easements is required in perpetuity). Effectiveness monitoring actions that the Conservancy or its successor will implement post-permit may include the following:

- Monitoring of nonnative species on reserve lands to determine if control actions need to be implemented to maintain covered species habitat functions, in perpetuity;
- Monitoring of ecological responses to substantial changes in management (e.g., grazing regimes) of reserve lands implemented during the post-permit period, in perpetuity; and
- Monitoring necessary to document the status and trends in natural communities and covered species and their habitats on reserve lands at 10 year intervals to provide information necessary to determine the ongoing effectiveness of the reserve system in maintaining ecological functions, in perpetuity.

Chapter 7
Plan Implementation

7.1 Overview

This chapter describes the implementation structure of the Yolo HCP/NCCP, including the responsibilities of the Yolo Habitat Conservancy (Conservancy) and other participating entities, land acquisition procedures, approval processes, data tracking and reporting, and the regulatory and other assurances requested by the Permittees. In addition, the chapter outlines the process for changing or amending the Yolo HCP/NCCP.

7.2 Implementation Structure

The Conservancy will coordinate implementation of the Yolo HCP/NCCP with the Permittees, the U.S. Fish and Wildlife Service (USFWS), the California Department of Fish and Wildlife (CDFW), and a range of stakeholders and other interests (Figure 7-1).

7.2.1 Permittees

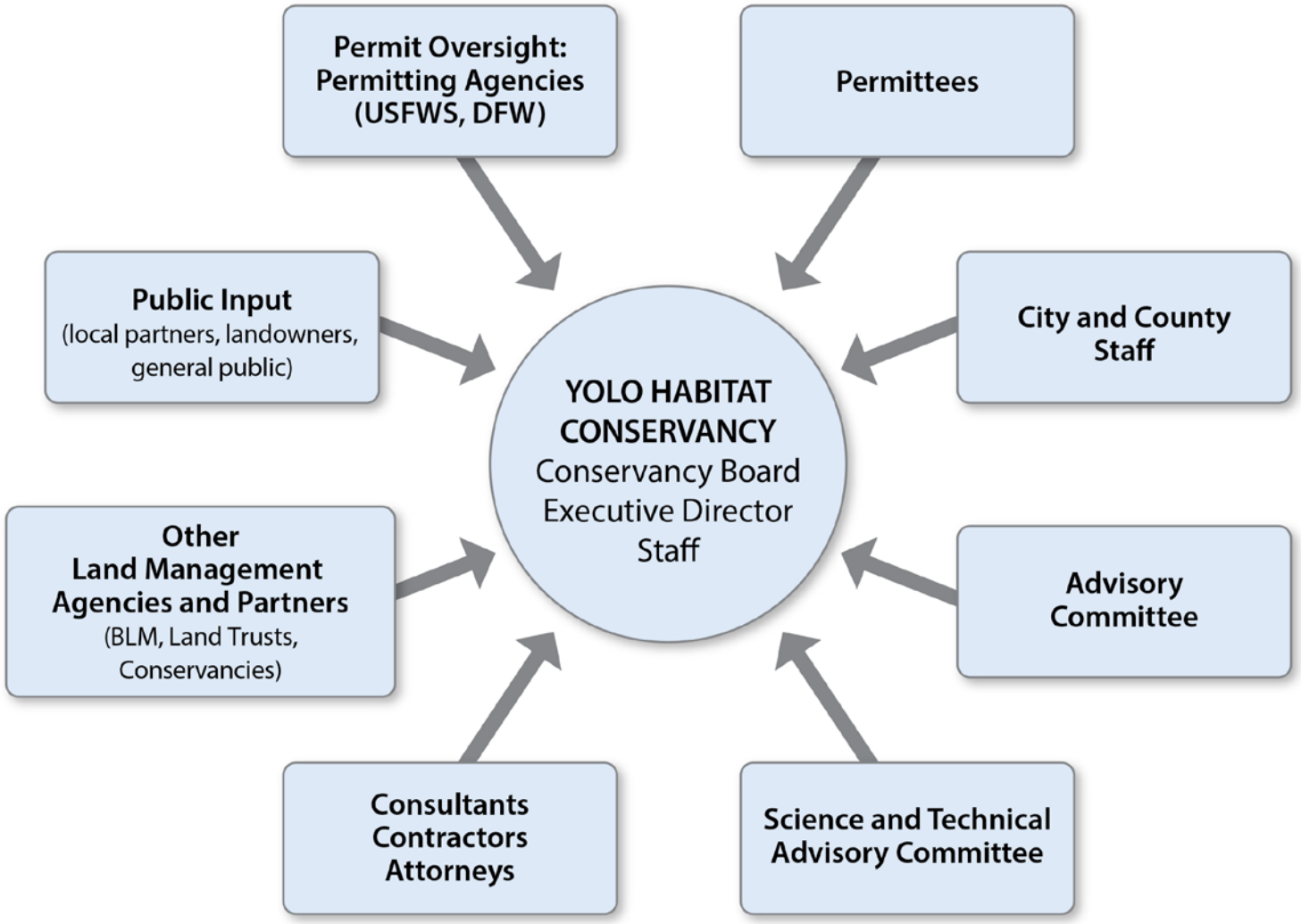
The Yolo HCP/NCCP provides the basis for the issuance of regulatory authorizations under the federal Endangered Species Act (FESA) and the California Natural Community Conservation Planning Act (NCCPA) for the incidental take of federally and state-listed species resulting from covered activities (Chapter 3, *Covered Activities*). The entities that receive incidental take authorizations for activities covered under the Yolo HCP/NCCP pursuant to FESA Section 10(a)(1)(B) and NCCPA Section 2835 are referred to collectively as the "Permittees." Each of the Permittees will also be a signatory to the Yolo HCP/NCCP's Implementing Agreement.

The following entities are Permittees for the purpose of the Yolo HCP/NCCP and its regulatory authorizations:

- Yolo Habitat Conservancy,
- County of Yolo,
- City of Davis,
- City of West Sacramento,
- City of Winters, and
- City of Woodland.

The Permittees will vest responsibility for implementing the Yolo HCP/NCCP in the Conservancy. The Permittees, however, will ultimately be responsible for compliance with all the terms and conditions of the Permits and the Conservancy's performance. Each entity will designate staff members to advise the Conservancy on implementation of the Yolo HCP/NCCP. The Permittees, including the Conservancy, may enter into agreements individually, amongst themselves, or with other entities to designate responsibility for carrying out certain actions under the Yolo HCP/NCCP.

Figure 7-1. Yolo NHP Organizational Structure



7.2.2 Yolo Habitat Conservancy

Immediately following execution of the Implementing Agreement and issuance of the Permits, the role of the Conservancy will shift from HCP/NCCP preparation to HCP/NCCP implementation. At that point, the Conservancy will begin implementation of the Yolo HCP/NCCP through its Board of Directors, Executive Director, and staff and consultants who work at the direction of the Executive Director. Additional information about the role of the Conservancy in HCP/NCCP implementation is provided below in Section 7.3, *Responsibilities of the Conservancy.*

7.2.3 Wildlife Agencies

On the basis of the Yolo HCP/NCCP, USFWS and CDFW will issue regulatory authorizations to the Permittees pursuant to the FESA and the NCCPA. Consistent with their authorities under these laws, USFWS and CDFW will retain responsibility for enforcing the terms and conditions of the Permits and regulatory authorizations.

USFWS and CDFW retain full responsibility to:

- Determine whether HCP/NCCP implementation is proceeding in compliance with the terms and conditions of the regulatory authorizations,
- Enforce the terms and conditions of the regulatory authorizations, and
- Modify, suspend, or revoke regulatory authorizations, consistent with the terms and conditions of the Yolo HCP/NCCP, the Implementing Agreement, the Permit, and applicable state or federal law.

USFWS and CDFW will also provide input on a range of implementation actions the Conservancy will carry out. The Conservancy will work closely with USFWS and CDFW to ensure ongoing compliance with the Permits and authorizations.

7.2.4 Other Land and Water Management Agencies

Local land and water management agencies (such as parks departments, private land trusts, etc.) other than the Permittees are also important to the HCP/NCCP's success. These agencies may acquire or manage HCP/NCCP reserve lands on behalf of the Conservancy. Further, these land and water management agencies may own land adjacent to HCP/NCCP reserve lands where coordinated management and monitoring may benefit both entities. The Conservancy will invite land and water managers from relevant local organizations to coordinate closely with the Conservancy to ensure management actions are compatible and consistent across the region. The Conservancy can achieve significant cost savings by undertaking joint management actions with local land and water management agencies that are consistent with the Yolo HCP/NCCP.

Examples of partnerships that could occur with identified local funding partners include:

- City of Davis. The Davis open space tax (see Section 8.4.2.1, *City of Davis*) provides funding for acquisition of open space lands. Where it is possible for the City to utilize the Yolo HCP/NCCP conservation easement template (Appendix K, *Conservation Easement Template*) for acquisitions, those lands can be counted acre for acre toward the Yolo HCP/NCCP conservation strategy. The Conservancy also may secure grants or other funds to match City of Davis

contributions for acquisition of open space lands consistent with the Yolo HCP/NCCP. Activities other than land or easement acquisitions that are purchased with open space tax funds, consistent with the Yolo HCP/NCCP, will also count toward the local share of HCP/NCCP implementation;

- Cache Creek Resources Management Plan (CCRMP). The Yolo County CCRMP (see Section 8.4.2.2, *Cache Creek Resources Management Plan*) provides a policy framework, regulations, and an implementation plan for management and restoration of lower Cache Creek. Where CCRMP implementation actions (e.g., invasive species removal) are consistent with the Yolo HCP/NCCP conservation strategy, that funding and those actions can count toward implementation of the plan. Moreover, where the county is willing to place a conservation easement, consistent with the Yolo HCP/NCCP conservation easement template (Appendix K), on county CCRMP open space land and manage that land pursuant to the Yolo HCP/NCCP management template, the Conservancy will manage the habitat on the property in perpetuity[1] consistent with the Conservancy's December 2014 partnership resolution with Yolo County. The value of the easement will count toward the Conservancy's local share of HCP/NCCP implementation; and
- Solano County Water Agency (SCWA)/Lower Putah Creek Coordinating Committee (LPCCC). The LPCCC (see Section 8.4.2.3, *Solano County Water Agency/Lower Putah Creek Coordinating Committee*) receives funding through a legal settlement that is used to hire a staff and conduct activities to restore lower Putah Creek. Where these activities are consistent with the Yolo HCP/NCCP conservation strategy, that funding and those actions can count toward implementation of the plan. If SCWA donates time and materials for restoration projects consistent with the Yolo HCP/NCCP, for example, those expenditures would count toward the Conservancy's local share of HCP/NCCP implementation. Prior to initiation of any easement acquisition that will contribute to the Yolo HCP/NCCP conservation strategy in Solano County, within the extended Plan Area on the south side of Putah Creek, the Conservancy will consult with Solano County. The purpose of any such easements will be to protect or restore and adaptively manage and enhance the riparian natural community along the Putah Creek corridor (Figure 6-3, *Ecological Corridors*) to create a continuous riparian and public open space corridor along the creek.[2]

In addition, new partnerships could be established. For example, the Parks Division of the Yolo County General Services Department manages large open space parks that are owned by Yolo County. Where the county is willing to place a conservation easement, consistent with the HCP/NCCP conservation easement template (Appendix K), on county open space land and manage that land pursuant to the HCP/NCCP management template, the Conservancy can oversee complete or partial operation and provide management in perpetuity.

7.2.4.1 Advisory Committee

In recognition of the need to have broad community participation during preparation of the Yolo HCP/NCCP, the Conservancy Board of Directors formed an Advisory Committee, with membership

[1] If the Conservancy dissolves after the HCP/NCCP permit term, the Conservancy will designate a successor entity to ensure management in perpetuity of CCRMP lands, subject to written approval of the conservation easement's third party beneficiaries.

[2] For current details, see https://www.putahcreekcouncil.org/lower-putah-creek-restoration-planning

that is representative of the varied interests in Yolo County, including the environmental interests, landowners, agricultural interests, member agency representatives, and the community at large. The Conservancy anticipates that these stakeholders may be interested in continuing to participate and provide input regarding HCP/NCCP implementation. As a result, the Conservancy will continue the Advisory Committee as a stakeholder group throughout the implementation process.

Advisory Committee input will ensure continuity between development of the Yolo HCP/NCCP and implementation of the Yolo HCP/NCCP. It will also ensure the timely, efficient, and proper implementation of the commitments reflected in the Yolo HCP/NCCP. Membership in the Advisory Committee will continue to be voluntary, and members will not be paid. The Advisory Committee will continue to consist of a range of individuals and entities with an interest in HCP/NCCP-related matters. Members of the Committee may include, but will not be limited to:

- Land developers and others who are seeking use of the Permits under the Yolo HCP/NCCP,
- Conservation interests,
- Agricultural interests,
- Landowner representatives, and
- Other stakeholders whose assistance will increase the likelihood of the success of HCP/NCCP implementation.

The Advisory Committee also includes non-voting liaisons from the USFWS, CDFW, and each of the Permittees. These liaisons regularly attend meetings and help to ensure consistent and productive communication between the Advisory Committee, the Permittees, and the Board of Directors. A liaison for a Permittee, for example, may brief their member on the Conservancy Board of Directors on important items. The Advisory Committee process will complement, but not substitute for, ongoing collaboration and communication between stakeholders and the Conservancy, Permittees, the Board of Directors, USFWS, and CDFW.

The Conservancy will organize, help convene, and provide support for the Advisory Committee and its proceedings. The Conservancy will convene the Advisory Committee at least twice a year. The Executive Director may also convene the Advisory Committee as needed to exchange information and discuss current issues, such as updates on HCP/NCCP implementation. Stakeholders will have the opportunity to inquire about implementation matters and make recommendations concerning pending decisions. All Advisory Committee meetings will be open to the public, and the Conservancy will publish notices regarding upcoming meetings on the Yolo HCP/NCCP web site or another appropriate public forum.

To further facilitate access to information and promote transparency in decision-making, the Conservancy will also maintain a publicly available database of key documents and information, such as annual implementation reports, work plans, and budgets (Section 7.9, *Data Tracking and Reporting*).

7.2.4.2 Science and Technical Advisory Committee

The Science and Technical Advisory Committee (STAC) will provide scientific and technical guidance to the Conservancy on the suitability of potential sites for easements and mitigation (e.g., species biology, species habitat requirements, and habitat restoration actions). The STAC may also advise

the Conservancy on other issues, as requested by the Executive Director, such as site-specific management and monitoring plans, habitat management, and/or enhancement opportunities.

The STAC will be composed of four to six biologists who have experience with the habitat types and species that are covered by the Yolo HCP/NCCP (preferably experience in local conservation planning). Representatives from the wildlife agencies may also participate in the STAC as liaisons. Between the members, the STAC will have a diversity of species expertise.

The STAC will meet every two months or as necessary to evaluate potential sites. The primary role of the STAC is to assess and evaluate prospective conservation sites (e.g., sites that have been proposed as mitigation receiving sites or other reserve lands).

Specific activities of the STAC include the following:

- Conduct a field assessment of prospective conservation sites;
- Assess and rank the value of the prospective conservation sites based on ecological, land use, and management parameters, including an evaluation of the extent to which the site is consistent with the Yolo HCP/NCCP;
- Submit a formal written evaluation based on the assessment and ranking effort to the Conservancy, including a recommendation to the Executive Director as to whether the property is appropriate for inclusion in the reserve system;
- Develop recommendations for site-specific management, restoration, and monitoring; and
- Coordinate, as requested, with the Conservancy to provide input, guidance, and recommendations on conservation actions, land use issues, and species needs.

The STAC will have a chair, whose responsibilities will include:

- Convening the committee in coordination with staff members;
- Organizing site visits with assistance from staff members;
- Assigning leads for completing site evaluations, based on expertise; and
- Ensuring timely reporting by the committee on proposed sites.

The STAC's role in Yolo HCP/NCCP implementation is advisory only. The STAC will make recommendations to the Executive Director, who in turn will make recommendations to the Conservancy Board. The Conservancy Board will retain authority to approve all acquisitions and individual mitigation receiving sites. All acquisitions will be subject to wildlife agency approval as described in Section 7.5.2, *Acquisition Process*, Step 12.

7.2.5 Special Participating Entities

Entities that are not subject to the jurisdiction of the Permittees may conduct or initiate projects or ongoing activities within the Permit area that may affect listed species and require take authorization from USFWS or CDFW. Such organizations may include existing or future school districts, water districts, irrigation districts, transportation agencies, local park districts, geologic hazard abatement districts, other utility or special districts that own land or provide public services, or individuals with activities that may result in take but that do not require a discretionary permit. These public agencies or individuals, known as *Special Participating Entities* (SPEs), can request

coverage under the Yolo HCP/NCCP during implementation. Such coverage will provide take authorization for their projects.

Chapter 4, Section 4.2.1.3, *Proposed Projects by Special Participating Agencies*, describes the application, review, and approval process for SPEs to be covered under the Yolo HCP/NCCP.

As described in Chapter 4, *Application Process and Conditions on Covered Activities*, some management and monitoring activities will result in take of the covered species, even if the net result of the actions are beneficial (e.g., prescribed burning, handling species to identify or mark them). Any special district or other agency that carries out such activities on behalf of the Conservancy will require take authorization. If the special district or agency is either a Permittee itself or a contractor of the Conservancy that carries out management and monitoring activities on Yolo HCP/NCCP reserve lands, it will receive take authorization under the HCP/NCCP Permits. Management or monitoring agencies that are not a Permittee or a contractor of the Conservancy can secure take authorization as an SPE.

7.3 Responsibilities of the Conservancy

The Conservancy is responsible for implementation of the Yolo HCP/NCCP through its Board of Directors, Executive Director, staff members, and consultants who work at the direction of the Executive Director (Figure 7-2). The Conservancy will have day-to-day responsibility for plan implementation and oversight and coordinate implementation actions with Permittees, USFWS and CDFW, the Advisory Committee, and other interests. The Conservancy will also provide additional detail regarding plan implementation in an implementation handbook the Conservancy will prepare within one year of Permit issuance. The Conservancy has the capacity to hire staff members and enter into contracts to implement the Yolo HCP/NCCP.

The Conservancy will have responsibility for the implementation of a broad range of actions, including:

- Oversight and coordination of administration of program funding and resources;
- Preparation of annual and 10-year reports, work plans, and budgets;
- Establishment of procedures to implement plan actions;
- Oversight of and engagement in the implementation of conservation measures;
- Management of the monitoring and research and adaptive management programs;
- Monitoring and enforcement of HCP/NCCP conservation easements;
- Implementation of the public outreach program; and
- Fulfillment of compliance monitoring and reporting requirements.

The following sections describe the functions and responsibilities of the Conservancy in implementing the Yolo HCP/NCCP. Some or all of these job functions may be performed within the Conservancy through its internal staff. Alternatively, the Conservancy may partner with Permittees to provide some of these staff functions through their own agencies. The Conservancy may also hire contractors or consultants to provide many of these functions under the direction of the Conservancy Executive Director.

7.3.1.1 Board of Directors

As stated in Section 1.3.1, *Role of the Conservancy*, the Conservancy Board of Directors consists of elected representatives who have been appointed by Yolo County and the incorporated Cities of Davis, West Sacramento, Winters, and Woodland. The seven-member board is composed of two members from Yolo County and one from each of the four incorporated cities and the University of California, Davis. The Board of Directors' current responsibility is to assist in the planning and administration of the Yolo HCP/NCCP and facilitate interim acquisition of conservation easements to preserve foraging habitat for Swainson's hawk. Upon execution of the Implementing Agreement and issuance of the Permits, this program will be subsumed and replaced by the Yolo HCP/NCCP.

The responsibilities of the Conservancy Board of Directors will transition to include:

- Selection, supervision, and evaluation of an Executive Director;
- Approval and oversight of the Yolo HCP/NCCP;
- Financial oversight, as specified in Board-approved administrative procedures and policies;
- Approval of the annual work plan and budget, including the anticipated Conservancy actions associated with the adaptive management program and the habitat acquisition and restoration projects. The Board's review of the work plan and budget will focus primarily on the programmatic aspects of the proposed actions;
- Coordination of regular meetings. The Board of Directors will hold a minimum of two meetings per year. The Chair of the Board or three members of the Board can convene a meeting. The Executive Director may also convene the Board as needed to review issues that arise in the implementation of the annual work plan and budget as well as the annual audit. The Board of Directors meetings will be public as provided by applicable law;
- Approval of all land acquisition or land provided by project proponents in lieu of HCP/NCCP fees (see Section 7.5.9, *Land Dedication In Lieu of HCP/NCCP Fee*);
- Approval of minor modifications to the plan or the submittal of an application for a formal plan amendment, as described in Section 7.8, *Modifications to the Plan*;
- Review of challenges by project proponents to the mapped extent of land cover types that are exempt from the land cover fee or wetland fee; and
- Review of appeals made by Permittees of HCP/NCCP fee determinations.

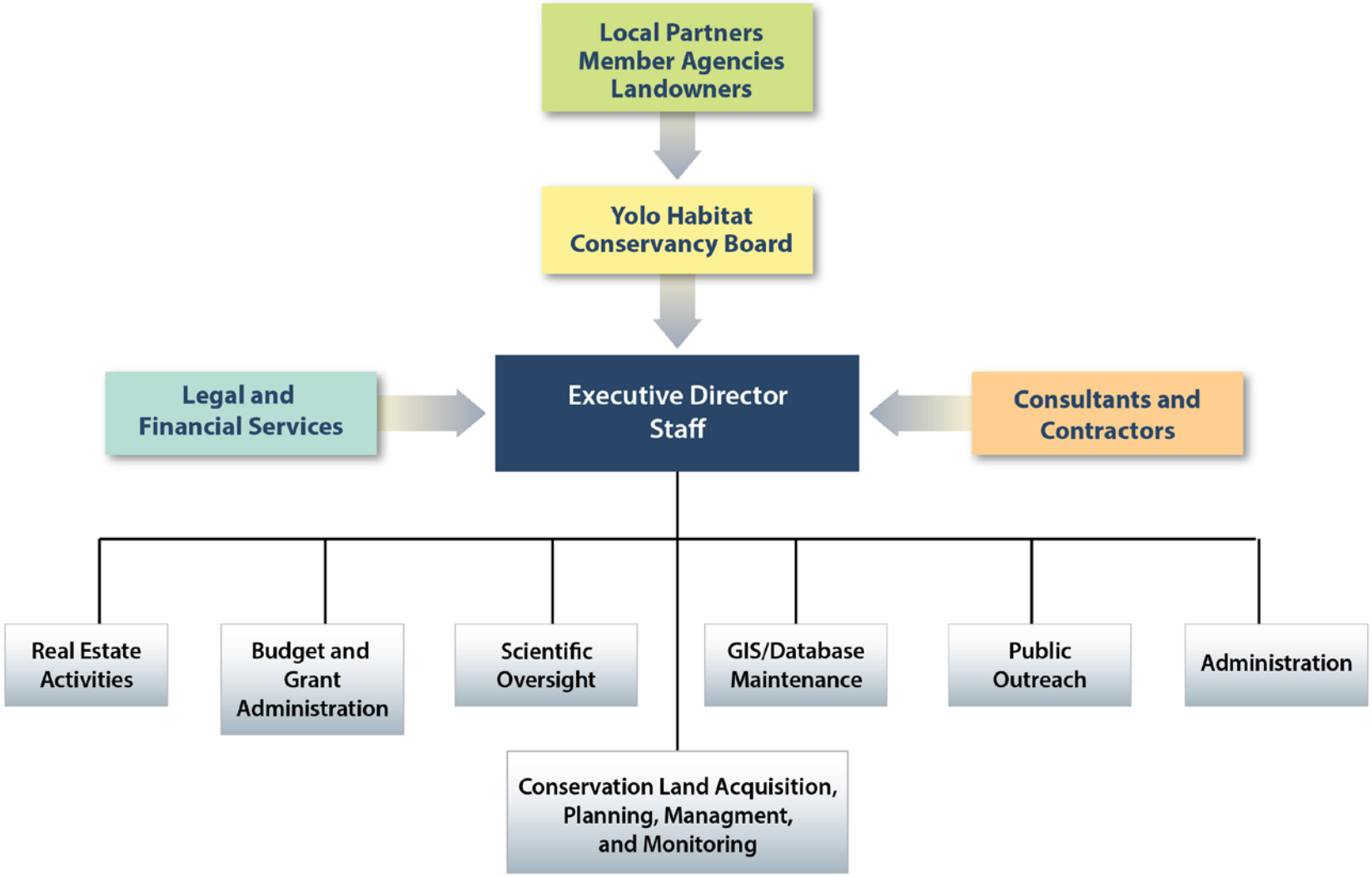
7.3.1.2 Executive Director and Staff

The Executive Director will organize, convene, and provide support for the Board of Directors and its proceedings and be responsible for day-to-day administration and implementation of the Yolo HCP/NCCP. The Executive Director will work with Conservancy staff to implement the HCP/NCCP conservation measures, including local conservation measures and those related to protection, restoration, and management of habitat throughout the life of the Yolo HCP/NCCP. The Executive Director will work with the Conservancy staff to implement the adaptive management program; monitoring, data collection, and scientific research efforts; annual and ten-year report, budget, and work plan preparation; and the public outreach process. To ensure the commitments reflected in the Yolo HCP/NCCP are carried out in a timely and efficient manner, the Executive Director (with approval of the Conservancy Board of Directors) will institute procedures to address planning,

budgeting, sequencing, oversight, and scheduling needs related to plan implementation. These procedures include:

- Preparation of the annual work plan and budget;
- Regular reporting to the Conservancy Board on the status of plan implementation, financial oversight, and the budget;
- Regular briefings of member agency governing boards on the status of plan implementation; and
- Regular communication with designated wildlife agency representatives.

Figure 7-2. Organization and Functions of the Yolo NHP Implementing Entity



7.3.2 Real Estate Activities

The Conservancy will conduct relevant financial and legal analyses to guide the selection of parcels for the reserve system. It will also conduct or manage appraisals and transactions. The Conservancy will hire or contract with a specialist with expertise in real estate law, zoning, and local regulations to fulfill the fiduciary duties of the Conservancy for the acquisition of properties. This specialist will work in coordination with the Executive Director and Conservancy Counsel to acquire properties. Existing county and city agencies may already have staff members with these skills; the Conservancy may partner with such agencies to obtain these skills externally as an in-kind service. The Conservancy may also hire contractors or consultants to provide these functions under the direction of the Executive Director.

7.3.3 Grant Administration

The Conservancy is responsible for writing grants and managing all grants, contracts, and other funding sources during HCP/NCCP implementation. The Conservancy must establish accounting procedures and methods for disbursing funds and actively pursue and acquire additional funding for HCP/NCCP implementation. Existing agencies may already have staff members with these skills; the Conservancy may partner with such agencies to obtain these skills externally. For any grants received, the Conservancy must also monitor, track, and report to the granting agency according to the grant requirements.

7.3.4 Budget Analysis

The Executive Director will develop, propose, and administer budgets for general program administration. The Board of Directors will approve the annual budget and provide oversight of Conservancy finances. Specific responsibilities will include developing and monitoring budgets, processing invoices, managing financial reserves, identifying cost savings, and managing administrative contracts (e.g., liability insurance). The Executive Director will establish processes to ensure timely implementation and proper oversight of annual budgets and related expenditures.

7.3.5 GIS/Database Maintenance

The Conservancy will use GIS or other equivalent spatially explicit database systems to collect, store, and utilize the relevant data necessary for HCP/NCCP implementation. The Conservancy will maintain these data systems to track compliance and guide reserve system design as well as monitoring and adaptive management programs. The Conservancy must query the database, for example, to summarize take and conservation by year and cumulatively (by land cover types and modeled habitat for covered species). The Conservancy will track all data related to the progress of meeting HCP/NCCP goals and objectives. The Conservancy may also hire contractors or consultants or use the staff from a local jurisdiction to provide these functions under the direction of the Executive Director. Data must be made available to USFWS and CDFW at any time.

7.3.6 Reserve Management and Monitoring

The Conservancy will direct the management of land and easements acquired for the reserve system and coordinate with managers of other protected areas to form a biologically cohesive network of

protected lands in the Plan Area. The Conservancy expects that minimal management will be required for lands on which the Conservancy purchases an easement, that remain in private ownership, and that continue in agricultural production. The Conservancy will coordinate closely with landowners as necessary, however, to implement the site-specific management plan for each property. On land that is not in agricultural production, the Conservancy will manage or oversee the management of the land to maintain the habitat values. These activities will include regular patrols, trash removal, fence/gate installation and repair, road maintenance, and other necessary activities. The Conservancy will not be responsible for management of recreational activities that may occur on these properties, however, and will reach agreement with landowners regarding the scope and management of these recreation activities on a case-by-case basis to ensure the habitat values of reserve lands are protected.

The Conservancy will be responsible for developing reserve unit management plans covering all units of the reserve system to guide site-specific management. The Conservancy may hire contractors or consultants to provide this function under the direction of the Executive Director. The Conservancy will develop, or will oversee contractor development of, site restoration plans for each site where restoration would occur. These plans will include designs and construction drawings. The Conservancy will also be responsible for interim management of newly protected lands prior to completion of these reserve unit management plans.

The Conservancy will be responsible for designing and implementing the monitoring and adaptive management program described in Chapter 6, *Conservation Strategy*. The Permittees and the Conservancy will be responsible for all monitoring and insuring management occurs in a manner that is consistent with the Yolo HCP/NCCP throughout the reserve system after the Permits expire (i.e., in perpetuity).

The schedules, approvals, and updating processes for management plans are as follows:

Reserve Unit Management Plans

- The Conservancy will prepare reserve unit management plans within five years of the first parcel acquired in each reserve unit. Each of these reserve unit management plans will be subject to review and approval by the Conservancy, USFWS, and CDFW.
- The Conservancy will review reserve unit management plans every five years and update them if needed. Reserve unit management plans may be revised more frequently if deemed necessary by the Conservancy, CDFW, and/or USFWS. The USFWS and CDFW must approve any changes.

Site-Specific Management Plans

- Individual site-specific management plans will rely on provisions from the applicable reserve unit management plan(s) to provide management approaches, prohibitions, and other conditions specific to relevant natural or semi-natural community type(s) and species associated with the site.
- Individual site-specific management plans will be updated on an as-needed basis as determined by either the Conservancy, the landowner, or in response to updates made by the umbrella reserve unit management plan. The Conservancy will provide notification of amendments and provide draft amendments to wildlife agencies for review and input; however, agency approval

will not be required if they are consistent with the reserve unit management plan[3]. Modifications to a site-specific management plan that are not consistent with the reserve unit management plan will require that the proposed modification undergo a wildlife agency review and approval process.

Pre-Permit Reserve Cultivated Lands Management Plan

- As described in Section 6.4.1.7, the Conservancy has committed to enroll baseline public and easement lands into the reserve system as *pre-permit reserve lands*. A portion of these baseline public and easement lands are either Swainson's hawk easement sites or Swainson's hawk mitigation receiving sites associated with the countywide Swainson's hawk mitigation fee program (See Section 7.5.9.2 for program description). All easements associated with the Swainson's hawk mitigation fee program utilize the easement template previously approved by CDFW and the associated lands consist of cultivated lands that are either in row crops, field crops, or pasture. Due to the similarities among these sites, a single management plan will be developed for all Swainson's hawk easement and mitigation receiving site properties that are enrolled as pre-permit reserve lands. The format for this management plan will be similar to the reserve unit management plans in that it is an umbrella plan covering multiple properties. The Conservancy will develop the pre-permit reserve management plan and USFWS and CDFW must approve it. The management plan for pre-permit reserve lands may be revised if deemed necessary by the Conservancy, CDFW, and/or USFWS. CDFW and USFW must approve any changes.

7.3.7 Public Outreach and Education

The Conservancy will conduct outreach to local private and public landowners and residents that will include education on the management goals and objectives as well as implementation techniques. The Conservancy may also hire contractors or consultants to provide this function under the direction of the Executive Director. The focus of public education and outreach activities will be to raise landowner and public awareness of reserve management goals, as well as actions and methods, and how the public can support them. To that end, the Conservancy will ensure development and management of a public web site for the Yolo HCP/NCCP, which will include information on establishing conservation easements, annual monitoring reports, and other useful information for landowners and others who may participate or have interest in the HCP/NCCP. Where appropriate, the Conservancy will develop and publish guidelines for local landowners and provide education programs to assist in the implementation of these guidelines. The Conservancy will coordinate public education and outreach with other local agencies that provide similar services in the study area.

During early implementation, the Conservancy will develop an implementation handbook, which will include information on implementing the HCP/NCCP. The handbook will include information for the following stakeholders:

- Developers interested in covering their projects under the HCP/NCCP;
- Farmers and landowners interested in selling easements or land in fee- title to the Conservancy for conservation purposes (the Conservancy may also convene a forum of farmers and

[3] Wildlife agency approval will be required for amendments to site-specific management plans if the wildlife agencies have not yet approved a reserve unit management plan.

landowners to address questions and concerns that may arise during HCP/NCCP implementation); and

- Conservation partners interested in coordinating with the Conservancy to achieve conservation consistent with the HCP/NCCP.

7.3.8 Legal and Financial Services

The Conservancy's staff and Board of Directors, in coordination with USFWS, CDFW, and other appropriate public agencies, will help direct efforts to defend against legal challenges to the Yolo HCP/NCCP or its associated state and federal authorizations. As necessary, the Conservancy may also provide funding for legal counsel, or use Permittee or other local agency legal counsel, to address the range of legal issues associated with implementation, including defense against litigation related to the Yolo HCP/NCCP, liability associated with land acquisition and related matters, disputes arising out of contractual agreements, and general, routine in-house legal matters.

The Conservancy will require outside financial analysis assistance every five years to review the program's cost/revenue balance and ensure that development fees are adjusted with changing land costs and inflation (see Chapter 8, *Cost and Funding*). This review is in addition to the Conservancy's annual process to update the fee to adjust to changing land costs and inflation, which may also require outside financial analysis assistance.

7.3.9 Consultants and Contractors

The Conservancy will retain consultants to meet any technical, scientific, or other staffing needs that cannot be effectively or efficiently addressed through in-house staff due to insufficient expertise or availability. It is expected the Conservancy will utilize consultants more heavily during the early stages of HCP/NCCP implementation, becoming less necessary as the Conservancy develops and becomes more familiar with the reserve system.

7.3.10 Responsibilities of the Local Jurisdictions

The local jurisdictions with land use planning and development authority that participate in the Yolo HCP/NCCP (County of Yolo, City of Davis, City of Woodland, City of West Sacramento, and City of Winters) have a responsibility to assist with implementation because of their local government authorities. As Permittees and members of the Conservancy, the participating local jurisdictions will support HCP/NCCP implementation by:

- Receiving, reviewing, and approving applications for take authorization under the Yolo HCP/NCCP from private project proponents, according to the procedures and requirements described in Chapter 4, *Application Process and Conditions on Covered Activities*;
- Requiring private project proponents to pay HCP/NCCP fees established by the Conservancy, as described in Chapter 8, *Cost and Funding*;
- Transferring quarterly the HCP/NCCP fees to the Conservancy to support HCP/NCCP implementation. The Conservancy may request that local jurisdictions transfer fees more frequently if necessary for prudent financial management of the Conservancy. All fees paid must be transferred or in the process of transfer (e.g., the member agency has notified the

Conservancy that the fee has been paid and the transfer process has been initiated) within 15 days of the end of the quarter in which the fee was paid;

- Reporting periodically, at least quarterly, information to the Conservancy regarding the applications and approvals for take authorization under the Yolo HCP/NCCP, including take associated with projects that are exempt from the fees and/or conditions of the Yolo HCP/NCCP. The participating local jurisdictions will report quarterly, ending in December of each year. The Conservancy will use the participating local jurisdictions' quarterly reporting to complete the annual report by the end of April of the following year. For example, staff will present the 2018 annual report to the Conservancy Board and the wildlife agencies in April 2019;
- Hearing appeals of fee determinations for projects within their jurisdictions;
- Monitoring the compliance with conditions on covered activities on project sites;
- Participating in regular working group meetings with Conservancy staff;
- Participating in the Conservancy's Advisory Committee as agency liaisons ; and
- Coordinating closely with the Conservancy regarding Plan implementation.

7.4 Local Implementing Ordinances

To implement the Yolo HCP/NCCP on the local level, each participating jurisdiction must adopt an implementing ordinance that will reference the permits, implementing agreement, and the Yolo HCP/NCCP as well as the jurisdiction's obligations under the Yolo HCP/NCCP. Each jurisdiction will consider ordinances for adoption no later than 120 days after execution of the implementing agreement (Appendix F, *Implementing Agreement*) and issuance of the last permit by USFWS and CDFW.

Once issued, the permits will be contingent upon the adoption of local implementing ordinances in Davis, Woodland, West Sacramento, Winters, and Yolo County. The implementing agreement and permits will specify that the permit is contingent upon the adoption of these implementing ordinances.

7.5 Land Acquisition

The Conservancy is responsible for ensuring acquisition of land for the reserve system in accordance with the requirements in Chapter 6, *Conservation Strategy*. As described in Chapter 6, all land for the reserve system must be acquired by Year 45 of the permit term.

7.5.1 Acquisition Credit

For inclusion into the reserve system, newly protected lands must meet the following criteria:

- Contribute to meeting the goals and objectives of the Plan and overall success of the Yolo HCP/NCCP, as described in Chapter 6, *Conservation Strategy*;
- Have a location, configuration, and quality that are consistent with the reserve design and assembly principles in Chapter 6, Section 6.4.1, Conservation Measure 1: Establish Reserve System*;*
- Permanently protect the biological functions and values that contribute to the Yolo HCP/NCCP. Permanent protection must be ensured through a conservation easement that is consistent with the requirements of Section 7.5.5, *Conservation Easements*, and the conservation easement template in Appendix K or by some other permanent dedication of land to the reserve system; and
- Have no hazardous materials or property encumbrances that conflict with HCP/NCCP goals and objectives.

7.5.2 Acquisition Process

The process for acquiring land in fee title or through conservation easements is represented by Steps 1 through 13, below. These steps are representative of the process for a typical transaction; the process, however, may vary based on the specific characteristics of each transaction. Regardless, certain elements (such as wildlife agency participation) will be integral to each acquisition. In addition, the Conservancy Board or Executive Director may make modifications to this process as needed with written approval by the wildlife agencies.

The Conservancy may perform these acquisition steps on its own or an acquisition partner (e.g., a local land management agency) could perform these steps. In addition, landowners who are interested in selling easements or land in fee title may initiate the acquisition process.

1. The Conservancy initiates the acquisition process by requesting applications from landowners who are interested in selling easements or land in fee title. The Conservancy may also approach a property owner directly with a proposal to acquire land through conservation easement or fee title;
2. The Conservancy reviews applications for consistency with the Yolo HCP/NCCP and requests additional information, as necessary. The Conservancy screens the applications to make sure they are complete and consistent with the framework of the acquisition strategy (e.g., within the boundary of the reserve system, without inconsistent property easements or land uses, etc.);
3. The Conservancy provides applications to the STAC for review, along with the necessary information on land cover types, habitat for covered species, restoration potential, and presence of covered species based on Plan data and other available data sources. The STAC will conduct an on-site evaluation, coordinate with the landowner for additional information, and prepare an evaluation report using a standardized report template. The property evaluation report will include an acquisition recommendation to the Executive Director based on the suitability of the property to meet the conservation goals and objectives for covered species identified in the conservation strategy;

4. The Conservancy will provide the wildlife agencies with the STAC evaluations (and mineral risk assessment if available at this time; if not, this information will be available in Step 9) and answer any questions the wildlife agencies may have prior to making a recommendation to the Board of Directors. Since the wildlife agencies must approve or deny the decision to include a site in the reserve system, the Executive Director is not required to wait for wildlife agency comments to proceed with a recommendation to the Board of Directors;
5. The Executive Director will make a recommendation to the Board regarding whether to include the proposed site in the reserve system. After Board approval of recommended sites, the Executive Director will seek approval from the wildlife agencies to proceed with the acquisition;
6. The Conservancy and the landowner will sign a letter of intent prior to negotiating easement or land acquisition terms to ensure a clear understanding of the process through which the Conservancy will evaluate the potential purchase of an easement. The Conservancy or the landowner may decide not to proceed with the acquisition if it is not possible to reach agreement on the letter of intent.
7. The Conservancy and the landowner will reach agreement on easement or land acquisition terms and any necessary management prior to purchase. When possible, development of a site-specific management plan should be completed before final purchase (site-specific management plans will be based on the applicable management in the reserve unit management plan that includes the site). Development of the site-specific management plan prior to final purchase of a conservation easement will allow the landowner, the wildlife agencies, and the Conservancy to agree on management practices on the property prior to the purchase (see Section 7.3.6, *Reserve Management and Monitoring*, regarding the process for development of management plans). If the easement terms deviate from the easement template, the wildlife agencies will review and approve these modifications.
8. Conservancy staff members will examine all leases that apply to the property for consistency with HCP/NCCP goals and objectives. Inconsistent leases may be terminated or modified to conform to the Yolo HCP/NCCP. The Conservancy may choose not to purchase a site with incompatible leases or management actions until the leases expire; if purchased, the lease area will be excluded from the reserve system until these leases expire;
9. Conservancy staff members will determine, through the due diligence process, whether a separate mineral estate exists for the property. If a separate mineral estate exists, Conservancy staff members will assess the risk of mineral extraction occurring on the property that would disturb the surface and degrade the conservation values being considered for purchase through easement or fee. This assessment will follow the procedures outlined in Section 7.5.12, *Mineral Rights*, below. If a separate mineral estate is found to have low likelihood of being exercised (i.e., for surface mining to occur), the Conservancy may proceed with its evaluation of the property. If the separate mineral estate is found to have a moderate to high likelihood of being exercised, the Conservancy will proceed with the options described in Section 7.5.12, *Mineral Rights*;
10. The Conservancy conducts an appraisal of property value (easement or fee), mineral estate (if applicable), and water rights consistent with legal requirements for acquisition of public lands;
11. The Conservancy and landowner negotiate a fair-market price and easement conditions, if applicable;
12. If the wildlife agencies have not already approved the acquisition (Step 5), the wildlife agencies have 30 working days to respond to a request for approval once all relevant and available

information has been provided (preliminary title report, conservation easement, STAC evaluation, management plan, and mineral extraction risk assessment). If after 30 days there has been no response from the wildlife agencies, the Conservancy may proceed with the acquisition; and

13. The Conservancy completes the acquisition, including final approval by the Board of relevant easement documents.

7.5.3 Stay-Ahead Provision

The conservation strategy of an NCCP must be implemented at or faster than the rate at which the loss of natural communities or habitat for covered species occurs so that conservation always stays ahead of effects and rough proportionality is maintained between adverse effects on natural communities or covered species and conservation measures (California Fish and Game Code 2820(b)(3)(B)). The rough proportionality standard of the NCCPA states that,

> "…implementation of mitigation and conservation measures on a plan basis is roughly proportional in time and extent to the impact on habitat or covered species authorized under the plan. These provisions shall identify the conservation measures, including assembly of reserves where appropriate and implementation of monitoring and management activities, that will be maintained or carried out in rough proportion to the impact on habitat or covered species and the measurements that will be used to determine if this is occurring" (California Fish and Game Code 2820(b)(3)(D)(9)).

Similarly, the FESA also requires that HCPs minimize and mitigate the impacts of the taking to the maximum extent practicable (FESA Section 10(a)(2)(B)(ii)). When conducting its jeopardy analyses prior to issuance of the incidental take permit, USFWS will consider whether the mitigation proposed is scientifically and rationally related to the impact of the taking. To make findings that the proposed impacts are mitigated to the maximum extent practicable, USFWS will consider temporal losses (if any) resulting from the time of impact relative to the time of mitigation.

