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LIST OF ACRONYMS AND ABBREVIATIONS

AMM	Avoidance and Minimization Measure
ATV	all-terrain vehicle
O&M	operations and maintenance
PCE	primary constituent elements
ROW	right-of-way

CHAPTER 4. IMPACT ASSESSMENT AND ESTIMATED LEVEL OF TAKE

4.1 INTRODUCTION

The NHP impact assessment describes the impacts or adverse effects of implementing the covered activities described in Chapter 3, *Covered Activities* including the conservation measures described in Section 5.4 and 5.7, on natural communities and covered species. The analysis of the effects reflects changes relative to the existing conditions described in Chapter 2, *Ecological Baseline Conditions* and Appendix A, *Covered Species Accounts*.

The assessment of impacts on each natural community identifies the potential acreage of the community that could be permanently and directly impacted (i.e., removed) as a result of implementing the covered activities as well as impacts on associated vegetation, wildlife, and ecosystem functions. The assessment of impacts on each covered species identifies the estimated level of incidental take¹ (take) and, if applicable, effects on designated critical habitat. The amount of NHP-requested take for each of the covered species under section 10 of the ESA and NCCPA permits, and extent of NCCPA permitted impacts on natural communities associated with implementation of the covered activities are described in Section 4.5, *Requested Level of Take and Permit Coverage*.

The quantification of effects on covered species habitats is limited by the known distribution of covered species within the Plan Area. Where information on covered species occurrences and occupied habitat is not available, the estimated impact is based on the loss or reduction in function of areas assumed to provide habitat for the species using the habitat models presented in Appendix A, *Covered Species Accounts*.

4.2 IMPACT ASSESSMENT APPROACH

The approach to the NHP impact assessment relies on application of the best available information regarding the covered activities (see Chapter 3, *Covered Activities*) and the best available scientific and commercial information regarding the distribution and acreage of natural communities and covered species habitats, the distribution and abundance of covered species, and the ecological requirements and behaviors of covered species (see Chapter 2, *Existing Ecological Conditions*, and Appendix A, *Covered Species Accounts*). Impacts are assessed based on an evaluation of the likely responses of the natural communities and covered species to impact mechanisms (see Section 4.2.2, *Impact Mechanisms*) associated with implementing covered activities. The approach to analyzing impacts is by necessity at a landscape level

¹ Take is defined under the ESA regulations as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct” as it applies to federally listed species (ESA §3[19]); see glossary for definitions of “harm” and “harass.” Take is defined under the California ESA as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill” (California Fish and Game Code section 86). Under both the ESA and California ESA, “incidental take” refers to actions that result in take that are incidental to otherwise lawful activities.

because of the large size of the Plan Area, the broad range of activities covered, and the long duration of NHP implementation. Consequently, the impact assessment represents approximate impacts rather than precise numbers; however, the estimate of impacts and level of take for each covered species are over estimates because of the assumptions used in estimating the amount and distribution of species habitat (see Appendix A, *Covered Species Accounts*, for a description of the components of each species' habitat model). For all covered species there is a greater area of land cover identified as suitable habitat than actual suitable habitat present (i.e., more areas that are "false positive" for habitat than "false negative" for habitat. See Appendix A, *Covered Species Accounts*, for descriptions of species habitat and how habitat models were developed. The acres of impacts on natural communities and covered species habitat presented in this chapter constitute the total impacts on natural communities and covered species habitats allowable under the NHP Permits.

The impact assessment addresses the impacts of the following major categories of covered activities described in Chapter 3, *Covered Activities*, and listed below:

- Permanent Development
 - Residential, Industrial, and Commercial Development
 - Public and Private Infrastructure
 - Transportation Projects
 - Utility Projects
 - Recreational Facilities
 - Solar Energy Development Projects
 - Flood Control and Water Conservation Activities
 - Other Infrastructure Projects
 - New Agricultural and Livestock Facilities
 - Aggregate Mining
- Operations and Maintenance (O&M) and Other Ongoing Activities
 - Residential, Industrial, and Commercial Development O&M Activities
 - Public and Private Infrastructure O&M Activities
 - Transportation Facilities O&M Activities
 - Utilities O&M Activities
 - Recreational Facilities O&M Activities
 - Solar Energy Facilities O&M Activities
 - Flood Control and Water Conveyance Infrastructure O&M Activities
 - Agricultural and Livestock Operations and Maintenance Activities
 - Aggregate Mining Site Operations and Maintenance Activities
- Implementation of NHP Conservation Strategy and Local Conservation Strategy

4.2.1 Impact Category Definitions

Impacts are defined as adverse effects on biological resources that result from the covered activities, specifically adverse effects on natural communities and the covered species habitat they support, agricultural lands that support covered species habitat, and covered species occurrences and populations. The effects can be temporary or permanent and direct or indirect; they can also be cumulative. These terms are defined and used in the NHP as follows in accordance with USFWS regulations² (see Appendix M, *Glossary of Terms*).

- **Permanent Effects.** Permanent effects are impacts of covered activities that result in 1) the injury or mortality of a covered wildlife species, 2) removal of a covered plant species, 3) irreversible permanent removal, degradation, or alteration of a land cover type supporting habitat for covered and other native species, or 3) adverse effects on the functions of a land cover type as habitat for covered species for more than one year following implementation of the activity (e.g., creating a new road through annual grassland).
- **Temporary Effects.** Temporary effects are impacts of covered activities that 1) alter the behavior of a covered wildlife species for the duration of a temporary activity that is less than one year, 2) alter the habitat conditions that support covered plant or vernal pool shrimp species occurrences for a period of less than one year following implementation of the activity, or 3) alter a land cover type or that affect the functions of a land cover type as habitat for covered and other native species for less than one year following implementation of the activity (e.g., mowing annual grassland for construction staging areas). Impact mechanisms that result in temporary effects on covered species include disturbances, such as noise and dust generation, associated with the operation of construction equipment (e.g., noise and visual disturbances may result in wildlife avoiding habitat areas adjacent to construction sites and dust falling on leaves may reduce photosynthesis in plants).
- **Direct Effects.** Direct effects are those effects on natural communities and covered species and their habitats that are expected to occur immediately as a result of the implementation of covered activities at the time and place of project implementation (e.g., construction-related ground, noise, and visual disturbances). Direct effects can be permanent or temporary.
- **Indirect Effects.** Indirect effects are those effects on natural communities and covered species and their habitats that are caused by or will result from the implementation of covered activities and are later in time but still reasonably certain to occur. Indirect effects are defined by ESA regulations as “those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.”³ For example, indirect effects on species could result from increased noise, disturbance by unattended pets, and

² 50 CFR 402.02.

³ 50 CFR 402.02.

night lighting as a result of homes built in immediate proximity to habitat. Indirect effects are generally permanent (e.g., once lighting is installed for residential areas, it is assumed it will remain indefinitely), and no temporary indirect effects have been identified with implementation of the NHP covered activities.

- **Cumulative Effects.** Cumulative effects result from the incremental impact of the covered activities when viewed together with past, present, and reasonably foreseeable future actions. The ESA regulations define cumulative effects as “those 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.”⁴ In the case of the NHP, the “federal action” is the issuance of incidental take permits by USFWS, and the federal “action area” is the NHP Plan Area, as no impacts of covered activities on covered species and natural communities are anticipated to extend beyond the Plan Area boundary. The ESA definition only applies to ESA section 7 analyses and differs from the broader definition of cumulative effects under NEPA and CEQA. HCPs are not required to discuss cumulative effects; however, as stated in the *Habitat Conservation Planning Handbook*, “the applicant should help ensure that those considerations required of the [USFWS] by Section 7 have been addressed in the HCP” (USFWS and NMFS 1996). Accordingly, the NHP addresses the cumulative effects that could result from state, local, and private activities. Cumulative effects of all projects with a federal nexus are analyzed in the NHP EIR/EIS and, because they will require compliance under section 7 of the ESA, are not addressed in the NHP.

4.2.2 Impact Mechanisms

Impact mechanisms are defined as actions or results of actions to implement a covered activity that result in an adverse effect on natural communities and covered species. The impacts of covered activities are determined based on the likely response of natural communities and covered species to the impact mechanisms using the best available scientific and commercial information and professional judgment. Impact mechanisms associated with the NHP covered activities are summarized by category in Table 4-1, *Summary of Covered Activity Impact Mechanisms and Associated Potential Adverse Impacts for Covered Activity Categories* and are described below. Impact mechanisms associated with implementation of the covered activities result in permanent direct, temporary direct, and permanent indirect effects on biological resources (see Section 4.2.1, *Impact Category Definitions*). No impact mechanisms are identified that would result in temporary indirect effects (Table 4-1). Consequently, temporary indirect effects are not described further in the assessment of impacts on natural communities (Section 4.3) and covered species (Section 4.4).

⁴ 50 CFR §402.02.

1 **Table 4-1. Summary of Covered Activity Impact Mechanisms and Associated Potential**
2 **Adverse Impacts for Covered Activity Categories**

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Impact mechanisms are grouped for the purposes of analysis and in accordance with the description of covered activities presented in Chapter 3, *Covered Activities*. While Chapter 3 provides details on the activities themselves, this section describes how groups of covered activities affect land cover and habitat for covered species. These descriptions provide an overview of the direct and indirect effects that could result from each category of covered activities. Required NHP avoidance and minimization measures designed to avoid or reduce the impacts of covered activities on covered species and natural communities are presented in Section 5.4.4, *Avoidance and Minimization Measures*.

4.2.2.1 Residential, Industrial, and Commercial Development

NHP covered residential, industrial and commercial facilities permanent development activities are described in Section 3.2.1, *Residential, Industrial, and Commercial Development*. With the exception of culverts placed in small intermittent drainages that cross roads, bike paths, and other similar infrastructure within the footprint of new residential, commercial, public and industrial facilities, these activities do not include construction of in-water structures.

4.2.2.1.1 Permanent Direct Effects

The primary impact mechanism for residential, industrial and commercial development projects that result in permanent direct effects on natural communities and covered species is conversion of natural communities and habitat for covered and other native species to developed land that does not support habitat.

In addition to the permanent removal of natural communities and agricultural lands that support habitat for covered and other native species, such conversion may further fragment or isolate remaining natural habitat within the Planning Units, rendering it less suitable or unsuitable for use by covered species. The operation of equipment to implement these permanent development projects also result in the removal of covered and other native plant species and injury or mortality of covered and other native wildlife species that cannot avoid operating equipment (e.g., crushing or striking of individuals, destruction of nests with eggs or nestlings). Accidental introduction of contaminants within project construction sites associated with construction-related activities (e.g., fuel spills) could also result in mortality or inhibit normal behaviors of covered and other native wildlife species that are sensitive to and come into contact with these contaminants.

4.2.2.1.2 Temporary Direct Effects

The temporary impact mechanism for residential, industrial and commercial development projects on natural communities and covered species is the operation of construction-related equipment.⁵ Noise, visual (e.g., movement of equipment and people), and other disturbances

⁵ Residential, industrial and commercial facility permanent development projects are assumed to result in the complete conversion of natural communities and agricultural lands within project footprints. Consequently, there are no temporary direct impacts on natural communities and agricultural lands within project footprints. Operation of construction-related equipment to

(e.g., ground vibrations, night lighting of construction sites) associated with operation of construction-related equipment can result in temporary abandonment or reduction in use of habitat areas by covered and other native wildlife species adjacent to work sites. Erosion, dust and sedimentation associated with construction-related disturbance of soils during construction periods may also reduce the function of receiving waters and land surfaces as habitat for covered and other native species (e.g., increased turbidity, covering of plants with soil).

4.2.2.1.3 Permanent Indirect Effects

Impact mechanisms for residential, industrial and commercial development projects that result in permanent indirect effects on natural communities and covered species include increased human activity associated with human occupancy of new residential, commercial, and industrial facilities adjacent to natural communities and agricultural lands supporting covered species habitats and the creation of impermeable ground surfaces (e.g., paved or compacted land). Human activities associated with occupancy and use of new developments can result in increased ambient noise levels (e.g., traffic noise, lawnmowers) and visual disturbances that cause reduction in use or abandonment of habitat adjacent to new developments (e.g., increased traffic, increased intrusion of humans into adjacent habitat areas, night lighting of habitat areas emanating from adjacent structures). Occupancy of new development will result increased risk for injury or mortality of covered and other native wildlife species. For example, increased traffic associated with new developments adjacent to 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). Loose pets (e.g., dogs and cats) can result in increased predation (e.g., cats preying on small mammals and nesting birds) and harassment of native wildlife (e.g., dogs chasing deer). Increased levels of human access into adjacent habitat areas also increases the risk for wildfire that could result in temporary periodic removal of vegetation that supports habitat for covered and other native species.

Occupancy of new residential developments can exacerbate the introduction or spread of nonnative species. Nonnative aquatic wildlife is known to have serious impacts on native amphibian populations. For example, aquarium species released in the wild may introduce new diseases to wild amphibian populations. Ornamental plants and native cultivars may spread to adjacent habitat areas and outcompete and displace native species; they can also hybridize (interbreed) with local native plants and thereby disrupt the genetics of the native population. Such hybridization can cause a number of problems for the native plant population, including poor growth and reproduction.