The stay-ahead provision requires the Conservancy to ensure the amount of each natural community conserved, restored, or created by the Conservancy as a proportion of the total requirement for each natural community (Tables 6-2(a), *Newly Protected Lands Commitments* and 6-2b, *Pre-permit Reserve Lands Commitments*) is roughly proportional to the impact on that natural community as a proportion of the total impact expected by all covered activities (Table 5-1, *Maximum Allowable Loss, Natural Communities*). If 25 percent of the expected loss of grasslands has occurred, for example, then at least 25 percent of the required land acquisition for grasslands must also have occurred.

To provide flexibility during implementation, the Conservancy may fall behind by a maximum of 10 percent of its conservation strategy acreage requirements (conservation overall and by each applicable land cover type) and still be in compliance with the stay-ahead provision for the Yolo HCP/NCCP. This deviation accounts for the likely pattern of infrequent land acquisition of large parcels, which will allow the Conservancy to jump far ahead of impacts with one acquisition. The Conservancy will be allowed a 10 percent deviation below the required trajectory of conservation. Once the Permits end (i.e., through expiration, suspension, revocation), however, the Permittees will be held responsible for any outstanding requirements in the Permits, Implementing Agreement, and HCP/NCCP (see the Implementing Agreement for a detailed discussion).

7.5.3.1 Measurement of Stay-Ahead Provision

During the first year after Permit issuance, the Conservancy will be establishing its structure, collecting initial HCP/NCCP fees, and actively pursuing land acquisition deals with willing landowners. To allow time for these start-up tasks to occur, the stay-ahead provision will apply only two years after the last local ordinance takes effect. After two years of HCP/NCCP implementation, the Conservancy must measure its compliance with the stay-ahead provision by using the method described below.

To measure compliance with the stay-ahead provision, the amount of each natural community conserved, restored, or created as a proportion of the total requirement by natural community must be equal to or greater than the impact on the natural community as a proportion of the total impact expected by all covered activities. For example, if 40 percent of the total expected impacts on the grasslands natural community have occurred, then at least 40 percent of the conservation of the collective grasslands natural community must also occur. This method of aggregating land cover types into natural communities applies only to measurement of the stay-ahead provision. Requirements for acquisition by each natural community (Tables 6-2a, *Newly Protected Lands Commitments* and 6-2b, *Pre-permit Reserve Lands Commitments*) still apply and must be met by Year 45 of the permit term or by Year 40 if restoration or creation is to occur. This aggregation method provides incentives and flexibility to the Conservancy to acquire, restore, or create the most sensitive and difficult land cover types first within each natural community, even if impacts on these land cover types have not yet occurred.

Land that has been acquired or funded in full or in part by state or federal agencies that contributes to species recovery under the Yolo HCP/NCCP will also contribute to compliance with the stay-ahead provision once enrolled in the reserve system. A portion of the Yolo HCP/NCCP assumes funding by the state and federal governments. The Conservancy must recognize, however, that funds from public agencies will be available on budget cycles, and subject to administrative processes, that may or may not correspond to the timing of covered activities.

The Conservancy will monitor the status of the stay-ahead provision throughout HCP/NCCP implementation. The wildlife agencies will also evaluate the stay-ahead provision on an annual basis. The Conservancy will report the status of the stay-ahead provision in each annual report, beginning with the Year 2 annual report (see Tables 7-1, *Schedule for Major Implementation Tasks,* and 7-2, *Key Deadlines for HCP/NCCP Compliance*). As long as the pace of conservation measure implementation (i.e., preservation, restoration, or creation) does not fall behind the pace of covered activity impacts by more than 10 percent, the Conservancy will meet the stay-ahead provision.

If the stay-ahead provision is not met, the Conservancy and the wildlife agencies will meet and confer within 30 days of the annual report to assess the situation. If the wildlife agencies find that the Yolo HCP/NCCP is out of compliance with the stay-ahead provision, the wildlife agencies will determine if the Yolo HCP/NCCP has maintained rough proportionality. If any of the wildlife agencies issue a notification to the Conservancy that rough proportionality has not been met, then the wildlife agencies and the Conservancy will meet to develop and implement a mutually agreeable plan of action to remedy the situation and achieve compliance with the stay-ahead provision.

Table 7-1. Schedule for Major Implementation Tasks

Time Period	Tasks and Milestones[a]	Responsible Party[b]
Prior to Permit Issuance (i.e., Year 0)		
	Complete final versions of implementing agreement and Permittee ordinances in preparation for permit issuance.	Conservancy
	Where feasible, apply for state/federal grants for land acquisition (after publication of draft Yolo HCP/NCCP).	Conservancy
	Commence the recruitment process for Conservancy key staff members (if possible, to allow early implementation).	Conservancy
	Establish Science and Technical Advisory Committee.	Conservancy
By Permit Issuance (Day 1)		
	Prepare initial budget for Conservancy.	Conservancy
Post-Permit		
0-1 year	Hire Conservancy key staff members and consultants (if not completed prior to permit issuance). This task will be ongoing.	Conservancy
	Within six months of permit issuance, determine the annual date for the Conservancy's Board of Directors to update the HCP/NCCP fee, based on the indices and procedures described in Table 8-10, *HCP/NCCP Fee Adjustment Indices*.	Conservancy
	Develop monitoring protocol. This task may begin prior to permit issuance.	Conservancy
	Develop implementation handbook.	Conservancy
	Within two years of permit issuance, develop a set of guidelines subject to wildlife agency approval with which to evaluate the loss and necessary replacement of conservation easement values from the exercise of mineral rights (from Section 7.5.12, *Mineral Rights*)	Conservancy
	Develop database for tracking take coverage.	Conservancy
	Train Conservancy and Permittee staff members to review and process HCP/NCCP applications. This task will be ongoing.	Conservancy
	Provide each Permittee with detailed maps of land cover types so they can process and evaluate HCP/NCCP applications.	Conservancy
	Develop template pre-acquisition assessment and protocols prior to the first land acquisition.	Conservancy
	Prepare and review applications for public sector activities under the Yolo HCP/NCCP submitted to the Conservancy. This task will be ongoing.	Conservancy
	Where feasible, apply for state/federal grants for land acquisition and other conservation measures. This task will be ongoing.	Conservancy
	Establish an appeals process for HCP/NCCP fee determinations. This process will be consistent with the typical appeals process for each Permittee for development projects.	Conservancy
	Collect Yolo HCP/NCCP fees. This task will be ongoing.	Cities and County, Conservancy
	Develop application for land in lieu of fees.	
	Develop template HCP/NCCP application for Permittees and private entities to apply for take coverage under the plan.	Conservancy
	Develop Special Participating Entities application package for take coverage under the plan.	Conservancy

Time Period	Tasks and Milestones[a]	Responsible Party[b]
	Establish reserve fund for ongoing management when mitigation fees are not available or insufficient.	Conservancy
	Establish and maintain database to track permit compliance (e.g. land acquisition and HCP/NCCP effects). This task will be ongoing.	Conservancy
	Continue coordination of annual audit, including reports to the Conservancy Board. This task will be ongoing.	Conservancy
	Establish performance measures to evaluate progress during implementation.	Conservancy
	Complete prepermit reserve cultivated lands management plan (Section 7.3.6).	Conservancy
	Enter into a memorandum of understanding with the City of Davis to provide more detail about the terms of the partnership described in Section 8.4.2, *Local Funding.*	
1–5 years	Continue to hire or contract out Conservancy technical and operational staff as reserve system expands.	Conservancy
	Investigate restoration and creation opportunities on existing open space and newly acquired land to ensure compliance with stay-ahead provision. This task will be ongoing and Conservancy should begin this task as soon as feasible	Conservancy, Permittees
	Develop a set of guidelines with which to evaluate the loss and necessary replacement of conservation easement values from the exercise of mineral rights. (Within two years of permit issuance.)	Conservancy, Wildlife Agencies
	Update fees annually according to Chapter 8, *Costs and Funding*. Provide new fee schedule to Permittees (the Conservancy will give 30-day notice to Permittees prior to fees going into effect). This task will be ongoing.[a]	Cities and County, Conservancy
	Every five years, perform financial assessment as described in Chapter 8. This task will be ongoing.	Conservancy
	Submit annual report to the wildlife agencies. This task is performed on an annual basis by April 30 of every year for the previous fiscal year (July 1 to June 30).[a]	Conservancy
	Conduct annual meeting to report on implementation progress of HCP/NCCP. This task will be ongoing.	Conservancy
	Prepare reserve unit management plans as described in Chapter 6, *Conservation Strategy*. Conservancy must prepare plans within five years of the first parcel acquired in each reserve unit and reviewed no less than every five years.[a]	Conservancy
	Initiate adaptive management and monitoring of biological resources. This task will be ongoing.	Conservancy
	Initiate or continue management and monitoring in reserve system.	Conservancy
	Continue to acquire land to assemble reserve system and meet stay-ahead provision requirements (by Year 2). This task will be ongoing, but the Conservancy must complete all land acquisition by Year 45.[a]	Conservancy, Permittees
	Begin design of habitat restoration and creation and additional environmental compliance for restoration and creation. This task will be ongoing.	Conservancy
	Implement land cover restoration and creation projects described in Chapter 6. This task will be ongoing; however, the Conservancy must complete construction of all habitat restoration and creation projects for land cover types and plant occurrences by Year 40.	Conservancy

Time Period	Tasks and Milestones[a]	Responsible Party[b]
	Open selected reserve lands to public access according to reserve unit management plans. Develop enforcement procedures for the reserve system before newly acquired land is open to public access.	Conservancy or Applicable Local Agencies
	Prioritize implementation of studies described in Chapter 6.	Conservancy
	Update land cover map with most recent aerial photograph (at least every 5 years).	Conservancy
	Develop a wildfire local operating agreement for the reserve system with the California Department of Forestry and Fire Protection (CAL FIRE) and with any other firefighting agency that has responsibility for the reserve lands within 4 years of Permit issuance.	Conservancy
	Develop framework for landowner incentive program for Swainson's hawk foraging habitat.	Conservancy
	Complete enrollment of pre-permit reserve lands (the Conservancy will initiate this process prior to Year 6 and complete the enrollments by Year 5.	
6–50 years	Continue coordination of annual audit, including reports to the Conservancy Board.	Conservancy
	Ten-year comprehensive reviews.	Conservancy
	Finalize post-permit implementation structure prior to Permit expiration (Chapter 8, Section 8.4.4.5, *Funding for Post-Permit Management and Monitoring*).	Conservancy
		Conservancy
More than 50 years	Continue adaptive management and limited monitoring of biological resources to ensure management actions are working.	Conservancy

Notes:

a. Key Task Tied to Permit Compliance; see Table 7-2

b. The responsible party is the entity that must ensure the task or milestone is achieved. In many cases, the responsible party may delegate implementation of the task to a third party (e.g., a Permittee, landowner, or consultant).

Table 7-2. Key Deadlines for HCP/NCCP Compliance

Key Implementing Entity Task With Deadline Tied to Permit Compliance[a]	Deadline(s)	Deadline Flexibility
Key Initial Deadlines		
Cities and county will consider the adoption of local ordinances to implement HCP/NCCP	Within 120 days after the execution of the Implementing Agreement and issuance by the wildlife agencies of the last Permit	None
Development of strategic plan to outline activities over next 5 to 10 years	With one year of issuance by the wildlife agencies of the last Permit	At the discretion of the Conservancy Board
Enroll pre-permit reserve lands[a]	Within five years of issuance by the wildlife agencies of the last Permit	At the discretion of the Conservancy Board
Key Annual Deadlines		

Key Implementing Entity Task With Deadline Tied to Permit Compliance[a]	Deadline(s)	Deadline Flexibility
Update fees annually	Date to be determined by the Conservancy within the first six months of plan implementation	Fee update can be delayed if the federal indices are delayed
Submit annual report to wildlife agencies with all required information	By April 30 of each year for the previous fiscal year (July 1 to June 30)	Extensions available with prior approval by wildlife agencies
Review and approval of annual report and work plan by Conservancy Board	Should be submitted to Conservancy Board with annual budget	At the discretion of the Conservancy Board
Key Periodic or One-Time Deadlines		
Prepare reserve unit management plans	Within five years of first acquisition in each reserve unit	Extensions available with prior approval by wildlife agencies
Acquire and enhance land; restore and create habitat in compliance with the stay-ahead provision	Applies two years after the last ordinance takes effect and is measured annually thereafter	10% deviation below stay-ahead requirements is allowed
Update strategic plan	Every five years	At the discretion of the Board
The Conservancy will work with the wildlife agencies to conduct a formal and complete review of progress toward building the reserve system	Every ten years	None
Complete construction of all restoration and creation projects for land cover types	Year 40	Success criteria will be proposed in reserve management plans and restoration/creation designs. Success criteria in some cases may not need to be demonstrated by year 40 but would have to be demonstrated by the end of the permit term. The wildlife agencies would review these proposals as they are submitted during HCP/NCCP implementation
Acquire all land for the reserve system according to the acreage requirements in Chapter 6, *Conservation Strategy*, by land cover type, conservation analysis zone, and landscape linkage	Year 45	Extend by up to 2 years with wildlife agency approval if reserve system is within up to 5% of completion
Acquire modeled habitat for covered species in the reserve system according to the species protection requirements in Chapter 6	Year 45	Extend by up to 2 years with wildlife agency approval if reserve system is within up to 5% of completion

Key Implementing Entity Task With Deadline Tied to Permit Compliance[a]	Deadline(s)	Deadline Flexibility
Develop a wildlife agency-approved plan to address the continuing obligations of the Conservancy beyond the permit term	Years 45–47	None

Note:

a. The process and criteria for enrolling pre-permit reserve lands are described in Chapter 6, Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands.*

7.5.3.2 Counting Land Acquisition and Restoration toward Commitments

The criteria for incorporating land into the reserve system are described in Chapter 6, *Conservation Strategy*. Land may be counted toward HCP/NCCP requirements and the stay-ahead provision once it is enrolled into the reserve system (see Section 6.4.1.7 *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands*). Existing and newly constructed infrastructure (e.g., roads, watering facilities) within the reserve system do not count toward the land cover type land acquisition requirements described in Chapter 6.

Compliance with natural community restoration will be measured when construction of the restoration project is completed. If, at the conclusion of the monitoring period, the project fails to support the amount of restored land cover for which the Conservancy initially claimed credit, the Conservancy will adjust the credit to the actual amount of restored land cover type present on the site.

The Conservancy must document the conditions of the restoration site prior to initiating restoration to determine whether the project is enhancing or restoring the land cover type. If the site is only being enhanced and not restored (i.e., if the intended natural community or habitat for covered species is already present), as determined by a qualified biologist, then the enhanced land counts toward only the protection commitment. If the site meets the definition of restoration, then the restored acres will count toward the restoration commitment. The area restored will count toward only the restoration commitment and will not count toward the protection commitment. Restoration of a site will be presented to the Science and Technical Advisory Committee and the wildlife agencies. The wildlife agencies will review and approve any restoration projects.

A key requirement of the land acquisition strategy is landscape connectivity and connections to existing open space. Land acquired early in the permit term may be isolated from existing open space until future acquisitions can connect it. Such acquisitions are eligible for credit under the Plan and for the stay-ahead provision.

Some rights-of-way or utility easements are maintained or used regularly and may not be appropriate for receiving credit toward land acquisition requirements because of the frequent disturbance that occurs within these areas. Where land contemplated for the reserve system is encumbered by rights-of-way or easements, it is the responsibility of the Conservancy to document the frequency and type of use in these rights-of-way or easements and justify whether land acquisition credit should be applied in these areas.

7.5.3.3 Stay-Ahead Reporting and Process for Addressing Deficits in Land Conservation

As discussed in Section 7.5.3.1 *Measurement of Stay-Ahead Provision,* above, if the stay-ahead provision is not met, the Conservancy and the wildlife agencies will meet to develop and implement a mutually agreeable plan of action to remedy the situation and achieve compliance with the stay-ahead provision. The mutually agreeable plan of action may include a range of potential solutions, including those listed below.

- Wait for key pending land acquisition deals to close that will bring the Yolo HCP/NCCP into compliance with the stay-ahead provision;
- Speed delivery of funding sources or partnerships that will enable more land acquisition to bring the Yolo HCP/NCCP into compliance with the stay-ahead provision, including hiring consultants with project management, grant-writing, or real estate expertise;
- More aggressively solicit interest from key landowners who may be willing to sell land to the Conservancy that would enable compliance with the stay-ahead provision;
- Change the acquisition strategy (e.g., more direct acquisition of land by the Conservancy rather than relying on partnerships, shifting the Conservancy's budget allocations to place a higher priority on land acquisition, or accelerating the process for being able to count land that has already been acquired against stay-ahead requirements by, for example, recording easements more quickly);
- Require that project proponents provide land in lieu of fees (see Section 7.5.9, *Land Dedication In Lieu of HCP/NCCP Fee*);
- Slowing or stopping take authorizations until conservation strategy obligations catch up with impacts; and
- If, after the exercise of all available authority and utilization of all available resources, the Conservancy cannot comply with the stay-ahead provision, the Yolo HCP/NCCP will be reevaluated. An amendment may be warranted if adjustments to the take authorization, permit term, conservation obligations, or other aspects of the permits, implementing agreement, or HCP/NCCP are necessary. See Section 7.5.9, *Land Dedication In Lieu of HCP/NCCP Fee,* for more information on the requirement regarding land in lieu of fee when the Conservancy is not meeting the stay-ahead provision or is at risk of not meeting the stay-ahead provision.

7.5.3.4 Requirements for Providing Land Instead of Paying a Fee When Stay-Ahead Provision Is Not Being Met

If the Conservancy determines the Yolo HCP/NCCP is at risk of noncompliance with the stay-ahead provision, the Conservancy will notify the Permittees. The Conservancy may determine it is necessary to temporarily require project proponents (including Permittees) to provide land (or perform equivalent conservation actions [see Chapter 6, *Conservation Strategy*]) instead of paying a fee if the stay-ahead provision is not satisfied based on the criteria listed above. This requirement may be waived if the wildlife agencies agree, after conferring with the Conservancy, that a different plan of action, developed in concert with the Conservancy, will remedy the situation and that it is not necessary to require project proponents to provide land instead of paying a fee. Alternatively, a Permittee may have accrued sufficient credits to offset any fees that are due.

Land will be provided to the Conservancy according to the guidelines and criteria in Section 7.5.9, *Land Dedication In Lieu of HCP/NCCP Fee*. Project proponents will always have the option of providing land in lieu of the base development fee as long as the land that is being offered meets the criteria in Section 7.5.9, *Land Dedication In Lieu of HCP/NCCP Fee*. If the Conservancy initiated the requirement from its own determination that the Yolo HCP/NCCP was at risk of noncompliance, the requirement to provide land instead of a fee will be lifted (i.e., it will revert back to an option) as soon as the Conservancy determines that it is no longer at risk of noncompliance with the stay-ahead provision. If the Conservancy or wildlife agencies initiated the requirement following noncompliance with the stay-ahead provision, the requirement will be lifted as soon as the Conservancy demonstrates in writing, to the satisfaction of the wildlife agencies, that the Yolo HCP/NCCP is in compliance with the stay-ahead provision.

7.5.3.5 Conservation Action Deadlines Beyond Stay-Ahead Requirement

As summarized above, the Conservancy will be required to meet the stay-ahead provision so that land acquisition keeps pace with impacts. If impacts occur more slowly than expected, however, strict adherence to the stay-ahead provision would result in relatively slow growth of the reserve system initially, followed by a rapid expansion of the reserve system to meet the final acquisition targets. To ensure the Conservancy makes steady progress toward the final land acquisition targets, the Conservancy will work with the wildlife agencies to conduct a formal and complete review of progress toward building the reserve system every 10 years after the initial implementation.

7.5.4 Land Acquired by Other Organizations or through Partnerships

Agencies and organizations other than Permittees will acquire land in the Plan Area that will help meet the goals and objectives of the Yolo HCP/NCCP. In these cases, the Conservancy may receive credit toward HCP/NCCP requirements if the acquisitions are made in partnership with the Conservancy and are consistent with the Yolo HCP/NCCP. The Conservancy will most likely participate in many of the habitat-related land acquisitions in the Plan Area during the permit term. The Conservancy may own little or no land, however. If the Conservancy partners with other groups and provides matching funds, for example, larger land acquisitions will be possible (i.e., compared with the Conservancy purchasing land only on its own). Land acquired through partnerships with non-Permittees can be counted toward the Yolo HCP/NCCP conservation requirements (i.e., contribution to recovery) if the acquisition meets the criteria for reserve lands described in Chapter 6, *Conservation Strategy,* and the criteria described above in Section 7.5, *Land Acquisition*.

The Yolo HCP/NCCP budget assumes the Conservancy will always fund management for natural communities land monitoring for all land in the reserve system; actual funding will be determined on a case-by-case basis. The Conservancy, or other groups and agencies, may manage and monitor land acquired through partnerships as long as a contract or other binding agreement is in place to ensure that management and monitoring occurs according to the terms of the Yolo HCP/NCCP. Land acquired with state or federal money will be credited toward the state/federal contribution discussed in Section 8.4.3.2, *State and Federal Funding Sources*. All acquisitions—regardless of the method of acquisition—that are enrolled in the reserve system will be credited toward the stay-ahead provision, as discussed in Section 7.5.3, *Stay-Ahead Provision*.

7.5.5 Conservation Easements

Voluntary permanent conservation easements (hereafter referred to "conservation easements") on private lands are an important tool, one that the Conservancy will use together with fee title acquisition from willing sellers to fulfill the land conservation commitments. Conservation easements are voluntary, legally binding agreements between a landowner and an easement holder that restrict certain uses of the land to protect specified wildlife and plant species and natural communities while the landowner maintains ownership. Under the Yolo HCP/NCCP, the conditions of conservation easements must provide sufficient protection of a sufficient amount of land to achieve the biological goals and objectives of the Yolo HCP/NCCP. A number of entities may hold HCP/NCCP conservation easements (e.g., the Conservancy, Permittees, and land trusts); however, the Conservancy must always be granted the right of enforcement of the easement and access for monitoring (see the template easement in Appendix K). Although conservation easements can include a variety of restrictions and stewardship commitments, only those that are permanent and meet statutory and regulatory requirements, including specific substantiation requirements, are considered viable tools for implementing land conservation under the Yolo HCP/NCCP.

The primary purpose of conservation easements on private lands under the Yolo HCP/NCCP will be to provide the combined benefit of conservation for covered species and natural communities and continued viable use of rangelands and certain agricultural lands in the Plan Area. The Yolo HCP/NCCP includes acreage targets for the protection of natural communities to benefit a number of HCP/NCCP covered species. The Conservancy will achieve most of this conservation through conservation easements. The Yolo HCP/NCCP includes targets for the protection of rice lands, for example, that provide habitat for giant garter snake. The Conservancy will achieve a substantial portion of this target through conservation easements that allow for the continuation of rice production. Easements the Conservancy purchases from willing landowners on such rice lands will allow the use of agricultural practices that are compatible with the conservation of this species.

7.5.5.1 Conservation Easements on Private and Public Lands

The Conservancy will use conservation easements as an important tool in HCP/NCCP implementation in three ways:

- Conservation easements purchased from a private party and placed on the land that remains in the ownership of that private party (i.e., as an alternative to fee title acquisition),
- Conservation easements placed on land acquired in fee title by the Conservancy to secure credit under the Plan (see Section 8.3.1, *Establish Reserve System*), and
- Conservation easements placed on land in public ownership (may be purchased by the Conservancy or donated by the public entity, potentially for take credit).

The section below describes the process for developing acceptable conservation easements in all three cases.

7.5.5.1.1 Easements on Private Land

The Yolo HCP/NCCP assumes that the Conservancy will purchase most of the land for the reserve system in conservation easements rather than in fee title. Conservation easements are appropriate where landowners wish to retain ownership and control of the property and the Conservancy can meet the HCP/NCCP's conservation goals with an easement. The conservation easements purchased

by the Conservancy are intended to preserve the habitat values of the covered species and other native species habitat values that exist on a property. The Conservancy will count only portions of properties that meet one or more of the goals of the Yolo HCP/NCCP toward the conservation commitments outlined in the conservation strategy. In some cases, an easement may be placed over more of a property than the Conservancy initially counted toward the conservation targets if the Conservancy determines that other portions of the property will be restored or enhanced to accommodate HCP/NCCP goals in the future. Additional credit would be applied to the other sites once they meet HCP/NCCP goals.

7.5.5.1.2 Easements on Land Acquired by or for the Conservancy

If the Conservancy or a Permittee owns reserve system land, a conservation easement must be placed on the site to ensure permanent protection. For lands acquired for the reserve system but owned by other public entities, and for lands acquired in fee or easement but owned by private parties, permanent protection must also be ensured by a conservation easement, consistent with the requirements herein. In all cases, conservation easement terms will be consistent with those described in this section.

7.5.5.1.3 Easements on Public Lands

For lands in public ownership, the Conservancy will place permanent conservation easements on the properties that allow recreational uses compatible with the Yolo HCP/NCCP conservation strategy.. If these sites are protected and managed to support the Yolo HCP/NCCP biological goals and objectives, they may count toward the Yolo HCP/NCCP conservation commitments.

7.5.5.2 Conservation Easement Guidelines

The Conservancy, or partners who acquire conservation easements on behalf of the Conservancy with HCP/NCCP funding, will use the guidelines described below.

All conservation easements acquired to fulfill the requirements of the Yolo HCP/NCCP will be in perpetuity and in accordance with California Civil Code Sections 815 et seq.[4] as well as the current policies of the wildlife agencies. All conservation easements will be acquired voluntarily. The Conservancy or another qualified conservation organization (e.g., Yolo Land Trust, The Nature Conservancy) may own or *hold* the easement, provided the easement holder complies with all applicable provisions of state and federal law that dictate the qualifications of conservation easement holders. In addition, a binding agreement must exist between the Conservancy and the easement holder to ensure compliance with the Permits, Implementing Agreement, and HCP/NCCP. An objective of the easements is to have consistency in enforcement, monitoring, and maintenance. For land owned by the Conservancy, the easement must be held by another qualified conservation organization.

The wildlife agencies will be named as third-party beneficiaries on all conservation easements so that all rights conveyed to the Conservancy will also be conveyed to the wildlife agencies. The wildlife agencies will rely on the Conservancy to verify and enforce all easement terms. In the highly unlikely event that the Conservancy fails to do so, the wildlife agencies, as third-party beneficiaries, would have the right to access the property to verify compliance with the easement terms and to enforce those

[4] This section of California law allows placement of restrictions on the use of land for conservation purposes that is binding on all successive owners of that land.

terms, if necessary. To ensure compliance with the Yolo HCP/NCCP, all conservation easements will follow the template easement in Appendix K as closely as is reasonably possible[5]. Reasonable variations from the template may be needed to address site-specific constraints. CDFW and USFWS, along with the Conservancy, must review and approve any substantive modifications to the template easement.

It is the responsibility of participating landowners to abide by the terms of these conservation easements. The landowner and the Conservancy will negotiate the terms and prices of conservation easements on a case-by-case basis. The specific terms of the conservation easement will be based on site conditions, landowner preferences and operations, and species and habitat needs. Some landowners may wish to reserve a portion of their property for a home site or a recreational facility with high-intensity use. In those cases, the conservation easement may either exclude the incompatible site or apply to the entire property but define the portion of the site in which the incompatible uses are allowed.[6] The Yolo HCP/NCCP will receive credit only for the portion of the property that is compatible with HCP/NCCP goals and objectives.

Each conservation easement for the property or portion of the property that will be incorporated into the reserve system will be drafted to:

- Ensure that the property will be kept in compatible agricultural uses or, for properties that will not be used for the production of crops, in its natural or existing condition (all or portions of the site may also be enhanced or restored);
- Protect the existing, enhanced, and/or restored conservation values of the property in perpetuity;
- Ensure the easement cannot be extinguished without the prior written consent of the Conservancy and the identified third-party beneficiary wildlife agencies and compliance with any applicable provisions of state and federal law;
- Confine the allowable uses of the property to those activities that do not interfere with the protection or enhancement of those conservation values, consistent with the Yolo HCP/NCCP; and
- Prevent any use of the property that would impair or interfere with the conservation values of the property.

The conservation easement will describe the conservation values of the property in terms of covered species and their habitat, as well as land cover types and natural communities on the property. It will describe conservation values, at a minimum, using the land cover types and covered species habitat described in Chapter 2, *Existing Ecological Conditions*, and Appendix A, *Covered Species Accounts*. A legal description and map must be included in the easement.

Each conservation easement will prohibit certain activities, as described in the template provided in Appendix K, except as necessary to meet the biological goals and objectives of the Yolo HCP/NCCP (including reserve infrastructure required to support monitoring, management, and maintenance). The Conservancy will describe these allowances in the site-specific reserve management plan that

[5] The conservation easement template is likely to be modified over the course of HCP/NCCP implementation, subject to approval by the wildlife agencies, through the minor modification process described in Section 7.8.2, *Minor Modifications*).

[6] There may be advantages to having the conservation easement apply to the entire site (e.g., to avoid costly boundary surveys to define the conservation easement more narrowly than the property boundary).

the Conservancy will develop in coordination with the landowner, consistent with the management plan template provided in Appendix G, *Management Plan Template*. In addition, all recorded conservation easements will include or incorporate by reference the items listed below.

- The initial pre-acquisition assessment, or baseline report, of covered species habitat and natural communities present;
- A detailed list of the allowable uses and use restrictions on the parcel, consistent with the minimum requirements stated above;
- Any mandatory terms and conditions to maintain or enhance the habitat, pursuant to Section 6.4, *Conservation Measures*, of the Yolo HCP/NCCP;
- Provisions for reasonable access upon prior notice by the wildlife agencies and the Conservancy or its designee to monitor compliance with the terms of the conservation easement and to carry out all applicable management and monitoring requirements described in Chapter 6;
- Conservation easements on grazing lands will describe the general nature of the grazing to be allowed or refer to a management plan that covers such matters. The easement or its management plan will specify the desired vegetation and other habitat conditions and, if necessary, impose limits on the timing, stocking density, and duration of permitted grazing to meet those conditions. These desired conditions and grazing limitations will be allowed to fluctuate according to the adaptive management process. The conservation easement will describe a baseline condition to provide a benchmark and measure habitat enhancement on the site. The conservation easement may accomplish this requirement by reference to a separate reserve management plan prepared for the lands that are covered by the easement;
- Conservation easements will take into account issues of water use and runoff into adjacent or nearby streams and their potential effects on covered species, if applicable;
- Provisions for enforcement and available remedies for the Conservancy or appropriate other party in the event that title holder or a third party violates the terms of the conservation easement;
- If the easement boundaries are different from the parcel boundaries, a legal description and map of the easement boundaries will also accompany the easement; and
- When a site-specific management plan is prepared for private property, according to Section 6.4.3.3, *Site-Specific Management Plans*, the Conservancy will record a Memorandum of Unrecorded Site-specific Management Plan, indicating where that the site-specific management plan may be found and that the terms of such site-specific management plan will be followed. Such a record, to be recorded with the land deed, ensures that the site-specific management plan will be tied to the conservation easement in the event property ownership changes. It also ensures management of the site in perpetuity.

To approve and accept a conservation easement, the Conservancy must have the following documentation:

- A pre-acquisition assessment of the property, or baseline report, that summarizes the baseline biological conditions, including the presence and condition of natural communities and covered species, if known;
- A preliminary title report and legal description of the property;

- Assurance that any superior liens or interests will not substantially conflict with the property's conservation values;
- Evidence of all other easements, covenants, restrictions, reserved rights (including mineral rights), and property interests (including water rights);
- A Phase I Environmental Site Assessment to identify potential environmental contamination if there are indications that a property may have previously included uses other than reasonable and customary agricultural activities; and
- A map of the parcel and a description of its physical condition (e.g., roads, buildings, fences, wells, other structures) as well as its relation to other components of the reserve system and other properties that are subject to other permanent protections for conservation purposes.

7.5.5.3 Conservation Easement Minimum Requirements

This section describes the required content of a conservation easement and the minimum restrictions that must be placed on a conservation easement for it to count toward the goals of the Yolo HCP/NCCP.

7.5.5.3.1 Content of an HCP/NCCP Conservation Easement

A HCP/NCCP conservation easement deed is a recorded in-perpetuity deed restriction instrument that is conveyed to the Conservancy, Permittee, USFWS, CDFW, or other appropriate entity (e.g., a land trust) to restrict the uses of the subject property in a manner that achieves the intended conservation goals and objectives. HCP/NCCP conservation easements must state a specific conservation purpose, such as the protection of specified natural communities, covered species habitat, and agricultural uses that support one or more covered species.

The following describes the minimum content of HCP/NCCP conservation easements:

1. **Conveyance Form**. This section of the easement contains the identification of the parties, a description of the parcel(s), required words of conveyance, and a statement of consideration. All persons with ownership interest in the property must be a party to the deed;
2. **Recitals**. The recitals identify the nature of the agreement and describe the intent of the parties in establishing the conservation easement. They also identify the conservation values that warrant protection and the statutory foundation for the transaction;
3. **Easement Holder's Rights**. This section must grant the Conservancy the right to enforce the restrictions of the easement and the right to access the land for monitoring purposes. Ancillary rights related to these two primary functions of the holder are also granted;
4. **Restrictions and Reserved Rights**. This section identifies the land use restrictions, allowable and prohibited uses and activities, the requirement for prior approval of certain activities by the Conservancy, and those rights reserved by the landowner. All rights and restrictions will be directly relevant to the conservation purposes of the easement;
5. **Administrative Provisions**. This section must include all provisions that establish the easement holder's and the Conservancy's rights and remedies in case of a violation. The easement must include an environmental indemnity to ensure that the easement holder will not be liable under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 United States Code [U.S.C.] Sections 9601 et seq.) or the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. Sections 6901 et seq.). Additional administrative clauses

that govern, among other items, procedures for enforcement, notices, and required approvals may be included;

6. **Signatures of Necessary Parties**. All owners and the easement holder must sign the document. Signatures must be notarized; and
7. **Exhibits**. The legal description of the property is incorporated as an exhibit at the end of the conservation easement. The easement may also be clarified by attaching maps and other relevant information.

7.5.5.3.2 Minimum Restrictions of a Yolo HCP/NCCP Conservation Easement

The Conservancy will develop performance standards and minimum conservation easement requirements for HCP/NCCP conservation easement properties. In particular, the Conservancy will identify standard restrictions on allowable uses and develop a list of inconsistent uses for each conveyed easement to clearly identify the intended objectives, methods, and assurances that each conservation easement is expected to provide for achieving the conservation objectives of the property. These performance standards will represent the minimum conservation easement requirements. The Conservancy may negotiate additional requirements and restrictions with each property owner on a case-by-case basis. At minimum, the Restrictions and Reserved Rights section of each HCP/NCCP conservation easement (or, in some instances, the Management Plan) must:

1. Identify the conservation purpose and the natural communities and habitat for covered species that are addressed by the conservation easement;
2. Identify the conservation actions that may be implemented by the Conservancy on property (e.g., habitat improvements, control of nonnative species);
3. Identify the range of crops and rotation practices that are allowable under the easement and/or the range of crops and practices that are not allowable under the easement, as applicable for active agricultural fields that are included in HCP/NCCP reserve lands. For rice lands, this will include a provision that water will remain in conveyance channels if, during some years, rice fields cannot be flooded because of drought or market conditions;
4. Grant in-perpetuity protection of the subject natural communities and habitat values, permanently restricting the use of the property;
5. Allow the Conservancy to designate a successor or easement holder at its discretion;
6. Protect the land surface from mineral extraction where feasible (see Section 7.5.12, *Mineral Rights*);
7. Restrict the permanent separation of water rights from the property, and provide for short-term transfers only in limited circumstances and with prior approval by the easement holder;
8. Prevent improvements that reduce the property's conservation values;
9. Allow the easement holder and Conservancy access to the property to determine compliance with and to enforce the easement;
10. Allow the easement holder, the Conservancy, and its designees access to the property to conduct HCP/NCCP-required biological monitoring and documentation of baseline conditions, implement habitat improvements covered under the conservation easement, and control nonnative species;

11. Reference the site-specific management plan that is tied to the easement;
12. Provide standards for easement enforcement, amendments, and modification procedures;
13. Provide a clear set of restrictions and/or limitations on allowable uses, including commercial, agricultural, and recreational uses;
14. Clearly describe activities and actions by the landowner that require prior consent from the Conservancy;
15. Describe generally the extent to which removal, filling, or other disturbances to the soil surface as well as any changes in topography, surface or subsurface water systems, wetlands, or natural habitat may be allowed without approval by the Conservancy, except for active agricultural fields where normal farming practices will continue and the easement will identify the allowable (or, alternatively, prohibited) range of crops and rotation practices and specify any additional prohibitions;
16. Declare that all terms and conditions of the easement run with the property and shall be enforceable against the landowner or any other person or entity holding any interest in the property;
17. Provide for the notification of the Conservancy at least 30 working days prior to the transfer of title to the property; and
18. Include provisions in case a property interest is taken by public authority under power of eminent domain.

Management-related requirements for reserve lands are described in Chapter 6, Section 6.4.3, *Conservation Measure 3, Manage and Enhance the Reserve System.*

7.5.5.4 Allowable Activities on HCP/NCCP Reserve System

The following discretionary and non-discretionary activities may be conducted on HCP/NCCP reserve lands. In many instances, these activities will involve both the continuation of ongoing activities on properties and new activities related to implementation of HCP/NCCP conservation measures. Within the restrictions on allowable uses detailed in conservation easement deeds, the following activities may be allowable on HCP/NCCP reserve lands at the discretion of the Conservancy:

- Habitat management activities, as provided for in Conservation Measure 3, *Manage and Enhance Natural Communities*;
- Biological and physical resources monitoring, as described in Section 6.5, *Monitoring and Adaptive Management*;
- Directed studies that support the HCP/NCCP adaptive management decision-making process and non-HCP/NCCP-related research approved by the Conservancy;
- Controlled passive recreational uses (e.g., hiking, bird watching, and non-commercial fishing and hunting) and facilities to support such uses (e.g., trails, check-in kiosks, and interpretive signs), as approved within reserve lands management plans and Conservancy approved conservation easements. If there are trails or permanent structures, however, this acreage will not count toward the HCP/NCCP conservation commitments. If new trails or structures are built, this acreage will be counted as part of the jurisdiction's take. The Conservancy expects that most conservation easements will preclude public access;

- Commercial recreational uses (e.g., waterfowl or upland bird hunting during legal hunting seasons on HCP/NCCP protected lands), as approved within reserve system management plans by the wildlife agencies and Conservancy-approved conservation easements. Any hunting or recreational uses cannot diminish the conservation goals outlined in the Yolo HCP/NCCP;
- Access for emergencies and public safety (e.g., fire suppression, flood control, and emergency response). The Conservancy will develop a wildfire local operating agreement for fire suppression in the reserve system with the California Department of Forestry and Fire Protection (CAL FIRE) and with any other firefighting agency that has responsibility for reserve lands;
- Use of non-public roads on reserve lands to provide land manager and local landowner access to adjoining lands, as approved by the Conservancy;
- Access to and maintenance of water conveyance infrastructure by water districts;
- Access to and maintenance of existing road and utility infrastructure (e.g., maintenance of below- and aboveground electric transmission lines, below- and aboveground cable and telephone lines, and underground pipelines) on reserve lands, consistent with pre-existing easements and any other in-perpetuity agreements attached to property titles;
- Ongoing agricultural and grazing practices and other land uses (including customary fallowing and rotation practices that are necessary to maintain production of target crop types over time), as allowable under Conservancy-approved conservation easements;
- Ongoing use of approved pesticides, herbicides, and other agro-chemicals in accordance with U.S. Environmental Protection Agency (EPA) labels; for rice land application, the recommended application shall not be harmful to mammals, reptiles, and amphibians (use of these chemicals is not a covered activity under the Yolo HCP/NCCP);
- In rice conservation easements, crop rotations involving non-rice crops (e.g., row crops, corn) are allowable provided that the following conditions are met:
    - Conveyance channels that are customarily used for rice farming on the respective parcel must be filled with water to provide habitat for giant garter snakes during the active season of the species (March through October),
    - Berms, levees, and other potential hibernation habitat for giant garter snakes may not be removed, altered, or otherwise compromised during the hibernation season (October 1 through March 31) to avoid disturbance of hibernating snakes;
- Non-commercial wood cutting, as allowed under Conservancy-approved conservation easements. This precludes the removal of nesting trees that are used by Swainson's hawks or riparian vegetation associated with a stream;
- Educational tours of reserve lands (e.g., school science classes), as authorized by the Conservancy;
- Access for and implementation of specified mosquito abatement treatments, as agreed to by the Conservancy; and
- Other uses agreed to in writing by the Conservancy and the wildlife agencies.

The Conservancy must, in all cases, ensure that the intended conservation benefits and conservation values of the reserve lands, as stated in the HCP/NCCP conservation strategy, are not compromised.

7.5.5.5 Easement Stacking

The Yolo Habitat Conservancy recognizes the importance of preventing the conversion of agricultural lands to orchards and vineyards on key habitat properties. In some cases, properties that provide important habitat for Swainson's hawk or other covered species may already have an agricultural conservation easement established that restricts development activities on the site, but does not restrict orchards and vineyards, and/or is lacking other provisions needed to protect the habitat conservation values of the site to a standard necessary to include the property as part of the Yolo HCP/NCCP reserve system.

In general, the Conservancy will avoid placement of habitat conservation easements on properties already restricted by agricultural conservation easements, known as easement "stacking." This policy recognizes that properties restricted by an agricultural conservation easement are already protected from development and therefore provide some ecological benefits. As a result, the Conservancy will focus its scarce resources on lands with no pre-existing protection. If circumstances arise in which easement stacking is desirable from an ecological perspective, however, the Conservancy may consider allowing the placement of habitat conservation easements on lands already encumbered by agricultural land conservation easements as long as its placement is consistent with wildlife agency policies. The Conservancy may consider the following conditions in making this decision.

- Whether the existing easement can be amended and approved by participating parties, including the landowner and other signatories to the existing agricultural conservation easement, in a manner satisfactory to the Yolo Habitat Conservancy or a subordination agreement is signed by participating parties that subordinates the existing easement in favor of the of the habitat conservation easement.
- Whether the agricultural conservation easement was executed to fulfill CEQA mitigation obligations for loss of farmland.
- Whether the participating parties associated with the existing agricultural conservation easement (including the agency that required the agricultural mitigation in cases where the agricultural conservation was established to fulfill a mitigation requirement) are in agreement with the proposed stacking and determine that the proposed stacking would not diminish the intent of the existing agricultural conservation easement.
- Whether the landowner was paid to execute the previously established agricultural conservation easement. This consideration is not meant to apply to tax benefits the landowner may receive.

Existing easements not purchased for mitigation purposes include, but are not limited to, agricultural conservation easements: purchased by the City of Davis with Measure O funds, donated by the landowner, Cache Creek Area Plan reclaimed sites, or lands acquired with grant funding that allows stacking. With regard to the Cache Creek Area Plan, reclaimed sites that are protected by an agricultural conservation easement can be "upgraded" to a habitat conservation easement with the approval of Yolo County. Those easements were negotiated public benefits, not mitigation. For Cache Creek Area Plan reclamation sites approved in the future, Yolo County may require a habitat conservation easement that is permissive of ongoing agricultural use on the reclaimed (non-mitigation) portions of the mining site.

The Conservancy shall determine whether to count the acres associated with the habitat conservation easement at less than a 1:1 ratio in order to account for development rights that have already been extinguished from the property under the pre-existing agricultural conservation easement. The Conservancy may pay for the additional habitat conservation easement or the landowner may donate the easement. Grazing Leases, Licenses, or Contracts within the Reserve System

Livestock grazing is an important management tool that benefits some terrestrial covered species. As a result, the Conservancy will most likely use managed livestock grazing in some of the reserve system. Existing grazing leases or licenses on a newly established reserve will continue until the Conservancy prepares, and the wildlife agencies approve a reserve unit management plan. After the reserve unit management plan is approved, the Conservancy will review all grazing leases or licenses on the reserve for consistency with the reserve unit management plan and with the terms of the Yolo HCP/NCCP. If necessary, leases or licenses will be revised and brought into compliance with the HCP/NCCP's conservation strategy and the framework for adaptive management to the extent allowable by the terms of the lease. If land is acquired in fee title from a landowner who is also the grazing operator, the Conservancy may maintain the previous grazing regime with a willing former landowner (e.g., through a short-term lease) until the Conservancy prepares a reserve unit management plan and the wildlife agencies approve it. Once approved, this reserve unit management plan will establish the grazing regime on the site, which can then be incorporated into long-term grazing leases.