Increasing the extent of impermeable surfaces may alter local surface runoff patterns (i.e., timing and amount of runoff) that support native vegetation (e.g., wetland and riparian vegetation). Increases in the amount of runoff, especially during storm events, can result in greater levels of

implement residential, industrial, and commercial facility permanent development projects will avoid perennial stream channels and banks, thus avoiding the potential for temporary direct effects of construction-related disturbances on aquatic species and habitat.

scour and/or incision of local creeks, increased sediment loads, alterations of downstream hydrology, and decreased groundwater recharge. High runoff temperature may also result in an increase of in-stream water temperatures when runoff enters local streams affecting habitat conditions for covered and other native aquatic organisms. Occupancy of new facilities may increase the amount of pollutants such as grease, oil, detergents, and lawn pesticides that can be transported from residences during wet weather. An increase in the quantity of pollutants reaching local streams through higher runoff may affect the biological and physical characteristics of aquatic habitats for native aquatic organisms.

Impact mechanisms of recreational facilities and uses that may result in permanent indirect effects on natural communities and covered species include increased human activity in (e.g., trails) and adjacent to natural habitat areas. Use of recreational facilities can result in noise and visual disturbances that affect habitat use by covered and other native wildlife; increased risk for vehicle-wildlife collisions associated with increased traffic adjacent to habitat areas; and increased collection of native plants and wildlife, trampling of plants, harassment of wildlife by pets, deposition of harmful waste (i.e., illegal dumping) and other such disturbances. Incidental take associated with legal recreational uses, however, is only extended to the Implementing Entity and Permittees for the indirect effects of allowable recreational uses (i.e., take caused by actions of individual recreationists is not covered).

4.2.2.2 Private and Public Infrastructure

NHP covered private and public infrastructure development activities are described in Section 3.2.2, *Public and Private Infrastructure*.

4.2.2.2.1 Permanent Direct Effects

Impact mechanisms for private and public infrastructure development projects that result in permanent direct effects on natural communities and covered species include the conversion of natural communities and habitat for covered and other native species within the footprints of new infrastructure (e.g., roads, bridges, above and below ground utility corridors) to developed land. Permanent direct effects of converting natural communities and habitats include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1, *Residential, Industrial, and Commercial Development*. In addition, construction of new linear infrastructure (e.g., road surfaces, corridors of mowed vegetation along utility rights-of-way [ROWs]) may create barriers that disrupt movements of covered and other native wildlife species (e.g., small mammals, reptiles, amphibians) among habitat areas.

As described for permanent direct effects of residential, industrial and commercial permanent development projects in Section 4.2.2.1, the operation of equipment to construct new infrastructure could result in the removal of covered and other native plant species and injury or mortality of covered and other native wildlife species. The likelihood for these effects is expected to be low for projects to widen existing roads (described in Section 3.2.2.1, *Transportation Projects*) because they will occur within existing ROWs that support low

functioning wildlife habitat (i.e., low herbaceous vegetation adjacent to roads that are subject to on-going traffic-related disturbances). Excavation of trenches to install underground utilities (e.g., sewage mains, natural gas pipelines, telecommunications lines) can trap native wildlife species resulting in injury or mortality of individuals that are unable to escape (e.g., predation, starvation, hypothermia). Trenching required for pipelines may permanently alter the local hydrology, especially when impermeable soil layers or geological strata are punctured, thus draining wetlands if present. This could affect the hydro period, community and function of wetlands adjacent to pipeline corridors.

Operation of equipment and placing structures (e.g., bridge abutments, road crossings, channel stabilization structures) in permanent stream channel banks and stream beds associated with construction and replacement of bridges, pipeline crossings, and flood control and water conservation projects may result in alteration of in-stream channel habitat (e.g., in-stream woody debris, substrate).

4.2.2.2 Temporary Direct Effects

Impact mechanisms for temporary direct effects of private and public infrastructure development projects on natural communities and covered species is the operation of construction-related equipment. Temporary direct effects of associated with operation of construction-related equipment include those described for residential, industrial, and commercial permanent development projects in Section 4.2.2.1. Temporary direct effects of construction of underground natural gas and water pipelines include the temporary removal of natural communities and covered species habitat within the construction footprint necessary to install the pipelines. Temporary direct effects of pipeline installation include the temporary loss of habitat area for covered and other native species and the creation of barriers to movement for less mobile species of native wildlife (e.g., small mammals, reptiles, amphibians).⁶ In addition, in-channel operation of equipment to construct and replace bridges and install and repair flood control and water conservation structures could mobilize sediment from stream beds and banks, causing increased turbidity that could temporarily affect habitat conditions for native aquatic organisms. Equipment-related noise and visual disturbances, and vibrations associated with operating construction-related equipment in and near channels could also cause covered and other native aquatic species (e.g., fish, reptiles, and amphibians) to temporarily reduce use of or avoid habitat areas upstream and downstream from project sites.

4.2.2.3 Permanent Indirect Effects

Impact mechanisms for private and public infrastructure development projects that result in permanent indirect effects on natural communities and covered species include new or increased traffic volume associated with road construction and improvement projects, construction of new

⁶ As described in Section 4.2.2.1, the impact assessment assumes that pipelines will permanently impact natural communities and associated covered and other native species' habitats, but will only temporarily impact agricultural crop land that supports covered species' habitats because farming will continue once below ground pipelines are installed.

above ground utilities, creation of impermeable ground surfaces, and alteration of channel bank structure and flood pathways. Effects of new or increased traffic on new and improved roads and bridges include increased risk for injury and mortality of covered and other native wildlife species as result of vehicle collisions. Construction of new aboveground power poles and lines result in increased risk for injury or mortality of covered and other native bird species resulting from collisions with utility lines and poles and electrocution of larger birds (e.g., raptors) that perch on power poles.

Noise and visual disturbances associated with traffic on new road ways may also reduce the use of habitat adjacent to new roads by covered and other native species that are sensitive to such disturbances. Traffic along new roads and higher traffic volume on widened roads may also increase the amount of petroleum-based pollutants (e.g., oil) that can be transported from road surfaces during wet weather. An increase in the quantity of pollutants reaching local streams in roadway runoff may affect the biological and physical characteristics of aquatic habitats for native aquatic organisms.

Construction of new roads, expansion of existing road surface area, and other infrastructure that creates impermeable ground surface conditions may alter local hydrologic conditions resulting in the same effects on natural communities as described for construction of new residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1.

Construction of in-channel flood control and water conservation structures can result in localized alterations in stream channel erosion and sedimentation that can affect habitat conditions for covered and other native species that use riverine habitats. Construction of flood flow corridors to direct flood flows to reduce impacts on resources affected by existing flood pathways will alter local surface runoff patterns (i.e., timing and amount of runoff), by diverting and collecting sheet flow which may affect local water courses, wetlands, and native riparian vegetation supporting habitat for covered and other native species.

4.2.2.3 Planned New Agricultural Commercial and Industrial Facilities

Covered planned new agricultural commercial and industrial facilities are described in Section 3.2.3.. Impact mechanisms for permanent direct, temporary direct, and permanent indirect effects of land conversion and new agricultural and livestock operations facilities are the same as described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1, *Residential, Industrial, and Commercial Development*.

4.2.2.4 Aggregate Mining

Covered aggregate mining activities are described in Section 3.2.4.

4.2.2.4.1 Permanent Direct Effects

Impact mechanisms for new or expanded aggregate mining that may result in permanent direct effects on natural communities and covered and other native species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1, *Residential, Industrial, and Commercial Development*. In addition, excavation of aggregate material could result in direct mortality if covered and other native wildlife become trapped in excavated areas. Gravel pits and associated new roads may disrupt localized movement and access to habitat areas as new roads create barriers to movement of some covered and other native wildlife species (e.g., results in impeding the movement behavior of small mammals, reptiles, amphibians).

4.2.2.4.2 Temporary Direct Effects

Temporary direct effect mechanisms of aggregate mining are the same as described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1, *Residential, Industrial, and Commercial Development* (Table 4-1). Temporary direct effects of mining activities on near- and in-stream habitats are the same as described for public and private infrastructure activities in Section 3.2.2.

4.2.2.4.3 Permanent Indirect Effects

Impact mechanisms for aggregate mining projects that result in permanent indirect effects include increased risk for injury and mortality of covered and other native wildlife species resulting from collisions with vehicles that continue to use aggregate mine roads following the cessation of mining activities (e.g., recreational uses of reclaimed lands). Noise and visual disturbances associated post-mining traffic on access roads may also reduce the use of habitat adjacent to roads by covered and other native species that are sensitive to such disturbances. Mined areas and their associated roads may alter local surface runoff patterns (i.e., timing and amount of runoff) that support aquatic or riparian habitats and native vegetation. An increase in the quantity of pollutants reaching local streams may affect the biological and physical characteristics of aquatic habitats for native aquatic organisms. Increased recreational uses of reclaimed lands (after mining has ceased) may reduce the suitability and function of habitats for native wildlife species. In-channel operation of equipment to maintain channel conveyance functions along Cache Creek could result in alteration of channel erosional and depositional processes that support the establishment and maintenance of riparian vegetation.

4.2.2.5 Residential, Industrial, and Commercial Development O&M Activities

Covered operations and maintenance of residential, industrial, and commercial development areas are described in Section 3.3.1. There are no impact mechanisms associated with future maintenance of new residential, commercial, public, and industrial facilities located within developed lands because all covered species habitat will have been removed during construction of the development.

4.2.2.5.1 Permanent Direct Effects

The impact mechanism for residential, industrial, and commercial development operations and maintenance activities that could result in permanent direct effects on covered and other native species is the operation of maintenance-related equipment. For example, juvenile mammals and ground-nesting birds could be disturbed or injured by mowing equipment, or rodent burrows used by covered species could be buried by disking of fire breaks. In addition, tree removal may destroy or injure eggs, nestling birds, or roosting bats. The likelihood for these impacts is low because most or all of the lands within which maintenance and operations-related activities will be implemented are expected to be developed, thus supporting little or no habitat.

4.2.2.5.2 Temporary Direct Effects

The impact mechanism for residential, industrial, and commercial development operations and maintenance activities that could result in temporary direct effects on natural communities and covered species is the operation of large machinery (e.g., pump stations), maintenance-related equipment, and equipment used to demolish solar energy facilities. Noise and visual disturbances associated with the operation of large machinery and equipment could result in temporary reduced availability of habitat for covered and other native species during the period such activities are implemented. Operation of equipment to maintain herbaceous vegetation (e.g., mowing of road shoulders, annual maintenance of fire breaks) alters the vegetation structure. Such effects, however, are not expected to substantively alter habitat conditions for covered species that use these maintained habitats.

In addition, the introduction of contaminants associated with maintenance-related activities (e.g., fuel spills) may cause morbidity or mortality of covered and other native species coming in contact with contaminants. 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 and other native species (e.g., increased turbidity, reduced dissolved oxygen, silting over vegetation).

4.2.2.5.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with the operations and maintenance of residential, industrial, and commercial development areas.

4.2.2.6 Public and Private Infrastructure O&M Activities

Covered operations and maintenance of public and private infrastructure are described in Section 3.3.2.

4.2.2.6.1 Permanent Direct Effects

The impact mechanism for public and private infrastructure operations and maintenance activities that could result in permanent direct effects on natural communities and covered species include those described for residential, industrial, and commercial development operations and maintenance activities (Section 3.3.1). In addition, maintenance of underground utilities within developments could require excavation of trenches, which could trap native wildlife species resulting in injury or mortality of individuals (e.g., predation, starvation, hypothermia). Placement of material dredged from channels along or on channel embankments may 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). Periodic removal of trees and large shrubs to maintain flood control structures could remove habitat that support covered and other native wildlife species. Removal of woody and other debris from channels or irrigation canals may cause alteration of in-channel aquatic habitat structure and hydrodynamics and may affect cover for native aquatic organisms, and basking and foraging habitat available for reptile species (e.g., western pond turtle, giant garter snake).

4.2.2.6.2 Temporary Direct Effects

The impact mechanism for public and private infrastructure operations and maintenance activities that could result in temporary direct effects on natural communities and covered species include those described for residential, industrial, and commercial development operations and maintenance activities (Section 3.3.1).

4.2.2.6.3 Permanent Indirect Effects

Maintenance of new golf courses and other high maintenance recreational facilities may increase the amount of pollutants such as grease, oil, and lawn pesticides that can be transported in runoff from managed areas during wet weather. An increase in the quantity of pollutants reaching local streams may affect the biological and physical characteristics of aquatic habitats for native aquatic organisms.

4.2.2.7 Agricultural and Livestock Operations and Maintenance Activities

Covered agricultural and livestock operations and maintenance activities are described in Section 3.3.3. There are no impact mechanisms associated with future maintenance of agricultural commercial and industrial facilities located within developed lands because all covered species habitat will have been removed during construction of the facilities.

4.2.2.7.1 Permanent Direct Effects

Impact mechanisms for agricultural and livestock operations and maintenance activities that result in permanent direct effects on natural communities and covered species include operation of farm machinery, such as tractors, mowers and harvesters, seeding and planting equipment,

spray rigs, cattle trailers, all-terrain vehicles (ATVs), and horses (mainly for cattle gathers). Maintenance and operations equipment can cause direct injury or mortality of covered and other native wildlife species either by direct contact/collision or by destroying burrows, nests, or shelter used by covered species in the footprint of the activities. For example, juvenile mammals and ground-nesting birds could be disturbed or injured by harvesting equipment, or rodent burrows used by covered species could be buried by disking of fire breaks. In addition, any tree removal necessary to maintain agricultural production (e.g., to maintain water conveyance channels) may destroy or injure eggs, nestling birds, or hibernating bats. Vegetation removal during harvest, field preparation after fallowing, or creating fire breaks may injure or harm covered and other native wildlife species present at the site (e.g., ground nesting birds). Livestock grazing may cause mortality of covered species by trampling or direct consumption (e.g., covered plant species). Draining or dredging of ponds during the breeding season of native wildlife (e.g., western spadefoot toad, California tiger salamander, ducks) could result in injury or mortality of amphibian species larvae and eggs and reduced survival of species that brood young in ponds (e.g., ducklings).

4.2.2.7.2 Temporary Direct Effects

The impact mechanism for agricultural and livestock operations and maintenance activities that could result in temporary direct effects on natural communities and covered species is the operation of farming- and ranching-related equipment. Noise and visual disturbances associated with equipment operation could result in temporary reduced availability of habitat in and near where equipment is operated for covered and other native wildlife species. The introduction of contaminants associated with operations and maintenance-related activities (e.g., fuel spills, fertilizer spills) may cause morbidity or mortality of covered and other native species coming in contact with contaminants. Maintenance/repair of ponds may temporarily remove water supply for covered and other native wildlife species and may cause desiccation of larval covered species (e.g., amphibian eggs and tadpoles).

4.2.2.7.3 Permanent Indirect Effects

The impact mechanism for agricultural and livestock operations and maintenance activities that could result in permanent indirect effects on natural communities and covered species is operation of farm and ranching-related equipment. Erosion and sedimentation associated with disturbance of soils (e.g., grading, field leveling, plowing, disking), may result in reduced function of receiving waters and land surfaces as habitat for covered and other native species (e.g., increased turbidity, reduced dissolved oxygen, silting or dusting over vegetation). The likelihood for this impact is considered low because waterways within existing cultivated lands are typically highly modified (e.g., channelized) and, as such, support low value habitat for native species relative to undisturbed waterways.

4.2.2.8 Aggregate Mining Site Operations and Maintenance Activities

Covered aggregate mining site operations and maintenance activities are described in Section 3.3.4.

4.2.2.8.1 Permanent Direct Effects

Impact mechanisms for new or expanded aggregate mining aggregate mining site operations and maintenance activities that may result in permanent direct effects on natural communities and covered and other native species include those described for aggregate mining (Section 4.2.2.4). In addition, in-channel restoration operations may cause alteration of in-channel aquatic habitat structure and hydrodynamics and may affect cover for native aquatic organisms, and basking and foraging habitat available for reptile species (e.g., western pond turtle, giant garter snake). Impact mechanisms associated with maintenance of aggregate mining facilities are the same as those described for residential, industrial, and commercial development operations and maintenance activities (Section 4.2.2.5).

4.2.2.8.2 Temporary Direct Effects

Temporary direct effects of aggregate mining include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1, *Residential, Industrial, and Commercial Development*. In addition, in-channel operation of maintenance mining equipment may temporarily increase turbidity and thus habitat conditions for native aquatic organisms.

4.2.2.8.3 Permanent Indirect Effects

Impact mechanisms for new or expanded aggregate mining aggregate mining site operations and maintenance activities that may result in permanent indirect effects on natural communities and covered and other native species include those described for aggregate mining (Section 4.2.2.4). In addition, any changes in in-channel restoration operations that result in altering stream may cause alteration of in-channel aquatic habitat structure and hydrodynamics and may affect flow and cover conditions for native aquatic organisms downstream of work sites.

4.2.2.9 Habitat Restoration

NHP habitat restoration conservation measures are described in Section 5.4.2.1.

4.2.2.9.1 Permanent Direct Effects

Impact mechanisms associated with habitat restoration activities that result in permanent direct effects on natural communities and covered species include the conversion of cultivated lands to riparian, vernal pool, and emergent wetland land cover types and operation of restoration-related equipment. Land cover type conversion will result in the loss of habitat for covered and other native wildlife species for which the restored land cover types do not also support habitat for

those species. Operation of restoration-related equipment could result in injury or mortality of covered and other native wildlife species that cannot avoid operating equipment. Accidental introduction of contaminants within restoration sites associated with equipment operation (e.g., fuel spills) could also result in mortality or inhibit normal behaviors of covered and other native wildlife species that are sensitive to and come into contact with these contaminants.

4.2.2.9.2 Temporary Direct Effects

The impact mechanisms associated with habitat restoration activities that result in temporary direct effects on natural communities and covered species is the operation of restoration-related equipment. Restoration equipment and material staging areas and access roads may result in temporary impacts on habitat located outside of habitat restoration footprints. The area of affected habitat associated with each restoration project, however, is expected to be relatively small (e.g., less than 1 acre) and will be restored following completion of restoration activities.

Noise and visual disturbances associated with operation of restoration-related equipment can result in temporary abandonment or reduction in use of habitat areas by covered and other native wildlife species adjacent to restoration sites. Erosion, dust and sedimentation associated with construction-related disturbance of soils during construction periods may also reduce the function of receiving waters and land surfaces as habitat for covered and other native species (e.g., increased turbidity, reduced dissolved oxygen, covering of plants with soil).

4.2.2.9.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with habitat restoration activities because the overall change in ecological functions of restored habitats for covered species will be increased from existing conditions.

4.2.2.10 Enhancement and Management of Protected Lands

NHP conservation measures to enhance and manage NHP conservation lands are described in Sections 5.4.2.2.

4.2.2.10.1 Permanent Direct Effects

Impact mechanisms associated with the enhancement and management of NHP conservation lands that result in permanent direct effects on natural communities and covered species include the development of conservation land management-related infrastructure (e.g., access roads, fences, small outbuildings, and signage) and operation of habitat enhancement and management-related equipment. Development of infrastructure will result in the removal of relatively small areas of land cover supporting habitat for covered and other native wildlife species. New access roads are expected to be unimproved (e.g., unpaved two-track roads, gravel surfaced secondary roads) and have narrow ROWs (e.g., no road shoulder). Consequently, new access roads are not

expected to create barriers to the movement of covered and other native wildlife species. Management of some conservation lands may require establishment and maintenance of new fire breaks. Maintenance of fire breaks are primarily expected to retain the existing land cover (e.g., grassland), but alter vegetation structure following disking of firebreaks during the dry season.

Operation of vehicles and other equipment necessary to manage NHP conservation lands could result in injury or mortality of covered and other native wildlife species that cannot avoid operating equipment. Accidental introduction of contaminants within project construction sites associated with construction-related activities (e.g., fuel spills) could also result in mortality or inhibit normal behaviors of covered and other native wildlife species that are sensitive to and come into contact with these contaminants.

4.2.2.10.2 Temporary Direct Effects

Impact mechanisms associated with the enhancement and management of NHP conservation lands that result in temporary direct effects on natural communities and covered species include those described for habitat restoration activities in Section 4.2.2.9. Mechanical and chemical removal/control of nonnative vegetation may result in the temporary removal of small patches of vegetation associated with ground disturbance and vegetation removal in the immediate vicinity of where such actions are implemented. The effects of these activities on natural communities and covered species is expected to be low because each maintenance event typically will be of short duration and will only affect small patches of habitat (e.g., less than 1 acre).

Temporary direct effects of noise and visual disturbances associated with periodic controlled public access for education (e.g., scheduled school classes) and recreation (e.g., bird watching) on designated NHP conservation lands can result in temporary abandonment or reduction in use of habitat areas by covered and other native wildlife species adjacent to public access sites (e.g., trails).

4.2.2.10.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with NHP conservation land enhancement and management.

4.2.2.11 Maintenance of Agricultural Habitat Values and Riparian Habitats

The local conservation measures (see Section 5.7, *Conservation Provided for Local Concern Species*) include entering into agreements with landowners to maintain the production of agricultural crop types as may be necessary to maintain agricultural habitat unit value targets and with landowners and managers to maintain sufficient riparian habitat area to achieve riparian habitat acreage targets in the Valley Landscape Unit. Actions that may be implemented under these agreements include the planting of specified crop types and avoiding the removal of riparian vegetation. As such, there are no impact mechanisms associated with providing for the continued implementation of ongoing and customary agricultural practices within the Plan Area

and avoiding actions that could remove riparian habitat. Consequently, implementation of this element of the Local Conservation Strategy will not result in permanent or temporary impacts on natural communities or covered species.

4.2.3 Assumptions Used to Calculate Acreage Impacts on Natural Communities and Covered Species Habitat

The acreage of natural communities and modeled and mapped covered species habitats that could be directly and indirectly affected by permanent development covered activities was assessed based on the planned future permanent development footprints shown in Figure 4-1, *Planned Future Permanent Development Footprints Used to Conduct the GIS Impact Analysis*. The actual footprint location where each of the permanent development activities will be implemented may differ from that shown in Figure 4-1. Assumptions regarding the design (e.g., area of impact footprints) and implementation of permanent development, and operations and maintenance and other ongoing activities that were used to conduct the assessment of acreage impacts are presented in Table 4-2, *Covered Activity Implementation Assumptions Used to Conduct the Assessment of Impacts on Natural Communities and Modeled Covered Species Habitat*.

4.2.4 Assessment of Impacts on Natural Communities and Agricultural Habitats

Effects of the impact mechanisms under each category of covered activity described in Section 4.2.2 on natural communities and agricultural habitats are assessed quantitatively and qualitatively. The following describes how impacts on NHP natural communities and agricultural habitats were determined by impact category.

The footprint location of implemented permanent development projects may differ from the permanent development project footprints shown in Figure 4-1. Any such differences between planned and actual project footprints must be minor and the project will be required to be consistent with all applicable elements of the NHP.

- 1 **Figure 4-1. Planned Future Permanent Development Footprints Used to Conduct the GIS**
- 2 **Impact Analysis**

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- 1 **Table 4-2. Covered Activity Implementation Assumptions Used to Conduct the**
- 2 **Assessment of Impacts on Natural Communities and Modeled Covered Species Habitat**

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4.2.4.1 Permanent Direct Effects

Permanent direct effects (described in Section 4.2.2) for which permanent development footprints are defined (Figure 4-1) were determined using GIS by intersecting the NHP land cover type GIS data layer with the project footprints identified in the County and other planning documents that have been prepared for the covered activities (e.g., regional recreation plans, county ordinances). With the exception described below for riparian and wetland habitats, all natural communities and agricultural habitats within the urban Planning Units 19–22 are assumed to be removed by new permanent development projects. For permanent development projects for which project footprints are not defined in existing plans and for which sufficient information was available, hypothetical GIS footprints were developed based on a reasonable interpretation of the project descriptions. For permanent development projects for which sufficient information is not available to develop a reasonable hypothetical GIS footprint, a limit on the extent and location of allowable impacts was established.

The GIS intersection of the land cover type data layer with the permanent development project GIS footprint data layer represents the acreage of each natural community and land cover type that could be permanently and directly affected by the permanent development projects. The GIS-generated acreages of valley foothill riparian and fresh emergent wetland land cover types that could be affected within covered activities GIS footprints were adjusted downward to reflect NHP maximum allowable amount of impacts and avoidance and minimization requirements for these natural communities within specified Planning Units. Limits are included in the NHP on the acreage of valley foothill riparian and fresh emergent wetland land cover types that may be permanently and directly affected by permanent development projects because these land cover types support covered species habitats that have declined substantially both within California and the Plan Area. Impact avoidance requirements are based on the distribution of these land cover types within the permanent development projects and an estimated acreage of each of the land cover types that could be reasonably avoided through project design and application of the avoidance and minimization measures described in Section 5.4.4. The NHP does not allow the removal by covered activities of perennial stream courses, canals, and other features that support the open water land cover type, and therefore, GIS-generated impact acreages resulting from slight spatial inconsistencies between the permanent development footprint and land cover type GIS data layers, are not presented as impacts. The reductions made from the GIS-generated acreage on intersection to the NHP allowable acreage of impact on valley riparian, fresh emergent wetland, and open water land cover types are described in footnotes to the natural community impact tables (see Table 4-3a, *Summary of Permanent Impacts and Impact Limits on Natural Communities for Permanent Development Activities with a Spatially Defined Footprint* to Table 4-3c, *Acreage of Permanent Impacts and Impact Limits on Natural Communities in the Valley Landscape Unit for Permanent Development Activities with a Spatially Defined Footprint*).

1 **Table 4-3a. Summary of Permanent Impacts and Impact Limits on Natural Communities**
2 **for Permanent Development Activities with a Spatially Defined Footprint**

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- 1 **Table 4-3b. Acreage of Permanent Impacts and Impact Limits on Natural Communities in**
- 2 **the Hill and Ridge Landscape Unit for Permanent Development Activities with a Spatially**
- 3 **Defined Footprint**

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- 1 **Table 4-3c. Acreage of Permanent Impacts and Impact Limits on Natural Communities in**
2 **the Valley Landscape Unit for Permanent Development Activities with a Spatially Defined**
3 **Footprint**

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4.2.4.2 Temporary Direct Effects

Temporary direct effects (described in Section 4.2.2) of the covered activities on natural communities and agricultural habitats are assessed qualitatively based on the likely effect of impact mechanisms (e.g., construction-related noise and visual disturbances, dust generation, ground vibrations) on ecological conditions and biological resources associated with each of the natural communities and habitats.