If livestock grazing is introduced to reserve land or if the pre-existing grazing lease or license expires, the Conservancy or other Permittee will enter into a lease agreement or license with the livestock operator. A contract may be necessary in the event the Conservancy pays the livestock operator to graze livestock (e.g., when grazing a small site or the operator is implementing a grazing regime prescribed by the Conservancy that does not provide an economic return to the operator). The contract, lease agreement, or license will specify the desired vegetation and other habitat conditions and impose limits on the timing, stocking density, and duration of permitted grazing to meet those conditions. The Conservancy will review the grazing contracts, leases, or licenses annually with the operator to adjust grazing practices to meet habitat goals. At the expiration of the contract, lease, or license, the Conservancy will review monitoring data to determine whether the contract, lease, or license should be reissued with no changes in grazing management, reissued with changes in the grazing regime, or not reissued. All new and renewed contracts, leases, or licenses will include the following conditions of agricultural use and covenants to protect resources:

- Grazing capacity and stocking rates;
- Residual dry-matter guidelines or other management targets;
- Conditions under which the desired stocking rate can be changed or exceeded (e.g., seasonal adjustments to maintain habitat quality, annual adjustments in response to rainfall);
- Grazing and livestock practices; and
- Pest control restrictions.

The lease agreement will also outline the responsibilities of each party for maintaining reserve infrastructure. In addition to maintenance of reserve infrastructure, lease agreements will also include the responsibilities of the grazing lessee to maintain or meet desired habitat conditions. Responsibilities of the grazing lessee may include, but are not limited to:

- Evaluation, repair, and general maintenance of fences, including in riparian areas;

- Invasive species control, including any necessary herbicide application (this does not include rodenticide application); and
- Pond maintenance (if California tiger salamanders are confirmed to be absent).

The Conservancy may include other maintenance actions in the lease agreements if the Conservancy deems appropriate.

7.5.6 Willing Sellers

A key principle of the Yolo HCP/NCCP is that the Conservancy will acquire land for the conservation strategy only from willing sellers. The Conservancy will strictly follow this principle; the Conservancy will not condemn land from unwilling sellers to meet Plan conservation requirements.

Nothing in the Yolo HCP/NCCP will prevent other organizations from exercising their powers of eminent domain for purposes other than implementation of the HCP/NCCP and with funds other than those raised as a result of the Yolo HCP/NCCP. If, subsequent to such a condemnation and after soliciting input from the public and the Advisory Committee, the Conservancy Board of Directors finds that the condemned lands are integral to the successful implementation of the Yolo HCP/NCCP, the Conservancy may seek agreement with the owner of the condemned lands to manage those lands in a manner consistent with the Yolo HCP/NCCP.

Given the many land acquisition requirements in Chapter 6, *Conservation Strategy*, it is possible that one or several landowners who own key resources that are of interest to the Conservancy will refuse to sell or negotiations to sell will fail. It is impossible to predict at this time where this may occur and in what context it will occur (e.g., how much of the reserve system has been acquired, the extent of resources remaining to protect). This situation, if it occurs, is expected only near the end of Year 45, when all land acquisition requirements must be met. By that time, most or all of the development impacts will have most likely occurred; consequently, any delays in land acquisition associated with a lack of willing sellers will affect few covered activities. The Conservancy can avoid this situation if the Conservancy begins negotiations with key landowners early in the permit term. A review of progress toward land acquisition goals will take place at least annually, with each annual report submitted to the wildlife agencies.

If the wildlife agencies are not satisfied with the reserve system, as constructed, based on purchases from willing landowners, the Conservancy will reconfigure the land acquisition strategy in coordination with the wildlife agencies. If such a reconfiguration is not possible, the Conservancy and wildlife agencies will meet and confer, as described above in Section 7.5.3.1, *Measurement of Stay-Ahead Provision.*

The Conservancy and wildlife agencies will consider the options below, and other available options.

- Requiring project proponents to provide land instead of fees to obtain coverage under the Yolo HCP/NCCP (see Section 7.5.8, *Land Dedication In Lieu of HCP/NCCP Fee*); and
- Slowing or stopping local Permit issuance under the Yolo HCP/NCCP until key land acquisitions can be made.

7.5.7 Gifts of Land

The Conservancy may accept land (or other conservation actions) as a gift or charitable donation. In the case of a prospective gift or donation, the Conservancy will evaluate the conservation benefit of

the lands to be donated relative to the goals, objectives, and requirements of the Yolo HCP/NCCP. The Conservancy may sell or exchange donated land that does not meet these goals, objectives, and requirements to enable acquisition of land that does meet these goals, objectives, and requirements. The Conservancy may also accept gifts of land that meet the goals and objectives of its Local Conservation Plan.

7.5.8 Land Dedication In Lieu of HCP/NCCP Fee

Private landowners (i.e., project proponents) or Permittees may own land that can help to meet the conservation goals of the Yolo HCP/NCCP. Project proponents that own land within areas the Conservancy has determined are a priority for implementation of the Yolo HCP/NCCP (Figure 6-6, *Priority Acquisition* Areas) may wish to transfer fee title or place a conservation easement on all or a portion of their property to satisfy their own mitigation requirements from covered activities on the site or off-site. If the Conservancy and wildlife agencies approve this transfer or easement dedication, it can reduce or eliminate the HCP/NCCP fees required for development. Alternatively, project proponents may prefer to acquire their own mitigation lands consistent with the Yolo HCP/NCCP and transfer title of these lands or dedicate easements to the Conservancy consistent with the Yolo HCP/NCCP instead of paying all or a portion of the development fees.

The section that follows describes the process for allowing these situations.

7.5.8.1 Criteria for Providing Land in Lieu of HCP/NCCP Fees

The Conservancy will consider requests for an HCP/NCCP fee reduction or waiver in exchange for land dedication (title transfer or conservation easement) on a case-by-case basis. . Land will be eligible for HCP/NCCP fee credit if the land satisfies the criteria below.

- The land satisfies the criteria for reserve lands in Chapter 6, *Conservation Strategy*, as demonstrated by a field assessment conducted by the project proponent and verified in the field by the Conservancy;
- The land is within an area considered to be a priority for acquisition (see Chapter 6, *Conservation Strategy*), or the unique and high values on the site justify its inclusion in these designated areas; and
- The transaction is approved for the reserve system by the Conservancy and the wildlife agencies, consistent with their review and approval authority over all land acquisitions for the reserve system (see Section 7.5, *Land Acquisition*, Step 12).

Project proponents must fill out an application, which is available on the Conservancy's web site that provides baseline data on the properties that are proposed in lieu of development fees, including the biological value to the Yolo HCP/NCCP. Documentation should explain how the site meets land acquisition requirements and relevant biological goals and objectives. The property owner also must provide access to the proposed site to allow Conservancy staff members or their designees to survey the site and verify its biological value for the reserve system. The Conservancy may require the project proponent to bear some or all of the costs of the evaluation, including potential surveys, and the process through which the landowner places an easement on the property. If the Conservancy decides to accept the land in lieu of fees, the cost of surveys will either be counted against the fees owed or reimbursed by the Conservancy. The Conservancy may also require a project proponent to pay the cost of other due diligence, such as a Phase 1 site assessment, appraisal, and title search.

The Conservancy will determine the amount of development fee credit based on the fair market value of the property. The Conservancy must also ensure that it has sufficient funds with which to conduct necessary management and monitoring of the proposed land in lieu. If the Conservancy finds that sufficient funds are available or are expected to be available for its operational costs associated with the land, it will allow credit of the land in lieu against all of the development fee, except for the portion of the fee dedicated to the endowment contribution (see Appendix I, *Funding*). If the Conservancy does not have or will not have sufficient funds for the operating costs associated with the property, the Conservancy may credit only the land in lieu against the portion of the development fee that pays for land acquisition (in these cases, the project proponent would pay the remainder of the fee).

If land proposed for dedication is of sufficient conservation value to the reserve system, the Conservancy may offer additional incentives to the project proponent for the land dedication. The Conservancy will determine the conservation value of the land that has been proposed for transfer based on the current and projected land acquisition needs of the Conservancy and the ability of the proposed site to meet those needs. In limited circumstances, and only late in the permit term (e.g., Years 35–45), the Conservancy may, for sites with high conservation value, credit the land dedication against the full value of the development fee, including the share of the fee for the endowment. This full fee credit is available only in circumstances where the Conservancy can document that the endowment is fully funded or can be fully funded from other expected sources.

7.5.8.2 Swainson's Hawk Mitigation Receiving Sites

In 2005, Yolo County established a program of "mitigation receiving sites" to provide developers with a fast, market-based system of mitigation for impacts on Swainson's hawk habitat. This system was put in place to support the county's Swainson's hawk mitigation fee program, established in 1993. A mitigation receiving site is property that is encumbered by a conservation easement for the purpose of providing mitigation credits to offset the impacts of future development, consistent with the 2005 agreement. The Conservancy has administered the review and approval of mitigation receiving sites. To date, several mitigation receiving sites have been approved and sold all of their credits; other sites may have credits available when the Yolo HCP/NCCP is put in place. Once approved, the Yolo HCP/NCCP will replace the county's Swainson's hawk mitigation fee program, and pre-existing mitigation receiving sites may continue to operate through the HCP/NCCP. During HCP/NCCP implementation, landowners may continue to sell credits through the in-lieu program described in Section 7.5.8.1, *Criteria for Providing Land in Lieu of HCP/NCCP Mitigation Fees.* Once approved, the Yolo HCP/NCCP may replace the county's Swainson's hawk mitigation fee program and eliminate the need for mitigation receiving sites, or may continue use of mitigation receiving sites. All mitigation receiving sites with unsold credits at the time of HCP/NCCP approval will be eligible to sell the portion of their land with remaining credits to the Conservancy or to third parties that wish to provide HCP/NCCP development fees for land in lieu, according to the criteria in section 7.5.8.1. In either case, eligible lands must place a conservation easement on the property, consistent with the Yolo HCP/NCCP (see Section 7.5.5, *Conservation Easements*).[7] If the landowner and Conservancy upgrade the conservation easements to be consistent with the template provided in Appendix K, *Conservation Easement Template,* then these lands may count toward the Yolo

[7] Conservation easements established previously for the Swainson's hawk mitigation fee program are not consistent with the HCP/NCCP easement requirements, but are similar enough to current requirements that the wildlife agencies agreed to count them toward the pre-permit reserve land requirements of the Yolo HCP/NCCP.

HCP/NCCP's newly protected lands commitments.[8] Otherwise, these lands may count toward the Yolo HCP/NCCP's commitment of 8,000 acres of pre-permit reserve lands.

7.5.9 Use of Mitigation Banks

A mitigation bank is privately or publicly owned land that is managed for its natural resource values. Mitigation banks may sell species credits, wetland credits, or both. Mitigation banks[9] must be approved by USFWS and/or CDFW. In exchange for permanently protecting and managing the land, the wildlife agencies allow the bank operator to sell species credits to developers who must satisfy legal requirements for compensating the effects of projects that affect listed species or their habitat.[10] A conservation or mitigation bank is a free-market enterprise that performs the following functions:

- Offers landowners economic incentives to protect natural resources,
- Saves project proponents' time and money by providing them with the certainty of preapproved compensation lands,
- Provides for long-term protection and management of habitat, and
- Operates with goals similar to those of regional HCPs or NCCPs, including this Plan.

Several mitigation banks operate in Yolo County that have conservation credits for covered species, including Swainson's hawk, giant garter snake, and valley elderberry longhorn beetle. Three mitigation banks in Yolo County target salmonids and other fish species and will not be used to meet Yolo HCP/NCCP conservation commitments for covered species. Table 7-3 lists the mitigation banks in Yolo County, excluding banks for fish species.

Table 7-3. Status of Mitigation Banks in Yolo County

Bank	Bank Purpose	Status[a]	Total Credits (Acres)	Credits Remaining for Sale[a]
Pope Ranch Conservation Bank	Giant garter snake	Sold out	387	0
Bullock Bend Mitigation Bank	Swainson's hawk	Active	116	10
River Ranch Valley Elderberry Longhorn Beetle Conservation Bank[b]	Valley elderberry longhorn beetle	Active	155	31
Ridge Cut Giant Garter Snake Bank (Teal)[c]	Giant garter snake	Active	186	119
Sacramento River Ranch Wetlands Mitigation Bank	Wetlands	Active	101	79
Putah Creek Mitigation Bank[d]	Wetlands and riparian	Approved	434	434
Capital Conservation Bank[e]	Giant garter snake	Pending	138	138

Note:

a. As of August 2016.

[8] The conservation easement template is likely to be modified during HCP/NCCP implementation, subject to wildlife agency approval, per the minor modification process described in Section 7.8.2, *Minor Modifications.*

[9] A conservation bank is a type of mitigation bank directed specifically at providing credits for species habitat (rather than wetlands, as in a wetland mitigation bank).

[10] For additional information on banking see https://www.wildlife.ca.gov/Conservation/Planning/Banking.

b. Not a CDFW-approved bank and may not have adequate protection to meet CDFW permit requirements. Is approved by the USFWS.

c. Currently not a CDFW-approved bank and until CDFW signs off on the bank it may not have adequate protections to meet permit requirements.

d. Not a CDFW-approved bank and may not have adequate protections to meet CDFW permit requirements.

e. No request for CDFW approval and may not have adequate protections to meet CDFW permit requirements.

Credits sold by private mitigation banks within the Plan Area to activities or projects covered by the Yolo HCP/NCCP can count toward the Yolo HCP/NCCP if they are consistent with the conservation, monitoring, adaptive management, and other relevant provisions of the Yolo HCP/NCCP. For the bank to be eligible to sell credits to project proponents (public or private) with activities covered by the Yolo HCP/NCCP, the bank must meet all of the relevant standards of habitat enhancement, adaptive management, and monitoring outlined in Chapter 6, *Conservation Strategy*. This includes updating the existing easement on the property to conform to the Yolo HCP/NCCP's easement template (Appendix K) and providing the Conservancy with copies of monitoring reports annually. All effects and mitigation for effects covered under the Yolo HCP/NCCP must occur within the Plan Area analyzed in USFWS's biological opinion for the Yolo HCP/NCCP. Similarly, CDFW policy requires all effects and mitigation to occur within the Plan Area. As such, mitigation banks located outside of the Plan Area may not be used.

Mitigation bankers that wish to establish a bank whose credits can count toward HCP/NCCP requirements must notify the wildlife agencies to allow consideration of such provisions during bank development and agency approval. Bankers must also coordinate closely with the Conservancy to help ensure the bank's consistency with the Yolo HCP/NCCP and use by HCP/NCCP Permittees.

For existing mitigation banks with no credits left to sell, the Conservancy may work with the bank (and possibly the conservation easement grantee and the bank's signatory agencies) to conform with the Yolo HCP/NCCP, if possible, so the bank may count toward the Conservancy's target as pre-permit reserve lands (Chapter 6, Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands*). Credits sold by banks located outside the Permit area cannot count toward HCP/NCCP goals or fees, even if the bank's service area extends into the Plan Area.

7.5.10 Pre-Permit Reserve Lands

Pre-permit reserve lands are defined in Chapter 6, Table 6-1(b), *Reserve System Land Types,* as Category 1 and 2 baseline public and easement lands that are enrolled into the reserve system. The process and criteria for enrolling pre-permit reserve lands are described in Chapter 6, Section 6.4.1.7, *Enrolling Baseline Public and Easement Lands into the Reserve System as Pre-permit Reserve Lands.* Some of the lands the Conservancy acquired between June 2006 and issuance of the Permits for the Yolo HCP/NCCP, in addition to other lands that meet the criteria described in Section 6.4.1.7, will count toward the 8,000-acre commitment of pre-permit reserve lands. Lands acquired after 2012 and prior to permit issuance that meet the requirements of the conservation strategy and use the conservation easement template provided in Appendix K, *Conservation Easement Template*[11] may count toward the newly protected lands commitments.

[11] The conservation easement template is likely to change over the course of HCP/NCCP implementation, subject to wildlife agency approval.

7.5.11 Compliance Tracking

The Conservancy will track all aspects of compliance with the permits, the HCP/NCCP, and implementing agreement. To track compliance, the Conservancy will maintain data as specified below.

- The Conservancy and member agencies will track the amount of land cover and covered species habitat temporarily and permanently removed as a result of covered activities regularly but no less than annually by overlaying impacts that year (and cumulatively) with each species model in a GIS exercise to ensure that impact caps are not exceeded. Modeled habitat impacts and modeled habitat acquisition requirements will be tracked according to the most recently developed land cover maps and habitat models. Implementation of species surveys described in Chapter 5, *Effects on Covered Species and Natural Communities*, and the remaining conservation strategy will be directed by the most current land cover maps and habitat models, as updated and maintained by the Conservancy throughout the permit term;
- The location, extent, and timing of land acquisition and Plan reserve lands establishment;
- The status of implementation of each conservation action in Chapter 6, *Conservation Strategy*;
- The success of the conservations actions in meeting the biological objectives in Chapter 6, *Conservation Strategy*;
- Descriptions of recorded conservation easements, lands acquired in fee title, interagency memorandums of agreement, or any other agreements entered into for the purposes of protecting, enhancing, restoring, or creating covered species habitat;
- The location, extent, and timing of effects on land cover types, based on reports submitted by project proponents and Permittees for take authority under the Yolo HCP/NCCP;
- The location and extent of compliance with the species occupancy requirements;
- The location, extent, and timing of restoration or creation of applicable land cover types;
- The location, extent, timing, and progress of plant occurrence creation and enhancement; and
- The location, extent, timing, and success rates of implementation of all other conservation actions described in Chapter 6, *Conservation Strategy* (e.g., preparation of reserve unit management plans, including recreation plans, construction of artificial perches, monitoring).

The purpose of monitoring this information will be to track the Conservancy's progress toward successful implementation of the conservation strategy described in Chapter 6, *Conservation Strategy,* of the Yolo HCP/NCCP. This tracking will help ensure that habitats for covered species and natural communities are conserved within the reserve system at a rate commensurate with the timing and magnitude of effects from covered activities. The data will also be linked to supporting information that documents Plan compliance. These reports and other data will be stored and archived electronically whenever possible.

Appropriate supporting information includes the following categories:

- Application material submitted for covered activities,
- Preconstruction survey reports, and
- Reports and other documentation related to the screening, selection, and acquisition of reserve lands.

HabiTrak is a standardized database developed by CDFW and others to track NCCP implementation. The database developed for the Plan must be compatible with the HabiTrak system or its successor so that compliance tracking for this Plan can be compared with other NCCPs in California.

The monitoring and adaptive management program described in Chapter 6, *Conservation Strategy,* will support compliance tracking. In addition, the monitoring program includes effectiveness monitoring, status-and-trend monitoring, and directed studies that are aimed at addressing key management or ecological questions. The data tracking system will be developed to assemble, store, and analyze all monitoring data in the program. The details of the monitoring program will not be developed until individual reserve unit management plans are prepared for each reserve. By necessity, therefore, the data tracking system for the monitoring and adaptive management program cannot be finalized until after this Plan is completed.

7.5.12 Mineral Rights

Mineral rights may occur on properties that the Conservancy considers for the reserve system. If these mineral rights exist, they may be "severed" from the surface rights of the real property on the surface. This situation is known as a "split estate" where the mineral estate is severed from the surface estate. In such situations, if the mineral estate cannot also be acquired with the surface estate, there may be risk of the mineral estate being exercised in the future by a third party. Mineral rights could be exercised for the extraction of oil, gas, precious metals, trace elements, or other resources, such as sand or gravel (i.e., aggregate). Depending on the nature of the surface activity, exercising a mineral right could substantially disturb the surface and degrade the conservation values of the site. The Conservancy will place a permanent conservation easement on all lands enrolled in the reserve system; therefore, the conservation values are assumed to remain in place in perpetuity. A severed mineral estate therefore poses a risk that may undermine that important assumption. CDFW has a policy that applies throughout the state to help address this concern when CDFW evaluates an easement in which it will be an easement holder (CDFW 2015).

The reserve lands will all have conservation easements in which CDFW and USFWS will be named a third-party beneficiary (see Section 7.5.5.2 *Conservation Easement Guidelines*); therefore, the procedures included in this section and to be followed by the Conservancy are based on this CDFW policy.

Section 7.5.2, *Acquisition Process,* describes the process the Conservancy will use each time it considers and evaluates a property to acquire for the reserve system. Step 9 of this process is the determination of whether a severed mineral estate exists for the property. If a severed mineral estate exists, the Conservancy will then determine whether the risk of exercising that mineral estate is low, moderate, or high. A severed mineral right with a low risk of being exercised requires no further action by the Conservancy in the property evaluation process, other than documenting that conclusion. If the exercise of the mineral estate is found to be of moderate or high risk, then additional actions are required to evaluate that risk and provide information to the Conservancy Board and wildlife agencies for determining the best course of action with the property.

The determination of risk of exercising the mineral estate will be based on the following steps and criteria:

1. The Conservancy will review existing deeds, title policies, and any related leases for the property to determine ownership of or rights to the mineral estate. If the mineral estate is not severed (i.e., bound to the real property or surface rights) or there is clear documentation that

there is no right to enter the surface in order to access the mineral estate, the Conservancy may determine a low risk of exercising the mineral right. In these instances, no further investigation is needed;

2. If the minerals are severed from the surface, review county assessor's records to determine if any recent ownership transactions have occurred. If feasible, review a title report that is no more than six months old; and
3. Based on the information it obtains, the Conservancy will determine if there is a low, moderate, or high level of risk of future mineral exploration or extraction by documenting answers to the following questions:

    a. Is there evidence of past mining on the land, including any applications or permits to mine?

    b. Has the landowner been contacted by parties who wish to conduct exploration or mining on the land?

    c. Has the mineral estate owner previously conducted any exploratory actions on the land or entered into any leases for others to do so?

    d. Is there a mineral assessment report on the property that indicates risk?

    e. Is mining currently practiced on the property or adjoining lands?

    f. Is the mineral estate owner or mineral lease holder actively engaged in mining elsewhere?

    g. Is the property within an oil, gas, or geothermal field boundary mapped by the California Department of Oil, Gas, and Geothermal Resources? Is the property within an area mapped by the county as containing, or likely to contain, a commercial mineral resources (e.g., sand or gravel)?

    h. Does the federal or state government own and plan to lease the mineral estate?

    i. Is there any credible indication of litigation risk posed by owners of the mineral estate?

If the answer to all questions is "no," the Conservancy may assign a low risk of exercising the mineral estate, and no further action is required in the property evaluation process. If the answer is "yes" to one or more of questions "a" through "d" *and* the answer to the remaining questions is "no," then the Conservancy will assign a moderate risk to the property where the severed mineral estate is being exercised. If the answer to *any* of the questions ("a" through "i") is "yes," then the Conservancy must determine a high risk of the mineral estate being exercised.

If the property has a moderate or high risk of the severed mineral estate being exercised, the Conservancy may either abandon consideration of the easement or property acquisition or proceed with the acquisition using the following options:

1. **Prepare a Mineral Assessment Report.** A mineral assessment report will further evaluate the status of the property and the risk of exercising the severed mineral estate. The required contents of a mineral assessment report are currently found in Appendix B of the 2015 memorandum from CDFW, titled *Policy and Procedural Guidance for Managing Risks of Mining on Conservation Lands* (CDFW 2015), and Appendix B (or any similar future CDFW guidance document that may replace it) should be used in preparing the assessment. The results of the assessment may change the risk rating according to the criteria listed above. The cost and

logistical difficulty in obtaining the required information, however, may make such a report impractical in some cases;

2. **Negotiate with the Mineral Estate Holder to Purchase the Estate.** The Conservancy may wish to purchase the mineral estate in cases where the conservation values of the site are high, the risk of exercising the mineral estate are moderate to high, and the cost of the estate is modest. In these cases, the Conservancy may need to complete a mineral estate valuation to determine its value. Alternatively, the Conservancy may request that the landowner purchase the mineral estate prior to the Conservancy purchasing an easement from the landowner;
3. **Establish a Surface Use Agreement.** The Conservancy could develop a surface use agreement to ensure that the conservation values of the property will be maintained. The required minimum contents of a surface use agreement are listed in Appendix C of the 2015 memorandum from CDFW, titled *Policy and Procedural Guidance for Managing Risks of Mining on Conservation Lands* (CDFW 2015), and Appendix C (or any similar future CDFW guidance document that may replace it) should be used in developing the agreement. Where feasible, surface access should be prohibited in the Surface Use Agreement. When this is not feasible, the Conservancy should attempt to negotiate with the owner(s) of the mineral estate to limit any future surface access of the mineral estate to specific locations on the site. The surface use agreement would be signed by the owner(s) of the mineral estate, the owner(s) of the real property, the Conservancy, any additional easement holders, and the wildlife agencies. In cases where the mineral estate ownership is complicated or unknown, this option may not be feasible; and
4. **Exclude the Mineral Estate from the Conservation Easement.** In some cases the mineral estate may apply only to a portion of the parcel. If there is a moderate or high risk of exercising the severed mineral estate, the simplest option may be to exclude the portion of the site from the conservation easement on which the mineral estate occurs. The Conservancy and the wildlife agencies must evaluate, however, whether the indirect impacts of any mineral extraction operation may, if it occurs, indirectly and adversely affect the conservation values of the protected portion of the site. In such cases, a suitable buffer will be established between the mineral estate boundary and the conservation easement.

If the Conservancy acquires a property with a mineral estate that overlaps the conservation easement and the Conservancy either does not own the mineral estate or does not have an overriding surface use agreement, the mineral estate owner may still exercise that mineral right. For sites in which this may occur, the mineral rights development envelope will not count toward the Yolo HCP/NCCP reserve system acres. If the mineral right is exercised, the Conservancy and the wildlife agencies will evaluate whether the exercise of the mineral right disturbs the conservation easement area beyond the mineral rights development envelope, thereby further reducing the conservation value for which the conservation easement was established. If the conservation values of the easement will be diminished, the Conservancy and the wildlife agencies will quantify the lost values of the site. The Conservancy must replace those lost values elsewhere in the Plan Area by purchasing an additional easement, habitat enhancement, habitat restoration, or a combination of these approaches, with approval by the wildlife agencies. Within two years of permit issuance, the Conservancy will develop a set of guidelines subject to wildlife agency approval with which to evaluate the loss and necessary replacement of conservation easement values from the exercise of mineral rights.

7.6 Implementing Agreement

The NCCPA requires an implementing agreement for all NCCPs and specifies necessary provisions. The purpose of an implementing agreement is to ensure that each party understands its obligations under the HCP Section 10(a)(1)(B) permit and NCCP permit and provide remedies should any party fail to fulfill its obligations. Accordingly, an implementing agreement has been prepared for the Yolo HCP/NCCP (Appendix F). This agreement specifies the responsibilities of each party, how the Yolo HCP/NCCP will be implemented, reporting and enforcement procedures, and various other provisions that have been agreed to by the parties. The implementing agreement references material in the Yolo HCP/NCCP whenever possible. As a result, the Yolo HCP/NCCP and the implementing agreement are made as consistent as possible. In the unlikely event that there are inconsistencies among documents, the Permits prevail first, then the Yolo HCP/NCCP, and finally the implementing agreement.

7.7 Plan Assurances

FESA regulations and provisions of the NCCPA each provide for regulatory and economic assurances to parties covered by approved HCPs and/or NCCPs concerning their financial obligations under a plan. Specifically, these assurances are intended to provide a degree of certainty regarding the overall costs associated with implementation and add durability and reliability to agreements reached between the Permittees and the wildlife agencies. That is, if unforeseen circumstances occur that adversely affect species that are covered by an HCP or NCCP, the wildlife agencies will not require of that HCP or NCCP any additional land, water, or financial compensation or impose additional restrictions on the use of land, water, or other natural resources. The assurances provided under the FESA and the NCCPA do not limit or constrain the wildlife agencies, or any other public agency, from taking additional actions to protect or conserve species that are covered by an HCP or NCCP.

7.7.1 Changed and Unforeseen Circumstances

7.7.1.1 Unforeseen Circumstances

Unforeseen circumstances are events that may not be reasonably anticipated during development of the Yolo HCP/NCCP. As a result of the unpredictable nature of unforeseen circumstances, response measures to such events are not included in the Yolo HCP/NCCP. The difference between a "changed" and an "unforeseen" circumstance might depend upon the severity of the event. For example, flooding up to a certain defined point might qualify as a "changed circumstance," whereas an even larger flooding event would be an "unforeseen circumstance." Likewise, a small fire that affects only limited acreage may be a "changed circumstance," but a large fire that destroys hundreds or thousands of acres may be considered unforeseen.

USFWS defines *unforeseen circumstances* as those changes in circumstances that affect a species or geographic area covered by an HCP that may not reasonably have been anticipated by the plan participants during development of the conservation plan and that result in a substantial and adverse change in the status of a covered species.

Similarly, unforeseen circumstances are defined in the NCCPA as changes that affect one or more species, habitat, natural community, or geographic area covered by a conservation plan that may not reasonably have been anticipated at the time of plan development and that result in a substantial adverse change in the status of one or more covered species. The NCCPA further provides that, in the event of unforeseen circumstances, CDFW shall not require additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources without the consent of the plan participants for a period of time specified in the Implementing Agreement as long as the plan is being implemented consistent with the substantive terms of the Implementing Agreement.

Under FESA regulations, if unforeseen circumstances arise during the life of the HCP, USFWS may not require the commitment of additional land or financial compensation or additional restrictions on the use of land, water, or other natural resources, other than those agreed to in the HCP, unless the HCP authorized entities consent. Within these constraints, USFWS may require additional measures, but only if (1) USFWS proves an unforeseen circumstance exists, (2) such measures are limited to modifications of the HCP's operating conservation program for the affected species, (3) the original terms of the HCP are maintained to the maximum extent practicable, and (4) the overall cost of implementing the HCP is not increased by the modification.

7.7.1.2 Changed Circumstances

The federal No Surprises Regulation[12] defines *changed circumstances* as changes in circumstances that affect a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and USFWS and that can be planned for (e.g., the listing of a new species or a fire or other natural catastrophic event in areas that are prone to such events). Similarly, state regulation under the NCCPA defines changed circumstances as those circumstances that are reasonably foreseeable and may affect a covered species or geographic area covered by the plan.[13] The wildlife agencies will not require any additional conservation or mitigation to address changed circumstances that are not identified in the Yolo HCP/NCCP without the consent of the Conservancy as long as the Conservancy is properly implementing the Yolo HCP/NCCP. *Properly implementing* means the Permittees are implementing or have fully implemented the commitments and provisions of the Yolo HCP/NCCP, Implementing Agreement, and Permits. Accordingly, an HCP/NCCP must identify potential changed circumstances and describe the remedial measures the Conservancy will take to address such circumstances. The Conservancy must implement these remedial measures in response to the existence of a changed circumstance in accordance with the federal No Surprises Regulation. If the Conservancy, wildlife agencies, or any of the Permittees becomes aware of the existence of a changed circumstance, that organization shall immediately notify the other organizations.

[12] See 63 Federal Register 35 (1998) (amending 50 CFR 17.22(b)(5) and 222.307(g)).

[13] California Fish and Game Code Section 2805 (c).

The following changed circumstances can reasonably be anticipated in the Plan Area:

1. New species listings,
2. Climate change,
3. Wildfire,
4. Nonnative invasive species or disease,
5. Flooding,
6. Drought,
7. Earthquakes, and
8. Loss of Swainson's hawk habitat and populations declining below the threshold, as specified in Section 7.7.1.2.8, *Regional Loss of Swainson's Hawk Habitat.*

If a changed circumstance occurs within the Plan Area, as defined by these sections, the Conservancy will modify its activities in the manner described below to the extent necessary to address the effects of the changed circumstances on the Yolo HCP/NCCP's conservation strategy and will report on its actions to the wildlife agencies.

7.7.1.2.1 New Species Listing

The wildlife agencies may list additional species as threatened or endangered under the FESA or CESA that are not HCP/NCCP covered species. In the event that USFWS or CDFW lists a species that is not covered by the Yolo HCP/NCCP, the provisions of this changed circumstance will be automatically triggered.

Upon a new listing of a species under state or federal endangered species laws, the Conservancy will undertake the following measures:

- Evaluate the potential impacts of covered activities on the newly listed or candidate species and conduct an assessment of the presence of suitable habitat in areas of potential effect, and
- Implement measures to avoid take of the newly listed species until such time as the Yolo HCP/NCCP and Permits have been amended to include the newly listed species as a covered species.

Alternatively, the Permittees may receive take authorization for the newly listed species as needed on a project-by-project basis through individual incidental take authorization (i.e., not under the Yolo HCP/NCCP).

In the event a species that is not covered by the Yolo HCP/NCCP becomes listed as threatened or endangered or designated as a candidate species, or is proposed or petitioned for listing, the Conservancy may request that USFWS and CDFW add the species to the relevant take authorizations issued pursuant to the Yolo HCP/NCCP. In determining whether to seek take coverage for the species, the Conservancy will consider, among other things, whether the species is present in the Plan Area and if the covered activities may result in take of the species. If such take coverage is sought, the Yolo HCP/NCCP and its authorizations will be amended consistent with the amendment procedures described in Section 7.8.3, *Amendments,* for major plan amendments. Alternatively, the Conservancy may seek new and separate take authorizations on behalf of the Permittees.

7.7.1.2.2 Climate Change

Global climate change is occurring as a result of high concentrations of greenhouse gases in the earth's atmosphere (National Research Council 2010; Intergovernmental Panel on Climate Change 2007). Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and ozone. These gases absorb energy emitted by the earth's surface and then re-emit some of this energy back to the earth, warming its surface and influencing global and local climates. As more and more greenhouse gases are emitted into the atmosphere from human activities such as the burning of fossil fuels, the earth's energy balance is disrupted, resulting in a number of changes to the historical climate. Evidence of long-term changes in climate over the twentieth century include the following (Intergovernmental Panel on Climate Change 2007; National Research Council 2010; Global Change Research Program 2009):

- An increase of 0.74 degree Celsius (°C) (1.3 degrees Fahrenheit [°F]) in the earth's global average surface temperature;
- An increase of 0.17 meter (6.7 inches) in the global average sea level;
- A decrease in arctic sea-ice cover at a rate of approximately 4.1 percent per decade since 1979, with faster decreases of 7.4 percent per decade in summer;
- Decreases in the extent and volume of mountain glaciers and snow cover;
- A shift to higher altitudes and latitudes of cold-dependent habitats;
- Longer growing seasons; and
- More frequent weather extremes such as droughts, floods, severe storms, and heat waves.

Current global and regional trends suggest climate change is likely to have an effect on the Plan Area. By mid-century, the average annual mean temperature in California is projected to increase 1.1°C (2°F) to more than 2.5°C (4.6°F) (Ostro et al. 2011). Although there is significant variability between models and emissions scenarios, projections suggest there may be up to a 10 to 20 percent decrease in total annual precipitation by mid-century in California (Luers et al. 2006). Model predictions for California range from a six-millimeter (0.24-inch) annual decrease in precipitation to a 70-millimeter (2.76-inch) annual increase. Consequently, it is likely the climate in the Plan Area will shift to warmer and dryer than current conditions.

A number of ecological responses to climate change may occur in the Plan Area. First, the timing of seasonal events, such as migration, flowering, and egg laying, may shift to earlier or later periods (Walther et al. 2002; Forister and Shapiro 2003; Root et al. 2003; Root et al. 2005). Such shifts may affect the timing and synchrony of events that must occur together, such as butterfly emergence and nectar availability. Second, the range and distribution of species and natural communities may shift (Parmesan 1999; Pimm 2001; Walther et al. 2002; Easterling et al. 2000). Range is the area over which a species occurs or potentially occurs, whereas distribution refers to where a species is located within its range. This is of particular concern for narrowly distributed species that already have restricted ranges due to urban growth or altitudinal gradients. Historically, some species may shift their ranges across the landscape. Today, urban and rural development prevents the movement of many species across the landscape. Species or natural communities that occur only at high elevation (no HCP/NCCP covered species fit this description) or within narrow environmental gradients (e.g., palmate-bracted bird's beak) are particularly vulnerable to changing climate because they most likely have nowhere to move if their habitat becomes less suitable (Shainsky and Radosevich 1986; Murphy and Weiss 1992; Thorne 2006, PIER Conference; Hillman pers. comm.).

Second, increases in disturbance events, such as fire or flooding, may increase the distribution of disturbance-dependent land cover types, such as grasslands, within the Plan Area (Brown and Hebda 1998; Lenihan et al. 2003; Fried et al. 2004; California Climate Change Center 2006; Rogers and Westfall 2007). An increase in the frequency and intensity of disturbance may increase the likelihood that these events will harm or kill individual covered species. Events that occur with unpredictable or random frequency (called stochastic events), such as those described above, can have an inordinately negative effect on rare species.

Third, the number or density of individuals found in a particular location may change. This may be triggered in large part by changes in resource availability associated with an increase or decrease in precipitation (Martin 1998; Dukes and Mooney 1999; Walther et al. 2002; Lenihan et al. 2003; Millar et al. 2006; Pounds et al. 2006). Such changes may benefit one species at the expense of other species.

Fourth, over a longer time period, species may change in outward appearance and behavior. Changes in climate may favor different adaptive strategies or appearances that may lead to genetic shifts (Davis and Shaw 2001). An example of this would be a shift to smaller average body size for certain mammals to use limited food sources for maintenance rather than growth.

The conservation strategy, reserve design, and monitoring and adaptive management program anticipate possible effects of climate change using a multi-scale approach that views conservation through landscape, natural-community, and species level. This approach focuses on protecting and enhancing a range of natural communities, habitat types, and environmental gradients (e.g., altitude, aspect, slope) as well as other features that are important as global warming changes the availability of resources and habitat types in the study area.

Implementing conservation actions that protect a variety of landscapes over a large scale provides flexibility for shifts in the range and distribution of species and natural communities due to climate change. Land acquisition actions target properties that provide connectivity and allow for northward and upslope movement, maintenance and restoration of habitat linkages, and reduced habitat fragmentation. As a result, some species and natural communities in the study area would continue to be able to "move" in response to climate change, allowing for shifts in range and distribution.

At the natural-community level, the Conservancy developed conservation and monitoring actions to address natural community issues primarily through the enhancement, restoration, and management of vegetation types (i.e., land cover types). It also monitors the changes. The Conservancy will manage habitats to help ensure natural community and species persistence in the face of abundance shifts driven by climate change. Enhancement, restoration, and management actions will most likely increase the resilience of natural communities by improving habitat quality overall and controlling invasive plants and nonnative predators.

At the species level, the Conservancy developed conservation and monitoring actions to supplement and focus actions that were developed at broader scales and ensure that all of the needs of particular species are addressed. These species-specific actions will help ensure that shifts in range, distribution, and abundance that are driven by climate change are buffered by the protection and enhancement of individuals, populations, and groups of populations. Status-and-trend monitoring will serve as an early warning of the possible effects of climate change and allow the conservation strategy to adapt, thereby ensuring species persistence in the Plan Area.

In addition to the conservation actions, monitoring actions will allow for the early detection of trends that are driven by climate change over multiple scales. Landscape-level monitoring is designed to detect large-scale changes, such as changes in ecosystem processes, shifts in natural-community distribution, and the integrity of landscape linkages. Community-level monitoring will, in turn, detect changes in the composition and function of natural communities, populations of key predator or prey populations, invasive species, and other important habitat factors for covered species. Finally, species-level monitoring will measure the effects of management actions on covered species and the status and trends of covered species in the reserve system. Collectively, these monitoring actions will allow the Conservancy to detect and respond to the effects of climate change. Taken together, the conservation and monitoring actions described above will help buffer against the effects of climate change in the Plan Area.

Climate change is considered a foreseeable event and is therefore a changed circumstance. The Plan places limits on the changed circumstance, as described below.

The Conservancy will use a method consistent with the California Climate Action Team for measuring temperature change within the study area. The annual average temperature in the Plan Area (16.5°C [61.7°F]) has risen, on average, 0.01°C (0.02°F) per year over the past century (1909 to 2009) (California Climate Change Center 2012). This increase in average temperature has been driven by warmer winters rather than by warmer summers, with three times larger percentage increases in the average temperature in January than that in July (California Climate Change Center 2012). If modeled California climate-change trends are applied to the Plan Area, one may anticipate that the temperature may increase up to 2.5°C (4.5°F) during the permit term. Under the Yolo HCP/NCCP, the following is considered a changed circumstance for which the Conservancy will fund remedial measures:

- An increase in temperature of up to 2.5°C (4.5°F), measured as a 10-year running average for three baseline periods (i.e., average annual temperature, average summer temperature [June, July, and August], and average winter temperature [December, January, and February]).

The Conservancy's response to the changed circumstance of global climate change will vary by the character and magnitude of the physical and biological changes observed. Responses may include those listed below. All responses will occur within one year of identifying changed circumstances, unless the wildlife agencies concur on a case-by-case basis that specific remedial actions would require more time to initiate.

- Enhanced monitoring to detect ecological responses to climate change,
- Identification of target species that are most vulnerable to climate change and increased status-and-trend monitoring for those species,
- Alterations to the conceptual ecological models for natural communities and covered species as a tool to devise improved management action,
- Altered or more intensive management actions on target/vulnerable species to facilitate shifts in species distribution (e.g., more active population management of covered species),
- More aggressive control of invasive species that respond positively to climate change, and
- Implement other measures through the Adaptive Management Program (Section 6.5, *Monitoring and Adaptive Management*) in ways consistent with Permit obligations and with the consent of the Conservancy.

The Conservancy has established thresholds for events that are not reasonably foreseeable for determining unforeseen circumstances. Unforeseen circumstances that are not funded by the Yolo HCP/NCCP include the following:

- A temperature increase greater than 2.5°C (4.5°F) for the three baseline periods (see above) will be considered an unforeseen circumstance. Temperature increases will be measured as a 10-year running average.

Limits on the variation in other parameters (e.g., rainfall) are much more difficult to determine. Given the seasonality of rainfall in the study area, an increase in winter precipitation may be offset by increased evapotranspiration during the summer months (Intergovernmental Panel on Climate Change 2007). A decrease in winter precipitation would be exacerbated by increased summer temperatures, leading to increased drought. Therefore, it is not possible at this time to define limits of rainfall patterns that would qualify as unforeseen circumstances. Regardless of increases or decreases in precipitation, it is anticipated that the number of strong storm events will increase during the winter season (Kim 2005). These events are more likely to result in flooding than in increased soil percolation or water storage recharge (California Natural Resources Agency 2009). Increased frequencies of flooding and drought are taken into account in the sections below that address these changed circumstances.

7.7.1.2.3 Wildfire

Fire is a natural component of many ecosystems and natural community types, including grasslands and oak woodlands. For these natural communities, fire frequency and intensity influence community regeneration, composition, and extent. To ensure that fire-dependent natural community processes occur, the Conservancy will implement minimum suppression techniques (e.g., limiting the use of earth-moving equipment, discouraging the application of fire-retardant chemicals) and prescribe burning as part of the conservation strategy. It is possible, however, that large, intense, and frequent fires may have a negative effect on natural communities and restoration projects. For example, more frequent, intense fires caused by high fuel loads and increased encroachment by woody species into grasslands may negatively affect community composition by favoring early successional species.

For the Yolo HCP/NCCP, *wildfire* is defined as any fire on reserve lands that is not prescribed by the Conservancy or its land manager that removes a sizeable extent of vegetation, leaving the intended habitat functions of the protected land for covered species substantially degraded, as jointly determined by the Conservancy, CDFW, and USFWS.