4.2.4.3 Permanent Indirect Effects

Permanent indirect effects (described in Section 4.2.2) of the covered activities on natural communities and agricultural habitats are assessed qualitatively based on the likely effect of impact mechanisms (e.g., changes in hydrology resulting from ground compaction associated with new developments, increased levels of human disturbance associated with occupancy of new developments) (Table 4-1) on ecological conditions and biological resources associated with each of the natural communities and habitats.

4.2.5 Assessment of Impacts on Covered Species

The acreage of permanent direct effects on habitat for each of the covered species is determined quantitatively using the species habitat models described in Appendix A, *Covered Species Accounts* using the methods described below.

4.2.5.1 Species Take Avoidance Requirements

Implementation of the covered activities must avoid direct mortality or injury of DFW-designated fully protected wildlife species and removal (i.e., damage or destruction) of covered plant species for which a biological objective to avoid their removal is established (see Section 5.3.2.3, *Species-Level Goals and Objectives*). Removal will be avoided with implementation of Avoidance and Minimization Measures (AMMs) (described in Section 5.4.4). With the exceptions described below, the assessment of impacts on these species in Section 4.4 assumes that direct impacts on individuals of the following species will be avoided.

- Colusa grass
- Solano grass
- Conservancy fairy shrimp
- White-tailed kite
- California tiger salamander
- Western spadefoot toad
- Conservancy fairy shrimp

1 Take of California tiger salamander and western spadefoot toad will only be permitted if the
2 species conservation requirements for these species described in Table 4-4, *Take and Habitat*
3 *Impact Limits for Covered Species Occurrences* are met. If the conservation provisions are met,
4 take will only be permitted for occurrences of these species if in consultation with USFWS and
5 DFW, it is determined that the taking would not remove a significant occurrence that is
6 necessary to maintain the genetic diversity or maintain the regional distribution of the species.

7 The impact analysis further assumes the application of the take limits described Table 4-4 for
8 each of the following species.

- | | | | |
|----|----------------------------|----|--------------------------------|
| 9 | • Alkali milk-vetch | 16 | • Vernal pool tadpole shrimp, |
| 10 | • Brittsescale | 17 | • California tiger salamander |
| 11 | • San Joaquin spearscale | 18 | • Western spadefoot toad |
| 12 | • Heckard's pepper-grass | 19 | • Western yellow-billed cuckoo |
| 13 | • Baker's navarretia | 20 | • Bank swallow |
| 14 | • vernal pool fairy shrimp | 21 | • Least Bell's vireo |
| 15 | • California linderiella | 22 | • Tricolored blackbird |

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1 **Table 4-4. Take and Habitat Impact Limits for Covered Species Occurrences**

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4.2.5.2 Species Habitat Models

This section describes how the NHP species habitat models were developed for each of the covered species to estimate the distribution and extent of covered species habitats within the Plan Area (see Appendix A, *Covered Species Accounts*, for a description of habitat models). These models are used to conduct the assessment of impacts on covered species habitats because specific survey information regarding the distribution of habitat areas occupied by covered species is not available and not feasible to collect across the entire Plan Area.⁷ The models are based on various combinations of parameters of vegetation, soils, water features, geology, topography, and the proximity of such features to each other used to circumscribe habitat for each of the species and species-specific requirements and behaviors (e.g., maximum typical distance between patches of nesting and foraging habitats that a species will travel) that can be spatially modeled using available and NHP-developed GIS databases. Species habitat models were reviewed by the NHP Advisory Committee and use of such models is considered by USFWS and DFW as appropriate tools for conducting HCP and NCCP impact assessments. Descriptions of the species habitat models and their component GIS data layers are presented in Appendix A, *Covered Species Accounts*, for each of the applicable covered species.

As described above for natural communities (Section 4.2.4), the GIS-generated impacts on modeled habitat for particular species that use riparian, wetland, and aquatic habitats were adjusted downward to reflect NHP maximum allowable amount of impacts and avoidance and minimization requirements. For example, Swainson's hawk uses riparian forest habitats for nesting, and the extent of riparian forest intersected by the GIS covered activity footprints is greater than the acreage that is allowed to be removed under the NHP and hence most riparian forest habitat must be avoided. Avoidance and minimization measures are described in Chapter 5, *Conservation Strategy*. The reductions in acreage between GIS intersection acreage and the NHP allowable acreage of impact on covered species are described in footnotes to the covered species impact tables (see Table 4-5a, *Summary of Permanent Impacts and Impact Limits on Covered Species' Habitats for Permanent Development Activities with a Spatially Defined Footprint* through Table 4-5c, *Acreage of Permanent Impacts and Impact Limits on Covered Species' Habitats in the Valley Landscape Unit for Permanent Development Activities with a Spatially Defined Footprint*).

Effects of the impact mechanisms described for each category of covered activity described in Section 4.2.2 on covered species are assessed quantitatively and qualitatively. The following describes how impacts on NHP covered species were determined by impact category.

⁷ Private property access and costs are the primary limiting factors that prevent complete survey coverage for covered species habitat across the entire Plan Area. Models provide a more practicable means to determine the distribution of habitat. Additionally, models provide an estimate of available habitat for species that may move among habitat patches and therefore may not be occupying habitat in some survey years.

- 1 **Table 4-5a. Summary of Permanent Impacts and Impact Limits on Covered Species'**
2 **Habitats for Permanent Development Activities with a Spatially Defined Footprint**

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**Table 4-5b. Acreage of Permanent Impacts and Impact Limits on Covered Species'
Habitats in the Hill and Ridge Landscape Unit for Permanent Development Activities with
a Spatially Defined Footprint**

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1 **Table 4-5c. Acreage of Permanent Impacts and Impact Limits on Covered Species'**
2 **Habitats in the Valley Landscape Unit for Permanent Development Activities with a**
3 **Spatially Defined Footprint**

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4.2.5.3 Permanent Direct Effects

The acreage of modeled habitat that could be permanently and directly impacted (i.e., removed) was determined by intersecting the GIS habitat model layers for each species (see Appendix A, *Covered Species Accounts*) with the future permanent development footprint data layer (Figure 4-1). The GIS intersection of modeled habitat with the permanent development project footprints represents the acreage of each species modeled habitat type that could be permanently removed.

Implementation of the covered activities could result in injury or mortality of covered wildlife species and damage or destruction of covered plant species. Direct impacts on known occurrences of covered plant species and Swainson's hawk nest sites was determined by intersecting the GIS covered plant occurrence and nest site location data layers (see Appendix A, *Covered Species Accounts*) with the permanent development footprint data layer (Figure 4-1). Known covered plant occurrences and nest sites that are located within permanent development project footprints are considered to be directly impacted (i.e., removed) unless there is an avoidance and minimization measure identified in Section 5.4.4, *Avoidance and Minimization Measures*, that will require that the impact be avoided. For most of the covered species, sufficient information regarding the location of occupied habitat and their abundance is not available to quantitatively determine the number of individual covered species that could be directly impacted by the covered activities. For these species, the impact mechanisms and the probability for direct impacts on individual covered wildlife, fish, and plant species is qualitatively described.

4.2.5.4 Temporary Direct Effects

Temporary direct effects (described in Section 4.2.2) of the covered activities on covered species habitats are assessed qualitatively based on the likely effect of impact mechanisms (e.g., construction-related noise and visual disturbances, dust generation, ground vibrations) on the ecological functions of their habitat and on individuals of the species.

4.2.5.5 Permanent Indirect Effects

Permanent indirect effects (described in Section 4.2.2) of the covered activities on covered species habitats are assessed qualitatively based on the likely effect of impact mechanisms (e.g., changes in hydrology resulting from ground compaction associated with new developments, increased levels of human disturbance associated with occupancy of new developments) (Table 4-1) on the ecological functions of their habitat and on individuals of the species.

4.2.6 Assessment of Impacts on Designated Critical Habitat

Critical habitat is designated in formal rules by USFWS for specific areas that have the physical and biological features essential to the conservation and recovery of listed species. Section 7 of the ESA prohibits the destruction or adverse modification of designated critical habitat by any

activity authorized by a federal agency. Because USFWS will be issuing a federal permit to participating jurisdictions, USFWS must evaluate the effects of implementing the NHP on critical habitat against this regulatory standard.⁸ Potential effects on the primary constituent elements (PCEs) of designated critical habitat in the Plan Area are assessed. Critical habitat has been designated within the Plan Area for the following covered species:

- California tiger salamander
- Vernal pool tadpole shrimp
- Colusa grass
- Solano grass

The location of critical habitat units are described in Appendix A, *Covered Species Accounts*, for each of the species for which critical habitat is designated within the Plan Area. Descriptions of the PCEs for the designated critical habitat for each species are presented in Section 4.4, *Impacts on Covered Species*.

Methods used to determine the extent of each designated critical habitat unit for each of the species that could be removed by covered activities was determined using the same methods as described for covered natural communities (see Section 4.2.2, *Impact Mechanisms*). The potential effects of each covered activity on the PCEs of each critical habitat unit were qualitatively assessed using aerial imagery.

4.3 IMPACTS ON NATURAL COMMUNITIES

This section describes the adverse effects on natural communities and agricultural habitats resulting from the impact mechanisms (described in Section 4.2, *Impact Assessment Approach*) of planned future permanent development projects, operations and maintenance and ongoing activities, the NHP conservation measures (CMs), and local conservation measures within the Plan Area (see Chapter 3, *Covered Activities*, Section 5.4, *Conservation Measures*, and Section 5.9, *Local Conservation Strategy*). The impacts of the covered activities on each natural community and agricultural habitat are described for each of these covered activity categories. The expected outcomes for the natural communities and agricultural habitats of implementing the covered activities, including the NHP conservation measures and local conservation measures, are described in Section 5.5, *Conservation Provided for Natural Communities*. The impact mechanisms associated with each of the covered activity categories that could result in permanent and temporary direct effects and permanent indirect effects on natural communities and agricultural habitats are presented in Table 4-1. No impact mechanisms are identified that could result in temporary indirect effects.

⁸ 16 U.S.C. § 1536(a)(2).

Figure 4-2, *Grasslands: Direct Impacts of Spatially Defined Permanent Development Covered Activities*, to Figure 4-6, *Agricultural Habitat: Direct Impacts of Spatially Defined Permanent Development Covered Activities*, depict the extent and location of each natural community land cover type that will be removed based on the assumed footprint locations of the permanent development activities described in Chapter 3, *Covered Activities*. The maximum acreage of each natural community and agricultural habitat that will be removed (i.e., permanent direct impacts) with implementation of the covered activities for which there is a defined footprint is summarized for the Plan Area by Landscape Unit in Table 4-3a and presented by Planning Unit in Tables 4-3b–4-3c. The maximum acreage of each natural community and agricultural habitat that may be removed by covered activities without a spatially defined footprint is presented in Table 4-6, *Acreage of Permanent Impacts and Impact Limits on Natural Communities from Permanent Development Activities with Spatially Undefined Footprints*. Figure 4-1 depicts the location of the defined planned development footprints used to conduct the GIS impact analysis within which the natural communities will be removed. As described in Section 4.2, *Impact Assessment Approach*, the actual footprint location where each of the permanent development activities will be implemented may differ from that shown in Figure 4-1. The acreage of each natural community that could be removed by the permanent development activities, however, will not exceed the acreages indicated in Table 4-7, *Acreage of Permanent Impacts and Impact Limits for Covered Activities with Spatially Defined and Undefined Impact Footprints on Natural Communities*.

The AMMs that will be applied during implementation of the covered activities to avoid and minimize impacts on the land cover types comprising each of the natural communities are presented in Table 4-8, *Avoidance and Minimization Measures that Reduce the Level of Impact of the Covered Activities on Natural Community Land Cover Types and Covered Species*.

1 **Figure 4-2. Grasslands: Direct Impacts of Spatially Defined Permanent Development**
2 **Covered Activities**

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1 **Figure 4-3. Shrublands and Scrub: Direct Impacts of Spatially Defined Permanent**
2 **Development Covered Activities**

1 **Figure 4-4. Woodlands and Forest: Direct Impacts of Spatially Defined Permanent**
2 **Development Covered Activities**

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1 **Figure 4-5. Riparian and Wetlands: Direct Impacts of Spatially Defined Permanent**
2 **Development Covered Activities**

Figure 4-6. Agricultural Habitat: Direct Impacts of Spatially Defined Permanent Development Covered Activities

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1 **Table 4-6. Acreage of Permanent Impacts and Impact Limits on Natural Communities**
2 **from Permanent Development Activities with Spatially Undefined Footprints**

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- 1 **Table 4-7. Acreage of Permanent Impacts and Impact Limits for Covered Activities with**
2 **Spatially Defined and Undefined Impact Footprints on Natural Communities**

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- 1 **Table 4-8. Avoidance and Minimization Measures that Reduce the Level of Impact of the**
2 **Covered Activities on Natural Community Land Cover Types and Covered Species**

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4.3.1 Effects of Covered Activities Common among the Natural Communities

Actions undertaken to implement the covered activities (e.g., operation of construction, maintenance, farming, and ranching-related equipment, livestock grazing and operations) could result in injury or mortality of covered and other native species if present in affected natural communities. The most susceptible species are those that are unable to avoid operating equipment and livestock (e.g., small mammals, reptiles, amphibians, covered plant species). For example, reptiles and amphibians aestivating underground could be crushed by operation of ground-disturbing equipment or disturbed ground vibrations. The potential for injury and mortality of native wildlife species is considered to be low for highly mobile species (e.g., birds, large mammals). Implementation of the applicable AMMs indicated in Table 4-8, however, will avoid or minimize the potential for these effects on covered and other native species associated with each of the natural communities.