Wildfire danger varies throughout Yolo County. The county is characterized by relatively level valley floor landscapes to the south and east. This lack of varied topography and complex fuel leads to very little severe fire behavior. In the increasingly hilly landscapes to the north and west, the rugged topography creates a landscape where fires can spread rapidly upslope and access for suppression equipment is limited. The risk of wildfire is greatest for protected lands in the western portion of the Plan Area, which support extensive areas of natural vegetation. Lands within the eastern portion of the Plan Area, in the Conservation Reserve Area, are characterized primarily by intensively managed agriculture, which generally does not provide the conditions for uncontrolled or extensive fire events.

To determine the limits of changed circumstances, the size of catastrophic fires (e.g., more than 10,000 acres) and their frequency (i.e., return interval) was assessed for the Plan Area. This assessment was based on both historic fire occurrence and the influence of climate change. These conservative estimates for the Plan Area were then scaled down to fit the reserve system. Since 1965 wildfires have burned more than 181,000 acres in Yolo County. During this time period, three catastrophic fires

occurred in Yolo County. The largest fire, in 1999, burned over 40,000 acres within the county. . Many of the fires have occurred along the Highway 16 corridor through Rumsey Canyon, two of which occurred as recently as the summer/fall of 2012. The most notable recent fire in the region was the Rocky Fire in August 2015, when 69,438 acres burned in Yolo, Lake, and Colusa Counties (approximately 10 percent, or 7,014 acres, of the Rocky Fire was in Yolo County, in the Little Blue Ridge Mountains). The Monticello Fire of 2014 burned 6,488 acres in western Yolo County.

Climate change must also be taken into account when predicting fire frequency in the Plan Area. Throughout California, fire occurrence can be correlated with drought, moisture availability, and biomass (fuel) accumulation (Lenihan et al. 2003). Both "wetter and warmer" and "dryer and warmer" climate change scenarios are predicted for the Plan Area (Hayhoe et al. 2004). The warmer, dryer scenario would increase the occurrence of drought, while increased biomass production would result from the warmer, wetter scenario. Both of these scenarios have the potential to increase fire frequency due to either increased drought frequency or an increase in biomass accumulation.

With climate change, it is assumed that the frequency of fire occurrence and the size of the area that is burned will increase by 25 percent. Recent literature that analyzed the relationship between climate change and fire frequency in California identified a median increase in fire occurrence and burned area of 30 percent by 2050 (Westerling et al 2009). This is a statewide estimate, with increases in fire occurrence ranging from 11 to 55 percent and increases in burned area ranging from 11 to 70 percent. The largest increases for both fire occurrence and burned area are expected to occur in the Sierra Nevada, Northern California Coast, and south Cascade Ranges. These increases are expected to occur by 2050.

The potential effects of climate change on fire frequency are anticipated to increase over the course of the permit term. At the beginning of the permit term, limited change from historic fire occurrences and burned area may be acceptable as a changed circumstance; however, the potential effects of climate change will grow over the permit term. In addition, at the beginning of the permit term, fire risks in reserve system will be low because it will be smaller. As such, it is felt that a 25 percent increase due to climate change represents a conservative estimate for the increase in fire frequency and burned area in the Plan Area for the duration of the permit term.

Lands within the eastern portion of the Plan Area are characterized primarily as having minimal to moderate wildfire risk, including the areas identified for the reserve system; therefore, it is foreseeable that three catastrophic fires could occur during the permit term, each burning four to 14 percent of the land cover types that are prone to wildfire within the study area. Increasing these values by 25 percent (0.04 * 1.25 and 0.14 * 1.25) to take climate change into account, the Plan anticipates up to four catastrophic fires (more than 10,000 acres) within the study area over the course of the permit term. This level of fire occurrence would be considered a changed circumstance for the purposes of the Yolo HCP/NCCP.

To minimize the risk of wildfire, the Conservancy will identify reserve lands with a high risk of fire (e.g., grasslands situated near roadways) and implement fire risk reduction measures on those lands consistent with Conservation Measure 3: *Manage and Enhance the Reserve System* (e.g., Section 6.4.3.5.2, *Grasslands Natural Community*), including:

- Establishing and maintaining fuel breaks around high-risk reserve lands,
- Coordinating with state and local fire agencies to improve fire suppression preparedness for reserve lands, and
- Developing post-fire monitoring plans.

In the event of a wildfire, the Conservancy will assess the proportion of the protected habitat area that has burned and likely effects on habitat use by covered species. The Conservancy will make an initial determination of whether or not the fire constitutes a changed circumstance and notify the wildlife agencies of the fire event.

If a changed circumstance is determined to exist, the Conservancy will implement an appropriate post-fire monitoring plan for a two-year period following the fire to assess the recovery of vegetation and wildlife. If, over the course of the monitoring period, it is determined that vegetation is not recovering sufficiently in the burned area to reestablish the functions of the affected habitat, the Conservancy will develop and implement through the adaptive management process a habitat restoration plan to enhance recovery of the affected habitat area to the extent practicable. Elements of habitat restoration plans may include provisions for planting and caring for native vegetation and controlling the establishment of invasive plant species.

7.7.1.2.4 Nonnative Invasive Species or Disease

Nonnative species and diseases currently occur in the Plan Area and will be present in the reserve system (e.g., bullfrogs). Additionally, there are nonnative species and diseases that exist in areas outside the Plan Area that have the potential to spread into the Plan Area and adversely affect the covered species and natural communities within the reserve system (e.g., sudden oak death). Given the nature of invasive species and diseases, there is no unforeseen circumstance, only an upper limit to which changed circumstances will be funded. In other words, a new disease or invasive species that spreads throughout the Plan Area within the permit term is a foreseeable event. If a disease or nonnative species spreads beyond the thresholds identified below, however, it will be considered a catastrophic event beyond the Yolo HCP/NCCP scope, and the wildlife agencies will not require the Conservancy to fund remedial actions to address it.

The conservation strategy includes measures to reduce existing and prevent future infestations of nonnative invasive species and diseases. The monitoring program will identify and map existing diseases and nonnative species in the reserve system so that new ones can be identified quickly and a control or eradication plan can be put into place. It is possible the following events may occur, however, despite implementation of the conservation strategy and monitoring program:

- New and aggressive nonnative species may invade the reserve system,
- Infestations of a new disease that affects covered or predominant species in the study area may have dramatic effects on the reserve system, and
- Existing nonnative species or diseases may expand to unprecedented levels in the reserve system, perhaps due to changing climate.

Under the Yolo HCP/NCCP, the following are considered changed circumstances for which the Conservancy will fund remedial measures:

- Infestations of new diseases or new nonnative invasive species that affect up to 25 percent of the extent (i.e., acres) of a predominant natural community (i.e., valley foothill riparian) or occupied covered species habitat within the reserve system in any given year,[14] and

[14] The Conservancy will assemble the reserve system for the majority of the permit term. The Conservancy must complete all creation and restoration activities by Year 40 and all land protection by Year 45. The Conservancy will monitor current levels of disease and nonnatives relative to the current composition of the reserve system each monitoring year.

- Spread of nonnative species or diseases on up to 25 percent above current conditions within the reserve system in any given year.

The reserve system builds on existing open space in the Plan Area, targeting specific natural communities and species habitat across a range of environmental gradients in geographically distinct areas. Diseases and nonnative species may spread into the Plan Area from lands adjacent to the Plan Area. It is foreseeable a single disease or invasive species would spread across the entire reserve system, even if the Yolo HCP/NCCP and remedial measures are properly implemented. Such an event would be catastrophic, and most likely no effort by the Conservancy alone would be able to stop its spread. Therefore, if remedial measure implementation does not prevent the spread of the nonnative species or disease beyond the established thresholds, it will be considered a catastrophic event beyond the Yolo HCP/NCCP scope, and the wildlife agencies will not require the Conservancy to fund remedial actions to address it.

In these situations, prior to ceasing or reducing remedial actions, the Conservancy must demonstrate the following to the wildlife agencies in writing:

- The changed circumstance was detected as soon as feasible and the wildlife agencies were notified;
- The Conservancy coordinated and worked actively with the wildlife agencies and other land managers to assess the changed circumstance and determine the best course of action;
- The Conservancy implemented remedial measures for the changed circumstance, according to the Yolo HCP/NCCP, but these measures failed to stop the spread of the disease or invasive species; and
- The disease or invasive species is a serious problem outside the reserve system in the Plan Area, and similar control measures implemented by others also failed to control its spread.

Based on current knowledge of likely diseases and nonnative species, disease spread at catastrophic levels is only reasonably likely in the study area for sudden oak death. For other known diseases or nonnative species, the remedial measure thresholds are assumed to be sufficient.

Sudden oak death is not currently found in the Plan Area; it is, however, found in adjacent Napa County. This disease spreads rapidly and may spread into the reserve system and affect Swainson's hawk nest trees and oaks in the valley foothill riparian natural community despite implementation of the conservation strategy, adaptive management, and remedial measures. If this occurs, the spread of the disease will not be limited to the reserve system and will affect oaks at the landscape scale. If sudden oak death spreads beyond an estimated 25 percent of the oaks in the reserve system, it will be considered a catastrophic event, beyond the Yolo HCP/NCCP scope, and the wildlife agencies will not require the Conservancy to fund remedial actions to address it.

The spread of diseases or invasive species in excess of 25 percent above baseline conditions is foreseeable for sudden oak death and may be foreseeable for other diseases that are not currently known. Although these events are considered catastrophic, the Conservancy will fund only remedial actions for these circumstances, up to a 25 percent increase in the extent (i.e., acres) for the predominant natural community affected, for any diseases or invasive species.

Nonnative animals include, but are not limited to, invasive brown-headed cowbirds, bullfrogs, and introduced predatory fish. These species currently occur in the Plan Area, and conservation and monitoring actions to reduce or contain their occurrence within the study area have been developed.

When a new disease or nonnative species is detected or an existing disease or nonnative species begins to spread aggressively, the Conservancy will contact the wildlife agencies and other relevant agencies with authority over disease control to collaboratively determine the best method of measuring, monitoring, and eradicating or controlling the disease before it spreads. Remedial measures that address the invasion of nonnative species or disease follow the steps listed below.

- Determine the best method for measurement and tracking extent within three months of detection,
- Prepare a damage-assessment report within six months of detection,
- Recommend and plan actions to address the threat within six months of detection, and
- Respond through adaptive management in ways that are consistent with Permit obligations and with the consent of the wildlife agencies within one year of detection.

7.7.1.2.5 Flooding

The effects of floods on HCP/NCCP reserve lands and covered species depend on several factors, including the severity of the flood event, its duration, and the type of habitat affected. Flood events are a natural process that maintain aquatic, riparian, and wetland ecosystems. Small flood events are expected to have relatively minor effects on protected natural communities and covered species. Furthermore, many of the covered species would not be adversely affected by flooding because they are adapted to flooding (e.g., the giant garter snake and western pond turtle), likely to not be present or nesting during winter flood events (e.g., Swainson's hawk, western burrowing owl), or are capable of fleeing flooded areas (e.g., bank swallow, tri-colored blackbird). More severe flood events, however, can have deleterious consequences on protected resources, including erosion of protected habitats, deposition of sediment and debris on reserve lands that damage habitat functions for covered species, and loss of vegetation plantings in restored riparian habitats.

Major floods are defined as flood events that exceed the stream's capacity (i.e., 10-year flood event). Several major floods have been documented in Yolo County, most recently in 1967, 1973, 1975, and 1986. Flooding probability is specific to each stream's capacity, the runoff potential of the stream's upper catchment, and rainfall patterns across the county. Given that urbanization has increased across the county (increasing flood potential) and that local agencies have completed and continue to develop flood control projects to accommodate increased peak runoff (decreasing flood potential), past flood events do not reliably predict future flood probability.

Taking into account climate change, we must rely on predictive models in addition to historic trends. Climate change models typically focus on the occurrence of 100-year flood events. Flood damage in protected natural communities and habitats caused by storms that are at or below a 100-year flood event on a given stream is considered to be a changed circumstance that is reasonably foreseeable over the term of the Yolo HCP/NCCP. Larger flood events are considered to be an unforeseen circumstance. The 100-year flood (i.e., one-percent flood) is defined as the flood event that has a one-percent probability of occurrence in any given year. Over a very long period of time, it is the flood event that would, on average, occur once per hundred years; however, over a short time span, it can occur more than once in a single year or not at all for several hundred years. For example, a one-year storm event has a 100%, approximately, probability of recurring each year. This does not mean that that a 1-year event will happen every year; however it is highly likely to happen each year. A 100-year storm event has a 1% probability of recurring each year. A 100-year flood event was selected as the limit of changed circumstances for the 50-year permit term because the frequency and severity of flooding in the Plan Area is expected to increase with climate change

(California Natural Resources Agency 2009). Therefore, a flood event that currently has a one percent probability of occurrence per year (i.e., a 100-year event) is likely to have a greater probability of occurrence with climate change.

Following a flood event, the Conservancy will inspect affected reserve lands within 45 days of the event to evaluate the extent of damage to the protected habitats and evaluate the need for implementing actions to rehabilitate affected habitat functions. If the habitat functions are unlikely to naturally reestablish the former conditions through natural processes at a similar or greater rate than with implementation of remedial management actions, the Conservancy will identify and implement, within one year of the flood event, the management actions necessary to restore affected habitat conditions.

7.7.1.2.6 Drought

Drought is defined by the National Weather Service as "a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage and causing adverse impacts on vegetation, animals, and/or people" (National Weather Service 2008). The Plan Area is characterized by a Mediterranean climate, with cool, wet winters and warm, dry summers. El Niño and La Niña climatic events typically cause large annual fluctuations in precipitation levels (Minnich 2007; Reever-Morghan et al. 2007). Precipitation occurs primarily in the form of rain from October through April, with very little precipitation in May through September. Drought is a natural part of Mediterranean climates. From 2011 to 2015, most of California, including Yolo County, experienced one of the worst droughts on record. Drought conditions experienced over the term of the Yolo HCP/NCCP may result in the loss of restored riparian and wetland natural communities as well as agricultural habitats that are maintained in the reserve system.

Historically, California has experienced multiple severe droughts. According to the Department of Water Resources, droughts that exceed three years are relatively rare in Northern California, the source of much of the state's developed water supply. According to the State of California Hazard Mitigation Plan, Yolo County experienced one drought that resulted in a state disaster declaration.

Yolo County receives an average of 18 inches of precipitation annually. In the Plan Area, drought is characterized as two or more consecutive water years with 75 percent or less of mean seasonal precipitation, as measured at the Woodland rain gauge in the Valley Landscape Unit and averaged between the Knoxville Creek rain gauge and Brooks rain gauge in the Hill and Ridge Landscape Unit.

To estimate how many drought years might be expected during the permit term, annual natural reservoir inflow (i.e., inflow from local precipitation, not imported water) within the Plan Area was reviewed from 2014 back to 1974 by water year (July 1 to June 30). The data show that droughts that lasted two to six years occurred three times over a 40-year period (National Climate Data Center 2014). Of these droughts, only a single event lasted six years. Based on the Yolo County Hazard Mitigation Plan (2012), historic data, and conservative application of climate change predictions, the Yolo HCP/NCCP will fund remedial actions for up to five droughts that occur during the permit term. Of the five droughts, only one is anticipated to be more than six years in duration. More than five droughts during the permit term, or more than a single drought of at least six years each, is considered an unforeseen circumstance and is not funded by the Plan.

Although climate change is anticipated to result in increased drought (potential precipitation is likely to decrease toward the end of the century), the extent of such change is not fully understood. Thus, the predicted drought potential during the permit term is conservative.

HCP/NCCP conservation land management plans (CM3, *Manage and Enhance Natural Communities,* in Section 6.4, *Conservation Measures*) include drought monitoring and protection measures to minimize the risk of losing restored natural communities to drought. Preventative measures include the following actions:

- Monitoring Yolo County rain data and gauges to determine if the seasonal rainfall at the end of March and April indicates a drought (near 75 percent of mean seasonal precipitation), and
- Monitoring natural community restoration sites that are beyond their establishment periods (i.e., no longer sustained by irrigation) for stress due to low soil moisture or high evapotranspiration rates.

In the event of drought conditions, the Conservancy will evaluate habitat restoration sites to assess the degree of effect on natural community development and functions. Following the evaluation, the Conservancy will prepare a report that documents the effects of drought on restoration sites and identifies management actions the Conservancy will implement through the adaptive management process (Section 6.5, *Monitoring and Adaptive Management*) to alleviate the effects of drought (e.g., providing supplemental irrigation for riparian plantings). For droughts that affect the availability of water for irrigation of HCP/NCCP-protected cultivated lands, the Conservancy may, if practicable, purchase additional water supplies to maintain crop types that support the target habitat functions of the cultivated land or acquire other natural communities, such as fresh emergent wetlands or grasslands, to replace the habitat functions provided by the affected cultivated land habitat. Objective NC-CL1.2 requires the Conservancy to ensure that water remains in conveyance channels during years when rice fields cannot be flooded because of drought or market conditions.

7.7.1.2.7 Earthquakes

Earthquakes of less the 4.0 on the Richter scale (defined as "micro" or "minor" earthquakes by the U.S. Geological Survey) occur frequently in the Plan Area. Their effects on natural communities and covered species are expected to be very small or undetectable. Although less common, earthquakes of "light" (4.0 to 4.9) or "moderate" (5.0 to 5.9) magnitude are expected to have little to no effect on covered species or natural communities. These earthquakes may be large enough, however, to cause moderate ground shaking, which may trigger small to moderate-sized landslides. These landslides are a natural part of the ecosystems in the Plan Area. Damage to reserve system facilities from such minor to moderate earthquakes is expected to be low to none.

A large catastrophic earthquake is typically defined in planning documents and engineering projects as having a magnitude equal to or greater than 6.7 (U.S. Geological Survey 2012). Although there are several faults within the Plan Area, the only fault in the county that has been identified by the California Geological Survey to be active or potentially active and subject to surface rupture (i.e., delineated as an Alquist-Priolo Earthquake Fault Zone) is the Hunting Creek fault (sometimes referred to as the Hunting Creek-Berryessa fault). The Hunting Creek fault is an active fault in the extreme northwestern corner of the Plan Area, with only a very short section of the fault occurring within the Plan Area. The Hunting Creek fault is a right-lateral fault and has an average slip rate of six millimeters per year. The Dunnigan Hills fault is the only other potentially active fault within Yolo County. It is located west of Interstate 5, between Dunnigan and northwest Yolo in the unincorporated area of the county.

In addition to the Hunting Creek and Dunnigan Hills faults discussed above, major regional faults outside the Plan Area but in the Coast Ranges and the Sierra Nevada foothills are capable of producing ground shaking in the Plan Area. The April 19, 1892, Vacaville-Winters earthquake

measured approximately 6.9 on the Richter scale and caused severe damage in Winters and lesser damage in Davis, Woodland, and elsewhere in the Plan Area. The 1892 Vacaville-Winters earthquake was once attributed to a large regional feature, referred to as the Midland Fault, which extends into the Plan Area a short distance near Winters. The earthquake is now believed to have originated from a segment of a complex zone of faults, referred to as the Coast Range-Sierran Block Boundary (CRSBB), at the edge of the western side of the lower Sacramento Valley. The CRSBB forms the western geomorphic boundary of the Central Valley, with the Coast Ranges to the west. The CRSBB is currently recognized as a potential seismic source that is capable of generating moderate earthquakes that may affect the Plan Area. The faults within the CRSBB are considered capable of generating moderate to large earthquakes that may produce strong seismic shaking throughout the region, including the Plan Area. Eleven moderate earthquakes (magnitude 5.8 to 6.8) have been documented along the CRSBB zone during the last 150 years. The Coalinga earthquake (magnitude 6.7) occurred within the CRSBB zone in 1983. As recently as August 2014, a magnitude 6.0 earthquake occurred near the West Napa fault, with tremors extending into the Plan Area (U.S. Geological Survey 2014).

The maximum expected earthquake in the Plan Area at the Hunting Creek fault over the next 30 years is estimated to be magnitude 7.1 (U.S. Geological Survey 2014). This is the primary active fault in the Plan Area; therefore, any earthquake exceeding this magnitude is considered unforeseen for the purposes of this Plan.

The negative effects of a catastrophic earthquake are likely to manifest mostly as damage to reserve system infrastructure rather than damage to natural communities or species. Should any earthquake occur, the Conservancy will rebuild reserve system infrastructure and conduct post hoc monitoring of species or populations that are identified as being potentially negatively affected by the incident. Reserve system infrastructure will be repaired or rebuilt within two years. Remediation of enhancement, creation, and restoration sites within the reserve system that have been affected by earthquakes during the permit term (i.e., as a result of landslides) will be remediated within two years of the earthquake. Site-specific covered species and natural community monitoring will be conducted for three years after the event if covered species or their habitats are adversely affected.

Damage to reserve system infrastructure, natural communities, and covered species from any earthquake of magnitude 7.1 or less will be remediated by the Conservancy. On cultivated lands, the landowner or agricultural lessee will remediate infrastructure necessary to support agricultural activity.

7.7.1.2.8 Regional Loss of Swainson's Hawk Habitat

As described in *A Proposed Conservation Strategy for the Swainson's Hawk in Yolo County* (Estep 2015), the Swainson's hawk population in the Plan Area may have increased between the mid-1980s and early 1990s; it has remained stable through at least 2012. The analysis in this report of crop patterns in the Plan Area also shows that the amount of available foraging habitat in the Plan Area has remained relatively stable from 1988 through 2012 (see Figure 3 in Estep 2015). The report describes two key thresholds that are necessary to maintain the current population of Swainson's hawk in the Plan Area: the total amount of suitable foraging habitat acres in the Plan Area and the amount of high-value foraging habitat in the Plan Area. The analysis in the conceptual conservation strategy suggests that, to maintain the current population of Swainson's hawk in the Plan Area (estimated at 300 nesting pairs), the amount of foraging habitat in the Plan Area should consistently exceed 267,750 acres, and the amount of high-value foraging habitat should be at least 24,584 acres.

If either metric drops below these values, the risk goes up that the current population of Swainson's hawk cannot be sustained.

With full implementation, the Yolo HCP/NCCP will protect 55,366 acres of Swainson's hawk foraging habitat in Category 1 and 2 public and easement lands. This represents 23 percent of the amount of total foraging necessary to maintain the current population in the Plan Area (Table 5-6, *Covered Species Benefits and Net Effects*). This level of protection in the Yolo HCP/NCCP was determined as the amount needed to meet the Permit issuance criteria of the FESA (to mitigate the impacts of taking to the maximum extent practicable) and the NCCPA (provide for the conservation of the species in the Plan Area). This level of protection was also determined to be the maximum feasible based on the amount of activities covered by the Plan and what state and federal funding may be available to support Plan implementation for land acquisition.

In the past, foraging habitat for Swainson's hawk has been lost in Yolo County in two ways: from agricultural conversion to urban or rural development or from conversion by farmers to unsuitable or less suitable crop types. With the Yolo HCP/NCCP, all conversion to development will require payment of an HCP/NCCP fee to fund appropriate mitigation and conservation for Swainson's hawk (and other covered species). Agricultural conversion by farmers to crop types that are unsuitable or less suitable foraging habitat for Swainson's hawk is not a covered activity under the Yolo HCP/NCCP because the Permittees do not regulate crop conversion (i.e., farmers do not need a permit from the cities or the county to change crop types). Agricultural conversion will continue during the permit term. On a particular farm, crops may change from those that are suitable for Swainson's hawk foraging to those that are unsuitable and back again multiple times during the permit term. These cropping patterns are often driven by agricultural market forces that are difficult to predict and are outside the control of the Permittees.

The Conservancy recognizes the importance of crop patterns outside of the reserve system for the overall health of the Swainson's hawk population in Yolo County. Farming activities outside the reserve system are, however, outside of the direct control of the Permittees. To help inform conservation efforts in the region and provide the wildlife agencies with additional information with which to evaluate the status of the species throughout its range, the Conservancy will monitor the following, as described in Section 5.5, *Effects Analysis Approach and Methods* (these monitoring results will be reported in the Yolo HCP/NCCP annual report):

- Changes in crops and other agricultural land uses, with data from the annual reports of the Yolo County Department of Agriculture on crop types and amounts in the county;
- The distribution of crops and crop patterns every 5 years through updates of the GIS mapping program, which uses available aerial photography of the Plan Area; and
- The Swainson's hawk population in the Plan Area every 5 years, using the sampling approach described in Section 6.5, *Monitoring and Adaptive Management*.

If the amount of Swainson's hawk foraging habitat falls below 267,750 total acres or 24,560 high-value acres, the Conservancy will evaluate the effect on the nesting population in the Plan Area by applying the sampling methodology described in Section 6.5, *Monitoring and Adaptive Management*. Based on this analysis, if the Conservancy finds the nesting population has fallen below 240 breeding pairs, the Conservancy will meet and confer with the wildlife agencies within 30 days of the annual report to assess the need for further action. The wildlife agencies and the Conservancy will then develop and implement a mutually agreeable plan of action to try to increase Swainson's hawk populations in the Plan Area. Remedies may include, but not be limited to, the following:

- Planting nest trees in key locations, as determined by Swainson's hawk experts, that have a deficit of nest trees. In some locations within the Plan Area, such as north of Cache Creek, the majority of nesting trees occur as isolated trees or roadside tree rows. This type of nesting habitat is unsustainable because of tree mortality and the lack of natural regeneration. A large segment of the nesting population occurs in this area and, in the future, may be at risk because of the lack of suitable nest trees. A program of tree planting, including the establishment of permanent hedgerows along field borders, would provide future nesting habitat for this population and help to offset future declines related to nesting habitat loss. A desirable location for planting nest trees would be in areas within the Yolo-Brentwood soil association between Cache and Putah Creek and the Sacramento River, to create "stepping stones" (discontinuous patches) of habitat between the larger habitat corridors (Greco 2017);
- Monitoring more frequently than every five years (if the Conservancy, wildlife agencies, and species experts determine that more frequent monitoring would be beneficial for assessing trends);
- Managing existing HCP/NCCP reserve lands to enhance foraging value for Swainson's hawk (e.g., providing temporary incentive payments to reserve system landowners to change to high-value crops, beyond the requirements of the Plan);
- Implementing a landowner incentive program throughout Yolo County (i.e., on non-reserve lands) to increase the availability of high-value foraging habitat. This program could be designed to target areas that support or could support Swainson's hawk territories that also have a deficit of suitable foraging habitat. Payments would be temporary and based on available HCP/NCCP and other external funding (see below); and
- Establishing a landowner incentive program to increase available suitable foraging habitat of any kind. The Conservancy could partner with willing landowners to remove unsuitable perennial crops (e.g., orchards and vineyards) and replace them with annual crops that provide suitable foraging habitat. By Year 5 of Plan implementation, the Conservancy will develop a framework that could be used for a landowner incentive program. This framework will also cite models that have been used by similar programs elsewhere (e.g., the federal Conservation Reserve Program). The framework would also quantify the range of habitat improvement possible, depending on funding levels.

Improved management and other remedial actions within the reserve system will be attempted first because they are more cost effective and can be implemented quickly. If these measures prove ineffective in reversing the observed trends, however, additional off-reserve measures will be implemented, either in addition to or instead of the reserve system measures. The remedial actions identified above would be funded, in part, by the Yolo HCP/NCCP through the funding set aside for this changed circumstance. At least $110,000 will be set aside every five years to fund this program ($10,000 reserved for plan design and preparation and $100,000 for plan implementation), for a total of $1.1 million. The Yolo HCP/NCCP funding, when combined with other funding sources, will be enough to initiate a substantive program of land use changes that will address this changed circumstance in the event that it occurs.

7.7.2 Federal No Surprises

The Secretary of Interior established the federal No Surprises Regulation on March 25, 1998. It provides assurances to Section 10 permit holders that no additional money, commitments, or

restrictions of land or water will be required should unforeseen circumstances that require additional mitigation arise once the Permit is in place. The No Surprises Regulation states that USFWS and/or the National Marine Fisheries Service (NMFS) will not require an additional commitment of resources, beyond that already specified in the HCP, if a Permittee is properly implementing an HCP that has been approved by these agencies.

The Permittees request regulatory assurances (No Surprises) for all covered species in the Yolo HCP/NCCP. In accordance with No Surprises, the Permittees will be responsible for implementing and funding remedial measures in response to any changed circumstances, as described in this chapter. The Permittees will not be obligated to address unforeseen circumstances but will work with the wildlife agencies to address such circumstances within the funding and other constraints of the Yolo HCP/NCCP should they occur.

The Permittees understand that No Surprises assurances are contingent on the proper implementation of the Permits, Implementing Agreement, and the Yolo HCP/NCCP. The Permittees also understand that USFWS may suspend or revoke the federal Permit, in whole or in part, in accordance with the federal regulations (50 CFR Sections 13.27 and 13.28 and other applicable laws and regulations) that are in force at the time of such suspension.

7.7.3 Federal Section 7 Consultations

USFWS will evaluate the direct, indirect, and cumulative effects of the covered activities in its internal biological opinion, which will be issued in connection with the Yolo HCP/NCCP and issuance of the Section 10(a)(1)(B) permit. Accordingly, in any consultation under FESA Section 7 that occurs after approval of the Yolo HCP/NCCP, USFWS will ensure that any biological opinion that is issued in connection with the proposed project that is the subject of the consultation is consistent with the HCP/NCCP's biological opinion. The proposed project must be consistent with the terms and conditions of the Yolo HCP/NCCP and the Implementing Agreement. Any reasonable and prudent measures included under the terms and conditions of a biological opinion that is issued subsequent to approval of the Yolo HCP/NCCP with regard to the covered species and covered activities will, to the maximum extent appropriate, be consistent with the measures of the Yolo HCP/NCCP and the Implementing Agreement. USFWS will not impose measures in excess of those that have been or will be required by the Permittees, pursuant to the Yolo HCP/NCCP, Section 10 permit, and Implementing Agreement.

7.7.4 State NCCP Assurances

Under the NCCPA, CDFW provides assurances to Permittees that are commensurate with the long-term conservation measures and associated actions that will be implemented under the NCCP. In its determination of the level and term of the assurances that are to be provided, CDFW takes into account the conditions that are specific to the NCCP, including such factors as the level and quality of information regarding covered species and natural communities, the sufficiency and use of the best available scientific information in the analysis of impacts on these resources, reliability of mitigation strategies, and appropriateness of monitoring techniques, including the use of centralized information to evaluate the effectiveness of the NCCP, the adequacy of funding assurances, the range of foreseeable circumstances that are addressed by the NCCP, and the size and duration of the NCCP.

The assurances provided under the NCCPA will, at a minimum, ensure that, if there are unforeseen circumstances, no additional financial obligations or restrictions on the use of resources will be required of the Permittees without their consent. Specifically, the NCCPA directs that "[i]f there are

unforeseen circumstances, additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources shall not be required without the consent of plan participants for a period of time specified in the implementation agreement, unless [CDFW] determines that the plan is not being implemented consistent with the substantive terms of the implementation agreement." Similar to the provision in the FESA regulations, however, the NCCPA requires that CDFW suspend or revoke a permit, in whole or in part, if the continued take of a covered species would jeopardize its continued existence.

7.7.5 Conservation Contributions by State and Federal Agencies

It is anticipated that state and federal agencies, including USFWS and CDFW, will contribute to the conservation portion of the Plan. The Permittees recognize that state and federal funds cannot be guaranteed in advance of the approval of annual budgets, nor can agency staff members without the authority to commit these funds provide assurances of state and federal financial contributions. The Permittees seek assurance, however, that USFWS and CDFW will make every effort to assist the Conservancy in securing the funding outlined in Chapter 8, Cost and Funding, to contribute to species recovery and help implement the conservation portion of the Yolo HCP/NCCP (see also the discussion of funding contingencies in Chapter 8).

7.7.6 Staff Contributions by State and Federal Agencies

Successful implementation of the Yolo HCP/NCCP relies on the continued participation and feedback of representatives of USFWS and CDFW. As described in Chapter 7, *Plan Implementation*, USFWS and CDFW staff members are expected to participate in Conservancy meetings and subcommittees as needed to evaluate and provide advice and applicable consent on HCP/NCCP implementation. In particular, USFWS and CDFW participation is critical to the success of the adaptive management and monitoring program. The Permittees request that USFWS and CDFW make every effort, given budget and workload constraints, to provide staff members to serve on all appropriate committees and participate in discussions and meetings to ensure that implementation of the Yolo HCP/NCCP is consistent with any findings upon which the Permits are based.

7.7.7 Assurances for Private Landowners

Third parties may receive take authorization pursuant to Section 4.2, *Receiving Take Authorization under the Yolo HCP/NCCP*. Once take authorization has been provided to a third party, it will remain in effect for that covered activity as long as the Permits issued by CDFW and USFWS to the Permittees remain in effect. If USFWS or CDFW suspends or revokes its Permit, take authorization provided under the jurisdiction of the Permittees would also be suspended or revoked. In addition, if a local jurisdiction determines that one of its project proponents is in violation of the take permit (i.e., in violation of the conditions in Chapter 4, *Application Process and Conditions on Covered Activities*), the local jurisdiction will suspend or revoke take coverage that had been extended to the project proponent and report the violation to the Conservancy, USFWS, and CDFW.

7.7.7.1 Neighboring Landowner Protection Program

The Yolo HCP/NCCP requires development of a reserve system that may eventually encompass approximately 33,362 acres of lands in the Plan Area for mitigation and provide for conservation of

species and natural communities (Tables 6-1(b), *Reserve System Land Types,* and 6-2(b), *Pre-permit Reserve Lands*). The Conservancy will protect, restore, enhance, and manage natural communities on these reserve lands for the benefit of ecosystem functions, natural communities, and covered species. HCP/NCCP implementation is expected to result in the expansion of populations of covered species. Individuals or populations of these species may move to and colonize adjacent lands that are not within the reserve system as an inadvertent result of HCP/NCCP implementation. In recognition of this potential, the Yolo HCP/NCCP includes a process by which neighboring landowners may receive assurances through certificates of inclusion under FESA Section 10 and NCCPA Section 2835 permits, to provide coverage for take of covered species that may enter property from adjacent reserve system lands. The neighboring landowner protection program provides the following benefits to landowners with actively farmed properties.

- A voluntary program, administered locally.
- Provides protection against enforcement actions related to the take of endangered species above baseline populations.
- Provides "no surprises" assurances to landowners, creating an "insurance policy" for the Endangered Species Act compliance.

With respect to take, the process for neighboring landowner assurances provides for incremental increases in the number of individuals or populations of covered species, above baseline conditions, on neighboring lands. The assurances do not provide for take of existing populations or occupied habitat prior to the establishment of adjacent reserve lands and, therefore, will not result in impacts relative to baseline conditions.

The Conservancy will provide certificates of inclusion for incidental take by neighboring landowners who are engaged in agricultural and rangeland activities and agree to participate (i.e., "opt-in"). Landowners who do not wish to participate would not be required to participate.

Landowners who wish to voluntarily enroll their working lands into the Yolo HCP/NCCP and receive take authorization for the covered activities described in Chapter 3, *Covered Activities,* must follow the steps below to prepare an HCP/NCCP enrollment application package.

1. **Conduct Baseline Surveys**. The landowner will contract with a qualified biologist to conduct surveys for all covered species with neighboring landowner assurances and their habitat (i.e., natural habitat that may be present between agricultural fields and not the actively cropped fields themselves that may provide habitat) and identify all occurrences of species and habitat on the property on a map. The landowner is responsible for contracting with the qualified biologist but also may contract with, and fund, the Conservancy to conduct these surveys. A baseline survey report, including maps of locations, will be provided to the Conservancy. The report will describe the location and quality of occupied habitat, identify the locations of occurrences, and estimate the number of individuals within each occurrence for all covered species on the property;
2. **Identify Covered Practices**. The landowner will provide to the Conservancy a written description of the ongoing and expected future agricultural practices on the property; and
3. **Pay Fees**. Pay a fee to cover Conservancy's enrollment cost.

The Conservancy will review the enrollment application and determine if it meets all requirements of the Yolo HCP/NCCP, specifically, the covered activities and the required avoidance and

minimization provisions regarding take of covered species, as described in Section 4.3, *Avoidance and Minimization Measures.*

If approved, the Conservancy will authorize take through a certificate of inclusion specifically for agricultural practices. Authorized take may not result in the property falling below the baseline conditions for covered species with respect to occurrences and habitat. The Conservancy may add conditions, as appropriate to the Yolo HCP/NCCP, to the certificate of inclusion to ensure that HCP/NCCP goals and objectives are met.

There is no requirement under the Yolo HCP/NCCP that farmers and ranchers enroll in the HCP/NCCP or request certificates of inclusion. It is a voluntary opt-in program. The Conservancy will maintain a record of all applications provided by and certificates of inclusion provided to farmers and ranchers who are under this program as well as any signed certificates of inclusion that are returned by landowners. The Conservancy will set the administrative fee for participation in this program during Plan implementation. The Conservancy will notify USFWS and CDFW annually of the number, location, and size of the lands that are covered under certificates of inclusion. The Conservancy will provide copies of the certificates of inclusion to USFWS and CDFW upon request. Certificates of inclusion do not transfer with the property.

7.8 Modifications to the Plan

The Yolo HCP/NCCP or incidental take permits can be modified in accordance with USFWS and CDFW regulations and the terms of the Implementing Agreement and the Permits. Plan modifications are not anticipated on a regular basis. A Permittee or the permitting agencies may request modifications. The categories of modification that are recognized, in order of significance, are administrative changes, minor modifications, and amendments, each of which is described below.

7.8.1 Administrative Changes

The administration and implementation of the Yolo HCP/NCCP will require frequent and ongoing interpretation of the provisions of the HCP/NCCP. Actions taken on the basis of these interpretations that do not substantively change the purpose or intent of the Yolo HCP/NCCP's provisions will not require modification or amendment of the Yolo HCP/NCCP or its associated authorizations. These administrative changes will not trigger a new National Environmental Policy Act (NEPA) or California Environmental Quality Act (CEQA) analysis. Such actions related to the ordinary Conservancy administration and implementation of the Yolo HCP/NCCP may include, but are not limited to, the following:

- Clerical corrections to typographical, grammatical, and similar editing errors that do not change the intended meaning or changes to maps or other exhibits to address insignificant errors;
- Modifications to habitat management strategies developed through and consistent with the adaptive management strategy described in Section 6.5, *Monitoring and Adaptive Management*;
- Variations in the day-to-day management of HCP/NCCP reserve lands, such as adjusting habitat management techniques and timing on the basis of observed changes in conditions in response to prior management actions;
- Annual adjustments to HCP/NCCP fees, consistent with Chapter 8, *Cost and Funding*;

- Adjustments to monitoring or research protocols to incorporate new protocols that are approved by USFWS and CDFW; and
- Other changes requested by the Conservancy that are determined to be administrative by the wildlife agencies.

7.8.2 Minor Modifications

As part of the process of HCP/NCCP implementation, the Conservancy will most likely need to make minor modifications to the Yolo HCP/NCCP from time to time to respond appropriately to new information, scientific understanding, technological advances, and other such circumstances. Minor modifications will not involve changes that would adversely affect covered species, the level of take, or the obligations of Permittees; therefore, these modifications do not trigger a new NEPA or CEQA analysis.

Minor modifications may include, but are not limited to, the following circumstances:

- Minor corrections to land ownership descriptions;
- Changes to survey, monitoring, reporting, and/or management protocols for HCP/NCCP effectiveness, beyond those in response to changes in standardized protocols;
- Transfers of targeted habitat acreages among HCP/NCCP planning areas, provided such change does not preclude meeting reserve assembly requirements, significantly increase the cost of land management, or preclude achieving covered species and natural community goals and objectives;
- All project-level adaptive management actions;
- Revisions to avoidance and minimization measures;
- Plan-level adaptive management actions that do not involve major changes in HCP/NCCP commitments and require a formal amendment to implement;
- Modification of existing or adoption of additional conservation measures that improve the likelihood of achieving covered species objectives, as long as the effects of implementation are consistent with the effects analysis of this Plan;
- Discontinuation of ineffective conservation measures;
- Minor changes to the biological objectives in response to adaptive management;
- Minor updates to the conservation easement template (Appendix K) that would not result in adverse effects or take of covered species beyond what this HCP/NCCP provides;
- Modifications or updates to the reserve unit management plans;
- Modifications or updates to the STAC evaluation criteria (Appendix F) that are consistent with the HCP/NCCP conservation strategy;
- Updates/corrections to the land cover or other resource maps and/or species occurrence data;
- Minor changes to the reporting protocol; and
- Other proposed changes to the Yolo HCP/NCCP that have been determined to be insubstantial and appropriate for implementation as a minor modification.

7.8.2.1 Minor Modification Process

The Conservancy, USFWS, or CDFW may propose minor modifications to the Yolo HCP/NCCP (as applied to both the federal and state Permit) by providing written notice to the Conservancy, Permittees, USFWS, and CDFW. Such notice will include a description of the proposed minor modifications; an explanation of the reason for the proposed minor modifications; an analysis of its environmental effects, including any impacts on covered species; and an explanation of why that party believes the effects of the proposed minor modifications would not:

- Significantly differ from, and would be biologically equivalent to, the effects described in the Plan, as originally adopted;
- Conflict with the terms and conditions of the Plan, as originally adopted; and
- Significantly impair implementation of the Yolo HCP/NCCP Conservation Strategy.

USFWS, CDFW, and the Conservancy may submit comments on the proposed minor modification in writing within 60 days of receipt of notice. If any party does not concur with the proposed minor modification for any reason, the minor modification will not be incorporated into the Yolo HCP/NCCP. If USFWS and CDFW do not concur that the proposed minor modification meets the requirements for a minor modification, the proposal must be approved according to the amendment process (see Section 7.8.3, *Amendments*). The Permittees, Conservancy, USFWS, and CDFW may utilize the informal dispute resolution process set forth in the Yolo HCP/NCCP Implementing Agreement (Appendix F, *Implementing Agreement*) to resolve disagreements concerning proposed minor modifications.

If the Conservancy is in agreement regarding the proposed minor modification, and USFWS and CDFW concur that the requirements for a minor modification have been met and the modification should be incorporated into the Yolo HCP/NCCP, the HCP/NCCP will be modified accordingly.

7.8.3 Amendments

Under some circumstances, it may be necessary to make changes to the Yolo HCP/NCCP that are more significant than administrative actions or the minor modifications described above. Any proposed changes to the Yolo HCP/NCCP that do not qualify for treatment as administrative actions or minor modification, as defined above, will require an amendment to the Yolo HCP/NCCP. Amendment to the Yolo HCP/NCCP will also require corresponding amendment to the Permits, in accordance with applicable laws and regulations regarding Permit amendments. The Conservancy will be responsible for submitting any proposed amendments to USFWS and CDFW.

Amendments to the Yolo HCP/NCCP will most likely occur very infrequently or may not occur at all. The process for amendments is described below for each Permit. Amendments include, but are not limited to, the following:

- Substantive changes to the boundary of the Plan Area, Permit area, or reserve area;
- Additions to or deletions from the covered species list;
- Increasing the allowable take limit of covered activities;
- Adding substantial new covered activities to the Plan;
- Modifications of any important action or component of the conservation strategy, including funding, that may substantially affect levels of authorized take, effects of the covered activities,

or the nature or scope of the conservation program. This includes a reduction in the conservation strategy in the event that covered activities and fee funding do not occur as projected; and

- A change in the Permit duration.

7.8.3.1 Amendment Process for the FESA Permit

To amend the Section 10(a)(1)(B) permit, the Conservancy Board will submit a formal application to USFWS. This application must include a revised HCP/NCCP, a Permit application form, any required fees, a revised implementing agreement, and the required compliance document under NEPA. The appropriate NEPA compliance process and document will depend on the nature of the amendment being proposed. A new scoping process may be required, dependent upon the nature of the amendment. If additional scoping is deemed appropriate and necessary, USFWS and/or NMFS will publish a notice of intent in the *Federal Register* to initiate the scoping process. Upon submission of a completed application package, USFWS and/or NMFS will publish a notice of the proposed application in the *Federal Register*, initiating the NEPA and HCP amendment review process. After public comment, USFWS or NMFS may approve or deny the Permit amendment application.

7.8.3.2 Amendment Process for the NCCP Permit

Procedures for applying for an amendment to the NCCP Permit are included in the implementing agreement and will be processed in accordance with applicable NCCPA requirements. The NCCP Permit amendment will be subject to the requirements of CEQA. Following compliance with CEQA, CDFW will either approve or deny the Permit amendment. To approve the Permit amendment, CDFW must make appropriate NCCPA and CEQA findings.

7.9 Data Tracking and Reporting

7.9.1 Reporting

The Conservancy will prepare annual reports to provide an accounting of compliance with the Yolo HCP/NCCP and its associated authorizations and facilitate interagency coordination, scientific exchange, and public outreach. The FESA requires habitat conservation plans to establish monitoring programs to assess the effects of plan implementation on covered species. In addition, the USFWS Five-Point Policy recommends that such plans provide for annual reporting on matters related to compliance with permit terms and conditions. Similarly, the NCCPA requires that implementing agreements include "provisions for periodic reporting to USFWS and [CDFW] and the public for purposes of information and evaluation of plan progress." The Conservancy will, over the term of the Yolo HCP/NCCP, submit annual reports to USFWS and CDFW that serve the following purposes:

- Provide the necessary data and information to demonstrate that the Yolo HCP/NCCP is being properly implemented;
- Identify the effect of plan implementation on covered species and on the effectiveness of the conservation strategy at advancing the Yolo HCP/NCCP's biological goals and objectives;

- Document actions taken under the adaptive management program (e.g., process, decisions, changes, results, corrective actions); and
- Describe schedules and costs related to the implementation of actions over one-year timeframes.

Throughout the course of plan implementation, the Conservancy will prepare the following documents:

- Annual work plan and budget, and
- Ten-year comprehensive review.

These documents will provide the information necessary to enable USFWS, CDFW, other state and federal agencies, local agencies, stakeholders, and the general public to assess on an ongoing basis the progress and performance of the Plan toward meeting its biological goals and objectives and make informed recommendations to the Conservancy regarding Plan implementation. To accommodate access to this information, these reports will be available to the public and posted on the Conservancy web site.

7.9.2 Annual Reports

The Conservancy will prepare an annual report to provide a summary of the activities that were carried out during the previous implementation year. The Conservancy will complete an annual report within three months of the close of each reporting year to provide sufficient time to compile data and complete analyses of monitoring data. The Conservancy will develop a standardized format for annual reports. Final annual reports will be maintained in the Yolo HCP/NCCP implementation database (see Section 7.9.1, *Reporting*). The Conservancy staff will present these reports annually to the Conservancy Board at a public meeting, and will submit them annually to the wildlife agencies.

Each annual report will provide the following information:

- Documentation of the implementation of habitat conservation measures (protection/enhancement/restoration), including the following information:
    - A summary of the completed or in-progress habitat conservation actions, including information related to type, extent, and location of restored, enhanced, and existing protected habitats and natural communities. The report will document, on an annual and cumulative basis, the habitat conservation actions completed by the Conservancy and its partners;
    - A summary of all land management activities undertaken on HCP/NCCP reserve lands and a discussion of overall and site-specific management issues encountered by the Conservancy;
    - Identification of habitat protection, restoration, or enhancement actions that have not been implemented in accordance with the implementation schedule (i.e., behind or ahead of schedule) and an explanation for the deviation from the schedule;
- An assessment of the nature and extent of the impacts of covered activities on natural communities and covered species, including the following information:
    - A description of each covered activity conducted, the entity responsible for the covered activity, and the location of habitat permanently or temporarily removed or disturbed by the covered activity;

  - A cumulative summary of all impacts of HCP/NCCP covered activities on covered natural communities and covered species habitats, habitat mitigation implemented to address these impacts, and a description of how implementation of conservation measures is roughly proportional in time and extent to the impacts on covered species and their habitats;
  - Amount of authorized take of species habitat and reporting of any observed harassment or mortality of covered species;
  - The status of the Yolo HCP/NCCP reserve system assembly with respect to authorized take/habitat loss;
- An evaluation of the results of monitoring and directed studies, including the following:
  - A description of monitoring activities undertaken during the reporting period and a summary of monitoring results, data analysis results, and the knowledge gained from monitoring that is valuable to adaptive management;
  - A description of all HCP/NCCP directed studies conducted during the reporting period, a summary of study results to date, and a description of how these results were or will be integrated into implementation;
- A description of adaptive management activities, including the following:
  - A description of the adaptive management decisions made during the reporting period, including how existing information was used to guide these decisions and the rationale for the actions;
  - A description of the use of independent scientists or other experts in the adaptive management decision-making processes;
  - A description of adopted and recommended changes to the conservation measures, avoidance and minimization measures, and monitoring plan (e.g., monitoring protocols, variables, analytical methods) through the adaptive management process based on interpretation of monitoring results and research findings;
- A financial report describing the following:
  - Funds provided to the Conservancy and the source of those funds;
  - Annual and cumulative expenditures by major cost category;
  - Deviations in expenditures from the annual budget and other relevant information as appropriate;
- A description of implemented actions to respond to changed circumstances, including the following:
  - A description of the changed circumstance and its effects on covered species and natural communities;
  - A description of the actions taken to address the changed circumstance and the effectiveness of those actions, including the outcomes of actions to address changed circumstances from earlier years;
  - A description of any unforeseen circumstances occurrences and the process taken to address them; and

- A summary of any administrative changes, minor modifications and revisions, or formal amendments to the Plan proposed or approved during the reporting period.

7.9.3 Ten-Year Comprehensive Review

The Yolo HCP/NCCP adaptive management plan requires 10-year reviews of HCP/NCCP implementation to provide the Conservancy with a longer term and methodical process and periodically evaluate its progress toward achieving the biological goals and objectives and assessing its implementation procedures. The Conservancy will prepare a ten-year comprehensive review document and make it available to USFWS, CDFW, and the Advisory Committee within six months following the end of each HCP/NCCP 10-year implementation period.

The primary purpose of the ten-year comprehensive review is to provide a periodic program-level assessment of the progress made under the Yolo HCP/NCCP toward achieving the biological goals and objectives. As such, the review will be focused on identifying and evaluating broad ecological trends within the Plan Area, including covered species abundance, distribution, and population growth rate; ecological processes and stressors; natural community distribution, function, and diversity; habitat restoration extent and functionality; and other relevant measures.

The objectives of the Ten-Year Comprehensive Review are:

- To provide an overview of the status of HCP/NCCP implementation, including implementation of conservation measures and the progress made toward achieving biological goals and objectives;
- To assess covered species trends and habitat conditions associated with HCP/NCCP implementation relative to overall trends and conditions for covered species and natural communities based on all relevant information (i.e., not limited to HCP/NCCP data and reports);
- To evaluate the relevance of the various monitoring actions, directed studies, and outside research to the implementation of conservation measures; and
- To evaluate changes that have been made in implementation of the Yolo HCP/NCCP and set out potential modifications that may be advisable in the future based on new information and lessons learned.

The Ten-Year Comprehensive Review will look back over the entire implementation period (not just the prior 10 years since the last review) to build on cumulative data and knowledge. Ten-Year Comprehensive Reviews will include critical evaluations of the information and assumptions upon which the Yolo HCP/NCCP has been based and the efficacy of the conservation measures in light of monitoring data and the analysis and synthesis of information through the adaptive management process.

The Ten-Year Comprehensive Review will also include an evaluation of the Plan's monitoring program, assessing such issues as the program's capacity to adequately measure the HCP/NCCP's progress toward achieving biological goals and objectives. The review will discuss the lessons that have been learned during the course of implementation and reach conclusions regarding how best to approach monitoring into the future. The review will also afford an opportunity to evaluate the Yolo HCP/NCCP biological goals and objectives and assess their continued relevance in light of new information that has become available.

The Conservancy will post the Ten-Year Comprehensive Review on the Conservancy web site and include a summary of the review to assist stakeholders and the public in their understanding of the report.

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Chapter 8
Costs and Funding

8.1 Introduction

This chapter describes the methods the Yolo Habitat Conservancy (Conservancy) used to estimate the costs and funding needed to implement the Yolo HCP/NCCP over the 50-year duration of the Permits. This chapter also identifies fees and other funding sources that support implementation of the Yolo HCP/NCCP, the funding needed to support ongoing management of the reserve system after the permit term ends, and funding adequacy. As described in Section 8.4.5, *Funding Adequacy*, if any funding source delivers less than expected revenue over the duration of the permits, the Permittees and wildlife agencies will meet and discuss modifications to the Plan, up to and including a major amendment.

8.2 Cost to Implement the Yolo HCP/NCCP

The Conservancy estimated the full cost of Yolo HCP/NCCP implementation to demonstrate that adequate funding is available to meet regulatory standards. The process to estimate costs involved many assumptions about how the reserve system would be assembled, how working landscapes would be integrated in the reserve system, and how conservation measures would be implemented over time and maintained in perpetuity. The assumptions are consistent with the specifics of the conservation strategy outlined in Chapter 6, *Conservation Strategy*. The costs are identified for planning purposes only. The Conservancy will prepare and approve a budget for Plan implementation annually, based on current information and projections regarding Yolo HCP/NCCP assets, revenues, and expenses. Major cost categories are listed below and summarized in this chapter.

- Establish reserve system;
- Restore natural communities;
- Manage and enhance easement and pre-permit reserve system lands;
- Monitoring, research, and scientific review;
- Plan administration;
- Local partner activities in riparian corridors;
- Contingency;
- Costs in perpetuity; and
- Plan preparation costs.

Table 8-1, *Yolo HCP/NCCP Cost Summary by Cost Category, 50-year Permit Term*, shows the anticipated cost of each category for the Yolo HCP/NCCP by five-year period and cumulatively for the 50-year permit term. Cost estimates summarized by five-year period are generalized predictions of the timing of funding needs. Annual costs will vary over the 50-year permit term because of the

increase in the size of the reserve system over time and the schedule of restoration activity. All costs are in 2017 dollars. Cost factors were originally developed in 2014 and were updated to reflect mid-2017 values based on changes in the Consumer Price Index (as identified in Table 8-10, *HCP/NCCP Fee Adjustment Indices)* and, for some land cost factors, analysis of updated data on trends in agricultural land values.[1] Limited management, monitoring, and administrative responsibilities will continue in perpetuity beyond the permit term. Those costs are estimated as an average annual cost.

8.3 Cost Estimate Methodology

To estimate the costs of the Yolo HCP/NCCP, the Conservancy developed a cost model to identify the specific costs in the major cost categories (listed above) (Appendix H, *Cost Supporting Materials*, provides the assumptions and output of the model). The Conservancy designed the cost model to demonstrate that the Conservancy has reasonably estimated the implementation costs of the Yolo HCP/NCCP. The Conservancy refined the model structure from cost models developed for other regional HCPs and NCCPs.[2] The cost model generates conservative estimates of the expenses of the Conservancy over the permit term and in perpetuity to allow the Conservancy to determine funding needs and develop an appropriate fee structure. During Plan implementation, the Conservancy will update the cost model to assist with the HCP/NCCP planning process as the cost assumptions are refined, based on actual experience.

The sections that follow describe the cost categories and unit cost factor assumptions and sources. The Conservancy developed cost assumptions by using local comparable cost data from land managers in the Plan Area, when available, and other sources when data from local agencies were unavailable. Examples of local sources of cost data include the Yolo Land Trust, Yolo County, and Yolo County mitigation banks.

Details regarding each cost category and the key assumptions the Conservancy used to develop the Yolo HCP/NCCP's cost estimate are provided below. Section 8.3.8, *Costs in Perpetuity*, describes the costs in perpetuity. See the cost model in Appendix H, *Cost Supporting Materials*, for an accounting of all assumptions.

8.3.1 Establish Reserve System

Reserve system assembly is the largest single component of the Yolo HCP/NCCP's costs, totaling about $218 million over the permit term, or about 54 percent of Plan costs (Table 8-1, *Yolo HCP/NCCP Implementation Cost Summary by Cost Category, 50-year Permit Term*). The reserve system assembly cost category includes acquisition costs (i.e., the price of the land or conservation easement or related enrollment costs for pre-permit reserve lands), the cost to conduct pre-acquisition assessments, and transaction costs. The cost to acquire cultivated lands and grassland in fee title for wetland restoration is not included in this section but, rather, is included as a cost in Section 8.3.2, *Restore Natural Communities*.

[1] Specifically, the agricultural land cost factors were originally based on analysis of *2014 Trends in Agricultural Land and Lease Values* published by the California Chapter of the American Society of Farm Managers and Rural Appraisers (ASFMRA). The updated 2017 cost factors are based on analysis of *2017 Trends in Agricultural Land and Lease Values*.

[2] The Santa Clara Valley Habitat Plan (an approved HCP/NCCP), the East Contra Costa County HCP/NCCP (an approved HCP/NCCP), and the Placer County Conservation Plan (an in-process HCP/NCCP).

The Conservancy based the reserve system assembly cost estimates on the land protection mechanisms specified in Chapter 6, *Conservation Strategy,* for Conservation Measure 1: Establish Reserve System. The proposed reserve system has two integrated land elements that, together, meet the conservation strategy requirements described in Chapter 6, *Conservation Strategy*.

1. Newly protected land acquired in fee title or by conservation easement, and
2. Pre-permit reserve lands enrolled in the Plan.

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Table 8-1. Yolo HCP/NCCP Implementation Cost Summary by Cost Category, 50-year Permit Term (rounded to the nearest thousand)

	Permit Period (years)												
Cost Category[a]	**Start up**	**1 - 5**	**6 - 10**	**11 - 15**	**16 - 20**	**21 - 25**	**26 - 30**	**31 - 35**	**36 - 40**	**41 - 45**	**46 - 50**	**50 Year Total**	**Average Annual Cost**
Establish Reserve System, except restored lands[b]	$0	$24,531,000	$24,270,000	$24,270,000	$24,270,000	$24,270,000	$24,270,000	$24,270,000	$24,099,000	$24,126,000	$0	$218,376,000	$4,367,520
Restore Natural Communities[c]	$0	$7,738,000	$7,944,000	$8,086,000	$8,204,000	$8,292,000	$8,398,000	$8,552,000	$8,693,000	$1,073,000	$1,169,000	$68,150,000	$1,363,000
Manage and Enhance Easement & Pre-Permit Reserve Lands[d]	$0	$1,405,000	$1,478,000	$1,352,000	$1,417,000	$1,365,000	$1,431,000	$1,497,000	$1,563,000	$1,634,000	$1,327,000	$14,468,000	$289,360
Monitoring, Research & Scientific Review, except restored lands[d]	$0	$1,240,000	$1,415,000	$1,642,000	$1,689,000	$1,917,000	$1,953,000	$2,181,000	$2,408,000	$2,375,000	$1,982,000	$18,802,000	$376,040
Plan Administration	$0	$3,590,000	$3,598,000	$3,454,000	$3,462,000	$3,567,000	$3,429,000	$3,437,000	$3,347,000	$3,209,000	$3,053,000	$34,145,000	$682,900
Local Partner Activities in Riparian Corridors	$0	$2,152,000	$2,152,000	$2,152,000	$2,152,000	$2,152,000	$2,152,000	$2,152,000	$2,152,000	$2,152,000	$2,152,000	$21,520,000	$430,400
Contingency	$0	$3,267,000	$3,287,000	$3,297,000	$3,321,000	$3,358,000	$3,365,000	$3,410,000	$3,445,000	$3,225,000	$753,000	$30,727,000	$614,540
Total	$0	$43,922,000	$44,144,000	$44,253,000	$44,514,000	$44,921,000	$44,997,000	$45,498,000	$45,707,000	$37,794,000	$10,436,000	$406,187,000	$8,124,000

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Table 8-2, *Yolo HCP/NCCP Newly Protected Lands by Means of Acquisition*, shows the cost model assumptions for acquiring newly protected lands (see also Table 6-1(b), *Reserve System Land Types)*. The conservation strategy commits to acquisition of 24,406 acres of a variety of land cover types. For the purposes of Plan cost estimates, the Conservancy assumes acquisition of an additional 135 acres of "non-target" land (about five percent more than the commitment) to satisfy Plan commitments for targeted wetland land cover types.[3] These 135 acres are not a commitment under the HCP/NCCP, but their acquisition was assumed for costing purposes. In addition, the Conservancy will acquire 956 acres of cultivated lands and grassland to meet mitigation and conservation requirements to restore wetland, riparian, lacustrine, and riverine natural communities (see Section 8.3.2, *Restore Natural Communities*). Plan costs are therefore based on acquisition of 25,497 acres (24,406 + 135 + 956 acres = 25,497 acres) of newly protected lands. Consistent with the conservation strategy, the Conservancy will generally acquire conservation easements on all but the cultivated lands and grassland acquired for restoration.[4]

The balance of the reserve (8,000 acres) will come from pre-permit reserve lands, defined as lands that are already in public ownership or protected under existing conservation easements that contribute to the biological goals and objectives of the Yolo HCP/NCCP (Table 6.1(b), *Reserve System Land Types*).[5] The Conservancy has conducted a detailed inventory and evaluation of almost 50 sites in the Plan Area that, in whole or in part, could qualify for enrollment. The combined acreage of all of the sites evaluated is about 9,400 acres, 1,400 acres more than the pre-permit reserve target; therefore, not all sites will be enrolled. See Appendix H *Cost Supporting Materials*, Table 6 for a list of the likely inventory from which pre-permit reserve lands would be enrolled. (Furthermore, other sites not in the current list may be considered or enrolled if they qualify.) The Conservancy evaluation of management plans and easement terms for the pre-permit reserve lands, with which the wildlife agencies preliminarily concurred, indicates that about 4,900 acres of pre-permit reserve lands on 23 sites will qualify for enrollment in the Yolo HCP/NCCP without additional acquisition costs. Table 8-3, *Yolo HCP/NCCP Pre-Permit Reserve Lands,* lists these 23 sites by number, identifies the managing agency, and provides the size of each site in acres. The balance of the enrolled pre-permit reserve lands (about 3,100 acres) will come from sites that will require some modifications to the terms of the easement or the establishment of new conservation easements, consistent with the Yolo HCP/NCCP requirements. The wildlife agencies will review and approve acquisitions for the reserve system as described in Section 7.5.2, *Acquisition Process*. Such modifications or new easements will generate acquisition costs for the Conservancy, as discussed below.

[3] Land acquisition to meet small targets will most likely exceed those targets because of parcel boundaries and the limitations of available acquisition from willing sellers.

[4] As part of the Cache Creek Area Plan, Yolo County has committed to enrolling in the reserve 276 acres of reclaimed off-channel mining land. The Conservancy will add habitat conservation easements on these properties and the acres will count towards the newly protected lands commitment. These sites are identified in Appendix H, *Cost Supporting Materials*, Table 3: Fee Title and Easement Acquisition Input. Also see Yolo Habitat Conservancy. June 26, 2015. *Local Cost Share Sources and Potential Approaches.* Memorandum to the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife from Petrea Marchand, Executive Director, and Chris Alford, Alford Environmental, regarding Yolo HCP/NCCP Local Cost Share Source Assessment.

[5] The 8,000 acres of pre-permit reserve lands does not include the 276 acres of reclaimed off-channel mining land described in footnote 4, above.

8.3.1.1 Acquisition Costs

As indicated in Table 8-2, *Yolo HCP/NCCP Newly Protected Reserve Lands by Means of Acquisition,* 70 percent of the newly protected lands will come from cultivated lands. The cost model and funding plan require reasonable planning-level estimates of this important component of Plan implementation. The cost model uses per-acre averages, based on the best available current information. Actual land costs and easement values will vary significantly around these averages, depending on numerous parcel-specific factors. Qualified appraisals of each potential acquisition site will establish actual fee title and easement costs.

Table 8-2. Yolo HCP/NCCP Newly Protected Lands by Means of Acquisition

	A	B	C	D = A + B	E = C + D	
Natural Community	**Newly Protected Lands Commitment**	**Additional Acquisition to Ensure Commitment of Sensitive Habitats[a]**	**Additional Fee Title Acquisition for Restoration**	**New Easement Acquisition**	**Total Acres Acquired**	**Percent**
Cultivated Lands						
Agriculture – Rice	2,800	—	—	2,800	2,800	11.0%
Agriculture – Non-rice	14,362	—	741	14,362	15,103	59.2%
Grassland[b]	4,364	—	215	4,364	4,579	18.0%
Blue Oak Woodland	10	—	—	10	10	0.0%
Valley Oak Woodland	20	—	—	20	20	0.1%
Alkali Prairie and upland grassland[b]	100	—	—	100	100	0.4%
Fresh Emergent Wetland	500	25	—	525	525	2.1%
Valley Foothill Riparian	1,600	80	—	1,680	1,680	6.6%
Lacustrine and Riverine	600	30	—	630	630	2.5%
Other – Barren						
Bank Swallow Habitat	50	—	—	50	50	0.2%
Total Newly Protected Lands[c]	**24,406**	**135**	**956**	**24,541**	**25,497**	**100.0%**

Assumptions/Notes:

[a] Because of parcel size boundaries and limitations regarding available acquisitions from willing sellers, land acquisition to meet the small acreage targets for sensitive habitats will most likely be greater than the underlying newly protected lands commitment. For the purpose of the cost analysis, the Conservancy assumes that 5 percent more acreage for sensitive habitats will be acquired to meet the sensitive habitat targets exactly, in case parcels are larger than the acre commitments.

[b] The amount of newly protected grassland to be acquired is reduced from the 4,430 acres commitment for the purposes of this table because 66 acres of upland grassland at Woodland Regional Park is acquired and managed as part of the alkali prairie reserve lands. The 66 acres of upland grassland are added to the 34 acres of alkali prairie for a total of 100 acres of alkali prairie and upland grassland natural community for the purposes of the acquisition cost and management cost analysis.

[c] This total includes 276 acres of reclaimed mining land held in fee title by Yolo County and committed to the reserve, with the addition of habitat conservation easements, as newly protected lands. The sites are part of the Cache Creek Area Plan. See. Appendix H *Cost Supporting Materials* Table 3 for a list of the parcels.

Table 8-3. Yolo HCP/NCCP Pre-Permit Reserve Land Sites Expected to be Enrolled "As-Is" without Additional Acquisition Cost

Number	Site	Managing Agency	Size (acres)
Type 1: Public and Easement Lands			
1	River Ranch – VELB Conservation Bank Phase 2	Wildlands/Wildlife Heritage Foundation	35.5
2	River Ranch – VELB Conservation Bank Phase 3	Wildlands/Wildlife Heritage Foundation	99.7
3	Ridge Cut Farms Conservation Bank	Wildlands	185.9
4	Pope Ranch – Giant Garter Snake	Wildlands	391.0
5	River Ranch – VELB Conservation Bank Phase 1	Wildlands/Wildlife Heritage Foundation	76.0
6	River Ranch – Wetlands Mitigation Bank	Wildlands/Wildlife Heritage Foundation	113.4
7	Grasslands Regional Park – Burrowing Owl Mitigation	County of Yolo/City of Davis	33.0
8	Conaway – Giant Garter Snake	American West Conservation	1,000.0
9	Conaway – Swainson's Hawk	American West Conservation	1,000.0
10	Conaway – Tri-colored Blackbird	American West Conservation	224.2
11	SWHA Mitigation – Bogle	Yolo Land Trust	76.0
12	SWHA Mitigation – Chickahominy Creek 1	Yolo Habitat Conservancy	148.9
13	SWHA Mitigation – Lara West	Yolo Land Trust	83.1
14	SWHA Mitigation – Lara East	Yolo Land Trust	41.0
15	SWHA Mitigation – Los Rios	Yolo Land Trust	80.2
16	SWHA Mitigation – Schmid	Yolo Land Trust	80.2
17	SWHA Mitigation – Tule Ranch	Yolo Land Trust	143.4
18	SWHA Mitigation – Virgin	Yolo Habitat Conservancy	347.0
19	SWHA – Kerr	Yolo Land Trust	87.3
20	SWHA Mitigation – Chickahominy Creek 4		160.7
21	SWHA Mitigation – Chickahominy Creek 5		161.1
22	SWHA Mitigation – Tule Ranch Area II		289.6
23	Yolo Bypass Wildlife Area	CDFW	TBD
		Subtotal acres Sites 1–10	3,158.7
		Subtotal acres Sites 11-23	1,698.5
		Grand Total Sites 1-23	4,857.21
	Net remaining acres to reach 8,000 acre pre-permit reserve land commitment	[8,000 – 4,857.2]	3,142.8
	Total additional acres in potential inventory of 46 sites	[9,426.9 – 4,857.2]	**4,569.7**

Source: Yolo Habitat Conservancy. June 26, 2015. *Local Cost Share and Potential Approaches.* Memorandum to the U.S. Fish and Wildlife Service and California Department of Fish and Wildlife from Petrea Marchand, executive director, and Chris Alford, Alford Environmental, regarding Yolo HCP/NCCP Local Cost Share Source Assessment, as updated January 2018.

VELB = valley elderberry longhorn beetle

SWHA = Swainson's hawk

WWTP = wastewater treatment plant

For this cost model, the Conservancy based fee title land value assumptions on an analysis of trends in agricultural land values, as documented in *2017 Trends in Agricultural Land and Lease Values: California and Nevada*, published by the California Chapter of the American Society of Farm Managers and Rural Appraisers (ASFMRA) in Yolo County and interviews with appraisers, real estate brokers, and land management agencies that are active in the region. The ASFMRA gathers data from its members and prepares an annual trends report that estimates values for several categories of agricultural land, including land for vegetable row crops, irrigated field crops, rice, and rangeland in south Sutter County, western Placer County, north Sacramento County, and Yolo County. As noted above, it is anticipated that the Conservancy will acquire fewer than 1,000 acres of the reserve system in fee title.

For the purposes of the cost analysis, it is anticipated that the Conservancy will acquire fee title for non-rice cultivated agricultural land and grassland needed for restoration projects (see Section 8.3.2, *Restore Natural Communities*).

Fee title land value factors are another component of the formula that is used to calculate the cost of acquiring Yolo HCP/NCCP conservation easements. The cost model assumes the Conservancy can acquire easements at about 60 percent of fee title values in all cases, except for non-rice cultivated agricultural land (in current market conditions). As detailed below, that easement cost is estimated as the difference in value between orchard land and irrigated cropland.

The fee title and easement cost factors used in the model to estimate the cost to acquire easements on newly protected lands are listed below.

- $14,000 per-acre fee title for cultivated agricultural land (rice). The range of ASFMRA 2017 values for rice is $9,500 per acre to $15,500 per acre with a mid-point of $12,500 per acre. Values at the high end of the range are justified in the area served by Reclamation District (RD) 108 (the Colusa Basin). The model cost factors assume a mix of values across this range. For the purposes of this cost analysis, the Conservancy will acquire only voluntary easements on newly protected rice land. The cost model estimates those easement acquisition costs as a percentage of the fee title cost;
- $2,648 per-acre fee title for grassland in the Dunnigan Hills planning unit, assuming large parcels (greater than 160 acres). The conservation strategy identifies 3,000 acres of the grassland commitment in the Dunnigan Hills planning unit. The Conservancy will acquire grassland in the Dunnigan Hills planning unit through voluntary conservation easements. The cost model estimates those easement acquisition costs as a percentage of the fee title cost;
- $4,237 per-acre fee title for grassland and alkali prairie habitat in the valley, assuming smaller parcels in the range of 50–160 acres. The higher per-acre cost of land in the valley than in the Dunnigan Hills reflects the possible construction of farm dwelling(s) on these smaller parcels in the valley. This factor applies to the grassland acres acquired in fee title for the purpose of restoration (see Section 8.3.2, *Restore Natural Communities*). The Conservancy will acquire other newly protected grassland and alkali prairie habitat in the valley as conservation easements. The cost model estimates those easement acquisition costs as a percentage of the fee title cost;
- $1,059 per-acre fee title for the other natural communities in the newly protected lands commitment (blue oak woodland, valley oak woodland, fresh emergent wetland, valley foothill riparian, lacustrine and riverine, and bank swallow habitat). These natural

communities represent less than 15 percent of the commitment regarding newly protected lands and have a lower economic value than parcels on the valley floor, which are suitable for residential development. They are likely to be acquired as part of a predominantly cultivated land- or grassland-dominated parcel. The cost estimate assumes acquisition of these natural communities as conservation easements, and that cost is estimated as a percentage of the fee title cost; and

- $10,200 per acre for a conservation easement that restricts the conversion of cultivated non-rice land to orchards or vineyards. This HCP/NCCP conservation easement, similar to the existing Swainson's hawk easements in Yolo County, restricts the conversion to orchards and vineyards. Orchard and vineyard values are the driving force in the current agricultural land market in Yolo County, as described above. Therefore, the Conservancy assumes the conservation easement cost of cultivated non-rice land is the difference in value between orchard land ($24,250 per acre) and irrigated cropland ($17,600 per acre) or field cropland ($10,500 per acre), instead of a percentage of the fee title value, as used for other land cover types.[6] For planning purposes at this time, it is reasonable to use this differential as an estimate of the price the Conservancy will have to offer to attract willing sellers of conservation easements with such restrictions. The cost model adds another five percent to this per-acre value to reflect the additional cost for easement encumbrances on the landowner, such as providing Conservancy access for monitoring, and various prohibitions. These assumptions apply to most (about 60 percent) of the conservation easements for newly protected lands.[7]

The land acquisition assumptions in the cost model assume an approximately even pace of acquisition over the five-year acquisition periods. The Conservancy will complete all land acquisition for protection by Year 45 and all land acquisition for restoration by Year 40 of the 50-year permit term. Land acquisition prices over such a long period will vary considerably. During this period, higher-than-average prices, such as those experienced now,[8] are expected to be offset by lower-than-average prices, similar to what was experienced during the recession of 2009–2012.

The Conservancy assumes the per-acre costs to enroll pre-permit reserve lands to be substantially less than the costs of acquiring newly protected lands. As noted above, sites that represent more than half of the 8,000 acres are currently protected by permanent conservation easements and have endowments or agricultural income to support ongoing management and monitoring. The cost

[6] Calculation of the midpoint value for an easement restricting conversion to orchards or vineyards is as follows: [$24,250 - $17,600 = $6,650; $24,250 - $10,500 = $13,750; the midpoint of $6,650 and $13,750 is $10,200]

[7] As described in Section 7.5.12, *Mineral Rights*, the Conservancy may acquire a limited number of conservation easements on land in which the mineral right is severed from the surface rights of the real property, and which the Conservancy cannot acquire. In those instances, the Conservancy should negotiate an acquisition price for the conservation easement that reflects the risk of the severed mineral right being exercised later and forcing the Conservancy to replace the biological values lost as a result with easement acquisition or habitat restoration elsewhere. See Section 7.5.12 for details of the acquisition process required in those circumstances.

[8] Appraisers, brokers, and land managers that are active in Yolo County agree that current market conditions for agricultural land are unprecedented. High commodity prices, with particularly strong growth in demand that fuels increased prices for orchard acreage, and new entrants in the form of investors who seek diversification are among the factors behind what might be considered "bubble" conditions in California's current agricultural land market. This means prices are trending high relative to underlying longer-term agricultural values. There are no current comparable transactions for habitat conservation easements, and past examples are not representative of current market conditions.

model assumes no additional reserve system assembly cost to enroll these pre-permit reserve lands; the legal or other staff costs for negotiating any necessary easement updates are covered in the Plan's administration staff and legal services costs, described below (Section 8.3.5, *Plan Administration*). In this sub-set of pre-permit reserve lands, not all sites have existing management plans; therefore, the Conservancy assumes a modest cost for preparing those plans, based on reserve unit management plan guidelines.

The Conservancy assumes some additional cost to enroll the balance of the pre-permit reserve lands. Some sites will require new HCP/NCCP easements; others will require easement modifications to satisfy the enrollment criteria. The costs will vary significantly, depending on the characteristics of the property. The Conservancy will balance these costs against the biological value of the site to the reserve system and will strive to cost-effectively enroll these sites. The cost model assumes an average cost of $2,648 per acre to enroll this sub-group of pre-permit reserve lands.

Mechanisms to account for expected changes in land costs over time are described in Section 8.4, *Funding Sources and Assurances*.

8.3.1.2 Transaction Costs

Transaction costs include costs for appraisals, title reports, boundary surveys, legal descriptions, negotiation of easement terms, and Phase 1 Environmental Site Assessments for hazardous materials.[9] These costs can vary significantly, depending on the size and complexity of the site. The Conservancy assumes an average of $45,000 per transaction in this cost model and the same level of transaction costs for easement and fee title acquisitions for newly protected lands. In addition, newly protected lands will require site-specific management plans. The site-specific plans are based on reserve unit management plan guidelines; the costs are estimated to be $30,000 per transaction (or site) for the purposes of this analysis. The number of transactions throughout the permit term is based roughly on the minimum patch sizes by natural community type, as specified in Section 6.4.1.4, *Reserve System Assembly*. Transaction costs for parcels acquired for restoration appear as a line item in the Restore Natural Communities cost category.

Transaction costs for enrolling pre-permit reserve lands are likely to vary more than transaction costs for newly protected lands. Costs will be substantially lower in most cases, consisting of research of existing documents and preparation of modifications to easements or other documents as needed. Some sites already have management plans, but others will require the development of site-specific management plans based on reserve unit management plan guidelines. Some sites will require the Conservancy to conduct more intensive easement acquisition services.

To represent this range of potential costs, the Conservancy makes the following assumptions:

- Five percent of the per-transaction cost for newly protected lands required to enroll pre-permit reserve lands in Sites 1–23,
- 15 percent of the per-transaction cost for newly protected lands required to enroll all other pre-permit reserve lands,

[9] A Phase 1 Environmental Site Assessment is a preliminary investigation to determine if a site might contain hazardous materials. The Conservancy will evaluate sites with hazardous materials to determine the cost-benefit of acquiring the site (e.g., if agricultural pesticides are likely to be found or suspected on many sites).

- 50 percent of the pre-permit reserve lands from among other sites that will require easement acquisition/modification services, and
- $24,365 per site for easement acquisition/modification services.

8.3.1.3 Pre-acquisition Assessments

As described in Chapter 6, the Conservancy will undertake pre-acquisition assessments to determine the biological value of any land considered for inclusion in the Yolo HCP/NCCP's reserve system. The pre-acquisition assessments will also assess physical characteristics of each site, including infrastructure. Pre-acquisition assessments include surveys for the following characteristics:

- Land cover type, including assessment of infrastructure and other site conditions;
- Covered species habitat;
- Wetlands and streams (i.e., wetland delineations);
- Covered wildlife population; and
- Landscape linkages and ecosystem functions.

The model estimates the cost of pre-acquisition assessments based on the estimated number of hours required for each type of survey and associated report writing for a typical 160-acre parcel and the cost per hour, including travel costs, for consulting qualified biologists to conduct the surveys. To account for due diligence investigation of sites that were investigated but not acquired, the model assumes a 25 percent premium on these costs. The cost of pre-acquisition assessments on lands that are acquired for restoration appears as a line item in the Restore Natural Communities cost category.

8.3.2 Restore Natural Communities

The Conservancy estimates natural community and covered species habitat restoration costs at approximately $68 million over the permit period, or, on average, $1.4 million annually during the permit term (Table 8-1*, Yolo HCP/NCCP Cost Summary by Cost Category, 50-year Permit Term*). The budget covers the activities listed below.

- Identifying and prioritizing potential restoration sites;
- Fee title acquisition of restoration sites, including transactions costs and site improvements;
- Design of restoration projects;
- Development of plans, specifications, and engineering documents;
- Bid assistance;
- Preconstruction surveys for projects within the reserve system;
- Environmental compliance (covers permitting for effects on federal and state jurisdictional waters and streambed alteration agreements as well as National Environmental Policy Act (NEPA), California Environmental Quality Act (CEQA), and National Historic Preservation Act (NHPA) documentation, as necessary);
- Construction within the reserve system;
- Construction oversight and monitoring within the reserve system;
- Post-construction monitoring and maintenance;

- Restoration repair necessary to meet success criteria specified in each reserve unit management plan (monitoring component) and site restoration plans;
- Costs associated with using contractors to assist with or complete any of the restoration components identified in the items above or make payments to partner agencies for restoration activities consistent with the Yolo HCP/NCCP on behalf of the Conservancy;
- Costs associated with Conservancy staff management and oversight of the work of contractors or partner agencies;
- Monitoring and management of restored habitat during and after the permit term (monitoring and management of lands that are not restored are included in the cost categories *Manage and Enhance Easement and Pre-Permit Reserve Lands* and *Monitoring, Research, and Scientific Review*, below); and
- Contingency of 10 percent to account for the uncertainty in these costs (contingency costs for restoration actions are independent of costs assumed for the general contingency fund described below in Section 8.3.7, *Contingency*).

Land acquisition in fee title represents 16 percent of the total cost associated with restoring natural communities. The Conservancy will acquire appropriate agriculture parcels and grassland parcels for wetland restoration. The Conservancy assumes a $13,500-per-acre *fee title* value for non-rice cultivated agriculture. The mid-point of the range for Class I and II irrigated vegetable crops soils in ASFMRA's *2017 Trends* is $17,600 per acre; the mid-point for Class II and III field crop soils is $10,500 per acre. Weighting these two values by the percentage of Yolo County cropland in irrigated vegetable crops vs. field crops (according to the *2016 Yolo County Crop Report*) results in a weighted average value of $13,200 per acre, rounded up to $13,500 per acre. The greater likelihood of finding willing sellers among those who own land with lower-value soil types and more constraints on use or properties that are subject to flooding justifies the weighted average approach to these cost estimates. Fee title value for grassland parcels is $4,237 per acre, assuming smaller parcels with farm dwelling values, as described in Section 8.3.1, *Establish Reserve System*).

The Conservancy assumes all land management responsibilities for land acquired in fee title and may need to stabilize newly protected lands before undertaking restoration activities. Site improvements may include demolition or repair of unsafe facilities, repair of boundary fences, repair and replacement of gates, installation of signs (e.g., boundary and landmark signs), and road repair and/or removal. Cost estimates are based on a per-acquired-parcel cost factor.

The Yolo HCP/NCCP calls for restoration of valley foothill riparian, fresh emergent wetland, and lacustrine and riverine land cover types. The Conservancy based the cost for each five-year period on the area of each land cover type estimated to be restored during that period. Actual restoration will depend on the acres of each natural community lost as a result of covered activities. For planning purposes, the Conservancy assumes that all restoration will be complete by Year 40 and that the pace of restoration will be constant during the permit term. The actual pace of restoration of the land cover types listed above will comply with the stay-ahead provision described in Chapter 7, *Plan Implementation*. Separately, Section 8.3.3, *Manage and Enhance Easement and Pre-Permit Reserve Lands*, accounts for enhancement costs on other newly protected cultivated lands that were acquired by means of conservation easements.

Table 8-4, *Yolo HCP/NCCP Cost per Acre to Restore Natural Communities, by Natural Community Type,* presents the restoration cost factor assumptions for the three wetland types the Conservancy will restore. The Conservancy expects the contractors will complete the restoration projects with use of

rented vehicles and equipment. Alternatively, partner agencies that have access to the necessary labor, vehicles, and equipment may complete projects. The Conservancy does not expect to maintain in-house the types of labor resources and specialized equipment needed for habitat restoration projects. For large-scale projects, a great deal of labor is typically required (e.g., for planting seedlings, cuttings, or container stock for riparian restoration projects), which only a contractor can provide. In addition, the Conservancy expects to hire contractors or work with local partners to design restoration projects, create restoration plans and specifications, assist with construction bids, conduct preconstruction surveys, oversee the construction of habitat restoration projects, and conduct post-construction monitoring and maintenance. Conservancy staff time is included in this cost category to account for the time needed to hire and oversee the contractor/partner designs, specifications, and construction.

Costs for restoration repair include the costs to monitor and replant restoration sites in the event that plantings fail because of site conditions, human error, animal browsing, or other factors. The Conservancy calculated these costs as 15 percent of the cost to restore an acre of each land cover type.[10] The Conservancy assumes restoration repair costs will be unnecessary once the performance standards are met. Restoration repair costs do not include costs associated with remedial measures for changed circumstances, which apply to the destruction of restoration sites from foreseeable natural disasters such as flooding and drought (see Chapter 7, *Plan Implementation*).

Section 8.3.3.3, *Remedial Measures for Changed Circumstances*, describes costs associated with remedial measures that deal with changed circumstances. The Restore Natural Communities cost category includes a budget for remedial measures on restored lands. For planning purposes, the cost model assumes acquisition and restoration occurs evenly over the course of the permit term. The Conservancy will complete all fee title acquisitions for restoration, which will occur evenly over eight five-year periods, by Year 40. Although the Conservancy will complete construction of habitat restoration projects by Year 45, ongoing management and monitoring of restoration sites will continue throughout the permit term. The cost model includes these costs in the Restore Natural Communities cost category.

[10] This percentage is based on the assumptions that restoration repairs will be needed on a minority of restoration projects, and these repairs will be substantially less expensive than the original construction costs. Restoration contingency funds or general contingency funds (see Section 8.3.6) could also be used to repair restoration projects, if necessary.

Table 8-4. Yolo HCP/NCCP Cost per Acre to Restore Natural Communities, by Natural Community Type

Restoration Cost Element	Fresh Emergent Wetland (wetlands only)	Valley Foothill Riparian	Lacustrine and Riverine
Preconstruction Restoration Planning Surveys	$426	$426	$237
Bid Assistance	191	169	127
Plans, Specifications, and Engineering	4,767	4,237	3,178
Construction Activity	19,068	16,949	12,712
Construction Biological Monitoring	379	379	379
Construction Oversight	953	847	636
Post-construction Restoration Monitoring and Maintenance	14,301	25,424	9,534
Total per Acre, before Contingency	**$40,085**	**$48,432**	**$26,802**
Restoration Contingency	4,009	4,843	2,680
Total per Acre, including Contingency	**$44,094**	**$53,275**	**$29,482**

Notes:
In 2017 dollars.
Plan, specification, and engineering work; bid assistance; and restoration oversight will be conducted in the five-year period in which restoration takes place. The estimate of restoration costs is a planning tool for assessing the level of effort required to perform the work. Actual restoration costs will vary from the above estimates because of competitive bidding, negotiations with the client, or fluctuations in market prices.
The per-acre costs for each restoration cost element are based on a number of assumptions, some of which vary by land cover. See Appendix H for details on these assumptions.

8.3.2.1 Environmental Compliance

Restoration projects may trigger environmental compliance documents and permitting costs, including fees. This includes compliance with NEPA and CEQA, Sections 401 and 404 of the Clean Water Act (CWA), Section 106 of the NHPA, Sections 1600–1607 of the California Fish and Game Code, and other miscellaneous requirements (e.g., county grading permits, road encroachment permits, stormwater pollution prevention plans). The environmental impact statement/environmental impact report (EIS/EIR) for the Yolo HCP/NCCP is expected to address the NEPA and CEQA compliance issues for most or all restoration projects, but individual restoration projects may require a NEPA or CEQA review to verify this compliance at the time the projects are designed. Restoration activities involving effects on state or federal jurisdictional waters will require Section 404 CWA, Section 401 CWA, and Section 1602 California Fish and Game Code permits. Projects with a federal nexus (e.g., CWA Section 404 permits), including cultural resource inventories, will trigger NHPA compliance. If the Conservancy finds significant cultural resources at a location that would be disturbed by the HCP/NCCP's restoration activities, the Conservancy may opt to relocate these activities to avoid disturbing the cultural resources.

For the purposes of cost modeling and estimating if the funding is adequate, the Conservancy assumes that an allowance of 3 percent of the restoration project's budget will cover environmental compliance reporting, documentation, and fees for HCP/NCCP restoration activities. Actual costs will vary, depending on the location and scale of the project as well as the

nature of the resources at the project site. Some projects will be covered by general permits. These will trigger minimal additional compliance costs.

The Conservancy expects to incur all environmental compliance costs during the permit term, through Year 40, because such costs are associated with habitat restoration projects. The Conservancy assumes completion of those projects by Year 40. Covered activity sponsors will bear the environmental compliance costs of their covered activities that are unrelated to conservation actions; this cost estimate does not include those compliance costs.