The accidental introduction of contaminants associated with operation of construction- and maintenance-related equipment (e.g., fuel spills) could adversely affect individual native wildlife and other organisms present in each of the affected natural communities that come into contact with and are sensitive to the contaminant(s). The potential for this effect is considered low, because most wildlife are likely to avoid work sites in response to ongoing noise and visual disturbances associated with equipment operation. In addition, implementation of the applicable AMMs indicated in Table 4-8 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.3.2 Grasslands

The maximum acreage of the grassland natural community that will be permanently and directly affected (i.e., removed) with implementation of the covered activities, including the conservation measures, is 2,598 acres (see Table 4-7). Following implementation of the covered activities, approximately 97 percent of the existing annual grassland and 100 percent of the existing serpentine grassland (Table 4-3a) will remain in the Plan Area. Temporary direct and permanent indirect effects will be incurred on an additional, not quantified, acreage of annual grassland that is present adjacent to permanent develop project sites and locations where operations and maintenance and other ongoing activities are implemented.

4.3.2.1 Permanent Development Activities

Direct effects of permanent development activities will result in the permanent removal of up to 2,455 acres of annual grassland (Tables 4-3a, 4-6, and 4-7). Permanent development activities will not remove serpentine grassland. Temporary direct and permanent indirect effects of permanent development projects will reduce the functions of a not quantified acreage of annual grassland adjacent to permanent development project sites.

4.3.2.1.1 Permanent Direct Effects

Implementation of the permanent development activities within Planning Units 5–8, 10, 11, 13, 15, 17, and 19–22 will result in permanent direct effects on up to 2,111 acres of annual grassland (Tables 4-3b–4-3c). Covered activities that are not spatially defined could remove up to an additional 344 acres of annual grassland (Table 4-6). Covered activities will not result in the removal of serpentine grassland. Implementation of the permanent development activities could create barriers that disrupt localized movements of covered and other native non-bird/bat wildlife species, but such effects are expected to be minimal because the preponderance of permanent development activities will be implemented within the existing and highly fragmented agricultural and urban landscape of the Valley Landscape Unit.

4.3.2.1.2 Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development facilities and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4-1). These impact mechanisms could cause covered and other native wildlife associated with the grasslands natural community to reduce their use of affected habitat areas during the period these activities are implemented. Other temporary direct effects of construction (altered runoff, dust) could result in localized degradation of ecosystem functions (e.g., erosion, burying of herbaceous vegetation). The potential for temporary direct effects on the grasslands natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.3.2.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4-1). Permanent indirect effects will result along approximately 27 miles of interface between existing annual grassland and future planned permanent development, representing less than 3 percent of the interface between all existing land cover types and future development. These disturbances could affect use by covered and other native wildlife species of annual grassland habitats that are adjacent to new permanent developments and result in damage of covered plant species and other native vegetation. For example, lighting may affect native wildlife species that are active nocturnally and cause them to avoid habitat around permanent development. In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species, as well as reptile and amphibian species, and increased human activity in adjacent natural habitat areas could increase the risk for wildfire, resulting in periodic loss of habitat for associated covered and other native species. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4-8. Based on the application of the avoidance and minimization requirements for serpentine grassland (see AMM1 in Section 5.4.4,

Avoidance and Minimization Measures), implementation of permanent development activities are unlikely to result in permanent indirect impacts on serpentine grassland.

4.3.2.2 Operations and Maintenance and Other Ongoing Activities

4.3.2.2.1 Permanent Direct Effects

With the exception of the impact mechanisms and their associated affects described in Section 4.3.1, *Effects of Covered Activities Common among the Natural Communities*, there are no additional impact mechanisms associated with implementation of operations and maintenance and other ongoing activities that are expected to result in permanent direct effects on the grasslands natural community.

4.3.2.2.2 Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance, farming, and ranching-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4-1). The effects of these impact mechanisms on the grassland natural community are the same as described for the temporary direct effects of implementing permanent development activities, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities. Other temporary direct effects such as erosion and sedimentation associated with the disturbance of soils (e.g., from grading, disking, and plowing) and mowing vegetation on road shoulders and annual maintenance of fire breaks may temporarily reduce habitat function. Such wildfires could result in the temporary loss of grassland vegetation and habitat functions until the following growing season. Implementation of the applicable AMMs indicated in Table 4-8, however, will minimize the potential effects operations and maintenance and other ongoing activities on covered and other native species associated with the grasslands natural community.

4.3.2.2.3 Permanent Indirect Effects

As described in Table 4-1, there are no impact mechanisms associated with implementation of operations and maintenance and other ongoing activities that could result in permanent indirect effects on the grassland natural community.

4.3.2.3 Conservation Activities

4.3.2.3.1 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Implementation of conservation actions to restore valley foothill riparian is estimated to remove up to 143 acres of grassland (Table 4-7), but could remove up to 476 acres of annual grassland if

all of the restoration is located in annual grassland (Table 5-6).⁹ In addition, the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to NHP protected grassland could result in injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment, and the removal of covered and other native plant species (Table 4-1). The potential for permanent direct effects on native species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

Temporary Direct Effects

Habitat restoration, enhancement and management actions undertaken in NHP protected grasslands could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use grasslands habitats (Table 4-1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects. The potential for temporary direct effects on the grasslands natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on grasslands natural community, because actions implemented in NHP conservation lands will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.3.2.3.2 Effects of Local Conservation Measures

The only local conservation measure that could impact the grasslands natural community is LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units.

Permanent Direct Effects

Implementation of LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units could require the restoration of valley foothill riparian habitats to achieve the riparian habitat maintenance objectives (Table 5-28). If necessary to achieve the goals and objectives of the Local Conservation Strategy, up to 40 acres annual grassland will be converted to restore valley foothill riparian in the Plan Area. Effects of restoration-related activities on covered and other native species are the same as described the effects of covered activities within NHP conservation lands. The potential for permanent direct effects on native species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

⁹ Additional acreage will be removed if actions to restore other habitat types listed in Table 5-7, though unlikely, are implemented in annual grassland. NHP habitats will not be restored in serpentine grassland.

Temporary Direct Effects

The temporary direct effects of valley foothill restoration, if implemented, are the same as described for valley foothill riparian restoration within NHP conservation lands. The potential for temporary direct effects on the grasslands natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units will not result in permanent indirect effects on grassland communities, because the restoration is not expected to result in increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.3.3 Shrublands and Scrub

The maximum acreage of the shrublands and scrub natural community that will be permanently and directly affected (i.e., removed) with implementation of the covered activities is 1 acre (see Table 4-7). Temporary direct and permanent indirect effects will be incurred on an additional not quantified acreage of chamise alliance and mixed chaparral that are present adjacent to permanent develop project sites and locations where operations and maintenance and other ongoing activities are implemented. Temporary direct and permanent indirect effects on the ecosystem functions of shrublands and scrub are expected to be minimal based on the small acreage of permanent direct effects and the total acreage of shrublands and scrub in the Plan Area.

4.3.3.1 Permanent Development

Direct effects of permanent development activities will result in the permanent removal of up to 1 acre of mixed chaparral from the 44,629 acres of existing shrublands and scrub in the Plan Area (Tables 4-3a and 4-7). Permanent development activities will not remove chamise alliance. Temporary direct effects (e.g., noise, visual, and other disturbances associated with operation of construction equipment) and permanent indirect effects (e.g., impacts of human activities following occupancy of new permanent development structures) of the covered activities on the shrublands and scrub natural community are minimal because only a small number of covered activities with small areas of effect (e.g., bridge construction/improvements) will be implemented in this community.

4.3.3.1.1 Permanent Direct Effects

Implementation of two bridge construction/improvements projects in Planning Unit 2 will result in permanent direct effects on up to 1 acre of mixed chaparral (Table 4-3b). Permanent development activities will not result in removal of chamise alliance.

4.3.3.1.2 Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development facilities and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4-1). These impact mechanisms could cause covered and other native wildlife associated with the shrublands and scrub natural community to reduce their use of affected habitat areas during the period these activities are implemented. Other temporary direct effects of construction (altered runoff, dust) could result in localized degradation of ecosystem functions (e.g., erosion, burying of herbaceous vegetation). These potential effects, however, are expected to be minimal and highly localized because most permanent development activities will not be implemented in or adjacent to shrublands and scrub communities. The potential for temporary direct effects on the shrublands and scrub natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.3.3.1.3 Permanent Indirect Effects

Implementation of the permanent development activities are not expected to result in permanent indirect effects on the shrublands and scrub natural community.

4.3.3.2 Operations and Maintenance and Other Ongoing Activities

4.3.3.2.1 Permanent Direct Effects

In addition to the impact mechanisms and their associated potential effects described in Section 4.3.1, *Effects of Covered Activities Common among the Natural Communities*, the operation of maintenance and ranching-related equipment in and adjacent to natural areas could increase the risk for wildfire. Such wildfires could result in the loss of shrublands and scrub vegetation and habitat functions until the dominant plant species have reestablished.

4.3.3.2.2 Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance and ranching-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4-1). The effects of these impact mechanisms on the shrublands and scrub natural community are the same as described for the temporary direct effects of implementing permanent development activities, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

4.3.3.2.3 Permanent Indirect Effects

As described in Table 4-1, there are no impact mechanisms associated with implementation of operations and maintenance and other ongoing activities that could result in permanent indirect effects on the shrublands and scrub natural community.

4.3.3.3 Conservation Activities

4.3.3.3.1 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

The operation of equipment and other activities related to implementing shrublands and scrub natural community enhancement and management actions in or adjacent to NHP protected shrublands and scrub habitats could result in injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment, and the removal of covered and other native plant species (Table 4-1). The potential for permanent direct effects on native species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

Temporary Direct Effects

Habitat enhancement and management actions undertaken in NHP protected shrublands and scrub could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use shrublands and scrub habitats (Table 4-1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects. The potential for temporary direct effects on the shrublands and scrub natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on the shrublands and scrub natural community, because actions implemented in NHP conservation lands will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.3.3.3.2 Effects of Local Conservation Measures

Local conservation measures will not be implemented in or near shrublands and scrub communities and, therefore, will have no direct or indirect impacts on this natural community.

4.3.4 Woodlands and Forest

The maximum acreage of the woodlands and forest natural community that will be permanently and directly affected (i.e., removed) with implementation of the covered activities is 143 acres (Table 4-7), 131 acres of which is eucalyptus, a genus of nonnative tree species introduced to the Plan Area (Table 4-3a). Temporary direct and permanent indirect effects will be incurred on an additional not quantified acreage of woodlands and forest land cover types that are present adjacent to permanent develop project sites and locations where operations and maintenance and other ongoing activities are implemented. Temporary direct and permanent indirect effects on the ecosystem functions of woodlands and forest are expected to be minimal based on the small

acreage of permanent direct effects and the total acreage of woodlands and forest in the Plan Area.

4.3.4.1 Permanent Development

Direct effects of permanent development activities will result in the permanent removal of up to 143 acres of woodlands and forest from the 83,535 acres of existing woodlands and forest in the Plan Area (Tables 4-3a and 4-7). Permanent development activities will not remove closed-coned pine-cypress, juniper woodland, montane woodland, or valley oak woodland. Temporary direct effects (e.g., noise, visual, and other disturbances associated with operation of construction equipment) and permanent indirect effects (e.g., impacts of human activities following occupancy of new permanent development structures) of the covered activities on the woodlands and forest natural community are minimal because only a small number of covered activities with small areas of effect will be implemented in this community.

4.3.4.1.1 Permanent Direct Effects

Implementation of the permanent development activities within Planning Units 2–4, 13 and 22 will result in permanent direct effects on up to 6 acres of the 43,817 acres of blue oak-foothill pine, 6 acres of the 35,891 acres of blue oak woodland, and 131 acres of the 369 acres of eucalyptus present in the Plan Area (Table 4-3a). Permanent development activities will not remove closed-cone pine-cypress, juniper woodland, montane woodland, or valley oak woodland.

4.3.4.1.2 Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development facilities and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4-1). These impact mechanisms could cause covered and other native wildlife associated with the woodlands and forest natural community to reduce their use of affected habitat areas during the period these activities are implemented. Other temporary direct effects of construction (altered runoff, dust) could result in localized degradation of ecosystem functions (e.g., erosion, burying of herbaceous vegetation). These potential effects, however, are expected to be minimal and highly localized because most permanent development activities will not be implemented in or adjacent to woodlands and forest communities. The potential for temporary direct effects on the woodlands and forest natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.3.4.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human

occupancy following construction of permanent developments (see Table 4-1). The area of potential permanent indirect effects is along up to 5.5 miles of blue oak-foothill pine and blue oak woodland at the interface with future planned permanent development, representing approximately 0.5 percent of the land cover interface with future development. These disturbances could affect use of woodlands and forest habitats by covered and other native wildlife species that are adjacent to new or improved County park sites located in or near patches of woodlands and forest and result in damage of covered plant species and other native vegetation. For example, night lighting around developed parts of these County parks may affect native wildlife species that are active nocturnally and cause them to avoid habitat near the parks. In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species, as well as reptile and amphibian species, and increased human activity in adjacent natural habitat areas could increase the risk for wildfire, resulting in periodic loss of habitat for associated covered and other native species. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.3.4.2 Operations and Maintenance and Other Ongoing Activities

4.3.4.2.1 Permanent Direct Effects

In addition to the impact mechanisms and their associated potential effects described in Section 4.3.1, *Effects of Covered Activities Common among the Natural Communities*, the operation of maintenance and ranching-related equipment in and adjacent to natural areas could increase the risk for wildfire. Such wildfires could result in the loss of woodlands and forest vegetation and habitat functions until the dominant plant species have reestablished.

4.3.4.2.2 Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance and ranching-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4-1). The effects of these impact mechanisms on the woodlands and forest natural community are the same as described for the temporary direct effects of implementing permanent development activities, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

4.3.4.2.3 Permanent Indirect Effects

As described in Table 4-1, there are no impact mechanisms associated with implementation of operations and maintenance and other ongoing activities that could result in permanent indirect effects on the woodlands and forest natural community.

4.3.4.3 Conservation Activities

4.3.4.3.1 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

The operation of equipment and other activities related to implementing woodlands and forest natural community enhancement and management actions in or adjacent to NHP protected woodlands and forest habitats could result in injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment, and the removal of covered and other native plant species (Table 4-1). The potential for permanent direct effects on native species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

Temporary Direct Effects

Habitat enhancement and management actions undertaken in NHP protected woodlands and forest could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use shrublands and scrub habitats (Table 4-1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects. The potential for temporary direct effects on the woodlands and forest natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on the woodlands and forest natural community, because actions implemented in NHP conservation lands will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.3.4.3.2 Effects of Local Conservation Measures

Local conservation measures will not be implemented in or near woodlands and forest communities and, therefore, will have no direct or indirect impacts on this natural community.

4.3.5 Riparian and Wetlands

The maximum acreage of the riparian and wetlands natural community that will be permanently and directly affected (i.e., removed) with implementation of the covered activities is 1,315 acres (Table 4-7). Following implementation of the covered activities, over 97 percent of the existing riparian and wetland communities will remain in the Plan Area (Table 4-7). Temporary direct and permanent indirect effects will be incurred on an additional not quantified acreage of riparian and wetland land cover types that are present adjacent to permanent develop project sites and locations where operations and maintenance and other ongoing activities are implemented.

4.3.5.1 Permanent Development

Direct effects of permanent development activities will result in the permanent removal of up to 1,315 acres of the riparian and wetlands natural community (Table 4-7). Permanent development activities will not remove vernal pool complex. Temporary direct and permanent indirect effects of permanent development projects will reduce the functions of a not quantified acreage of riparian and wetlands land cover types adjacent to permanent development project sites. Following implementation of the covered activities, over 97 percent of the existing riparian and wetlands natural community (Table 4-7) will remain in the Plan Area.

4.3.5.1.1 Permanent Direct Effects

Implementation of the permanent development activities within Planning Units 2, 3, 5–15, and 17–22 will result in permanent direct effects on up to 1 acre of alkali sink, 378 acres of fresh emergent wetland, 310 acres of valley foothill riparian, and 588 acres of open water (Tables 4-3a–4-3c). The 588 acres of open water is primarily comprised of open water in agricultural and flood control water conveyance channels and water retained in 172 seasonal and perennial ponds (Table 4-3a). Permanent development activities will not remove any vernal pool complex.

4.3.5.1.2 Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development facilities and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4-1). These impact mechanisms could cause covered and other native wildlife associated with the riparian and wetlands natural community to reduce their use of affected habitat areas during the period these activities are implemented. Other temporary direct effects of construction (altered runoff, dust) could result in localized degradation of ecosystem functions (e.g., erosion, burying of herbaceous vegetation). The potential for temporary direct effects on the riparian and wetlands natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.3.5.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4-1). Permanent indirect effects will result along up to 108 miles of existing riparian and wetlands at the interface with future planned permanent development, representing less than 11 percent of the land cover interface with future development. These disturbances could affect use of riparian and wetlands habitats by covered and other native wildlife species that are adjacent to new permanent developments and result in damage of covered plant species and other native vegetation. For

example, lighting may affect native wildlife species that are active nocturnally and cause them to avoid habitat around permanent development. In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species, as well as reptile and amphibian species, and increased human activity in adjacent natural habitat areas could increase the risk for wildfire, resulting in periodic loss of habitat for associated covered and other native species. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

No permanent indirect effects on hydrologic conditions supporting mapped alkali sink are expected because existing developments, roads and/or drainage ditches are between the nearest proposed activities and patches of alkali sink. Similarly, the function of the only mapped vernal pool complex in the Plan Area at the Yolo Grasslands Regional Park and the Davis Communications Facility property will not be affected because the nearest proposed permanent development project is over 300 feet away at a lower topographic elevation and across a drainage ditch and County Road 36.

4.3.5.2 Operations and Maintenance and Other Ongoing Activities

4.3.5.2.1 Permanent Direct Effects

In addition to the impact mechanisms and their associated potential effects described in Section 4.3.1, *Effects of Covered Activities Common among the Natural Communities*, the operation of maintenance and ranching-related equipment in and adjacent to natural areas could increase the risk for wildfire. Such wildfires could result in the loss of riparian and wetlands natural community and habitat functions until the dominant plant species have reestablished. Periodic removal of trees and large shrubs to maintain flood conveyance structures and the removal of woody and other debris from channels or irrigation canals may alter in-channel habitat used by covered and other native aquatic wildlife species.

4.3.5.2.2 Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance, farming, and ranching-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4-1). The effects of these impact mechanisms on the riparian and wetlands natural community are the same as described for the temporary direct effects of implementing permanent development activities, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities. Periodic dewatering of ponds for maintenance of water retention capacity will result in the temporary loss of habitat for associated covered and other native wildlife during the period ponds are dewatered. Pond maintenance activities, however, are necessary to maintain the habitat functions of cultivated lands for wildlife over time.

4.3.5.2.3 Permanent Indirect Effects

As described in Table 4-1, there are no impact mechanisms associated with implementation of operations and maintenance and other ongoing activities that could result in permanent indirect effects on the riparian and wetlands natural community.

4.3.5.3 Conservation Activities

4.3.5.3.1 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

The operation of equipment and other activities related to implementing habitat enhancement and management actions in or adjacent to NHP protected riparian and wetlands habitats could result in injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment, and the removal of covered and other native plant species (Table 4-1). The potential for permanent direct effects on native species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

Temporary Direct Effects

Habitat enhancement and management actions undertaken in NHP protected riparian and wetlands could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use riparian and wetlands habitats (Table 4-1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects. Periodic dewatering of ponds for maintenance of water retention capacity or to implement habitat enhancements (e.g., planting of emergent wetland vegetation) will result in the temporary loss of habitat for associated covered and other native wildlife during the period ponds are dewatered. Pond maintenance activities, however, are necessary to maintain the habitat functions of cultivated lands for wildlife over time. The potential for temporary direct effects on the riparian and wetlands natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on riparian and wetlands natural community, because actions implemented in NHP conservation lands will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.3.5.3.2 Effects of Local Conservation Measures

The only local conservation measure that could impact the riparian and wetlands natural community is LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units.

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on the riparian and wetlands natural community described in Section 4.3.1, *Effects of Covered Activities Common among the Natural Communities*, there are no additional impact mechanisms associated with implementation of local conservation measures that are expected to result in permanent direct effects on riparian and wetlands communities.

Temporary Direct Effects

Implementation of LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units could require the restoration of valley foothill riparian habitats to achieve the riparian habitat maintenance objectives (Table 5-28). Implementation of riparian habitat restoration activities implemented near existing patches of riparian and wetlands (e.g., restoration in locations that will fill gaps between patches of existing patches of riparian vegetation) could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use riparian and wetlands habitats (Table 4-1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects. The potential for temporary direct effects on the riparian and wetlands natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units will not result in permanent indirect effects on riparian and wetlands communities, because actions the restoration is not expected to result in increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.3.6 Agricultural Habitats

The maximum acreage of agricultural habitat (agricultural types that support modeled habitat for covered species) that will be permanently and directly affected (i.e., removed) with implementation of the covered activities is 14,889 acres (see Table 4-7). Following implementation of the covered activities, approximately 96 percent of the existing agricultural habitat (Table 4-7) will remain in the Plan Area. Temporary direct and permanent indirect effects will be incurred on an additional, not quantified, acreage of agricultural that are present adjacent to permanent develop project sites and locations where operations and maintenance and other ongoing activities are implemented. Temporary direct and permanent indirect effects on the habitat functions of agricultural habitats for covered wildlife species are expected to be minimal because agricultural lands are subject to ongoing disturbances associated with cultivation practices (e.g., operation of equipment to till fields and harvest crops) that are necessary to maintain the habitat functions of cultivated lands for covered wildlife species.

4.3.6.1 Permanent Development

Direct effects of spatially defined and undefined permanent development activities will result in the permanent removal of up to 13,906 acres of agricultural habitat that supports modeled covered species habitat (i.e., land cover types field crops, grain/hay crops, pasture, truck/nursery/berry, and rice) (Tables 4-3a, 4-6, and 4-7). Temporary direct effects (e.g., noise, visual, and other disturbances associated with operation of construction equipment) and permanent indirect effects (e.g., impacts of human activities following occupancy of new permanent development structures) of the covered activities on agricultural habitats are minimal because agricultural lands are subject to ongoing disturbances associated with cultivation practices (e.g., operation of equipment to till fields and harvest crops) that are necessary to maintain the habitat functions of cultivated lands for covered wildlife species.

4.3.6.1.1 Permanent Direct Effects

Implementation of the permanent development activities within Planning Units 3, 5–7, 10–15, and 19–22 will result in permanent direct effects on up to 10,944 acres of agricultural habitat (Tables 4-3a–4-3c). Covered activities that are not spatially defined could remove up to an additional 2,962 acres of agricultural habitat that supports modeled covered species habitat (Table 4-7) for a total of 13,906 acres of permanent direct effects on agricultural habitat. Other agricultural lands (i.e., citrus/subtropical, deciduous fruits/nuts, semi-agricultural/incidental to agriculture (e.g., farmsteads), truck/nursery/berry crops, and vineyard agricultural land categories), that will be impacted by covered activities do not support habitat (or support very low functioning habitat) for covered wildlife species. These non-habitat agricultural land cover types are not included in this impact analysis.

4.3.6.1.2 Temporary Direct Effects

The installation of two underground natural gas pipelines will temporarily remove up to 180 acres of agricultural habitat, which is expected be maintained as agricultural habitat following installation. The temporary direct effects of operation of equipment to construct permanent development facilities adjacent to agricultural habitats include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4-1). These impact mechanisms could cause covered and other native wildlife that use agricultural habitat during the period these activities are implemented to reduce their use of agricultural habitat. These effects on wildlife are expected to be minimal because they are not necessarily additive to the existing ongoing disturbances associated with cultivation practices (e.g., operation of equipment to till fields and harvest crops; see Section 4.3.6.2, *Operations and Maintenance and Other Ongoing Activities*). The potential for temporary direct effects on agricultural habitats will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.3.6.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4-1). Permanent indirect effects will result from covered activities along up to 131 miles of existing field crop, grain/hay crop, pasture, rice, and truck/nursery/berry crop field at the interface with future planned permanent development, representing approximately 14 percent of the land cover interface with future development. These disturbances could affect use by covered and other native wildlife of agricultural habitat that are adjacent to new permanent developments. For example, visual disturbances associated with human activity may cause waterfowl to avoid foraging in portions of cultivated fields near the source of human activity. These effects on wildlife are expected to be minimal because they are not necessarily additive to the existing ongoing disturbances associated with cultivation practices (e.g., operation of equipment to till fields and harvest crops; see Section 4.3.6.2, *Operations and Maintenance and Other Ongoing Activities*). In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.3.6.2 Operations and Maintenance and Other Ongoing Activities

4.3.6.2.1 Permanent Direct Effects

With the exception of the impact mechanisms and their associated affects described in Section 4.3.1, *Effects of Covered Activities Common among the Natural Communities*, there are no additional impact mechanisms associated with implementation of operations and maintenance and other ongoing activities that are expected to result in permanent direct effects on agricultural habitats.

4.3.6.2.2 Temporary Direct Effects

Temporary direct effects of seasonal farming practices result in temporary changes in habitat functions of cultivated lands (e.g., amount of and availability of food following harvest of crops) for associated covered and other native wildlife. These farming practices, however, are necessary to maintain the habitat functions of cultivated lands for wildlife over time.

Temporary direct effects associated with operation of farm equipment include noise, visual, and other disturbances (e.g., ground vibrations) that could cause covered and other native wildlife that use agricultural habitat during the period these activities are implemented to reduce their use of the affected agricultural habitat (Table 4-1). Operation of equipment to maintain permanent development facilities adjacent to agricultural habitats will have a similar effect, but the additive adverse effects of these activities to the effects of farming operations is expected to be minimal.

4.3.6.2.3 Permanent Indirect Effects

As described in Table 4-1, there are no impact mechanisms associated with implementation of operations and maintenance and other ongoing activities that could result in permanent indirect effects on agricultural habitats.