8.3.3 Manage and Enhance Easement and Pre-Permit Reserve System Lands

Once lands have been acquired, the Yolo HCP/NCCP describes a program to ensure that the Conservancy manages reserve lands and achieves the biological goals and objectives identified in Chapter 6, *Conservation Strategy*. This cost category includes costs for management planning and management activities related to the overall reserve system. Also included are habitat enhancements on cultivated lands that are added to the reserve system (newly protected and pre-permit reserve lands) to improve foraging and nesting habitat values. For the purposes of estimating reserve management and enhancement costs, there are four categories of reserve lands, as described below.

- Most of the newly protected lands in the reserve system (about two-thirds of the newly protected lands) will remain as working agricultural landscapes where the private landowner retains responsibility for land management. The Conservancy will hold a conservation easement that specifies the terms related to habitat conservation, consistent with the Yolo HCP/NCCP's biological goals and objectives. Costs on these lands include enhancements to improve foraging and nesting values. The responsibilities of the Conservancy staff (or contractor) include the costs to monitor reserve lands annually, thereby ensuring that the landowner's management is in compliance with the terms of the conservation easements; these are included in Section 8.3.5, *Plan Administration*.
- The Conservancy will acquire up to 956 acres of newly protected lands in fee title for the purpose of habitat restoration activities under the Plan and ensuring no net loss of wetlands (biological objective L1.1). The Conservancy will actively manage these reserve lands. Active reserve management activities include fencing, gate, and signage installation and repair; trash/debris removal; vegetation and pest management; and water supply management on restored giant garter snake habitat. Costs for these ongoing activities are included in Section 8.3.2, *Restore Natural Communities*.
- Pre-permit reserve lands will contribute another 8,000 acres to the reserve system. About 4,900 acres of pre-permit lands enrolled in the reserve system have existing endowments or agricultural income to support management activities, consistent with the HCP/NCCP, for the duration of the permit term and in perpetuity. The Conservancy assumes no additional ongoing land management costs for this sub-set of pre-permit reserve lands. The cost model includes costs for enhancements to improve foraging and nesting values on cultivated lands in this category of pre-permit reserve lands.
- About 3,100 acres of the 8,000 acres of pre-permit reserve lands do not have existing management endowments or agricultural income. Reserve unit management plans and, if necessary, site-specific management assessments of these properties will identify reserve management strategies, consistent with the Yolo HCP/NCCP's biological goals and objectives.

The conservation easements negotiated prior to enrolling these lands in the Yolo HCP/NCCP's reserve will specify management costs and funding responsibilities for these pre-permit reserve properties. For the purposes of this cost estimate, the Conservancy assumes a modest per-acre management cost on these working landscapes and publicly owned properties The cost model also includes costs for enhancements to improve foraging and nesting values on cultivated lands in this category of pre-permit reserve lands.

As indicated above, this cost category includes a variety of types of expenses, and not all expenses would apply to all reserve lands, most notably because landowners will retain primary management responsibility for newly protected lands and pre-permit reserve lands that are protected by means of the Yolo HCP/NCCP's conservation easements. Given these assumptions, the model generates costs of $14.5 million over the term of the permit, or an average of about $300,000 annually (Table 8-1, *Yolo HCP/NCCP Cost Summary by Cost Category, 50-year Permit Term*). Costs are fairly uniform throughout the permit term, varying by the pace of habitat enhancement efforts.

Cost estimates related to management and enhancement activities include those listed below.

- Conservancy staff oversight of management and enhancement activities and any contractors;
- Reserve unit management plans for seven reserve units, including initial plans and periodic updates, which are most likely a contractor cost. The plans will cover newly protected lands and pre-permit lands that are added to the reserve system. The Conservancy assumes that the common characteristics of many of these properties will support planning documents that have been developed around natural communities and species. Site-specific management plans may be necessary to address particular site conditions or other extraordinary circumstances. These costs are estimated as part of reserve system assembly transaction costs in Section 8.3.1.2, *Transaction Costs*;
- Developing an invasive species control program for the reserve system (e.g., use of herbicides or grazing);
- Coordination by Conservancy staff with other Yolo County land management entities on a pollinator strategy (a Plan administration staff responsibility and included in that cost category). The Conservancy's cost responsibility for the pollinator strategy is limited to coordination, assistance with securing funding, and public outreach;
- Managing alkali prairie habitat and associated uplands for covered and other native species by improving hydrologic conditions and reducing adverse effects of nonnative plants and human activities;
- Habitat enhancement of natural communities within the reserve system, focused on improving conditions for the covered species in cultivated lands and grassland preserves (described below);
- Adaptive management, including staff time to evaluate the results of monitoring and research to determine the effectiveness of reserve management (described below); and
- Remedial measures for changed circumstances (described below).

Management activities may be implemented by the Conservancy, contractors, landowners, or other third parties. Notably, the Conservancy assumes no staff costs for field labor and no specific cost to own or maintain the vehicles or equipment needed to conduct active management or enhancement activities. The cost model estimates represent costs for contracted labor and rented

vehicles/equipment or, alternatively, payments to partner entities such as the Yolo County Resource Conservation District to implement projects on behalf of the Conservancy. The Yolo HCP/NCCP requires reserve land management in perpetuity, although at a lower level after the permit term than during the permit term.

8.3.3.1 Habitat Enhancements

As outlined in Chapter 6, the Conservancy will manage cultivated lands to increase the habitat functions they support. The Conservancy has identified two types of habitat enhancements that would have beneficial effects for Swainson's hawk and white-tailed kite: hedgerows, consisting of uncultivated habitat strips adjacent to cultivated lands that provide important foraging habitat, and increased density for trees in cultivated lands to provide more opportunities for nesting. The Conservancy will also install nesting burrows and create debris piles in grassland preserves to enhance the function of grassland preserves for the western burrowing owl.

As with other restoration and management cost components, the cost estimates in the model represent planning-level estimates of the costs to complete these types of projects, regardless of who actually implements the project. The Conservancy might incur the cost directly by contracting out the labor, equipment, and supplies or might pay partner entities or landowners to implement the enhancement projects. Sources for the unit costs in these enhancement cost estimates include the Yolo County Resource Conservation District, Yolo Audubon, University of California Cooperative Extension, Hedgerow Farms and Estep Environmental Consulting.

Hedgerows would be established in cultivated lands at parcel edges along existing agricultural roads, canals, or drainage ditches. The model assumes a hedgerow planted with native grasses, forbs, shrubs, or trees for the purposes of demarcation as well as nesting habitat. The cost factor includes site analysis, design, site preparation, installation, and three years of maintenance to ensure establishment as well as less intensive costs for perpetual maintenance. Hedgerows are assumed for all of the newly protected cultivated lands and for the half of the pre-permit reserve lands that are assumed to be cultivated lands.[11]

A target density of one tree per 10 acres is the basis for the cost estimate for nest tree enhancement. The density factor is applied to all newly protected cultivated lands and to the approximately 4,500 acres of pre-permit reserve lands that are cultivated lands. The cost per tree includes labor, materials, and equipment and covers seedlings/saplings, planting, fertilizer, and irrigation. The cost includes a 10 percent replacement allowance to ensure success. Associated surveying and monitoring costs are included in Section 8.3.4, *Monitoring, Research, and Scientific Review.*

Target densities of two nesting burrows per 100 acres of grassland habitat and one debris pile per 200 acres of grassland habitat are the basis for the cost estimate for burrowing owl enhancements. These factors are applied to 3,000 acres of newly protected grassland preserves. Cost estimates include materials, labor and equipment for initial installation and periodic replacement as needed over the permit term.

[11] A less intensive hedgerow of largely native perennial grasses with a limited number of trees would be less costly than what the cost model assumes.

8.3.3.2 Adaptive Management

Adaptive management activities within the reserve system include any change in the management of the reserve system necessary to meet the biological goals and objectives described in Chapter 6, *Conservation Strategy*. Monitoring described in Section 6.5, *Monitoring and Adaptive Management,* informs these changes. Adaptive management could include, but is not limited to, enhancement of the reserve system through planting of trees and hedgerows and providing on-site assistance to and oversight of landowner management.

As currently designed, the adaptive management decision-making process is part of the regular duties of Conservancy staff members who are in the position of restoration/reserve project manager or senior environmental scientist. Therefore, the assumed costs associated with adaptive management decision-making, except for external scientific review, are allocated between management and enhancement of easement and pre-permit reserve system lands and Plan administration.

8.3.3.3 Remedial Measures for Changed Circumstances

The Conservancy estimated remedial measure costs to address the response to changed circumstances (see Section 7.7, *Plan Assurances*, for a description of all changed circumstances and remedial measures). The Conservancy assumes the cost estimate for remedial measures is an additional 10 percent of the cost of management activities on reserve lands. In addition, the Conservancy has budgeted for remedial measures to address the potential regional loss of Swainson's hawk foraging habitat below specific thresholds. The budget could fund a range of potential activities, such as additional habitat enhancements, easement acquisition, or development and implementation of a farmer incentives program to promote crops that also support Swainson's hawk.

As described in Chapter 7, *Plan Implementation*, the Conservancy is required to implement remedial actions if any of the changed circumstances occur. The Conservancy will maintain sufficient financial reserves to fund the remedial actions described in Chapter 7 when they arise. Starting in Year 5 of implementation, the Conservancy will annually assess its funding reserves and supplement the reserves to fund implementation of remedial actions in the coming year, based on historic events and frequency. Funds used to supplement these financial reserves could come from outside the Conservancy or from within the Conservancy budget (i.e., funds shifted from other HCP/NCCP uses). This approach will ensure that adequate funds are available immediately in the event of a changed circumstance occurring.

Annual funding for remedial measures will grow each year in proportion to the size of the reserve system, with substantial funding for remedial reserves generated later in the permit term. The changed circumstances described in Chapter 7, *Plan Implementation,* are more likely to occur on a larger scale later in the permit term because of the greater size of the reserve system and the expected effects of climate change.

The cost assumptions are made for planning purposes and will not limit the Conservancy's obligation to respond to these changed circumstances. Remedial measures for the reserve system are not required after the permit term; therefore, these costs are assumed to apply only during the permit term.

8.3.4 Monitoring, Research, and Scientific Review

Monitoring and directed research costs are estimated to be $18.8 million over the permit term and, on average, $376,000 annually (Table 8-1). The Conservancy based the monitoring cost estimates on the monitoring and adaptive management program outlined in Section 6.5. Contractors will complete most of the fieldwork, data collection, analysis, and reporting. Conservancy staff members will manage the contractors, provide oversight for the fieldwork and targeted studies, and coordinate input from the Science and Technical Advisory Committee (STAC). Compliance monitoring to track and document the status of Yolo HCP/NCCP implementation is covered as a staff cost in Section 8.3.5, *Plan Administration*.

The cost model and funding plan account for the cost of monitoring restoration projects in the Restore Natural Communities cost category. This ensures that all restoration costs are reflected in one cost category and aids in the calculation of fees for wetland effects.

Chapter 6 fully describes monitoring and directed research activities. Monitoring and directed research costs cover the following items:

- Costs associated with Conservancy staff oversight of monitoring contractors and directed research grants;
- Planning, conducting, analyzing, and reporting for baseline surveys conducted within three years of reserve site acquisition for natural communities and covered species within the Plan Area;
- Planning, conducting, analyzing, and reporting for periodic status and trends surveys of natural communities and covered species within the Plan Area, including evaluating the effectiveness of conservation measures (the cost of monitoring habitat restoration projects is included in the habitat restoration category);
- Research directed at management and monitoring needs of the reserve system; and
- Stipends for STAC for scientific review and meetings.

Species monitoring on newly protected lands is the largest contributor to monitoring costs. The Conservancy based these cost estimates on reserve land parcel size assumptions, the pace of reserve land acquisition, the number of qualified biologists required to conduct each survey, the hours required for surveying as well as the hours required for data analysis and reporting, the number of years required to establish baseline data, and the frequency of survey updates. These assumptions vary by natural community and species. Some efficiencies are taken into account when monitoring can be conducted for multiple species in the same natural community (e.g., surveys for Swainson's hawk and white-tailed kite in the same cultivated lands survey).

There are different categories of pre-permit reserve lands for the purposes of monitoring cost estimates. The Conservancy assumes no additional natural community monitoring costs for the pre-permit reserve lands that are covered by existing endowments or agricultural income (about 3,150 acres of the 8,000 acres of pre-permit reserve lands). There will be costs, however, for natural community and species biological monitoring on the rest of the pre-permit reserve lands. All pre-permit reserve acres except the approximately 900 acres in existing mitigation banks will require species biological monitoring. The Conservancy estimated the natural communities and species monitoring costs for these pre-permit reserve lands based on the mix of natural communities and species habitats in the balance of potential enrolled pre-permit reserve land sites.

The Conservancy expects most monitoring and research to occur on the reserve system, including monitoring on pre-permit reserve lands incorporated into the reserve system. Some monitoring and research, however, will occur outside the reserve system to achieve the goals of the monitoring program described in Chapter 6, *Conservation Strategy*. Monitoring costs include a limited amount of monitoring that would occur off the reserves (e.g., along streams and on other public lands to support status and trend monitoring). The Conservancy will fund targeted research studies to resolve management uncertainties that may include pilot projects investigating management and monitoring techniques or adaptive management experiments. Conservancy staff members, in consultation with the wildlife agencies, will define and manage the studies that graduate students, university researchers, or other scientists will conduct. The Conservancy will complete the targeted studies phase by Year 25 of the permit term. Reserve management costs include the cost of implementing the adaptive management recommendations of these studies.

Scientific review costs include costs for scientists to provide advice to the Conservancy throughout the permit term (see Section 6.5, *Monitoring and Adaptive Management*) through the STAC. A minimum of four biologists will compose the STAC, with one member serving as chair of the committee. Compensation for each member is assumed to be $106 per meeting, based on actual in-person attendance. The chair is assumed to receive a travel cost compensation of $159 per meeting. The cost estimate assumes five members, with an average of two meetings per month through Year 40. Meeting frequency is assumed to be an average of one meeting per month in Years 41–50. The Conservancy caps the number of meetings that can occur in any month.

The Conservancy assumes all research costs and most monitoring costs occur during the permit term. Some monitoring tasks will be required in perpetuity (see Section 8.3.8, *Costs in Perpetuity*).

8.3.5 Plan Administration

Plan administration costs are expenses for Conservancy staff, office space, supplies, and professional services. Plan administration costs to carry out the Yolo HCP/NCCP's requirements are estimated to average $683,000 annually during the permit term (Table 8-1*, Yolo HCP/NCCP Implementation Cost Summary by Cost Category, 50-year Permit Term*). Some Plan administration costs will be necessary beyond the permit term.

For the purpose of estimating administration costs, the Conservancy assumes that it will administer the Plan by hiring and managing its own staff in its own facilities. This assumption ensures the model does not understate potential costs of staffing and Plan administration. The Conservancy may realize cost savings in Plan administration by partnering with existing land management agencies that already have a staff with the required qualifications and the infrastructure to hire and manage such a staff.

Administrative costs incurred by Permittees, other than the Conservancy, to fulfill their own responsibilities under the Yolo HCP/NCCP are not included in the cost estimates. For example, each participating jurisdiction will incur costs when reviewing applications for take authorization from project proponents. The participating cities and the county may recover these costs from applicants according to the fee policies in place at each local jurisdiction. The fee amounts specified in the Yolo HCP/NCCP do not reflect the costs of application review by the local jurisdictions, and revenues from the Yolo HCP/NCCP's fees will not be used to cover these costs. Similarly, the cost of all conditions on covered activities described in Chapter 4, *Application Process and Conditions on Covered Activities,* will be borne by the project proponents, either public agencies, or private developers.

8.3.5.1 Staffing

Most of the costs of Plan administration are related to staff salaries and benefits. The cost model identifies up to 5.0 staff positions annually at the peak for Plan implementation in Years 11–25. Staffing levels are highest during the first years of implementation to meet the targets for reserve system assembly, restoration (as needed), reserve management planning, and assessing resources and developing monitoring plans. By the end of the permit term, the staffing level is down to 3.25 full-time employees. Other staffing mixes could fulfill the obligations of the Yolo HCP/NCCP; the staffing mix presented here is conservative and satisfies the purposes of the cost analysis.

For the purposes of the cost estimate, the Conservancy assumes the following staff positions to carry out the Yolo HCP/NCCP's implementation, as described in Chapter 7, *Plan Implementation*: executive director, senior environmental scientist, restoration/reserve project manager, data analyst/GIS specialist, real estate specialist, planner/grant specialist, accountant/budget analyst, and administrative support. Some positions are part-time. These positions are proposed for the type of role required to support implementation of the Yolo HCP/NCCP, but the actual staff hired may be different.

The cost estimate assumes the Conservancy will hire its own staff to administer the Plan. To reduce costs, the Conservancy may instead contract with Permittees or non-profit agencies, such as local agricultural or conservation groups, to accomplish some of the work identified for staff positions, especially in the early phase of Plan implementation. The Conservancy may also leverage existing resources of local jurisdictions and agencies that are already working in the Plan Area to use funding as efficiently as possible. At a minimum, the Conservancy will have an executive director who functions as both an organizational leader and someone to oversee the implementation effort.

Most of the estimated costs for implementation staff are covered in the Plan Administration cost category. Some staff and associated overhead costs are allocated to other cost categories. All of the real estate specialist staff costs are allocated to *Establish Reserve System*. Half of the staff costs for the senior environmental scientist/specialist are accounted for under *Monitoring, Research, and Scientific Review* and 25 percent are accounted for in *Manage and Enhance Easement and Pre-Permit Reserve Lands*, with the remaining 25 percent accounted for in *Plan Administration*. The staff costs for restoration/reserve project manager are allocated one-third to *Restore Natural Communities* and two-thirds to *Manage and Enhance Easement and Pre-Permit Reserve Lands* through Year 40, and then 100 percent to *Reserve Management* when restoration projects are complete in Year 40.

8.3.5.2 Staff and Associated Overhead Costs

Staff costs include employee salaries and benefits. Staff benefits are defined by a salary multiplier of 60 percent to include the cost of health insurance, payroll taxes, a retirement plan, workers' compensation, disability, and life insurance. Annual salaries are based on posted salary rates for comparable Yolo County or state of California positions.

The Plan administration category also includes all overhead costs associated with general office operations. This includes office space and utilities, office equipment and supplies, printing, publications, postage, fees and subscriptions, training, travel, and information technology. The cost model uses an estimating factor that reflects the current Conservancy budget allocation for these cost categories as well as assumptions about current office rents in Woodland. The Plan administration cost estimate also includes a cost for insurance (i.e., professional insurance for the Board of Directors [often known as "directors and officers insurance"], general liability and automobile insurance, and professional liability insurance for Conservancy staff members).

8.3.5.3 Legal and Financial Analysis Services

The Conservancy will require legal and financial analysis services during implementation. The Conservancy will need legal resources to draft and review conservation easements, finalize land purchases, assist with negotiations, and assist with resolving easement violations if they occur. The Conservancy assumes limited use of outside counsel, relying instead on legal services that can be provided by the Permittees from their in-house legal staff (i.e., outside the Conservancy but within Permittee agencies). Legal costs are based on respective billing rates for in-house and outside counsel and the estimated amount of time needed per five-year period. The Conservancy will require financial analysis assistance for annual financial review and periodic evaluation of the program's cost/revenue balance, thereby ensuring the Yolo HCP/NCCP's fees are in line with changing land costs and inflation. The cost model estimates the cost for contracted financial analysis services per five-year period. The Conservancy also expects attorneys and financial analysts with each local jurisdiction to provide some support during the permit term.

8.3.5.4 State Agency Staff Support

The Conservancy will fund a partial State agency staff position to ensure appropriate support for implementing this HCP/NCCP. Specifically, the Conservancy will fund a one quarter-time position at the California Department of Fish and Wildlife (assumed to be $50,000 per year including overhead and benefits). Although staff funding is assumed to continue for the duration of the permit term, the agreement will be re-evaluated periodically.

8.3.5.5 Advocacy and Public Outreach

The Conservancy assumes a cost of $42,000 per year for advocacy and public outreach services and/or materials. This provides for specialized services to assist with fundraising, building relationships with landowners and other interested parties, and raising awareness of Plan benefits and needs.

8.3.5.6 Neighboring Landowner Protection Program

Neighboring landowners who agree to participate will receive assurances through certificates of inclusion from the Conservancy that allow for incremental increases in the number of individuals or populations of covered species, above baseline conditions, on properties adjacent to the reserve system. If requested by the landowner, the Conservancy will partially fund the baseline surveys (up to half of the cost) that are required for landowners to enroll in this assurance program.

8.3.5.7 Risk Management and Conservation Easement Defense

Easement defense involves response to easement violations by subsequent property owners, neighboring landowners, and third party trespassers as well as defense against claims by affected parties such as subsequent property owners and neighboring landowners. To address the risk of easement challenges, the Conservancy intends to become a member of the Land Trust Alliance and participate in their land trust accreditation and risk management training programs. The Conservancy also intends to enroll in Terrafirma, a conservation defense liability insurance pool. These programs add about $500,000 to Yolo HCP/NCCP implementation cost over the permit term.

8.3.6 Local Partner Activities in Riparian Corridors

Activities in the Cache Creek and Putah Creek riparian corridors will contribute to the conservation of habitat for species that are protected by the Yolo HCP/NCCP. The Cache Creek Resources Management Plan (CCRMP) defines a number of activities within the Cache Creek Area Plan that are consistent with the HCP/NCCP conservation strategy. Activities budgeted on an annual basis include tracking and monitoring for invasive species control, elderberry surveys, creek walk monitoring, aerial surveys and riparian vegetation mapping and analysis, riparian and wetlands restoration, off-highway vehicle (OHV) enforcement, and remediation. In total, Yolo County, through the Cache Creek Area Plan, spends about $221,000 annually to fund these activities that contribute to the conservation of habitat for HCP/NCCP covered species.

The Lower Putah Creek Coordinating Committee (LPCCC) also conducts activities throughout the Putah Creek corridor that are consistent with the HCP/NCCP conservation strategy. The activities are budgeted annually and paid for with local funding from the Solano County Water Agency (SCWA) and in-kind services from the LPCCC and SCWA. Activities that contribute to the conservation of habitat for the Yolo HCP/NCCP's covered species include invasive species monitoring and management, wildlife monitoring and assessment, riparian and wetlands restoration (including engineering and permitting support), and native plant propagation. The annual budget for these activities in the Putah Creek riparian corridor is about $209,000.

These ongoing riparian corridor activities contribute to achieving the biological goals and objectives of the Yolo HCP/NCCP; therefore, the Conservancy has added these local partner costs to total HCP/NCCP costs for the 50-year permit term. At about $430,000 per year, these activities, in total, account for about $22 million of Plan costs.

8.3.7 Contingency

To account for uncertainties in costs, the model includes a contingency cost line item of 10 percent for acquisition and all other program costs except restoration costs and local partner activity costs. (The contingency budget for restoration activity—also 10 percent—is included in the Restore Natural Communities cost category. The budgets for local partner activities are set and do not require a contingency factor.) The contingency will be used on a short-term basis to offset any program costs that are higher than predicted. The Conservancy will use contingency funds only when needed to address costs beyond those predicted in this cost estimate and in annual budgets. Contingency funds could be used for the following:

- Acquiring materials and or data that were not forecast in the budgets,
- Adding temporary staff members or consulting services to address new issues,
- Acquiring land that is more expensive than planned or property that generates extraordinary transaction costs,
- Applying more expensive management techniques in response to adaptive management needs and conducting additional monitoring, and
- Addressing unforeseen administrative or management costs.

Adaptive management needs may arise throughout the permit term in response to monitoring results or external data that dictate shifts in management techniques and protocols. Costs for routine adaptive management needs are included in the Reserve Management cost category.

Contingency funds could address other management needs, such as expected actions that simply cost more than budgeted or minor adjustments in management that result in higher costs. This contingency budget will accrue over time; therefore, it is expected to be adequate for supplementing the adaptive management budget described above, if necessary. The Conservancy could also use the contingency to fund other HCP/NCCP needs.

Contingency funds are assumed to be needed only during the permit term because most Plan costs will be complete, (e.g., reserve assembly, directed research), and other annual costs will not only be well understood by then but will also drop substantially after the permit term.

8.3.8 Costs in Perpetuity

The Conservancy expects some costs to be incurred only during the permit term (reserve system assembly, restoration, environmental compliance, remedial measures, and contingency), while other responsibilities and costs will continue in perpetuity. Many of the conservation actions must be implemented permanently because most of the effects of the covered activities are permanent (see Chapter 5, *Effects on Covered Species and Natural Communities*). For example, management must continue beyond the permit term to ensure that the reserve system retains the biological values maintained and enhanced during the permit term. Similarly, limited species biological monitoring must continue beyond the permit term to ensure that management actions are effective.

Overall, annual costs beyond the permit term are estimated to be about 21 percent of average annual costs in the final years of the permit term (Table 8-5, *Yolo HCP/NCCP Post-permit Costs, Annual Average Costs in Perpetuity*). Many reserve system management activities continue beyond the permit term, but enhancement actions will be discontinued and management planning will be reduced. The costs for directed research, scientific review, monitoring plans, and natural communities monitoring will be discontinued, and ongoing species biological monitoring costs will be at about 25 percent of the level in place at the end of the permit term. Staffing and other plan administration costs will be at about 25 percent of the level in effect during the last five years of the permit term. Estimated annual costs in perpetuity are shown in Table 8-5, *Yolo HCP/NCCP Post-permit Costs, Annual Average Costs in Perpetuity*. Appendix H describes the assumptions used to estimate these costs.

Table 8-5. Yolo HCP/NCCP Post-Permit Costs, Annual Average Costs in Perpetuity

Cost Category	Annual Average Cost	Assumptions
Assemble Reserve (except restored lands)	$0	Reserve assembly complete in Year 45
Restored Lands (ongoing management)	$50,250	75% of annual average level of effort in Year 50 is maintained on average in perpetuity
Restored Lands (ongoing species monitoring)	$48,000	30% of annual average level of effort in Year 50 is maintained on average in perpetuity
Conservancy Reserve Management Staff and Overhead	$30,500	50% of annual average level of effort in Year 50 is maintained on average in perpetuity
Reserve Unit Management Plans (development and updates)	$37,077	Seven new reserve unit management plans, then each updated every 20 years; annualized cost
Other Management Costs	$64,000	50% of annual average level of effort in Year 50 is maintained on average in perpetuity
Natural Communities Monitoring (rest of reserve)	$0	Not required after permit term
Species Monitoring (rest of reserve)	$61,5000	25% of annual average level of effort in Year 50 is maintained on average in perpetuity
Plan Administration	$152,750	25% of annual average level of effort in Year 50 is maintained on average in perpetuity
Local partner activities in riparian corridors	$0	Not required
Contingency Fund	$0	Not required
Total	**$444,077**	
Percent of Average Annual Cost, Years 46–50	**21%**	

Notes:
In 2017 dollars.
Detail may not add to total because of independent rounding.

Based on the endowment model, an endowment fund of approximately $13.7 million in 2017 dollars would be needed at the end of the permit term to generate average real returns (i.e., inflation adjusted) that would be adequate for funding $444,000 (Table 8-5) in post-permit term reserve system management and monitoring, including accounting for inflation after the permit term. Annual real returns on endowment fund balances were assumed to equal 3.25 percent. This key assumption was based on a current habitat endowment management program operated by the National Fish and Wildlife Foundation (NFWF) under agreement with the California Department of Fish and Wildlife (CDFW). The 3.25 percent annual real rate of return is net of NFWF administrative fees.

The endowment will be built over the entire permit term through allocation of a percentage of HCP/NCCP fee revenue (see Section, 8.4.1*, HCP/NCCP Fees*). Nominal rates of return on endowments routinely exceed inflation. Consequently, of the total endowment fund balance required at the end of the permit term, only about 40 percent will come directly from HCP/NCCP fee revenue, or about $5.6 million (2017 dollars; see Table 3 in Appendix I). The remainder of the funding will come from endowment capital gains, interest, and dividend income on endowment investments. Fee levels will

be adjusted as needed to ensure sufficient endowment funding by the end of the permit term (see Section 8.4.1.6, *Adjustment of HCP/NCCP Fees*, below).

8.3.9 Plan Preparation Costs

From fiscal year (FY) 2012–2013 through estimated completion and adoption of the Yolo HCP/NCCP in FY 2017–2018, the Conservancy estimates that member agencies will spend approximately $1.5 million on preparation of the Plan. The Conservancy has also spent $3.58 million from the Conservancy's Swainson's hawk Mitigation Trust Account (MTA) on plan preparation. These amounts exclude all grants and other outside funding, and they will be reimbursed to the Conservancy and the MTA from HCP/NCCP fees during the permit term (see Section, 8.4.1, *HCP/NCCP Fees*). Total costs for plan preparation to be reimbursed are estimated to be $5.1 million.

8.4 Funding Sources and Assurances

Methods for assembling and equitably distributing the costs associated with the Yolo HCP/NCCP have been the subject of extensive discussion and consideration by members of the public, officials from local, state, and federal agencies, and elected officials. The Yolo HCP/NCCP, which incorporates the input from this diverse group, offers a balanced approach to conserving species and habitats while equitably distributing the costs.

The Yolo HCP/NCCP establishes a framework for compliance with state and federal endangered species laws and regulations that accommodates future growth in the Plan Area. Without the Yolo HCP/NCCP, public and private entities whose activities would affect threatened or endangered species and their habitats would be required to obtain permits and approvals from the U.S. Fish and Wildlife Service (USFWS) and CDFW before undertaking those activities to mitigate the effects of their activities on the affected species. To comply with the Natural Community Conservation Planning Act (NCCPA) and thereby obtain necessary permits under the California Endangered Species Act (CESA), the Yolo HCP/NCCP also provides for the conservation of the covered species in the Plan Area. Proponents of private and public development activities will benefit from this comprehensive approach in several ways: They will be assured of state and federal take coverage, they will avoid the time and expense of securing their own regulatory approvals, and they will have certainty and predictability with respect to their permit obligations and costs. Consequently, the HCP/NCCP fees imposed to implement the Yolo HCP/NCCP include some of the costs of providing for the conservation of covered species in the Plan Area that are necessary to meet the requirements of the NCCPA.

A variety of groups will directly benefit from the Yolo HCP/NCCP; therefore, those groups will also share in the responsibility for funding and implementing the Yolo HCP/NCCP. This shared responsibility includes all of the costs associated with Plan implementation described in Section 8.3, *Cost Estimate Methodology*.

Plan funding will come from several different sources, which fall into one of four categories:

- **HCP/NCCP Fees.** This source includes private and public sector development effect fees. Fees are also charged on specialized effects such as wetlands (wetland fee) and temporary effects (temporary effect fee). These HCP/NCCP fees are described in Section 8.4.1, *HCP/NCCP Fees*;

- **Local Funding.** Non-fee local funding will complement fee-based funding sources. Non-fee local funding will take many forms but consist primarily of activities funded and managed by local government agencies in cooperation with the Conservancy that will offset costs to implement the Yolo HCP/NCCP. Additional funding is expected from private foundations. These non-fee local funding sources cannot be used for mitigation purposes; they will be directed toward the NCCP portion of the Yolo HCP/NCCP (i.e., provide for the conservation of covered species in the Plan Area necessary to meet the requirements of the NCCPA). Local funding sources are described in Section 8.4.2, *Local Funding*;
- **Interest Income.** The Conservancy is expected to gain substantial revenue from interest on the Yolo HCP/NCCP endowment as it grows prior to its use to fund costs in perpetuity after the 50-year permit term. The Conservancy will also gain limited income from interest on revenue not yet spent. Interest income is described in Section 8.4.2.5, *Interest Income*; and
- **State and Federal Funding.** This source includes federal and state grant programs. Certain state and federal funding can be used only for portions of the Yolo HCP/NCCP that provide for the conservation of covered species in the Plan Area (i.e., not for mitigation).[12] State and federal funding sources are described in Section 8.4.3, *State and Federal Funding*.

Table 8-6, *Funding Plan*, summarizes the expected revenues and their sources over the 50-year permit term. The table includes total costs described in the preceding sections of this chapter, including endowment contributions and plan preparation costs. HCP/NCCP fee funding will contribute mostly to mitigation of effects, while non-fee funding from local, state, and federal sources will contribute mostly to the conservation needs of the Yolo HCP/NCCP. Each funding source is described below.

Table 8-6. Funding Plan

	Amount ($ 2017)	Percent of Total Funding[e]
Yolo HCP/NCCP Funding		
Mitigation Funding		
Land Cover Fee	$215,882,000	51%
Wetland Fee	$66,526,000	16%
Temporary Effect Fee[a]		0%
Subtotal Mitigation Funding	$282,408,000	66%
Conservation Funding		
Local Sources		
Davis Open Space Program[b]	$5,146,000	1%
Cache Creek Area Plan	$16,666,000	4%
Lower Putah Creek[c]	$10,437,000	2%
Local Foundations & Other Non-Profits	$10,000,000	2%
Subtotal Local Sources	$42,249,000	10%
State & Federal Sources[c]	$72,569,000	17%
Other Local, State & Federal Sources[d]	$18,287,000	4%

[12] The exception to this rule is if a state agency seeks Permit coverage for a public project under the HCP/NCCP as a Special Participating Entity (see Section 8.4.1.9, *Special Participating Entities*).

	Amount ($ 2017)	Percent of Total Funding[e]
Subtotal Conservation Funding	$133,105,000	31%
Other Funding		
Endowment Fund Investment Income	$8,149,000	2%
Operational Fund Interest Income	$1,300,000	<1%
Subtotal Other Funding	$9,449,000	2%
Total Yolo HCP/NCCP Funding	$424,962,000	100%
Yolo HCP/NCCP Costs		
Total Yolo HCP/NCCP Costs		
Plan Implementation (50-Yr. Permit Term)	$406,187,000	96%
Endowment Fund Balance, Yr. 50	$13,699,000	3%
Plan Preparation	$5,076,000	1%
Total Yolo HCP/NCCP Costs	$424,962,000	100%
Yolo HCP/NCCP Net Revenue		
Surplus / (Deficit)		0%

[a] Temporary effects and consequent fee revenue are likely to be quite small relative to permanent effects, and any estimates likely to be speculative, so temporary effects fee revenue is not estimated for purposes of the funding plan. Any such revenue will be credited to the development fee obligation at each five-year adjustment of the funding plan and fee levels adjusted accordingly (see section 8.4.1.6 *Adjustment of Development Fees*).

[b] The City of Davis funding objective is $10 million over 50 years in nominal dollars (not adjusted for inflation). The amount shown here is based on $200,000 per year, discounted for inflation over the permit term. The actual amount of funding adjusted for inflation will vary, depending on the timing of acquisitions and inflation rates.

[c] Estimate of state and federal funding is based on current funding sources, which are generally limited to land acquisition and wetland restoration/creation costs. Assumes state and federal funds pay for acquisition of 8,231 acres of conservation land and acquisition and restoration of an additional 44 acres of lands. See Section 8.4.3, *State and Federal Funding*, for details.

[d] Estimate of new sources of funding for the conservation share of the HCP/NCCP from a combination of local, state, and federal sources reasonably anticipated during the 50-year permit term.

[e] Percentages do not sum due to rounding.

8.4.1 HCP/NCCP Fees

The Yolo HCP/NCCP utilizes a variety of private and public development-based fees to fund mitigation that will offset losses of land cover types, covered species habitat, and other biological values. These one-time fees pay for the full cost of mitigating project effects on the covered species and natural communities. In addition, these fees are expected to satisfy all or most of the CEQA mitigation needs for biological resources, as discussed in Chapter 1, *Introduction*. Participating jurisdictions may assess their own fee to HCP/NCCP applicants to cover their processing costs.

Fees are based on the maximum allowable permanent and temporary effects on the land cover types shown in Table 6-3. The Conservancy used land cover effects because land cover is the best predictor of potential species habitat and is applicable to all of the covered species (see the species accounts in Appendix A). Effects on land cover are also used, in part, as the basis of the conservation strategy (see Chapter 6 for details). The following Yolo HCP/NCCP fees will apply in the Plan Area (summarized in Table 8-7, *HCP/NCCP Development Fee Schedule*):

- Land cover fee,

- Wetland fee, and
- Temporary effect fee.

The following subsections describe the Yolo HCP/NCCP fees, the areas within the Plan Area to which they are applied, and how they are calculated. These sections also describe the process and timing for collecting fees and how fees are adjusted over time. The Conservancy will comply with all applicable provisions of the Mitigation Fee Act[13] as to the deposit, accounting, expenditure, and reporting of such fee revenues and any other applicable legal requirements.

Fees must meet the following criteria:

- Fees will assist in meeting Federal Endangered Species Act (FESA), California Endangered Species Act (CESA), and NCCPA requirements;
- Fees generate sufficient funding to offset a proportionate share of the Yolo HCP/NCCP's costs, including endowment contributions to fund all post-permit activities in perpetuity (see Section 8.3.8, *Costs in Perpetuity*) and reimbursement of the local share of plan preparation costs (see Section 8.3.9, *Plan Preparation Costs*);
- Fees are consistent with the general level of costs that would be associated with comparable project-by-project mitigation of biological effects in the Plan Area; and
- Fees compare favorably with the actual or expected future cost of FESA and CESA permitting on a project-by-project basis, including the costs of regulatory uncertainty and project delays associated with a typical permitting process.

The underlying analysis for the HCP/NCCP fee calculations is provided in Appendix I, *Funding Plan*.

Table 8-7. HCP/NCCP Development Fee Schedule

	Fee per Acre of Land Conversion
Land Cover Fee per Acre [a, b]	$12,952
Wetland Fee per Acre [b]	
Fresh Emergent Wetland	$71,651
Valley Foothill Riparian	$79,353
Lacustrine and Riverine	$57,464

Note:
In 2017 dollars.

[a] Applied to effects on all land cover types, including other land cover types (see Chapter 5, Sec. 5.6.7, *Other Land Cover Types*), except those other land cover types that are (1) developed areas or (2) vegetated corridors that do not overlap with giant garter snake habitat, or (3) barren except gravel and sand bars.

[b] The temporary effect fee is calculated based on the land cover fee or wetland fee. See Sec. 8.4.1.4, *Temporary Effect Fee*, explanation.

8.4.1.1 Exemptions from HCP/NCCP Fees

Activities or projects not covered by the Yolo HCP/NCCP are not required to pay HCP/NCCP fees.[14] The Conservancy has determined that some covered activities should be exempt from HCP/NCCP

[13] California Government Code Sections 66000–66025.

[14] See Chapter 3 *Covered Activities*, for what is covered and what is not covered by the Yolo HCP/NCCP.

fees because they will have minimal or negligible adverse effects on the covered species, have primarily or entirely beneficial effects, will be difficult and expensive to track and report, or a combination of these factors. For these reasons, the following covered activities are *exempt* from HCP/NCCP fees and will not be tracked or reported by the Conservancy:

- All covered activities that occur on the following land cover types (see Chapter 2, *Existing Ecological Conditions*, for land cover type descriptions): developed except vegetated corridors that overlap with giant garter snake modeled habitat, and barren except where it overlaps with covered species modeled habitat. [15] The Conservancy will use a verified land cover map provided by the project proponent (see Section 4.2.2, *HCP/NCCP Application Package*) in comparison to the land cover map in the final Yolo HCP/NCCP to determine which areas are developed and therefore exempt from HCP/NCCP fees[16].

The following covered activities are also exempt from the Yolo HCP/NCCP fees but are tracked as effects, count against the Stay-Ahead Provision, and are reported by the Conservancy:

- CCRMP activities that are covered by the HCP/NCCP;
- Additions to existing structures or new structures within 50 feet of an existing structure (e.g., a new garage) that result in less than 5,000 square feet of impervious surface as long as no fresh emergent wetland, riparian, lacustrine, or riverine land cover types are affected. Expansion measurements are based on the existing structure's footprint at the time of Plan commencement. Subsequent additions must be added to the original amount to determine whether this threshold has been crossed;
- Activities on a parcel that is less than 2.0 acres, unless the project proponent's site survey[17] shows that the project will adversely affect suitable habitat for a covered species;
- Recreational facilities such as trails, signs, and other improvements within the HCP/NCCP reserve system; and
- Implementation of the conservation actions described in Chapter 6 (or otherwise consistent with the Yolo HCP/NCCP's conservation strategy) inside or outside the reserve system.

These exemptions overlap with the exemptions from conditions on covered activities described in Section 4.4, *Exemptions from Avoidance and Minimization Measures*.

8.4.1.2 Land Cover Fee

The primary component of the Yolo HCP/NCCP fees is a land cover fee. This fee is based on the mitigation of a new development's effects on land cover types at the project site that support the covered species. The basis for the land cover fee is that the primary effect on covered species is through the direct and indirect loss or degradation of habitat (see Chapter 5, *Effects on Covered*

[15] CCRMP activities affecting barren lands will not pay fees, as all CCRMP activities are exempt.

[16] If the extent of developed land cover mapped by the project proponent is substantially greater than what is mapped in the final Yolo HCP/NCCP, the local jurisdiction or the Conservancy will require the project proponent to apply the mapped extent of developed land cover in the Yolo HCP/NCCP to the fee calculation. Project proponents may contest the mapped extent of the developed land cover type on a project site by documenting the land cover type on the site prior to adoption of the Yolo HCP/NCCP (i.e., historic aerial photos, survey reports). Evidence provided by project proponents is subject to review by the local jurisdiction and the Conservancy, in accordance with the mapping methods described in Chapter 2. Any substantial increase in developed land cover from the Yolo HCP/NCCP's land cover map (i.e., a substantial reduction in fees) must be approved by the local jurisdiction and the Conservancy.

[17] See Section 4.2.2, *Item 3: Land Cover Mapping and Planning-Level Surveys,* for details.

Species and Natural Communities, for effects on each covered species). The primary determinant of the HCP/NCCP fee is the amount of effects by land cover type because habitats for covered species are so closely tied to land cover types (see Chapter 2, *Existing Ecological Conditions*, and Appendix A, *Covered Species Accounts,* for details). Land cover fees on private and public projects will be based on the *area of impact*. The area of impact for the purposes of assessing the land cover fee is defined as the area where permanent impact occurs, plus an area 50 feet from these effects, but not extending beyond the boundary of the parcel. The 50-foot buffer accounts for indirect effects of construction and operation (or occupancy) of the project. (Temporary effects are subject to the temporary effect fee described below.)

Linear public projects (e.g., in-stream and utility and road corridors) will always be assessed a land cover fee that is based on the area of effect plus a 10-foot buffer, regardless of parcel size. The fee will not be paid on any land that has been set aside for the reserve system (i.e., conservation easement).

The land cover fee is based on the fair share of the total HCP/NCCP costs associated with mitigating effects of covered activities. Land cover fee revenues may fund any type of Plan cost, including costs associated with the conservation of covered species, as long as other revenue sources directly offset this funding by funding an equivalent amount of the mitigation share of Plan costs.

Reserve system assembly costs allocated to the land cover fee are based on the per-acre cost of conservation easements on newly protected lands and exclude the per-acre cost of enrolling pre-permit reserve lands. Pre-permit reserve lands already provide some level of ecological protection and therefore cannot mitigate the effects of future covered activities under the HCP/NCCP (see Section 6.1, *Introduction*, in Chapter 6, *Conservation Strategy*, including Table 6-1(b), *Reserve System Land Types*). Table 8-8, *Land Cover Fee,* shows the calculation of the land cover fee and total fee revenue based on the average cost per acre for newly protected lands, the share of the reserve allocated to mitigation, and maximum allowable permanent effects.

The NCCP permit provides projects and activities covered by the Yolo HCP/NCCP a unique economic benefit—state regulatory assurances for all covered species. As described in Section 7.7.4, *State NCCP Assurances*, the state provides assurance that if there are unforeseen circumstances[18], no additional financial obligations or restrictions on the use of resources will be required of the Permittees without their consent. The state provides these strong regulatory assurances for all of the covered species, whether they are currently listed by the state or not. Such state regulatory assurances are only available through an NCCP. The Yolo HCP/NCCP covers 13 species, including four species not currently state listed: valley elderberry longhorn beetle, western pond turtle, western burrowing owl, and tricolored blackbird. The regulatory assurances provided by the NCCP permit ensure that even if the state lists any of these species, the state will not require the proponent of a covered activity using the Yolo HCP/NCCP to pay more in fees or apply additional avoidance or minimization measures than the Yolo HCP/NCCP currently requires. In addition, an NCCP is the only mechanism available that allows the state to provide take authorization for fully protected species. The Yolo HCP/NCCP covers one fully protected species, white-tailed kite, and provides limited take authorization as described in Section 5.7.7, *White-Tailed Kite*. The Conservancy believes these unique state regulatory assurances, unique only to an NCCP, confer real economic benefit to covered activities in the form of:

- clear and fixed project obligations for 50 years (see Chapter 4, Application Process and Conditions on Covered Activities);

[18] Changed and unforeseen circumstances are defined in Section 7.7.1, *Changed and Unforeseen Circumstances*.

- predictable fees;
- take authorization for projects with impacts to white-tailed kite; and
- no risk of additional burdens or cost when additional species are listed by the state.

The economic value of these NCCP benefits to covered activities is included in the mitigation share of the Plan.

Table 8-8. Land Cover Fee

Category	Amount
Mitigation Cost Share in Acres[a]	17,619
Cost per Acre[b]	$12,687
Mitigation Cost Share	$215,881,992
Land Conversion (acres)	16,668
Land Cover Fee per Acre of Land Conversion	**$12,952**

Notes:
In 2017 dollars.
[a] Excludes acquisition of restored lands that are funded separately by wetland fees.
[b] Cost per acre based on total costs and total acres for newly acquired lands.

8.4.1.3 Wetland Fee

Public and private project proponents are required to map all land cover types, including all fresh emergent wetland, valley foothill riparian, and lacustrine and riverine types, as part of the Yolo HCP/NCCP's application package (Section 4.2.1, *Authorization Process*). Public and private project proponents that affect these wetland land cover types will be required to pay a *wetland fee* in addition to the land cover fee. The Conservancy may waive the wetland fee if the applicant conducts wetland mitigation through restoration at a ratio of at least 1:1, and if the Conservancy and wildlife agencies agree that this restoration can be counted toward the restoration commitments in the HCP/NCCP.

Table 8-9, *Wetland Fee*, shows the calculation of the wetland fee and total fee revenue based on the natural community affected. The wetland fee is intended to pay the full cost of restoration of these land cover types off-site, including design, implementation, post-construction monitoring, management, and remediation throughout the permit term.

The wetland fee will cover the cost of wetland preservation and restoration. Wetland fees vary by wetland type to account for the different costs of restoration at a 1:1 mitigation ratio. Table 8-9 shows the calculation of the wetland fees, which are based on the average cost per acre for restoration costs by natural community and the mitigation ratio.

Table 8-9. Wetland Fee

	Fresh Emergent Wetland	Valley Foothill Riparian	Lacustrine and Riverine	Total
Costs Allocated to Restoration[a]	$6,305,320	$48,246,605	$14,940,719	$69,492,644
Restored Amount (acres)	88	608	260	956
Restoration Cost per Acre	$71,651	$79,353	$57,464	
Mitigation Ratio[b]	1.00	1.00	1.00	
Wetland Fee per Acre of Land Conversion	**$71,651**	**$79,353**	**$57,464**	

Notes:
In 2017 dollars.

a. Includes land acquisition for restoration, management, monitoring, and a share of endowment contribution and plan preparation costs. See Section 8.3.2, *Restore Natural Communities*, for details.

b. The conservation strategy requires that all wetland loss be restored at a ratio of 1:1. Wetland preservation is also a component of wetland mitigation and is included in the land cover fee.

8.4.1.3.1 Calculating Fees for Wetland Effects

The fees for effects on fresh emergent wetland and lacustrine and riverine communities are calculated by multiplying the applicable wetland fee (Table 8-9) by the amount of effect (in acres) on the wetland, water body, or stream. Covered activities that do not completely avoid indirect effects on wetlands, as described in Chapter 4, Section 4.3.3, *Sensitive Natural Communities*, will be considered permanently affected. The area of indirect effects, as determined by the local jurisdiction or Conservancy, will be added to the area of direct effects when calculating fees for wetland effects. Exceptions to this are described further in AMM9 and AMM10.

The fee for effects on valley foothill riparian is based on the amount of direct effects on woodland or scrub vegetation, in acres, as measured from the outer limit (the side away from the stream) of the tree or shrub canopy (drip line). Effects on valley foothill riparian that also affect the stream channel will incur the lacustrine and riverine fee, which will be based on direct and indirect effects on each wetland.

8.4.1.3.2 Aquatic Restoration Provided in Lieu of Wetland Fee

Unlike other HCP/NCCP fees, wetland fees cannot be waived in lieu of land dedication (see Section 8.4.1.8, *Land Provided in Lieu of* HCP/NCCP *Fees*). Project proponents, however, have the option of restoring, managing, and monitoring their own wetland, stream, or riparian mitigation site (on- or off-site) in lieu of paying all or part of the wetland fee. Construction of wetland restoration will be initiated prior to or concurrent with construction of the covered activity, the mitigation will be consistent with the requirements of Chapter 6, the site will be protected by a conservation easement, and management and monitoring will be funded in perpetuity. Applicants may propose paying the Conservancy to manage and monitor the site after construction is completed. Construction of all aquatic restoration projects must comply with the stay-ahead provision of the Yolo HCP/NCCP and must be completed by Year 40, consistent with the requirement for the Conservancy to do the same (see Chapter 6).

The Conservancy must approve requests to perform aquatic restoration in lieu of paying the wetland fee. The Conservancy's evaluation of proposals to perform restoration in lieu of wetland fees will be based, in part, on the history of the applicant with respect to performing successful wetland restoration elsewhere and whether the restoration project is consistent with the conservation strategy and requirements of the Yolo HCP/NCCP. Restored aquatic features must also meet the reserve design and assembly criteria in Chapter 6. For the Conservancy to approve aquatic restoration in lieu of fees, the local jurisdiction that approves the project must secure a guarantee through conditions of approval, ensuring that the restoration or creation will be implemented and remediated if the success criteria are not met. In the case of a Permittee that proposes restoration in lieu of wetland fees, the Permittee must sign an agreement with the Conservancy to provide this guarantee. After the success criteria are met and the applicant assures funding, the Conservancy will assume all management and monitoring responsibility of the restoration site as part of the reserve system.

Alternatively, applicants may purchase appropriate wetland restoration credits in a private mitigation bank in the Plan Area that has been approved separately by USFWS and CDFW and designed to service the Yolo HCP/NCCP (see Section 7.5.9, *Use of Mitigation Banks*, for more details).

8.4.1.4 Temporary Effect Fee

As described in Chapter 3, *Covered Activities*, there are many covered activities that are ongoing and that result in small, localized, temporary effects on natural land cover types. As described in Chapter 2, the majority of these activities, particularly those within urban areas, will support little or no covered species or their habitats. Some ongoing activities, however, are expected to have substantial temporary effects on covered species because of their large footprint, location in natural land cover types, local soils or hydrology, or a combination of these factors. Temporary effects are defined in Chapter 5 as direct effects that alter land cover for less than one year and that allow the disturbed area to recover to pre-project or ecologically improved conditions within one year of completing construction (see Section 5.3, *Terminology*).

Temporary effects that meet this definition are subject to a *temporary effect fee*, unless specifically excluded by the section below. Projects that are subject to the temporary effect fee will pay the fee on the portion of the site in which the temporary effects occur, in one of two ways, as selected by the applicant.

- If the frequency of the effect over the permit term can be predicted, the applicant may pay the fee for infrequent treatments up front to address all effects during the permit term. This discounted fee is calculated as a fraction of the full land cover fee. The total fee will be calculated using the formula below. (F = the number of calendar years in the remainder of the permit term in which the activity occurs.)

  $$\text{Temporary Effect Fee} = \text{Land cover fee} \times \text{area of temporary effect in acres} \times (F/50)$$

  To qualify for the temporary effect fee, the maximum time allowed for a site to return to pre-project conditions will be one year from the end of construction. With the denominator held at 50 years, the formula discounts the fee for temporary effects that occur less frequently or that occur later in the permit term. The project proponent must document to the satisfaction of the Conservancy that the disturbance and site recovery occurred at or better than the predicted timeline.

  or

- The applicant may pay the full land cover fee (see Table 8-7, *HCP/NCCP Development Fee Schedule*) and retain the ability to disturb the area as often as necessary during the permit term.

For example, if a project proponent has a temporary effect that occurs in one year of the 50-year permit term on a total of 3.0 acres and the land cover fee per acre is $10,000 (in the example only; the actual land cover fee will vary annually), the project proponent would pay $600 (= $10,000 × 3.0 × [1/50]). In another example, if a project proponent has a temporary effect that occurs every other year from Year 10 to Year 50 of the permit term (i.e., for 40 years) and affects 10.0 acres total, the project proponent would pay $40,000 (= $10,000 × 10.0 × [20/50]).

Temporary effects that occur in the same location repeatedly during the permit term and that pay the full land cover fee will be counted and tracked as a permanent effect. Temporary effect fees paid on a site can be credited toward any permanent effect fees that may be required on the same site in the future.

As described above, all or a portion of the temporary effect fee can be waived in exchange for land dedication or wetland restoration, based on the nature of the effect. The amount waived will be determined by the Conservancy on a case-by-case basis, according to the rules and principles described above.

Temporary effects that occur within fresh emergent wetland, valley foothill riparian, or lacustrine and riverine land cover types will be assessed a temporary effect fee, according to the formula shown above, but based on the applicable wetland fee (see Table 8-9, *Wetland Fee*).

Applicants have the option of developing and implementing their own wetland restoration project in lieu of the temporary wetland fee. If the Conservancy approves the applicant's restoration plan, then no temporary wetland effect fee is required. The Conservancy will verify that the applicant's wetland restoration project is constructed according to specifications and that the project meets its pre-defined success criteria, based on the Plan's conservation strategy.

Temporary effects and consequent fee revenue are likely to be quite small relative to permanent effects and are highly uncertain. Therefore, temporary effects fee revenue is not estimated for purposes of the funding plan. Any such revenue will be credited to the HCP/NCCP fee obligation at each five-year adjustment of the funding plan and land cover fee adjusted accordingly (see Section 8.4.1.6, *Adjustment of HCP/NCCP Fees*).

8.4.1.4.1 Activities Not Subject to the Temporary Effect Fee

To reduce administrative costs, temporary effect fees will not be assessed on any covered project with effects of less than 0.10 acre, except for wetlands (fresh emergent wetlands, valley foothill riparian, and lacustrine and riverine land cover types). All covered activities that result in temporary effects on wetlands of any size will be charged a temporary effect fee.

The conservation and monitoring actions described in Chapter 6, *Conservation Strategy,* will not be assessed a temporary effect fee. For example, wetland, stream, and riparian restoration projects conducted for the Yolo HCP/NCCP may result in temporary effects; however, because these actions support the conservation strategy, they will not be assessed a temporary effect fee.

Sediment removal in artificial off-channel detention basins or groundwater recharge ponds, when free of vegetation, is not subject to temporary effect fees.

Covered activities such as mowing, tree trimming, and other activities that result in temporary effects that occur in areas with "urban ruderal" or "urban or built-up" land cover types (see Chapter 2, *Existing Ecological Conditions,* for definitions) are subject to the conditions described in Chapter 4, *Application Process and Conditions on Covered Activities,* but will not be charged a temporary effect fee because the effect analysis assumed these land uses have little or no value for the covered species.

8.4.1.5 Collection of HCP/NCCP Fees

Permittees will collect all fees paid by private applicants to their jurisdictions. Permittees will transfer these fees to the Conservancy on a regular basis but quarterly or more frequently if needed. The Conservancy will determine the transfer schedule and process early in Plan implementation.

All fees paid by public agencies (i.e., the Permittees) will be similarly collected and transferred to the Conservancy, according to the same process and schedule developed by the Conservancy for fees from private applicants. Permittees may pre-pay fees if desirable to assist with ensuring the Conservancy has a reliable source of revenue for ongoing costs.

8.4.1.6 Adjustment of HCP/NCCP Fees

The dynamic nature of the costs associated with HCP and NCCP implementation, including land acquisition costs and operating, maintenance, and management costs, requires a flexible approach to funding through time. Many existing HCPs have not incorporated sufficient flexibility into their funding mechanisms and, as a result, have found that funding lags behind increasing costs, compromising Plan implementation. The Yolo HCP/NCCP includes two mechanisms for adjusting fee levels: automatic adjustments and periodic assessments. The Conservancy will perform both adjustments and will provide the results to all Permittees.

8.4.1.6.1 Automatic Adjustment of Fees

The two primary costs of the Yolo HCP/NCCP—land acquisition and operations/maintenance—will most likely change at different rates over time. Conservation easement costs for cultivated agriculture, which will make up the majority of the reserve system, can fluctuate on an annual basis and at rates that are significantly different from the general inflation rate. In Yolo County, for example, the annual change in the median value of vegetable and irrigated field crops since 2000 has ranged from a decrease of 18 percent to an increase of 31 percent. The annual inflation rate during that period rarely fluctuated by more than a percentage point from the prior year. Other HCP/NCCP costs, including the cost of personnel, supplies, and equipment involved in managing, operating, restoring, and maintaining the reserve system, will more closely follow the general rate of inflation. To account for these differing rates of inflation, the Conservancy will update the HCP/NCCP fee automatically on an annual basis and by a date determined by the Conservancy's Board of Directors. The Board will determine the date within the first six months of Plan implementation, based on the indices and procedures described in Table 8-10, *HCP/NCCP Fee Adjustment Indices*.

The variation in the cost of land due to site-specific factors means that it is difficult to develop land cost indices; consequently, no such indices are available. Annual changes in agricultural land value can be estimated from published sources, such as the ASFMRA values, however. The Conservancy will construct an annual index from the data by calculating the year-to-year change in the median value, weighted by the types of agricultural lands that will compose the reserve system. The index may be a rolling average of the change over prior years (e.g., three or five years) to smooth out the large fluctuations in agricultural land values mentioned above and avoid similar fluctuations in the

HCP/NCCP fees. An index that is based on agricultural values is superior to one that is based on housing values as a surrogate for land values because the Yolo HCP/NCCP's reserve system will be assembled from lands that are largely beyond the spheres of urban development in Yolo County.

Table 8-10. HCP/NCCP Fee Adjustment Indices

		Annual Adjustment Index			
			2003–2016 Annual Change		2003–2016 Compounded Annual Growth Rate
Fee/Cost Component	Initial Index Weight[a]	Index Description	Low	High	
Land Cover Fee					
Reserve System Assembly[b]	56%	Five-year rolling average annual compounded change in agricultural land values for the most-recent year-to-year period, weighted by remaining reserve lands to be acquired.[c]	-7.4%	20.6%	5.7%
All Other Plan Costs	44%	Annual change in the Consumer Price Index – All Urban Consumers (all times, not seasonally adjusted) for the West region during the most-recent year-to-year period.[d]	-0.4%	3.5%	1.9%
Wetland Fee					
Reserve System Assembly	16%	Same index as land cover fee for Reserve System Assembly component.	-7.4%	20.6%	5.7%
All Other Plan Costs	84%	Same as land cover fee for All Other Plan Costs component.	-0.4%	3.5%	1.9%

a. Index weight based on estimated sources and uses of funds over entire permit term. As the reserve system is assembled, these ratios may change and should be recalculated as part of the 5-year periodic adjustment (see Section 8.4.1.6.2, *Periodic Assessment and Adjustment of Fees*).

b. Fee title and conservation easement costs only. Excludes all other costs associated with reserve assembly transactions such as staff costs, pre-acquisition assessments, due diligence, and legal costs.

c. See ASFMRA annual reports, *Trends in Agricultural Land and Lease Values.*

d. U.S. Department of Labor, Bureau of Labor Statistics. 2016. *Databases, Tables & Calculators by Subject.* Available: http://www.bls.gov/data/. Accessed: November 2017.

The Conservancy will use the Consumer Price Index (CPI) from the U.S. Bureau of Labor Statistics for the West Region to adjust the non–land cost portion of fees. The Conservancy may decide to use other indices during Plan implementation if other indices are developed that better predict the costs of the Yolo HCP/NCCP.

8.4.1.6.2 Periodic Assessment and Adjustment of Fees

Every 5 years, the Conservancy will complete a fee assessment to review the costs and the underlying assumptions the Conservancy developed as part of the original funding plan as well as estimate the remaining costs to implement the Yolo HCP/NCCP. The review could include comparing appropriate land sales in the study area transacted after the start of the Yolo HCP/NCCP with the original land cost assumptions (see Appendix H). The Conservancy can also compare the actual costs of operating, maintaining, and managing the reserve system to the original estimates of these costs to determine the actual change in non-land costs. The Conservancy will adjust fees based on this

analysis to ensure full funding of the mitigation share of remaining HCP/NCCP costs, including endowment contribution and plan preparation. Automatic annual fee increases will resume after the periodic fee assessment and will continue until the next periodic assessment.

8.4.1.7 Timing of HCP/NCCP Fee Payment

For private projects, the Conservancy will require the payment of HCP/NCCP fees by the time the grading permit for the project is issued. If a grading permit is not required, fees must be paid before or at the time the first construction permit is issued.

For public projects, the Conservancy will require payment of HCP/NCCP fees prior to implementing the covered activity. For public projects conducted by outside contractors, the timing of fee payment may coincide with the award of the construction contract because this represents the time at which the public agency commits to implementing the project.

8.4.1.8 Land Provided in Lieu of HCP/NCCP Fees

If a landowner or Permittee conveys a portion of the development site (either in fee simple or through a conservation easement) for inclusion in the Yolo HCP/NCCP's reserve system and the Conservancy and the wildlife agencies approve the inclusion, the Conservancy will not assess the land cover and/or land cover temporary effect fees on the portion of the property included in the reserve system. Landowners may also provide land separate from development sites for the reserve system, if approved by the Conservancy and the wildlife agencies. In both cases, for land provided on or off the covered activity site, landowners and Permittees that convey land to the Conservancy may receive credit for the dollar value of these acquisitions against select HCP/NCCP fees that might be owed by the landowner or Permittee because of the effects of their covered activities. Land to be conveyed by a landowner or Permittee will be eligible for HCP/NCCP fee credit if the land satisfies the criteria described below.

The Conservancy will determine the value of the conveyance of land to the Conservancy and any credit against HCP/NCCP fees on a case-by-case basis. Landowners or Permittees that convey land may be required to still pay a portion of the land cover fee to pay for HCP/NCCP costs related to land management, monitoring, and other operational costs. Any land provided in lieu of HCP/NCCP fees must contribute toward the implementation objectives and requirements of the Yolo HCP/NCCP. The Conservancy will consider all of the following as part of quantifying the credit:

- The extent to which the land would contribute toward the implementation objectives and requirements of the Yolo HCP/NCCP,
- The fair market value of the land based on an appraisal,
- Actual land transactions costs, and
- Actual costs of biological survey work performed to provide baseline data for the Yolo HCP/NCCP, if applicable.

The Conservancy will award any credits against HCP/NCCP fees from land conveyed after the conveyance has been completed.

Fee waivers and credits in exchange for land conveyed will be allowed only when the Conservancy determines that acceptance of land in lieu of funds is consistent with the conservation strategy and

funding plan. One of the factors the Conservancy will consider, for example, is whether the Conservancy has sufficient funds available or funding commitments to manage and monitor the conveyed land during the permit term and whether it will require an endowment contribution. The project proponent will provide funding to ensure management and monitoring of the conveyed land. The Conservancy will credit any funds provided by the landowner or Permittee to ensure management and monitoring against any land cover fee otherwise due. Land cannot be dedicated in lieu of wetland fees (only wetland restoration projects can be provided in lieu of wetland fees).

The Conservancy or local jurisdiction that processes the development application may charge additional administrative fees to account for the cost of reviewing and processing HCP/NCCP applications for the use of mitigation banks or mitigation receiving sites in lieu of the land cover fee.

8.4.1.9 Special Participating Entities

Special Participating Entities are described in Section 7.2.5, *Special Participating Entities*. For activities performed by a Special Participating Entity, the Special Participating Entity will pay any applicable development or wetland fees to receive take authorization. The Conservancy will also require an additional fee to cover the direct and indirect costs of extending permit coverage under the Yolo HCP/NCCP, including the cost of Conservancy staff time to assist with permit coverage and a portion of the cost of conservation measures that support species conservation.

8.4.1.10 Voluntary Participation in HCP/NCCP

Some private projects that are exempt from the Yolo HCP/NCCP's fees and ordinance may wish to pay Plan fees or comply with other Plan conditions to facilitate compliance with environmental laws other than the FESA or CESA. For example, projects that are otherwise exempt from the Yolo HCP/NCCP's fees may wish to pay Yolo HCP/NCCP fees and apply applicable conditions on covered activities, as described in Chapter 4, *Application Process and Conditions on Covered Activities,* through their local development approval process to enhance their project for other purposes (e.g., CEQA). These private projects would still be subject to the regulatory requirements of the FESA and CESA, if applicable.

8.4.2 Local Funding

Some funds for Plan implementation will come from local sources other than the Yolo HCP/NCCP's fees (Table 8-6, *Funding Plan*, and Appendix I). As described in Chapter 6, *Conservation Strategy,* for example, the CCRMP and LPCCC will perform activities directly in support of the Yolo HCP/NCCP's goals and objectives. In addition, the City of Davis has an Open Space Program that will acquire conservation easements that may be credited to the reserve system. The Conservancy can count such activities and actions conducted by local organizations toward the Yolo HCP/NCCP as long as those conservation actions meet the terms of the Yolo HCP/NCCP. (See Chapter 7, Section 7.2.4, *Other Land and Water Management Agencies,* for a description of Conservancy coordination with Solano County prior to establishing conservation easements in Solano County that would count toward the Yolo HCP/NCCP conservation strategy.)

The following local agencies and foundations have committed to provide funding that will support the Yolo HCP/NCCP or conduct activities that offset the costs described in Section 8.2, *Cost to Implement the Yolo HCP/NCCP*. The City Council for the City of Davis, the Yolo County Board of Supervisors, and the governing bodies of both the SCWA and the LPCCC passed resolutions in 2015 that support a partnership with the Conservancy, consistent with the Yolo HCP/NCCP. The City of Davis and the Conservancy will also enter into a memorandum of understanding to provide more

detail about the terms of the partnership. Yolo County, the SCWA, and LPCCC may also decide to enter into similar agreements with the Conservancy.

The Conservancy may identify and use other funding sources during Plan implementation. There may be future ballot measures, for example, that include a funding component for specific elements of the Yolo HCP/NCCP's implementation. The Yolo HCP/NCCP assumes a modest amount of funding from these other sources over the 50-year permit term, as described in Section 8.4.4, *Other Local, State and Federal Sources*. The participating agencies, however, are not expected or required to utilize local general funds for the Yolo HCP/NCCP's implementation. Funding shortfalls, and the options available if they occur, are discussed below in Section 8.4.5, *Funding Adequacy*.

8.4.2.1 City of Davis

The citizens of Davis have long understood that the character of the community is directly connected to lands within which the community resides. The City of Davis has demonstrated a long-term commitment to the protection of natural resources, sensitive habitat, and agricultural lands in and surrounding the community for the past several decades. By 2000, the City had protected more than 2,400 acres of open space lands, in both fee title ownership and easements. These achievements relied on sporadic funding from grant funds and environmental mitigation, however.

To provide a stable source of funding for open space protection, the City Council passed Ordinance 2033 in 2000, establishing a parcel tax to fund the Open Space Protection Special Tax Fund. This ordinance was approved as Measure O in November 2000. Section 15.16.070 of Ordinance 2033 describes eligible types of expenditures for the parcel tax, including "acquisition in fee or easement of open space lands within the Davis Planning Area." By itself, Measure O does not generate enough money to purchase significant tracts of land. Its greatest value is its leveraging potential. Because it is a stable and reliable revenue source, Measure O gives the City of Davis an advantage in the competition for state and federal land acquisition grants. As a result, this fund has enabled the City to make remarkable progress toward achieving its long-term vision for land conservation in the Davis Planning Area. As of 2015, the City was able to purchase approximately $20 million worth of conservation easements, permanently protecting an additional 2,833 acres of farmland and habitat areas, using only approximately $3.3 million in Measure O funds.

The parcel tax generates approximately $635,000 annually through a flat tax per parcel. The tax rate is $24 per market-rate single-family home, with other rates depending on land use type. This annual amount has fluctuated by only one to two percent because the number of parcels and land use types changes only slightly year to year. The adopting ordinance does not allow for any adjustments to these tax rates, including any adjustments for inflation. The tax expires in 2030. Based on the high level of support the residents of Davis have exhibited for open space, it is reasonable to assume that the voters will re-authorize the parcel tax through at least to the 50-year permit term of the Yolo HCP/NCCP.

On July 7, 2015, the City Council agreed in principle to help finance the implementation of the Yolo HCP/NCCP with up to $10 million in nominal dollars (not adjusted for inflation) over 50 years, but asked staff to return to the City Council with the details of the partnership with the Conservancy. On December 15, 2015, the City Council adopted a resolution whereby the City of Davis agreed to a non-binding commitment (i.e., a goal) to spend up to $10 million in City open space acquisition dollars (not just Measure O dollars) over 50 years, if funding is available, for land acquisitions. The City will acquire and/or permanently protect habitat lands within the Davis Planning Area that are consistent with the Yolo HCP/NCCP under certain conditions, including consistency with local open space

policies and priorities. During the first 15 years, the City will make a good faith effort to spend up to $3.0 million (in nominal dollars, not adjusted for inflation) in City open space acquisition dollars before June 30, 2031, if funding is available. This will be to acquire and/or permanently protect lands within the Davis Planning Area that are consistent with the Yolo HCP/NCCP, assuming adoption of the Plan during FY 2017–18 (a 15-year period, representing 30 percent of the 50-year permit term and therefore 30 percent of the funding goal). Adoption of the Plan at a later date would adjust this interim funding objective accordingly. During the final 35 years, the City will make a good-faith effort to spend up to $7.0 million (in nominal dollars, not adjusted for inflation) in City open space acquisition dollars before June 30, 2066, if funding is available. This will be to acquire and/or permanently protect habitat lands within the Davis Planning Area that are consistent with the Yolo HCP/NCCP, assuming the City's Open Space Protection Special Tax (i.e., Measure O) is reauthorized by the voters at the same or higher rate. If voters reauthorize the tax at a lower rate, the City and the Conservancy will meet and confer to determine how future parcel tax revenues may support achieving the overall $10 million funding objective. If, at that time, the City does not anticipate that it will achieve the funding objective, then the Conservancy will have to adjust land cover fees and/or identify other revenue to replace this loss of funds.

This commitment will help ensure that the City of Davis' ongoing efforts to protect open space and other natural resources are partially focused on areas that have been identified in a community planning process as priorities for the protection of sensitive species. This commitment of funds will also allow the City to maximize revenue from other sources, utilizing the ability of the Yolo HCP/NCCP to bring additional state and federal conservation funds to Yolo County. The Conservancy, of which the City of Davis is a member, will administer the Yolo HCP/NCCP and propose potential easements or other conservation projects to the City consistent with the City's open space policies and priorities. City open space funding will only be used to support achievement of the conservation portion of the Yolo HCP/NCCP that is beyond mitigation, and will not be used to mitigate the effects of activities covered under the Yolo HCP/NCCP. The City may, at any time, decline to partner with the Yolo HCP/NCCP or decide not to invest in land acquisition or other projects proposed by the Conservancy. The City recognizes that a partnership with the Conservancy has the potential to help fulfill the City's open space priorities as well as contribute to the conservation of important habitat.

Consistent with implementation of the Open Space Program to date, funding to offset the Yolo HCP/NCCP's costs would be primarily for the acquisition of conservation easements, associated City staff time to support the acquisition program, and related transaction costs. The Davis City Council adopted an acquisition priorities map in January 2004; the City updated the map in 2007.[19] Many of the priority areas include lands that would be eligible for inclusion in the Yolo HCP/NCCP's reserve system. Funding outside the Open Space Program used by the City of Davis for habitat restoration or enhancement activities may also offset the Yolo HCP/NCCP's costs.

8.4.2.2 Cache Creek Resources Management Plan

The County of Yolo adopted the CCRMP in 1996 and amended it in 2002. The CCRMP is part of the Cache Creek Area Plan (CCAP), a focused planning policy document that is part of the Yolo County General Plan. The CCRMP eliminated in-channel commercial mining (i.e., mining inside of the Cache Creek channel) and established a program for implementing ongoing projects to improve channel

[19] City of Davis Open Space and Habitat Commission. 2013. *City of Davis Measure O, the Open Space Protection Special Tax Fund: Progress in Protecting Open Space (draft)*. December 2. Figure 5, page 29.

stability and restore riparian habitat along Cache Creek. The CCRMP provides a policy framework for restoration of 14.5 miles of lower Cache Creek and includes specific implementation standards. The Cache Creek Improvement Program (CCIP), the implementation plan for the CCRMP, identifies specific categories of projects, including bank stabilization, channel maintenance, revegetation, and habitat restoration. The CCRMP is implemented with the assistance of a Technical Advisory Committee (TAC), which is composed of scientists with expertise in geomorphology, biology, and hydraulic engineering. See Section 6.5.8.1.1, *Cache Creek Resources Management Plan*, for a more detailed description of how activities that are funded by the program would support achievement of the Yolo HCP/NCCP's goals and objectives.

The CCAP is funded by a specified share of the total revenue from a fee applied per ton of gravel (aggregate) extracted from Cache Creek in the Yolo County unincorporated area. The fee for calendar year 2017 is $0.550 per ton, increasing by 4 percent annually per the county's Gravel Mining Fee Ordinance.[20] For long-range budget planning, the county uses the 16-year average annual level of extraction through 2012 of 3,250,000 tons.[21] The Gravel Mining Fee Ordinance allocates 55.56 percent to the CCRMP, or approximately $993,000 in 2017 dollars (3,250,000 x $0.550 x 55.56 percent). Based on an analysis of CCAP activities that support the Plan's objectives (Section 6.5.8, *Conservation and Monitoring and Adaptive Management Actions Conducted by Local Partners*), the Yolo HCP/NCCP assumes that $221,663 of this funding on average (about 22 percent) would offset the Yolo HCP/NCCP's costs. This funding would total $11.1 million in 2017 dollars (Appendix I, Table 9).

Based on Yolo County Board of Supervisors Resolution No. 14-126, approved on December 2, 2014, Yolo County intends to place easements on between 250 and 660 acres of "net gains" or other lands within the CCAP area, consistent with the Yolo HCP/NCCP, as long as: 1) the easements are also consistent with the CCAP and future Cache Creek Parkway Plan development, 2) the Yolo HCP/NCCP pays for transaction costs associated with placement of the easements (not for the value of the easements), and 3) the Yolo HCP/NCCP pays for habitat related maintenance of these properties in perpetuity. This Plan assumes the county will provide 276 acres of easements as a result of this commitment. The County of Yolo may also contribute CCAP funding toward acquisition of conservation easements, if funding is available and the acquisition is consistent with the policies and objectives described in the CCAP program documents. The County of Yolo intends to continue to implement activities prescribed in the CCIP (e.g., monitoring and invasive species removal) that are funded with CCAP revenue and consistent with the Yolo HCP/NCCP. The county may at any time decline to partner with the Conservancy or decide not to provide easements or dedicate revenue to activities, consistent with the Yolo HCP/NCCP. The Conservancy will work with the county to bring in revenue for Cache Creek Resources Management Plan and CCIP implementation that would not otherwise be available to the county.

The CCAP also will result in approximately 865 acres of land that is utilized for off-channel mining operations to be reclaimed to agricultural lands and have agricultural easements placed on them. The Conservancy and county will work with the aggregate companies that own the land to add an additional layer of protection for covered species habitat on these reclaimed lands. This is a voluntary process; therefore, the gravel companies must agree to add this protection for habitat. In return, the gravel companies would receive a per-acre incentive payment from the Conservancy. The Conservancy would be responsible for all associated costs of securing the endowment to enroll these lands in the

[20] Yolo County Code, Chapter 8, Title 11.

[21] Cache Creek Technical Advisory Committee. 2014. *2013 Cache Creek Annual Status Report*. January 14. Pages 43–44.

reserve system. The Conservancy would ensure that the initial agricultural easements would be consistent with the Yolo HCP/NCCP to the extent feasible. The Conservancy would further work with the county and the gravel companies to add the additional layer of protection for habitat based on the Yolo HCP/NCCP-approved conservation easement template and associated management plan template. This effort will benefit the Yolo HCP/NCCP by conserving lands along the Cache Creek corridor for habitat, a priority conservation area of the reserve system. Additionally, this incentive program is expected to provide a cost savings for the Yolo HCP/NCCP by providing an opportunity to enroll lands through conservation easements at a reduced cost. Aggregate companies will benefit from receiving the per-acre incentive payment that would not otherwise have been available to them.

The Gravel Mining Fee Ordinance sunsets on January 1, 2027. Based on confirmed aggregate reserves in the area and interest expressed by current mining enterprises to extend their permits beyond 2026, it is reasonable to assume that the county will extend mining permits and re-authorize the Gravel Mining Fee Ordinance through at least to the 50-year permit term of the Yolo HCP/NCCP.

In addition to the CCRMP share of 55.56 percent, CCAP revenue is allocated, as follows:

- 22.22 percent to the Cache Creek Conservancy (CCC), an independent nonprofit organization, for purposes of habitat restoration and enhancement along Cache Creek and revegetation projects consistent with CCRMP creek stabilization objectives;
- 17.78 percent to the Off-Channel Mining Plan (OCMP) to administer the mining permits and development agreements and inspect mining and reclamation operations; and
- 4.44 percent to the Maintenance and Remediation Fund (MRF), which will be placed in an interest-bearing account and not accessed until 2027—and then only for the purposes of environmental remediation and monitoring and maintenance of public lakes in the CCAP.

Current activities funded by the CCAP and conducted by the CCC, as well as future activities funded by the MRF after 2027, could support the goals and objectives of the Yolo HCP/NCCP. However, there is a limit to the overlap between CCAP activities and the Yolo HCP/NCCP's implementation costs; therefore, as a conservative assumption, the Yolo HCP/NCCP does not apply any funding from these activities against the costs of the Plan.

8.4.2.3 Solano County Water Agency/Lower Putah Creek Coordinating Committee

The LPCCC was created through a settlement to resolve a civil action brought by the Putah Creek Council, a nonprofit environmental organization, against the SCWA and the Solano Irrigation District (Settlement).[22] The LPCCC is composed of representatives of the Putah Creek Council; several water districts, including the SCWA; several cities, including the City of Davis; and the campus of the University of California, Davis. The Settlement requires annual expenditures by the SCWA for specified activities to protect and enhance the in-stream values associated with lower Putah Creek, including funding for a streamkeeper position. The LPCCC has a number of duties, including monitoring conditions in lower Putah Creek; conducting restoration, enhancement, and maintenance measures; seeking grant funds; and overseeing the streamkeeper. See Section 6.5.8.1.2, *Lower Putah Creek Coordinating Committee*, for a more detailed description of how activities funded by the SCWA and implemented by the LPCCC would support achievement of the Yolo HCP/NCCP's

[22] *Putah Creek Council v. Solano Irrigation District and Solano County Water Agency*, Sacramento County Superior Court No. 515766, Second Amended Judgment, October 30, 2002.

goals and objectives. On February 12, 2015, the SCWA took action (Action Item No. 2015-10) to approve a partnership with the Conservancy to work toward mutually beneficial goals. The LPCCC unanimously recommended this action to the SCWA on January 8, 2015.

The SCWA spends about $210,000 annually to implement the Settlement's provisions related to restoration along lower Putah Creek. This amount is based on $160,000 of expenditures, as specified in the Settlement, inflated to current levels according to an inflation index, also specified in the Settlement. In addition to this required funding, the SCWA currently provides $22,000 of miscellaneous funding for vehicle fuel and other small expenses. The $210,000 amount does not include in-kind services provided by the SCWA, such as grants management and project engineering. Between 2001 and 2013, the SCWA has leveraged approximately $12 million in grant funding to support restoration along lower Putah Creek, or about $1 million annually.

The components of the SCWA annual commitment of $160,000 are stated in Section III(A)(6) of the Settlement:

- $10,000 per year for native vegetation preservation and enhancement, including the identification of areas along lower Putah Creek that are dominated by nonnative species and their removal and replacement with native trees and grasses. This work will be coordinated with efforts by individuals and entities that are involved in similar removal and replacement efforts;
- $55,000 per year for the monitoring of wildlife, including birds, mammals, reptiles, and amphibians that live in and around lower Putah Creek;
- $55,000 per year for the monitoring of native fish in lower Putah Creek; and
- $40,000 per year for a streamkeeper for lower Putah Creek.

This section of the Settlement also allows "funding, if any, to be determined by the SCWA for acquisition of easements from willing sellers for the maintenance and enhancement of the biological resources of lower Putah Creek." The SCWA does not anticipate any acquisitions under the Settlement.

For purposes of projecting future grant funding and the related level of conservation activities, the Conservancy suggests 50 percent of the historical amount, or $500,000, annually. Any such grant funding would count toward the state and federal commitment to the Yolo HCP/NCCP.

The Yolo HCP/NCCP assumes that approximately $209,000 (2017 dollars) in annual direct spending, as overseen by the LPCCC, would offset costs of the Plan. The Yolo HCP/NCCP assumes that this share of total SCWA funding would remain constant over the permit term when adjusted for inflation, as mandated by the Settlement. Total funding for the Yolo HCP/NCCP would be $10.4 million (Table 8-6, *Funding Plan*, and Appendix I, Table 9).

8.4.2.4 Foundations and Other Non-profit Organizations

Private foundations and non-profit organizations that support open space acquisition and biodiversity planning are expected to play an important role in supporting the Yolo HCP/NCCP. Foundations such as the Packard Foundation and organizations such as the National Audubon Society (California Chapter) have a history of supporting land conservation in Yolo County and are supportive of regional conservation planning in general. Combined private charitable expenditures on open space acquisition and biodiversity planning are estimated to have totaled $20 million to $25

million from about 2000 through 2013, or about $1.5 million to $2 million per year. This rate of funding is difficult to project over the long term, however, given the ability of these organizations to shift priorities. To be conservative, the Yolo HCP/NCCP assumes private charitable funding will provide an average of $200,000 per year in 2017 dollars, or $10 million over the permit term (again in 2017 dollars), to offsets Plan costs (Table 8-6, *Funding Plan*).

8.4.2.5 Interest Income

A small source of income to the Conservancy will come from interest and other earnings on fund balances generated by land cover fee revenues held prior to expenditure. The Conservancy expects a large amount of interest income from earnings on the endowment prior to the end of the permit term. The interest estimate for fee revenues held prior to expenditure assumes that the Yolo HCP/NCCP's fund balances will earn an average annual interest rate of 1.01 percent, the most-recent 10-year average rate on the Local Agency Investment Fund, a pooled money fund managed by the California State Treasurer. The Conservancy is estimated to have about half of the annual average HCP/NCCP fee revenue on hand at any one time, or about $2.5 million. This would generate an annual average of $26,000 in interest income, leading to a 50-year estimate of interest earnings of $1,300,000 (2017 dollars) (see Table 11 in Appendix I, *Funding Plan*). The Yolo HCP/NCCP assumes no interest generated from grant funds because of the typical requirement to spend grants immediately.

The assumed net rate of earnings on the HCP/NCCP endowment that would fund post-permit costs is estimated at 3.25 percent, as discussed in Section 8.3.8, *Costs in Perpetuity*. The rate of return for the endowment is higher than on operating fund balances because the endowment has the flexibility provided by a long-term investment horizon to invest in a wide range of investment vehicles at levels of risk and return that are appropriate for a fund that is managed in perpetuity. With a constant level of annual contributions, the endowment is estimated to generate $8.1 million (2017 dollars) over the permit term (Table 8-6, *Funding Plan,* and Table 3 in Appendix I, *Funding Plan*).

8.4.3 State and Federal Funding

The U.S. Congress and the California Legislature have determined that conserving species and their natural habitats is an issue of both national and state importance. The federal and state governments will strive to assist local governments and property owners to assemble, manage, and monitor the Yolo HCP/NCCP's reserve system. This assistance would provide for the conservation of covered species in the Plan Area, and reduce or avoid the need to list additional species as threatened or endangered.

Federal contributions to the Yolo HCP/NCCP are earmarked only for the portion of the Yolo HCP/NCCP that provides for the conservation of covered species in the Plan Area. Federal contributions cannot be used for the mitigation component of the Yolo HCP/NCCP.

State and federal funding is estimated to provide over $72.5 million to the Yolo HCP/NCCP in 2017 dollars (Table 8-6, *Funding Plan*) for up to 8,231 acres of land acquisition and 44 acres of restoration/creation of wetlands (see Table 10, Appendix I). If the Conservancy obtained maximum funding from the federal and state government, it would contribute up to 8,231 acres of land to the

reserve system (Table 6-1(b)) at an average cost of $8,467 per acre (Table 10, Appendix I) and 44 acres of restored/created conservation lands at a cost of $2.9 million (Table 10, Appendix I). The Conservancy based the estimate of state and federal funding on current sources, which are generally limited to land acquisition and wetland restoration/creation costs. Land acquisition costs paid for by state and federal funds can include pre-acquisition surveys and transaction costs. State and federal funding may also be able to pay for acquisition costs of pre-permit reserve lands, however, the funding estimate above assumes no state or federal funding for this purpose. As state and federal funding sources evolve over the 50-year permit term, the Conservancy expects funding sources to become more flexible in terms of the types of costs they can cover. For the time being, the Conservancy likely will incur the costs of administering, managing, and monitoring lands provided through state or federal funding, including endowment contributions.

State or federal funding for land acquisition could come from a variety of sources, including several sources administered by CDFW and USFWS (Table 8-11, *Likely Federal and State Funding Sources for HCPs and NCCPs in California*). Land contributions by USFWS and CDFW could be provided through contributions by the Wildlife Conservation Board. The Conservancy will assess progress toward the land acquisition and wetland restoration/creation goals stated in the prior paragraph every year and include a summary in the annual report submitted to CDFW and USFWS.

As stated above, the state and federal governments will strive to offer as many funding opportunities to this Plan as is possible. The record of state and federal funding for approved HCP/NCCPs in California suggests state and federal government will contribute the estimated funding. An analysis of the likelihood of the Yolo HCP/NCCP receiving available state and federal funds during the first 10 years of Plan implementation is provided in Appendix J, *State and Federal Funding Analysis*. This analysis concludes that, because of the competitive nature of this Plan and the available sources and history of funding, meeting the needs of the Plan from state and federal funding in the first 10 years is feasible. New funding sources are expected to arise, increasing the likelihood of achieving this goal even further. If, however, after the exercise of all available authority and utilization of all available resources, the CDFW and USFWS are unable to provide the estimated funding to the Yolo HCP/NCCP, the Conservancy, the Permittees, CDFW, and USFWS will re-evaluate the Yolo HCP/NCCP and work together to develop a mutually acceptable solution.

Implementation of the Yolo HCP/NCCP is subject to the federal Anti-Deficiency Act and the availability of appropriated funds. Nothing in this Plan will require the obligation, appropriation, or expenditure of any money from the United States Treasury. USFWS will not be required to expend any federal agency's appropriated funds until an authorized official of that agency commits these funds in writing. Similarly, CDFW will not be required to expend any state agency's appropriated funds until an authorized official of that agency commits these funds in writing. The state and federal agencies will use their best effort to contribute the amount of land identified below.