4.3.6.3 Conservation Activities

4.3.6.3.1 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Implementation of conservation actions to restore valley foothill riparian, valley oak woodland, fresh emergent wetland, and giant garter snake habitat is estimated to remove up to 983 acres of agricultural habitat, but could remove up to 1,126 acres of agricultural habitat if all of the restoration is located in agricultural fields (Table 4-7). In addition, the operation of equipment and other activities related to implementing habitat restoration, enhancement (e.g., enhancement of field border habitats), and management actions in or adjacent to NHP protected agricultural habitat could result in injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment (Table 4-1). The potential for permanent direct effects on native species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

Temporary Direct Effects

Habitat restoration, enhancement, and management actions undertaken in NHP protected agricultural habitat could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use agricultural habitats (Table 4-1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects. The potential for temporary direct effects on the grasslands natural community will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on agricultural habitats, because actions implemented in NHP conservation lands will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.3.6.3.2 Effects of Local Conservation Measures

The only local conservation measures that could impact the grasslands natural community are LCM3, Establish Field Edge Habitat Areas and LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units.

Permanent Direct Effects

Implementation of LCM5, Maintain Valley Foothill Riparian Acreage in the Agricultural Planning Units could require the restoration of valley foothill riparian habitats to achieve the riparian habitat maintenance objectives (Table 5-28). Any such restoration is likely to be implemented in gaps along existing riparian corridors, in annual grassland, and on agricultural lands. If necessary to achieve the goals and objectives of the Local Conservation Strategy, agricultural habitat may be converted to restore valley foothill riparian in the Plan Area. The acreage of impacts on agricultural habitat are expected to be less than 200 acres, but could be greater depending on the acreage of valley foothill riparian restoration needed to achieve the riparian habitat maintenance objectives. LCM3, Establish Field Edge Habitat Areas is expected to enhance existing field border strips and thus not result in the removal of agricultural habitat. Effects of restoration-related activities on covered and other native species are the same as described the effects of covered activities within NHP conservation lands. The potential for permanent direct effects on native species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

Temporary Direct Effects

The temporary direct effects of valley foothill restoration, if implemented, and enhancements of field edge habitats are the same as described for these activities within NHP conservation lands. The potential for temporary direct effects on agricultural habitat will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

Permanent Indirect Effects

Implementation of local conservation measures will not result in permanent indirect effects on agricultural habitat, because these actions are not expected to result in increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4-1).

4.4 IMPACTS ON COVERED SPECIES

This section describes the adverse effects on covered species of planned future permanent development projects, operations and maintenance and other ongoing activities, and Conservation Strategy and Local Conservation Strategy conservation measures within the Plan Area (see Chapter 3, *Covered Activities* and Section 5.4, *Conservation Measures*) resulting from the impact mechanisms described in Section 4.2, *Impact Assessment Approach*. The impacts of the covered activities on each covered species are described for each of these covered activity categories. Impacts of the covered activities on ESA critical designated habitat are also described. The expected outcomes of implementing the covered activities, including the NHP conservation measures, on each of the covered species are described in Section 5.6, *Conservation Provided and Expected Outcomes for Covered Species*. The impact mechanisms associated with each of the covered activity categories that could result in permanent and temporary direct effects and permanent indirect effects on covered species are presented in Table 4-1.

The maximum acreage of each covered species modeled or mapped habitat type that will be removed by spatially defined and undefined permanent development activities and by NHP conservation measures to restore habitat is presented in Table 4-9, *Acreage of Permanent Impacts and Impact Limits for Covered Activities with Spatially Defined and Undefined Impact Footprints on Modeled Covered Wildlife Species Habitats*. The maximum acreage of each covered species modeled or mapped habitat type and number of covered plant species occurrences that will be removed (i.e., permanent direct impacts) with implementation of the spatially defined permanent development activities is summarized by Landscape Unit and Plan Area-wide in Table 4-5a and presented by Planning Unit in Tables 4-5b–4-5c. Figure 4-1 depicts the location of the defined planned development footprints used to conduct the GIS impact analysis within which the natural communities will be removed. As described in Section 4.2, *Impact Assessment Approach*, the actual footprint location where each of the permanent development activities will be implemented may differ from that shown in Figure 4-1; the acreage of each covered species modeled or mapped habitat type that could be removed by the permanent development activities, however, will not exceed the acreages indicated in Table 4-5a.

The avoidance and minimization measures that will be applied during implementation of the covered activities to avoid and minimize impacts on each of the covered species are presented in Table 4-8. The following sections summarize the permanent and temporary direct effects on each of covered species.

4.4.1 Alkali Milk-Vetch

The maximum acreage of mapped alkali milk-vetch habitat that will be directly and permanently affected (i.e., removed) by permanent development covered activities is 1 acre (Table 4-5a).

Following implementation of the permanent development covered activities, 99.8 percent of the existing mapped alkali milk-vetch habitat will remain in the Plan Area (Table 4-5a).

Table 4-9. Acreage of Permanent Impacts and Impact Limits for Covered Activities with Spatially Defined and Undefined Impact Footprints on Modeled Covered Wildlife Species Habitats

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No known occurrences of alkali milk-vetch will be removed by the covered activities. Unknown occurrences or individual plants outside of NHP conservation lands but within the footprints of permanent development covered activities could be affected only with concurrence from USFWS and DFW (Table 4-4). Occurrences could be periodically affected by ongoing maintenance of water supply, flood control, and transportation infrastructure and farming practices that also maintain conditions necessary to maintain occurrences on highly disturbed sites. Implementation of the covered activities could result in temporary direct and permanent indirect effects on alkali milk-vetch if present near where covered activities are implemented.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction or habitat restoration) could result in damage or destruction of alkali milk-vetch occurrences or individual plants if they are present in affected habitat areas. For example, plants and seed could be removed from soil with construction of new structures and plants could be crushed by construction equipment. Plants and seed could suffer mortality from the accidental introduction of contaminants (e.g., equipment fuel spills) or changes in the hydrology of its habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.1.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of alkali milk-vetch within the Plan Area.

4.4.1.1.1 Permanent Direct Effects

Loss of up to 1 acre of mapped alkali milk-vetch habitat (Table 4-5a). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected mapped habitat. No occurrences of alkali milk-vetch will be removed in NHP mapped habitat within NHP conservation lands, although individual plants could be removed as the result of enhancement actions to improve habitat conditions for alkali milk-vetch. An additional small, but indeterminable, amount of direct impacts could be associated with the removal of individual plants from unknown occurrences outside of NHP conservation lands but within the footprints of permanent development covered activities if it is determined that the occurrence is not necessary to maintain the genetic diversity or regional distribution of the species (Table 4-4). Potential effects on occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.1.1.2 Temporary Direct Effects

Implementation of covered activities near alkali milk-vetch occurrences could generate air borne dust or sediment in runoff that could temporarily cover leaves and flowers of alkali milk-vetch individuals and impede their ability to photosynthesize or reproduce. Those disturbances could also increase the depth seed are buried in the soil or change soil surface characteristics that

provide germination cues to the dormant seed bank. Potential temporary direct effects on alkali milk-vetch will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.1.1.3 Permanent Indirect Effects

Permanent indirect effects of the covered activities include increased human activity associated with new developments in and adjacent to occurrences of alkali milk-vetch, altered hydrology, and introduction of nonnative species (see Table 4-1). These effects could cause the direct removal of alkali milk-vetch plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect alkali milk-vetch habitat. Additionally, the removal of vegetation near occurrences that support alkali milk-vetch pollinator habitat could reduce the number of available pollinators for alkali milk-vetch plants that are present near new permanent developments leading to reduced seed production.

4.4.1.2 Overall Impact Likely to Result from the Take

Recorded occurrences of alkali milk-vetch in the Plan Area are all within the alkali soils areas of the Putah Plains and Willow Slough (Figures 2-12 and 2-13) and in the vernal pools and playa pools on the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area. The vast majority of the acreage of these alkali soils areas has been developed or is in intensive agricultural production. Extant occurrences are mostly found on PEHL: Spring Lake Alkali Preserve (Category 1), Davis Communications Facility (Category 2), Grasslands Regional Park (Category 2), and the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area (Category 1), but unprotected occurrences are at Woodland Regional Park/Mavis Henson Field (Dean 2009). There have been historical occurrences on highly disturbed areas on these alkaline soils along railroad right of ways, levee and ditch banks, ruderal fields, and a closed landfill.

The covered activities will result in the loss of up to 1 acre of mapped alkali milk-vetch habitat in Planning Unit 13 Colusa Basin Plains, representing less than 1 percent of the current extent of mapped habitat (Table 4-5c). Within this impact area the acreage of actual habitat removed will be less because mapped habitat overestimates the actual acreage of habitat in the Plan Area. The ongoing operation of infrastructure maintenance (e.g., water supply, flood control, and transportation) and farming-related equipment could result in the removal of occurrences or individual plants at unknown locations. There may be impacts on individuals and some temporary reduction of habitat function with implementation of habitat enhancement actions on NHP conservation lands. The purpose of those actions, however, is to enhance overall habitat conditions and the abundance of alkali milk-vetch plants within protected occurrences.

Based on the available information regarding the status and distribution of alkali milk-vetch (see Appendix A, *Covered Species Accounts*), it is likely that the mapped habitat that is removed by the covered activities is unoccupied by alkali milk-vetch. Should a project be proposed, project-level botanical surveys would be required under AMM1 to determine if habitat is present and occupied. Implementation of AMM3 (see Section 5.4.4) permits the removal of newly

discovered occurrences unless the Implementing Entity in coordination with USFWS and DFW determine that those occurrences are necessary for the survival and recovery of alkali milk-vetch. Limits to take and implementation of applicable AMMs will serve to further minimize impacts on alkali milk-vetch (see Tables 4-8 and 5-20).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on alkali milk-vetch or adversely affect its Plan Area distribution or abundance.

4.4.2 Brittlescale

The maximum acreage of mapped brittlescale habitat that will be directly and permanently affected (i.e., removed) by permanent development covered activities is 1 acre (Table 4-5a). Following implementation of the permanent development covered activities, 99.8 percent of the existing mapped brittlescale habitat will remain in the Plan Area (Table 4-5a). No known occurrences of brittlescale will be removed by the covered activities. Unknown occurrences or individual plants outside of NHP mapped habitat but within the footprints of permanent development covered activities could be affected only with concurrence from USFWS and DFW (Table 4-4). Occurrences could be periodically affected by ongoing maintenance of water supply, flood control, and transportation infrastructure and farming practices that also maintain conditions necessary to maintain occurrences on highly disturbed sites. Implementation of the covered activities could result in temporary direct and permanent indirect effects on brittlescale if present near where covered activities are implemented.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction or habitat restoration) could result in damage or destruction of brittlescale occurrences or individual plants if they are present in affected habitat areas. For example, plants and seed could be removed from soil with construction of new structures and plants could be crushed by construction equipment. Plants and seed could suffer mortality from the accidental introduction of contaminants (e.g., equipment fuel spills) or changes in the hydrology of its habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.2.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of brittlescale within the Plan Area.

4.4.2.1.1 Permanent Direct Effects

Loss of up to 1 acre of mapped brittlescale habitat (Table 4-5a). The acreage of take will be the amount of actual habitat that is located within the area of affected mapped habitat. No known occurrences of brittlescale will be removed by the covered activities (Table 4-4). One

occurrence in Planning Unit 19 outside of mapped habitat will be removed. No occurrences of brittlescale in NHP mapped habitat within Planning Units 1, 2, 3, 4, and 5 may be removed by the covered activities until five salt spring occurrences are protected (Table 5-19). Individual plants could be removed as the result of enhancement actions to improve habitat conditions for brittlescale. An additional small, but indeterminable, amount of direct impacts could be associated with the removal of individual plants from unknown occurrences outside of NHP conservation lands but within the footprints of permanent development covered activities if it is determined that the occurrence is not necessary to maintain the genetic diversity or regional distribution of the species (Table 4-4). Potential effects on occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.2.1.2 Temporary Direct Effects

Implementation of covered activities near brittlescale occurrences could generate air borne dust or sediment in runoff that could temporarily cover leaves and flowers of brittlescale individuals and impede their ability to photosynthesize and reproduce. Those disturbances could also increase the depth seed are buried in the soil or change soil surface characteristics that provide germination cues to the dormant seed bank. Potential temporary direct effects on brittlescale will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.2.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development activities include increased human activity associated with new developments in and adjacent to occurrences of brittlescale, altered hydrology, and introduction of nonnative species (see Table 4-1). These effects could cause the direct removal of brittlescale plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect brittlescale habitat.

4.4.2.2 Overall Impact Likely to Result from the Take

Recorded occurrences of brittlescale in the Plan Area are all within the alkali soils areas of Willow Slough (Figure 2-12). The vast majority of the acreage of these alkali soils areas has been developed or is in intensive agriculture production. Extant occurrences are primarily found at the Spring Lake Alkali Preserve a Category 1 PEHL. There have been historical occurrences on highly disturbed areas on these alkaline soils along railroad right of ways, levee and ditch banks, ruderal fields, and a closed landfill.