Table 8-11. Likely Federal and State Funding Sources for HCPs and NCCPs in California

Program Name	Program Administrator	Funding Source	Funding Available in California	Year	Description	Eligibility	HCP/NCCP Potential
Endangered Species Act Cooperative Endangered Species (Section 6) Grants	U.S. Fish and Wildlife Service, California Department of Fish and Wildlife	Federal	$2,000,000 annual award cap per plan	2002–present (cap began 2014)	Grants for HCP land acquisition; current USFWS policy requires non-federal match of 25%.	Approved HCPs (see text for details)	Strong
				2001–present	Grants for recovery land acquisition; current USFWS policy requires non-federal match of 25%.	Draft and approved recovery plan for endangered or threatened species	
Land and Water Conservation Fund[a]	U.S. Fish and Wildlife Service, California Department of Parks and Recreation	Federal	$2,300,000 maximum grant request	1964–present	Dollar-for-dollar matching grants for planning, acquisition, and development of outdoor recreation areas and facilities.	Cities, counties, and districts with authority to acquire, develop, operate, and maintain public park and recreation areas	Moderate
North American Wetlands Conservation Act Grant Program[c]	U.S. Fish and Wildlife Service	Federal	$21.9 million awarded nationwide in 2017	1996–present	Program provides matching grants to aid wetland conservation projects, including land acquisition, restoration, and enhancement. Non-federal match must be at least 1:1.	Non-federal agencies, organizations, or individuals	Uncertain

Program Name	Program Administrator	Funding Source	Funding Available in California	Year	Description	Eligibility	HCP/NCCP Potential
Central Valley Project Improvement Act Habitat Restoration Program	U.S. Fish and Wildlife Service and U.S. Bureau of Reclamation	Federal	$3,200,000	2015	Provides funds for land acquisition, management, monitoring, research, and restoration for endangered/ threatened species affected by the CVP.	Federal and state government agencies, private non-profit or profit organizations, and individuals	Strong
Watershed Restoration and Delta Water Quality and Ecosystem Restoration Program[d]	California Department of Fish and Wildlife	State, Proposition 1	$372,500,000 over the life of the proposition	Expected 2015–2025	Provides $285 million for ecosystem restoration projects outside the Sacramento-San Joaquin Delta and $87.5 million for projects that benefit the Delta.	Public agencies, nonprofit organizations, public utilities, federally recognized Indian tribes, state Indian tribes listed on the Native American Heritage Commission's California Tribal Consultation List, and mutual water companies engaged in either watershed restoration projects of statewide importance outside the Delta or projects benefiting water quality, ecosystem restoration, and fish protection in the Delta	Strong

Program Name	Program Administrator	Funding Source	Funding Available in California	Year	Description	Eligibility	HCP/NCCP Potential
Water Quality, Supply, and Infrastructure Improvement Act of 2014	Wildlife Conservation Board	State, Proposition 1	$5,000,000	2015–present		Approved NCCPs in the Delta	Strong
Oak Woodlands Conservation Act of 2001 and Rangelands, Grazing Land, and Grassland Protection Program	Wildlife Conservation Board		$5,000,000		Grants for purchase of oak woodland easements, restoration or enhancement projects, long-term leases, or cost-sharing incentive payments.	Approved Oak Woodlands Management Plan	Moderate
Habitat Conservation Fund[e]	California Department of Parks and Recreation	State, Other[f]	$2,000,000 annually	1990–present	Program requires 50% match from grantees for nature interpretation programs that bring urban residents into park and wildlife areas, protection of various plant and animal species, and acquisition and development of wildlife corridors and trails.	Cities, counties, and districts	Moderate

Program Name	Program Administrator	Funding Source	Funding Available in California	Year	Description	Eligibility	HCP/NCCP Potential
Sustainable Agricultural Lands Conservation Program	California Strategic Growth Council	State, Other[g]	Up to $100,000,000 in FY 2014–15 for sustainable agricultural land strategy planning efforts; up to $4,000,000 in FY 2014–15 for grants for agricultural conservation easement acquisition		Supports the protection and management of California's agricultural lands with the goal of preventing increases in greenhouse gas (GHG) emissions by limiting opportunities for expansive, vehicle-dependent forms of development. The program accomplishes this through three major elements (sustainable agricultural land strategy plans, agricultural conservation easements, and financial incentives for adoption and use of land management practices), which emphasize planning, the permanent protection of farm and ranch lands through agricultural easements, and support for agricultural programs that reduce GHG emissions.	**Sustainable Agricultural Land Strategy Plans** – Counties and/or cities in collaboration with other partners that will inventory and evaluate agricultural lands and develop local strategies for long-term protection **Agricultural Conservation Easements** – Cities, counties, nonprofit organizations, resource conservation districts, regional park or open space districts, or regional park or open space authorities that have conservation of farmland among their stated purposes, as prescribed by statute or as expressed in the entity's locally adopted policies	Moderate

Notes:

a. California Department of Parks and Recreation 2014a.
b. Natural Resources Conservation Service 2014.
c. U.S. Fish and Wildlife Service 2017.
d. Water Quality, Supply, and Infrastructure Improvement Act of 2014.
e. California Department of Parks and Recreation 2014b.
f. Established by the California Wildlife Protection Act of 1990, Proposition 117.
g. Appropriations from the Budget Act of 2014 to the Greenhouse Gas Reduction Fund.

8.4.3.1 Federal Funding Sources

As described above and in Table 8-11, *Likely Federal and State Funding Sources for HCPs and NCCPs in California*, there are a variety of existing federal sources that could help to fund the conservation component of the Yolo HCP/NCCP. The federal source that is likely to provide one of the largest state and federal shares of funding for the Yolo HCP/NCCP is the USFWS's Cooperative Endangered Species Conservation Fund, authorized under Section 6 of the FESA. USFWS annually provides significant funds to local jurisdictions that develop and implement regional HCPs. The Section 6 grant program is divided into three funding categories: HCP Assistance (for planning), HCP Land Acquisition, and Recovery Land Acquisition Grants. CDFW applies for and administers these grants. The Yolo HCP/NCCP has already received six grants from the HCP Assistance Program, totaling more than $3.8 million. Once the FESA permit is issued, the Yolo HCP/NCCP will be eligible for HCP Land Acquisition grants.

HCP Land Acquisition grants can pay for land acquisition (conservation easement or fee title), transaction costs, and pre-acquisition surveys and inventories. These grants can also pay for management or monitoring costs after acquisition as long as those funds represent a minority of the cost of the project and they are spent within the three-year term of the grant award. It is possible these spending limitations could change during the 50-year permit term, in which case this funding source might be used to pay for more types of HCP/NCCP costs than those related strictly to land acquisition (or initial management or monitoring).

From 2002 to 2016, USFWS has made available, on average, $34.9 million per year in land acquisition funds nationally. Of this, an average of approximately 45 percent—nearly $20 million—was dedicated annually for land acquisition for HCPs and NCCPs in California. From 2002-2016, California has received more than $241 million in land acquisition funding for approved HCPs and NCCPs, by far the largest share of any state. Funding for the HCP Land Acquisition program has declined substantially since 2010. It appears to have stabilized at about $15 million every year since 2012, although competition for grants has increased as the federal government approves more regional HCPs. In FY 2014, USFWS instituted a cap on individual awards of $2.0 million, which has continued. It is unknown whether this funding cap will remain or if total funding amounts will change. This program has been in existence since 2002, however, and it remains the most important source of regional HCP land acquisition funding from the federal government. The program is assumed to continue and provide funding for the Yolo HCP/NCCP.

Other existing federal grant programs that could provide additional funding to the Yolo HCP/NCCP, particularly for wetland restoration, are the North American Wetlands Conservation Act Grant Program and the Central Valley Project Improvement Act Habitat Restoration Program (see Table 8-11). The Yolo HCP/NCCP also assumes additional funding over the 50-year permit term from new local, state, and federal sources not currently identified, as described in Section 8.4.4, *Other Local, State and Federal Sources*.

8.4.3.2 State Funding Sources

As described in Table 8-11, *Likely Federal and State Funding Sources for HCPs and NCCPs in California,* there are a variety of sources available for state funding, including existing California propositions (e.g., Proposition 1, passed by voters in 2014). Proposition funding for the Yolo HCP/NCCP can come from a variety of sources, including the Wildlife Conservation Board and the

California Department of Parks and Recreation. More state bond measures for open space preservation and management are expected to be issued as California propositions during the 50-year term of the Yolo HCP/NCCP. For example, Proposition 84 was passed by California voters in the November 2006 General Election by a margin of 53.7 percent. This bond provided funding for water, park, and natural projects, including $90 million for certain NCCPs. Additional open space bonds that provide funding for which HCP/NCCPs are eligible are expected to be placed on the statewide ballot several times during the 50-year permit term. A parks and open space bond is on the June 2018 ballot[23] that would provide $52 million for land acquisition to support approved NCCPs throughout California, administered by the Wildlife Conservation Board. Other existing state funding sources may include the Sustainable Agricultural Lands Conservation Program described in Table 8-11, *Likely Federal and State Funding Sources for HCPs and NCCPs in California*. The Yolo HCP/NCCP also assumes additional funding over the 50-year permit term from new local, state, and federal sources not currently identified, as described in Section 8.4.4, *Other Local, State and Federal Sources*.

8.4.3.3 Mitigation and Conservation Components

As discussed in Chapter 1, *Introduction,* NCCPs are required to provide for the conservation of covered species in the Plan Area. To achieve this standard, this conservation strategy exceeds typical project mitigation requirements. Although the Yolo HCP/NCCP provides a single conservation strategy to mitigate effects and provide for the conservation of covered species in the Plan Area, it is important to delineate the mitigation obligations of the Yolo HCP/NCCP from the conservation components because USFWS and CDFW can fund only land acquisition for the conservation component of the Yolo HCP/NCCP (i.e., they cannot subsidize mitigation). It is also important for purposes of demonstrating plan compliance with CEQA and with the state Mitigation Fee Act.

As described above, the Conservancy determined the land cover fee, in part, on the basis of mitigation requirements without the Yolo HCP/NCCP. The Conservancy estimated mitigation ratios for each land cover type that are reasonably applicable at a regional scale in the context of the Yolo HCP/NCCP to offset effects on habitat for the covered species. Based on these ratios, the overall mitigation component of the Yolo HCP/NCCP is estimated at approximately 17,016 acres of the total reserve system (see Table 1 in Appendix I); this includes the related share of all costs for management, monitoring, endowment, and plan administration, and a portion of the conservation components of the Plan described as NCCP benefits in Section 8.4.1.2, *Land Cover Fee*.

This analysis is provided to help delineate eligibility for state and federal grant funding for the conservation portion of the Yolo HCP/NCCP. The calculation above cannot be applied as a project mitigation ratio on a specific site because it was based on the substantial economies of scale provided by the Yolo HCP/NCCP (e.g., preserving large blocks of land that support many covered species). In addition, project mitigation ratios are typically based on the results of site-specific surveys and the likely presence of listed species. In contrast, the Yolo HCP/NCCP covers listed and non-listed species as well as occupied and unoccupied habitat. The Plan therefore provides substantially more regulatory assurances to Plan participants than are available on a project-by-project basis. For these reasons, it is inappropriate to compare the calculation above to a project mitigation ratio.

[23] State Senate Bill (SB) 5, The California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018. If passed, the total funding provided by SB 5 would be $4.0 billion.

The Yolo HCP/NCCP is a single plan that must be implemented as a whole. Permits will be issued on the basis of implementation of the entire Plan. The HCP/NCCP fees will cover the responsibilities and requirements of the Conservancy and Permittees to both mitigate their effects and help provide for the conservation of the covered species in the Plan Area. State and federal contributions; continuing local, state, and federal conservation efforts; and funding from private competitive grants can contribute to the conservation component of the Yolo HCP/NCCP.

8.4.4 Other Local, State and Federal Sources

The funding category *Other Local, State & Federal Sources* in Table 8-6 includes a modest assumption of $18.3 million of future funding from new local, state, or federal funding sources. The Conservancy makes no assumption regarding the share of this future funding from new local, state, or federal sources.

The local funding estimates described in previous sections are based on information about local funding sources available in 2018. During the 50-year term of the Yolo HCP/NCCP permit, local agencies are expected to generate new local sources of funding through a variety of mechanisms such as donations of land, surcharges on Special Participation Entities, or future open space taxes and fees. Although not expected to be substantial, these future new local funding sources could contribute to the conservation costs of the Yolo HCP/NCCP.

Like local sources, the Conservancy expects additional state and federal funding sources to arise during the 50-year term of the permit which could help to fund a variety of HCP/NCCP costs. New federal and state grant programs are expected to be created during the permit term that would add to the federal and state funding of the Yolo HCP/NCCP. These new grant programs may also be more flexible than existing federal or state grants in terms of what types of HCP/NCCP costs they can cover.

8.4.5 Funding Adequacy

The Conservancy conservatively estimated the funding sources described in this chapter. That is, actual funding from local, state, and federal sources may exceed these projections. For example, foundations that were not identified in this chapter may contribute more funds to the Plan than estimated. Alternatively, additional revenue may be secured from fees on Special Participating Entities. Temporary effect fees may also exceed projections if applicants choose to pay the HCP/NCCP fee in full rather than try to estimate the frequency of their activities during the permit term (thus resulting in greater up-front payments, which will also build the endowment faster). Despite these conservative assumptions and additional revenue sources, revenue may fall short of costs. This section further discusses the adequacy of the Yolo HCP/NCCP's funding in the event of funding shortfalls.

8.4.5.1 Additional Funds Needed for Management or Monitoring

The Conservancy will adjust HCP/NCCP fees annually to keep pace with increases in management and monitoring costs due to inflation (see Section 8.4.1.6, *Adjustment of HCP/NCCP Fees*). Every five years, the Conservancy will conduct a funding assessment to determine actual implementation costs. The purpose of this assessment will be to ensure that the annual adjustments have been adequate and that revenues track actual costs. If actual costs are found to be higher than the revenue provided by the HCP/NCCP fees, the Executive Director will ask the

Conservancy Board to increase the HCP/NCCP fee to compensate. These mechanisms are intended to ensure that reserve system management and monitoring costs will be paid for throughout Plan implementation.

A final safeguard is the contingency associated with management and monitoring costs (see Sections 8.3.3, *Manage and Enhance Easement and Pre-Permit Reserve Lands,* and 8.3.4, *Monitoring, Research, and Scientific Review*). The contingency fund is intended primarily to offset land management or monitoring costs that are higher than predicted by the Yolo HCP/NCCP on a short-term basis. If this fund is inadequate with respect to offsetting these costs, or if costs are predicted to exceed revenue on a long-term basis, then the Conservancy will consider whether to adjust management and monitoring requirements, without jeopardizing the Yolo HCP/NCCP's conservation requirements, or raise revenue from HCP/NCCP fees or other sources to offset the funding shortfall. When feasible, the Conservancy will make reasonable adjustments to revenue to meet the obligations of the Yolo HCP/NCCP. Some changes may require a minor or major amendment to the Yolo HCP/NCCP. See Chapter 7, *Plan Implementation,* for rules regarding changes to the Yolo HCP/NCCP.

8.4.5.2 Actions Required If Land Acquisitions Lag Behind Effects

The NCCPA requires that conservation keep pace with development in "rough proportionality." The stay-ahead provision of the Yolo HCP/NCCP (see Chapter 7, *Plan Implementation*) is intended to ensure that land acquisition and enhancement, restoration, and creation (i.e., both mitigation and conservation) keep pace with the loss of natural communities and covered species habitat. Meeting this requirement, however, depends on the steady acquisition of land from willing sellers.

The nature of land acquisition is such that assembly of the reserve system is not likely to be accomplished in a constant or predictable fashion. It is expected that large land acquisitions (500 acres or more) will be an important part of the total reserve system. Acquisition of large parcels (or combinations of parcels) is typically more complex and may take longer to accomplish than acquisition of small parcels. Therefore, many additions to the reserve system are expected to be episodic. As a result, the Conservancy may fall behind for short periods of time while the Conservancy negotiates and processes large land acquisition deals. Over the long term, large land acquisitions will save money because of their typically lower price per acre and lower per-acre land transaction costs.

The Conservancy will be responsible for performing the conservation actions necessary to comply with the stay-ahead provision, as described in Chapter 7, *Plan Implementation*. If the Conservancy determines it is at risk of non-compliance with the stay-ahead provision for land acquisition (e.g., more than 10 percent deviation from the requirements without reasonable land acquisitions being under way), the Conservancy may, after conferring with wildlife agencies, notify the other Permittees that it is necessary to temporarily require project proponents to provide land instead of paying a fee. If the Conservancy determines that it is at risk of non-compliance with the stay-ahead provision for other components of the conservation strategy besides land acquisition (e.g., habitat restoration), the Conservancy will confer with the wildlife agencies to determine the best course of action. Any requirements determined jointly by the Conservancy and the wildlife agencies to be necessary to return the Plan to compliance with the stay-ahead provision will be lifted as soon as the Conservancy demonstrates in writing to the reasonable satisfaction of the wildlife agencies that the Plan is in compliance with the stay-ahead provision.

8.4.5.3 Actions Required Should HCP/NCCP Fee Funding Fall Short of Expectations

This section describes the funding expected from HCP/NCCP fees from the implementation of covered activities by public agencies (the Permittees) and private developers. These estimates are based on long-term projections of development based on historic patterns and the approved planning documents of local jurisdictions.

The Conservancy estimated the revenue expected from public and private covered activities conservatively so as not to overestimate potential revenue sources. Despite these assumptions, however, the amount of covered activities and the revenue they generate could fall short of projections. If HCP/NCCP fees fall short of expectations, some elements of the Plan could be deferred, such as restoration that is linked to effects. Other elements of the Plan must continue regardless of the pace of HCP/NCCP fees, such as reserve management and monitoring and program administration. HCP/NCCP fees are essential to cover the costs of ongoing management and monitoring because many public funding sources cannot be used for such activities.

Revenue from non-fee funding sources could offset the shortfall in fee funding in the short term, especially for land acquisition. In the short term, if fee funding cannot keep pace with the operations and management needs of the reserve system, the Conservancy will consider the following options in consultation with the wildlife agencies:

- Continue to acquire land from willing sellers for the reserve system to take advantage of lower land costs but deferral of non-essential management and monitoring of these lands for up to five years or when HCP/NCCP fee revenue is adequate, whichever comes first (see below for additional details on this option);
- Identify new funding sources to cover the cost of operation and maintenance of the reserve system until fee revenue increases to offset these costs over the long term;
- With approval from the wildlife agencies, defer implementation tasks that are not critical for compliance with the Permits, Implementing Agreement, and the Plan; and
- Consider other options that meet the biological goals and objectives of the Yolo HCP/NCCP and are consistent with the Permits, Implementing Agreement, and the Yolo HCP/NCCP.

As described in Chapter 6, *Conservation Strategy,* if HCP/NCCP fee funding falls short of expectations but the reserve system is expanding as fast or faster than it should to meet or exceed the Stay-Ahead Provision, the Conservancy may defer most management of these lands until HCP/NCCP fee funding (or other sources) is available. Specifically, if needed, the Conservancy may limit management to essential management tasks and defer non-essential management tasks for up to five years from the purchase of the first parcel of each reserve unit or until HCP/NCCP fees become available, whichever comes first. Essential management tasks are defined as those tasks that are necessary to ensure that the condition of the reserve unit does not degrade below the existing condition at the time it was incorporated into the reserve system. This standard will be measured in terms of the amount and condition of natural land cover and habitat for covered species that are known on or expected to occupy the site. Existing conditions will be documented by the Conservancy through the pre-acquisition assessment and the site inventory, described in Chapters 5 and 7. Management in response to changed circumstances is considered essential management and therefore cannot be deferred.

Over the entire permit term, fee revenue may also fall short of expectations if fewer covered activities occur than assumed under the Yolo HCP/NCCP. Although unlikely, this shortfall will make it difficult for the Permittees to meet their conservation commitment. If it appears that take authorized under the Permits will fall short of expectations, substantially reducing fee revenue, the Conservancy and other Permittees will work with the wildlife agencies to apply for extensions to the Permits to allow the full use of the authorized take and full implementation of the Yolo HCP/NCCP. As described above, local entities are not expected to, nor are they required to, utilize local general funds for the Yolo HCP/NCCP's implementation in the event of funding shortfalls of any kind.

Alternatively, if revenues fall far short of expectations and it is unlikely that the Permittees will meet their permit obligations, they may apply to reduce the authorized take and reduce the permit obligations in line with reduced revenue forecasts. Any permit term extension or request for reductions in Plan obligations will follow the requirements for a major amendment, as described in Chapter 7.

8.4.5.4 Actions Required Should Non-Fee Funding Fall Short of Expectations

This section describes the non-fee funding sources that are being committed or are expected to be provided by local, state, and federal agencies (see Sections 8.4.2, *Local Funding*, and 8.4.3, *State and Federal Funding*). These commitments and expectations are based on conservative assumptions and a track record of providing similar funding locally or to other HCPs and NCCPs in California. Despite these assumptions, it is possible that these non-fee funding sources will fall short of expectations.

In the event of shortfalls in non-fee funding, the Conservancy will make reasonable adjustments to expenditures to reduce costs while still meeting the obligations of the Plan. If these adjustments are inadequate with respect to addressing the shortfall, the Conservancy will consult with the wildlife agencies regarding the best course of action. As described above, local entities are not expected to, nor are they required to, utilize local general funds for the Yolo HCP/NCCP's implementation in the event of funding shortfalls as a result of less non-fee revenue than expected. The actions that will be considered will include reducing take authorization and conservation obligations in proportion to the funding shortfall. Such reductions will need to follow the major amendment process described in Chapter 7, *Plan Implementation*.

8.4.5.5 Funding for Post-Permit Management and Monitoring

After the permit term, all of the Permittees are obligated to continue to protect, manage, and maintain the reserve system. This includes adaptive management and monitoring at a level that is adequate for determining whether management is effective. Other obligations, however, end after the permit term. For example, the Permittees are no longer obligated to report the status of the Yolo HCP/NCCP annually to the wildlife agencies. Preservation, enhancement, restoration, and creation obligations will also be completed prior to the end of the permit term and will not continue post-permit. Remedial measures and contingencies also no longer need to be funded after the permit term because the regulatory assurances associated with these obligations end with the permit. Detailed assumptions regarding post-permit costs are presented in Section 8.3.8, *Costs in Perpetuity*. Responsibility for funding long-term management and monitoring rests solely with the Conservancy.

As described in Section 8.3.8, funding provided by interest on the endowment that will be built during the permit term is expected to fully fund post-permit costs. Any shortfalls in the endowment during the permit term will be identified by the five-year funding assessments conducted by the Conservancy. If the endowment is not growing fast enough to reach its target size, then the endowment fee portion of the HCP/NCCP fees will be increased to make up the shortfall. With these built-in safeguards in the endowment, post-permit funding is expected to be adequate to fully offset necessary post-permit costs of management and monitoring.

Chapter 9
Alternatives to Take

9.1 Introduction

The Federal Endangered Species Act (FESA) requires Section 10 permit applicants to specify in an HCP the alternative actions to the take of federally listed species the applicant considered and the reasons the applicant did not select those alternatives. The Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998) identifies two types of alternatives commonly used in HCPs: (1) an alternative that would reduce take below levels anticipated for the proposed project, and (2) an alternative that would avoid take and, hence, not require a permit from the U.S. Fish and Wildlife Service (USFWS). This chapter identifies the alternative measures considered that would reduce or avoid the potential for take of species covered in the HCP/NCCP. The FESA does not prohibit take of federally listed plants; therefore, this chapter addresses only the take of covered wildlife species.

9.2 Description of Take Alternatives

The alternatives to take (i.e., take alternatives) addressed in this chapter are the No-Take Alternative, Reduced Development Take Alternative, and Reduced Number of Covered Species Take Alternative. These take alternatives are assessed below in relation to the effects on covered species described in Chapter 5, *Effects Analysis,* for the proposed conservation strategy and covered activities.

As part of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) process, the environmental impact statement/environmental impact report (EIS/EIR) for the Yolo HCP/NCCP identifies and evaluates a wider range of project alternatives than the take alternatives listed in this chapter. The analysis of take alternatives in this chapter serves a specific and narrow regulatory purpose, which is separate and apart from the analysis of project alternatives under CEQA and NEPA. The EIS/EIR for the HCP/NCCP identifies a reasonable range of project alternatives and evaluates the potential environmental impacts of those alternatives in relation to the No-Action or No-Project Alternative (Yolo Habitat Conservancy 2017).

9.2.1 No-Take Alternative

Under the No-Take Alternative, the Permittees would not engage in any activities that would result in take of any covered wildlife species and, therefore, would not need an Incidental Take Permit (ITP) from USFWS. Chapter 3, *Covered Activities,* describes the covered activities, which include activities associated with urban and rural community development, agricultural development, industrial development, and utilities. These covered activities are consistent with the approved City of Davis, City of West Sacramento, City of Winters, City of Woodland, and County of Yolo general plans.

The No-Take Alternative would have no adverse effects on covered wildlife species because take would be avoided. The No-Take Alternative would also not provide substantial benefits to covered wildlife species because the HCP/NCCP and its conservation measures would not be implemented. There would be no HCP/NCCP to provide for the conservation of the covered species in the Plan Area through a comprehensive landscape-scale conservation strategy.

The No-Take Alternative would be infeasible because it would prevent development under approved general plans and capital improvement plans. Under this alternative, the City of Davis, City of West Sacramento, City of Winters, City of Woodland, and County of Yolo would not fully implement their approved general plans and planned economic and community development activities such as residential, commercial, industrial, recreational, and open space land uses would not occur. These uses include infrastructure, flood protection, and transportation projects.

The general plans of the member cities and County of Yolo, for example, identify areas in which growth is expected to occur. These potential future growth areas include habitat utilized by species covered in the HCP/NCCP. In addition, covered species occur throughout the Plan Area at large. Under the No-Take Alternative, future development would not occur in areas with covered species. Thus, compared to the proposed HCP/NCCP, the No-Take Alternative would result in less growth in the Plan Area as a result of avoiding take.

The No-Take Alternative was rejected because it would (1) severely constrain the implementation of the county and city general plans and thus preclude achieving the objectives for planned growth and development and (2) preclude improvements and the maintenance of infrastructure that supports the health, safety, and economy of the Plan Area (e.g., road construction, improvements, and maintenance; flood protection). The HCP/NCCP provides an integrated way of permitting take of listed (and non-listed) species while allowing the Permittees to implement projects.

9.2.2 Reduced Development Take Alternative

The Yolo Habitat Conservancy (Conservancy) developed the Yolo HCP/NCCP to help implement the general plans of the Permittees. The Permittees developed these general plans with full public input to address local growth and development goals, including consideration of effects on wildlife species and other sensitive biological resources. Each general plan considered alternatives with less development than each jurisdiction proposed and ultimately adopted. The alternative to take with reduced development was designed to incorporate reduced development alternatives for each of the cities and the county.

The Yolo County 2030 Countywide General Plan EIR analyzed three distinct alternatives to the adopted plan: the No-Project Alternative, a Rural Sustainability Alternative, and a Market Demand Alternative. The Rural Sustainability Alternative would have resulted in less development (35 percent less residential, 86 percent less non-residential) than the adopted 2030 Countywide General Plan.

The City of Davis' general plan was adopted in 2001 and updated in 2007. The 2007 update consistently incorporates the land use vision originally adopted by the City of Davis in 1987 (1987 Davis General Plan) that promotes a cohesive, compact, university-oriented city surrounded by agricultural lands, greenbelts, and habitats. The City of Davis places a 1 percent

annual growth cap[1] on new housing development (which equates to approximately 260 units per year), of which no more than 60 percent (156) may be built on land at the urban limits. A referendum (Measure J), adopted in 2001 and extended in 2010, requires a public vote for any change in land use from open space and agricultural lands. This referendum has minimized development pressures to expand the urban sphere.

The City of West Sacramento adopted its first general plan in 1990 and approved a number of revisions from 1992 through 2008. It is currently updating its general plan and considering three alternative growth scenarios that will inform the selection of a preferred alternative for the general plan update. Alternative A, Riverfront Focus Alternative, is a modified version of the base conditions (existing general plan land use diagram). Areas along the Sacramento River waterfront would develop at slightly higher densities, creating more residential and employment capacity in these areas; however, some areas in the southern extent of planned urban development would be less dense than the base conditions. The overall character of development would be similar to what has occurred under the existing 1990 general plan. Alternative A does not expand development beyond the current city limits and, therefore, promotes the preservation of open space and productive farmland surrounding West Sacramento.

Alternative B, Riverfront, District, and Corridor Intensification Alternative, provides for the highest density and intensity development of the three alternatives. Development would be concentrated primarily in mixed-use districts and along mixed-use corridors. Nearly all of the higher density and intensity development would be concentrated in the northern part of the city. The densities, locations of development, and mix of uses would support pedestrian and bicycle mobility and create the potential for increased transit use. Alternative B assumes the greatest amount of redevelopment in the northern area of the city, creating new residential and employment opportunities.

Alternative C, City Limits Expansion Alternative, would expand the city beyond its existing city limits to the north and south, annexing over 2,000 acres to the city for new development. The northern and southern expansion areas would develop as master planned residential communities, and the Notch[2] area would develop as an industrial job center. The land use designations within the existing city limits would remain the same as in the existing general plan. .

The City of Winters' general plan was adopted in 1992. In 2009, the city council extended the general plan horizon year from 2010 to 2018. At that time the city council determined that the existing city general plan planning area was adequate to accommodate all projected growth through 2018. By not expanding the urban limit line from its 1991 location, the City of Winters has ensured that adverse effects on wildlife habitat will be minimized regardless of the general plan alternative adopted.

The City of Woodland's general plan was adopted in 1996, with a modest "technical" update in 2002. The general plan and EIR examined a variety of land use alternatives. The City of Woodland rejected an east and west expansion alternative because of concerns regarding encroachment on prime agricultural lands outside the city's urban limit line and because of the

[1] City Council Resolution No. 05-27.

[2] A 606-acre area northwest of the city and south of the Sacramento Bypass.

prohibitively expensive cost of extending infrastructure and essential services to these areas. A 2005 amendment to the general plan replaced a pre-existing 2015 population cap of 60,000 with a cap of 5,000 new single-family homes through 2020. A 2006 amendment by the voters established a permanent urban limit line (ULL) around the existing city limits. This ULL contains 3,148 acres; the current size of Woodland is 9,624 acres. The City is currently updating its general plan and analyzing four alternative growth scenarios. Scenario 1, Infill Only, depicts development on infill sites only, in the downtown area, along key corridors, and in the Spring Lake Specific Plan Area. Aside from continued development of Spring Lake, no development would take place in any of the new Specific Plan Areas. Scenario 2, Moderate Infill, SP-1A Fully Develops, SP-2 Partially Develops, assumes that a moderate amount of infill development occurs. This scenario assumes 100 percent buildout of SP-1A (Southeast Specific Plan Area) and a 25 percent buildout of SP-2 (Spring Lake Specific Plan Area). Scenario 3, Moderate Infill, SP-1A Fully Develops, SP-3 Partially Develops, assumes that a moderate amount of infill development occurs. The remaining need for residential development is accommodated in SP-1A (100 percent buildout) and in SP-3, the Spring Lake area (50 percent buildout). Scenario 4, High Infill, Full Buildout of SP-1A, 1B, and 1C, produces the highest amount of residential and non-residential development, with approximately 9,000 new housing units by 2035—a 1.7 percent growth rate.

Further reducing development through the Reduced Development Take Alternative would not allow for sufficient development to achieve sustainability in terms of supporting a jobs/housing balance within the community areas, lowering the number of vehicle miles traveled, and providing basic levels of community-serving water, wastewater, storm drainage, and public services for each of the Permittees. Further restricting development through the Reduced Development Take Alternative would not allow the Permittees to meet local growth and development goals.

9.2.3 Reduced Number of Covered Species Take Alternative

The Reduced Number of Covered Species Take Alternative would reduce the proposed covered species list to those that are listed as threatened or endangered under FESA or the California Endangered Species Act (CESA) and eliminate from the list species that are not currently protected under FESA or CESA.

Application of this criterion would result in a list of eight wildlife species: palmate-bracted bird's beak, valley elderberry longhorn beetle, California tiger salamander (Central California Distinct Population Segment [DPS]), giant garter snake, Swainson's hawk, western yellow-billed cuckoo, least Bell's vireo, and bank swallow. This revised list would not include four wildlife species that are covered by the proposed alternative: western pond turtle, white-tailed kite, western burrowing owl, and tricolored blackbird[3].

This alternative would provide some benefits to the Permittees in the short term because narrowing the list of covered species would reduce the Permittees' obligations to implement avoidance, minimization, and mitigation measures for these species, thereby reducing costs. Covering fewer species, however, would result in a biologically inferior program relative to the

[3] At the time the take alternatives were developed and refined in 2015, tricolored blackbird was not listed by the state. For the purposes of this analysis the species is excluded from this take alternative despite its current state listing status.

preferred approach. Also, the monitoring program addresses all covered species. The Conservancy will use the results of monitoring throughout the permit term and beyond for adaptive management decisions, which will benefit a wider range of species (covered and not). In addition, over the long term, this alternative would not provide take authorization for any species that has a high probability of listing under the FESA or CESA over the permit term. This could require development of individual permits for actions that result in take of these species in the future, when they become listed. Obtaining individual permits for these species could delay covered activities and increase costs above that of the preferred alternative. This alternative would result in less protection of and mitigation for rare and sensitive species and could result in greater long-term costs; therefore, this alternative was rejected.

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Chapter 10
List of Preparers

10.1 Introduction

10.2 Yolo Habitat Conservancy

10.2.1 Current Board Members

- Jim Provenza, Yolo County Supervisor (Chair, Board of Directors)
- Chris Ledesma, City of West Sacramento Councilmember (former Chair, Board of Directors)
- Don Saylor, Yolo County Supervisor (former Chair, Board of Directors)
- Merwin "Skip" Davies, City of Woodland Councilmember
- Matt Dulcich (ex officio), Director of Environmental Planning and Local Governmental Relations Manager, University of California, Davis
- Lucas Frerichs, City of Davis Councilmember
- Pierre Neu, City of Winters Councilmember

10.2.2 Past Board Members

- Cecilia Aguiar-Curry, City of Winters Councilmember
- Wes Beers, City of West Sacramento Councilmember
- Susie Boyd, City of Davis Councilmember
- Duane Chamberlain, Yolo County Supervisor
- Sean Denny, City of Woodland Councilmember
- Marjorie Dickinson (ex officio), Assistant Vice Chancellor, Governmental and Community Relations, University of California, Davis
- Martie Dotie, City of Woodland (former Chair, Board of Directors)
- Woody Fridae, City of Winters Councilmember
- Lynnel Pollock, Yolo County Supervisor (former Chair, Board of Directors)
- Matt Rexroad, Yolo County Supervisor
- Stephen Souza, City of Davis Councilmember
- Tom Stone, City of Winters Councilmember
- Helen Thomson, Yolo County Supervisor (former Chair, Board of Directors)
- Dan Martinez, City of Winters Councilmember
- Oscar Villegas, City of West Sacramento Councilmember

- Lois Wolk, Yolo County Supervisor (former Chair, Board of Directors)

10.2.3 Current Staff Members

- Petrea Marchand, Executive Director
- Shawna Stevens, Assistant to the Director
- Christine Alford, Deputy Director
- Susan Garbini, Research Associate
- Phil Pogledich, Counsel
- Heidi Tschudin, Project Manager

10.2.4 Past Staff Members

- John Bencomo, Interim Director
- Robyn Truitt Drivon, Counsel
- Kate Montieth, Assistant to the Director
- Scott Stone, Agency Land Manager

10.3 Advisory Committee[1]

10.3.1 Current Members and Liaisons

Members

- Michelle Azevedo
- John Brennan
- Bonnie Chiu
- Steven Greco
- Glen Holstein
- John Hopkins
- Kent Lang
- Chad Roberts
- Steve Thompson
- Charles Tyson
- Jeanette Wrysinski

[1] Prior to 2012, referred to as the "Steering Advisory Committee."

Liaisons and Alternates

- Jeff Anderson, Yolo County (alt.)
- John Donlevy, City of Winters
- Charline Hamilton, City of West Sacramento
- Ken Hiatt, City of Woodland
- John McNerney, City of Davis (alt.)
- Cindy Norris, City of Woodland (alt.)
- Eric Parfrey, Yolo County
- Mike Webb, City of Davis

10.3.2 Past Members and Liaisons

Members and Alternates

- Jim Baxter
- Todd Chambers
- Dan Efseaff
- Sid England
- Keith Fichtner
- Mike Hall
- Blake Harlan
- Vinton Hawkings
- Stefan Lorenzato
- Donna Mast
- Tim Miramontes
- Katy Pye
- Paul Robins
- Dan Ramos
- Dan Reiff
- Dennis Rogers
- Yvonne LeMaitre
- Price Walker
- David Stroud
- Chris Scheuring
- Denise Sagara (alt.)

- Eric Paulsen

Liaisons and Alternates

- Randy Bloom, City of Winters
- Bruce Boyd, City of Davis
- Nellie Dyer, City of Winters
- Kate Kelly, City of Winters
- Rick Landon, Yolo County
- Jeff Loux, City of Davis
- Bob MacNicholl, City of Woodland
- Janet Ruggiero, City of Woodland
- Mitch Sears, City of Davis
- David Shpak, City of West Sacramento
- Dan Sokolow, City of Woodland
- Cindy Tuttle, Yolo County
- Merrell Watts, City of Winters
- Warren Westrup, Yolo County
- Sandra White, City of West Sacramento
- John Young, Yolo County

10.4 Fish and Wildlife Agencies

U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) participated in Conservancy Board and Advisory Committee meetings in the capacity of providing technical advice and guidance regarding species biology and regulatory requirements. The following representatives from these agencies contributed to the preparation of the Yolo HCP/NCCP.

10.4.1 U.S. Fish and Wildlife Service

10.4.1.1 Current Representatives

- Eric Tattersall
- Mike Thomas
- Dan Cox
- Jennifer Norris
- Paul Souza

10.4.1.2 Past Representatives

- Craig Aubrey
- Ellen Berryman
- Valary Bloom
- Cay Goude
- Josh Hull
- Bill Lehman
- Meri Moore
- Steve Morey
- Cori Mustin
- Chris Nagano
- Wayne White

10.4.2 California Department of Fish and Wildlife

10.4.2.1 Current Representatives

- Stephanie Buss
- Jeff Drongesen
- Jennifer Nguyen
- Tina Bartlett
- Charlton Bonham

10.4.2.2 Past Representatives

- Janice Gan
- Jennifer Garcia
- Todd Gardner
- Paul Hofmann
- Brenda Johnson
- Jenny Marr
- James Navicky
- Monica Parisi
- Gail Presley
- Kent Smith
- Kevin Hunting

- Sandy Morey
- Scott Wilson
- David Zezulak

10.5 Independent Science Advisors

- Peter Bloom, Western Foundation of Vertebrate Zoology
- Stanley Gregory, PhD, Oregon State University
- Jaymee Marty, PhD, The Nature Conservancy
- Reed Noss, PhD, University of Central Florida, Orlando
- Mark Schwartz, PhD, University of California, Davis
- Elizabeth Soderstrom, PhD, Natural Heritage Institute
- Wayne Spencer, PhD, Conservation Biology Institute
- Glenn Wylie, PhD, USGS Western Ecological Research Center

10.6 Current Consultant Team

10.6.1 ICF International

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Chapter 11
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11.1.1 United States Code

16 U.S.C. § 703 (United States Code Title 16 Conservation. Chapter 7 Protection of Migratory Game and Insectivorous Birds. Subchapter 2 Migratory Bird Treaty. Section 703 Taking, Killing, or Possessing Migratory Birds Unlawful).

16 U.S.C. § 1532 (United States Code Title 16 Conservation. Chapter 35 Endangered Species. Section 1532 Definitions).

16 U.S.C. § 1536 (United States Code Title 16 Conservation. Chapter 35 Endangered Species. Section 1536 Interagency Cooperation. (a) Federal Agency Actions and Consultations).

16 U.S.C. § 1536 (United States Code Title 16 Conservation. Chapter 35 Endangered Species. Section 1539 Exceptions. (a) Permits).

33 U.S.C. § 1251(a) (United States Code Title 33 Navigation and Navigable Waters. Chapter 26 Water Pollution Prevention and Control. Section 1251 Congressional Declaration of Goals and Policy).

11.1.2 Code of Federal Regulations

33 C.F.R. § 325.5(c) (Code of Federal Regulations. Title 33 Navigation and Navigable Waters. Chapter 2 Corps of Engineers, Department of the Army, Department of Defense. Part 325 Processing of Department of the Army Permits).

33 C.F.R. § 328.3(a)(3) (Code of Federal Regulations. Title 33 Navigation and Navigable Waters. Chapter 2 Corps of Engineers, Department of the Army, Department of Defense. Part 328 Definition of Waters of the United States).

40 C.F.R. Part 230 (Code of Federal Regulations. Title 40 Protection of the Environment. Chapter 1 Environmental Protection Agency. Part 230 Section 404 (b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

50 C.F.R. § 17.3 (Code of Federal Regulations. Title 50 Wildlife and Fisheries. Chapter 1 United States Fish and Wildlife Service, Department of the Interior. Part 17 Endangered and Threatened Wildlife and Plants. Subpart 3 Definitions).

50 C.F.R. § 402.14(i)(5) [Code of Federal Regulations. Title 50 Wildlife and Fisheries. Chapter 4 Joint Regulations (United States Fish and Wildlife Service, Department of the Interior and National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce); Endangered Species Committee Regulations. Part 402 Interagency Cooperation – Endangered Species Act of 1973, as Amended. Subpart 14 Formal Consultation).

50 C.F.R. 21.27 (Code of Federal Regulations. Title 50 Wildlife and Fisheries. Chapter 1 United States Fish and Wildlife Service, Department of the Interior. Part 21 Migratory Bird Permits. Subpart 27 Special Purpose Permits).

50 C.F.R. § 17.22(b)(2)(B) (Code of Federal Regulations. Title 50 Wildlife and Fisheries. Chapter 1 United States Fish and Wildlife Service, Department of the Interior. Part 17 Endangered and Threatened Wildlife and Plants. Subpart 22 Permits for Scientific Purposes, Enhancement of Propagation or Survival, or for Incidental Taking).

11.1.3 California Code of Regulations

14 C.C.R. § 1.72 [California Code of Regulations Title 14 Natural Resources. Division 1 Fish and Game Commission-Department of Fish and Game. Subdivision 1 Fish, Amphibians and Reptiles. Chapter 1 General Provisions and Definitions. Section 1.72 Stream (includes creeks and rivers)].

11.1.4 California Fish and Game Code

Fish and Game Code § 1602(a)(4)(A)(i) (California Department of Fish and Game Code. Division 2 Department of Fish and Game. Chapter 6 Fish and Wildlife Protection and Conservation. Section 1602).

Fish and Game Code § 1603(a) (California Department of Fish and Game Code. Division 2 Department of Fish and Game. Chapter 6 Fish and Wildlife Protection and Conservation. Section 1603).

Fish and Game Code § 2080. (California Department of Fish and Game Code. Division 3 Fish and Game Generally. Chapter 1.5 Endangered Species. Article 3 Taking, Importation, Exportation, or Sale. Section 2080).

Fish and Game Code § 2080. (California Department of Fish and Game Code. Division 3 Fish and Game Generally. Chapter 1.5 Endangered Species. Article 3 Taking, Importation, Exportation, or Sale. Section 2081).

Fish and Game Code § 2800–2835 (California Department of Fish and Game Code. Division 3 Fish and Game Generally. Chapter 10 Natural Community and Conservation Planning Act).

Fish and Game Code § 2810(a)(7) (California Department of Fish and Game Code. Division 3 Fish and Game Generally. Chapter 10 Natural Community Conservation Planning Act).

Fish and Game Code § 2815 (California Department of Fish and Game Code. Division 3 Fish and Game Generally. Chapter 10 Natural Community Conservation Planning Act. Section 2815).

Fish and Game Code § 2820(a) (California Department of Fish and Game Code. Division 3 Fish and Game Generally. Chapter 10 Natural Community Conservation Planning Act. Section 2820).

Fish and Game Code § 2835 et seq. California Fish and Game Code. Division 3 Fish and Game Generally. Chapter 10 Natural Community Conservation Planning Act.

Fish and Game Code § 86 (California Department of Fish and Game Code. Division 0.5 General Provisions and Definitions. Chapter 1 General Definitions. Section 86).