The covered activities will result in the loss of up to 1 acre of mapped brittlescale habitat, representing less than 1 percent of the current extent of modeled habitat (Table 4-5a). Within these impact areas, because mapped habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The ongoing operation of infrastructure maintenance (water supply, flood control, and transportation) and farming-related equipment could result in the removal of occurrences or individual plants. There may be take of individuals and some temporary reduction of habitat function with implementation of habitat

enhancement actions on NHP conservation lands. The purpose of those actions, however, is to enhance overall habitat conditions and the abundance of brittlescale plants within protected occurrences.

Based on the available information regarding the status and distribution of brittlescale (see Appendix A, *Covered Species Accounts*), it is likely that the mapped habitat that is removed by the covered activities is unoccupied by brittlescale. Should a project be proposed, implementation of AMM1 would determine if brittlescale is present. Implementation of AMM3 (see Section 5.4.4) permits the removal of newly discovered occurrences under some circumstances unless the Implementing Entity in coordination with USFWS and DFW determine that those occurrences are necessary for the survival and recovery of brittlescale. Limitations on take and implementation of applicable AMMs will serve to minimize impacts on brittlescale (see Tables 4-8 and 5-20).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on brittlescale or adversely affect its Plan Area distribution or abundance.

4.4.3 San Joaquin Spearscale

The maximum acreage of mapped San Joaquin spearscale habitat that will be directly and permanently affected (i.e., removed) by permanent development covered activities is 1 acre (Table 4-5a). Following implementation of the permanent development covered activities, 99.8 percent of the existing mapped San Joaquin spearscale habitat will remain in the Plan Area (Table 4-5a). Three known occurrences of San Joaquin spearscale outside of mapped habitat will be removed by the covered activities. Unknown occurrences or individual plants outside of NHP mapped habitat but within the footprints of permanent development covered activities could be affected only with concurrence from USFWS and DFW (Table 4-4). Occurrences could be periodically affected by ongoing maintenance of water supply, flood control, and transportation infrastructure and farming practices that also support the conditions necessary to maintain occurrences on highly disturbed sites. Implementation of the covered activities could result in temporary direct and permanent indirect effects on San Joaquin spearscale if present near where covered activities are implemented.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction or habitat restoration) could result in damage or destruction of San Joaquin spearscale occurrences or individual plants if present in affected habitat areas. For example, plants and seed could be removed from soil with construction of new structures and plants could be crushed by construction equipment. Plants and seed could suffer mortality from the accidental introduction of contaminants (e.g., equipment fuel spills) or changes in the hydrology of its habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.3.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of San Joaquin spearscale within the Plan Area.

4.4.3.1.1 Permanent Direct Effects

Loss of up to 1 acre of mapped San Joaquin spearscale habitat (Table 4-5a). The acreage of take will be the amount of actual habitat that is located within the area of affected mapped habitat. No occurrences of San Joaquin spearscale in NHP mapped habitat within Planning Units 11, 16, 18, and 19 will be removed by the covered activities (Table 4-4). Two occurrences in Planning Unit 19 and one occurrence in Planning Unit 11 outside of mapped habitat will be removed. No occurrences of San Joaquin spearscale in NHP mapped habitat within Planning Units 1, 2, 3, 4, and 5 may be removed by the covered activities until five salt spring occurrences are protected. Individual plants could be removed as the result of enhancement actions to improve habitat conditions for San Joaquin spearscale. An additional small, but indeterminable, amount of direct impacts could be associated with the removal of individual plants from unknown occurrences outside of NHP conservation lands but within the footprints of permanent development covered activities if it is determined that the occurrence is not necessary to maintain the genetic diversity or regional distribution of the species (Table 4-4). Potential effects on occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.3.1.2 Temporary Direct Effects

Implementation of covered activities near San Joaquin spearscale occurrences could generate air borne dust or sediment in runoff that could temporarily cover leaves and flowers of San Joaquin spearscale individuals and impede their ability to photosynthesize and reproduce. Those disturbances could also increase the depth seed are buried in the soil or change soil surface characteristics that provide germination cues to the dormant seed bank. Potential temporary direct effects on San Joaquin spearscale will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.3.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development activities include increased human activity associated with new developments in and adjacent to occurrences of San Joaquin spearscale, altered hydrology, and introduction of nonnative species (see Table 4-1). These effects could cause the direct removal of San Joaquin spearscale plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect San Joaquin spearscale habitat.

4.4.3.2 Overall Impact Likely to Result from the Take

Recorded occurrences of San Joaquin spearscale in the Plan Area are all within the alkali soils areas of the Putah Plains and Willow Slough (Figures 2-12 and 2-13) and in the vernal pools and playa pools on the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area. The vast majority of the acreage of these alkali soils areas has been developed or is in intensive agriculture production. Extant occurrences are mostly found on PEHL: Spring Lake Alkali Preserve (Category 1), Davis Communications Facility (Category 2), Grasslands Regional Park (Category 2), and the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area (Category 1), but unprotected occurrences are at Woodland Regional Park/Mavis Henson Field (Dean 2009). There have been historical occurrences on highly disturbed areas on these alkaline soils along railroad right of ways, levee and ditch banks, ruderal fields, and a closed landfill.

The covered activities will result in the loss of up to 1 acre of mapped San Joaquin spearscale habitat, representing less than 1 percent of the current extent of modeled habitat and remove 3 occurrences (Table 4-5a); two occurrences in Planning Unit 19 and one occurrence in planning Unit 11, none of which are in mapped habitat. Within these impact areas, because mapped habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The ongoing operation of infrastructure maintenance (water supply, flood control, and transportation) and farming-related equipment could result in the removal of occurrences or individual plants. There may be take of individuals and some temporary reduction of habitat function with implementation of habitat enhancement actions on NHP conservation lands. The purpose of those actions, however, is to enhance overall habitat conditions and the abundance of San Joaquin spearscale plants within protected occurrences.

Based on the available information regarding the status and distribution of San Joaquin spearscale (see Appendix A, *Covered Species Accounts*), it is likely that the mapped habitat that is removed by the covered activities is unoccupied by San Joaquin spearscale. Implementation of AMM3 (see Section 5.4.4) permits the removal of newly discovered occurrences under some circumstances unless the Implementing Entity in coordination with USFWS and DFW determine that those occurrences are necessary for the survival and recovery of San Joaquin spearscale. Implementation of the remaining applicable AMMs (see Tables 4-8 and 5-20) will serve to further minimize impacts on San Joaquin spearscale.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on San Joaquin spearscale or adversely affect its Plan Area distribution or abundance.

4.4.4 Palmate-Bracted Bird's-Beak

The maximum acreage of mapped palmate-bracted bird's-beak habitat that will be directly and permanently affected (i.e., removed) by permanent development covered activities is 1 acre (Table 4-5a). Following implementation of the permanent development covered activities, 99.6

percent of the existing mapped palmate-bracted bird's-beak habitat will remain in the Plan Area. One known occurrence of palmate-bracted bird's-beak that is outside of mapped habitat will be removed by the covered activities (Table 4-5a). Unknown occurrences or individual plants outside of NHP conservation lands but within the footprints of permanent development covered activities could be affected only with concurrence from USFWS and DFW (Table 4-4). Occurrences could be periodically affected by ongoing maintenance of water supply, flood control, and transportation infrastructure and farming practices that also maintain conditions necessary to maintain occurrences on highly disturbed sites. Implementation of the covered activities could result in temporary direct and permanent indirect effects on palmate-bracted bird's-beak if present near where covered activities are implemented.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction or habitat restoration) could result in damage or destruction of palmate-bracted bird's-beak occurrences or individual plants if they are present in affected areas. For example, plants and seed could be removed from soil with construction of new structures and plants could be crushed by construction equipment. Plants and seed could suffer mortality from the accidental introduction of contaminants (e.g., equipment fuel spills) or changes in the hydrology of its habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.4.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of palmate-bracted bird's-beak within the Plan Area.

4.4.4.1.1 Permanent Direct Effects

Loss of up to 1 acre of mapped palmate-bracted bird's-beak habitat (Table 4-5a). The acreage of take will be the amount of actual habitat that is located within the area of affected mapped habitat. No occurrences of palmate-bracted bird's-beak in NHP mapped habitat will be removed by the covered activities (Table 4-4). One occurrence in Planning Unit 19 outside of mapped habitat will be removed. An additional small, but indeterminable, amount of direct impacts could be associated with the removal of individual plants from unknown occurrences outside of NHP conservation lands but within the footprints of permanent development covered activities if it is determined that the occurrence is not necessary to maintain the genetic diversity or regional distribution of the species (Table 4-4). Potential effects on occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.4.1.2 Temporary Direct Effects

Implementation of covered activities near palmate-bracted bird's-beak occurrences could generate air borne dust or sediment in runoff that could temporarily cover leaves and flowers of palmate-bracted bird's-beak individuals and impede their ability to photosynthesize and

reproduce. Those disturbances could also increase the depth seed are buried in the soil or change soil surface characteristics that provide germination cues to the dormant seed bank. Potential temporary direct effects on palmate-bracted bird's-beak will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.4.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development activities include increased human activity associated with new developments in and adjacent to occurrences of palmate-bracted bird's-beak, altered hydrology, and introduction of nonnative species (see Table 4-1). These effects could cause the direct removal of palmate-bracted bird's-beak plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect palmate-bracted bird's-beak habitat. Additionally, the removal of vegetation near occurrences that support palmate-bracted bird's-beak pollinator habitat could reduce the number of available pollinators for palmate-bracted bird's-beak plants that are present near new permanent developments leading to reduced seed production.

4.4.4.2 Overall Impact Likely to Result from the Take

Recorded occurrences of palmate-bracted bird's-beak in the Plan Area are all within the alkali soils areas of Willow Slough (Figure 2-12). The vast majority of the acreage of these alkali soils areas has been developed or is in intensive agriculture production. Extant occurrences are known from Spring Lake Alkali Preserve (PEHL Category 1) and the unprotected Woodland Regional Park/Mavis Henson Field (Dean 2009). There have been historical occurrences on highly disturbed areas on these alkaline soils along ditch banks, ruderal fields, and a closed landfill.

The covered activities will result in the loss of up to 1 acre of mapped palmate-bracted bird's-beak habitat, representing less than 1 percent of the current extent of mapped habitat and remove 1 occurrence (Table 4-5a). Within these impact areas, because mapped habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The ongoing operation of infrastructure maintenance (water supply, flood control, and transportation) and farming-related equipment could result in the removal of occurrences or individual plants. There may be take of individuals and some temporary reduction of habitat function with implementation of habitat enhancement actions on NHP conservation lands. The purpose of those actions, however, is to enhance overall habitat conditions and the abundance of palmate-bracted bird's-beak plants within protected occurrences.

Based on the available information regarding the status and distribution of palmate-bracted bird's-beak (see Appendix A, *Covered Species Accounts*), it is likely that the mapped habitat that is removed by the covered activities is unoccupied by palmate-bracted bird's-beak.

Implementation of AMMX (see Section 5.4.4) permits the removal of newly discovered occurrences unless the Implementing Entity in coordination with USFWS and DFW determine that those occurrences are necessary for the survival and recovery of palmate-bracted bird's-

1 beak. Implementation of the remaining applicable AMMs (see Tables 4-8 and 5-20) will serve to
2 further minimize impacts on palmate-bracted bird's-beak.

3 Based on this evaluation, implementation of the covered activities is not expected to result in
4 adverse population-level effects on palmate-bracted bird's-beak or adversely affect its Plan Area
5 distribution or abundance.

6 **4.4.5 Heckard's Pepper-Grass**

7 The maximum acreage of mapped Heckard's pepper-grass habitat that will be directly and
8 permanently affected (i.e., removed) by permanent development covered activities is 1 acre
9 (Table 4-5a). Following implementation of the permanent development covered activities, 99.8
10 percent of the existing mapped Heckard's pepper-grass habitat will remain in the Plan Area
11 (Table 4-5a).

12 No known occurrences of Heckard's pepper-grass will be removed by the covered activities.
13 Unknown occurrences or individual plants outside of NHP conservation lands but within the
14 footprints of permanent development covered activities could be affected only with concurrence
15 from USFWS and DFW (Table 4-4). Occurrences could be periodically affected by ongoing
16 maintenance of water supply, flood control, and transportation infrastructure and farming
17 practices that also maintain conditions necessary to maintain occurrences on highly disturbed
18 sites. Implementation of the covered activities could result in temporary direct and permanent
19 indirect effects on Heckard's pepper-grass if present near where covered activities are
20 implemented.

21 Actions undertaken to implement the covered activities (e.g., operation of equipment for
22 construction or habitat restoration) could result in damage or destruction of Heckard's pepper-
23 grass occurrences or individual plants if they are present in affected habitat areas. For example,
24 plants and seed could be removed from soil with construction of new structures and plants could
25 be crushed by construction equipment. Plants and seed could suffer mortality from the
26 accidental introduction of contaminants (e.g., equipment fuel spills) or changes in the hydrology
27 of its habitat, and invasive nonnative species could be introduced and negatively affect its
28 habitat. These potential impacts will be avoided and minimized with implementation of the
29 applicable AMMs indicated in Table 4-8.

30 **4.4.5.1 Estimated Level of Take**

31 Implementation of NHP covered activities will result in the following level of estimated take of
32 Heckard's pepper-grass within the Plan Area.

33 **4.4.5.1.1 Permanent Direct Effects**

34 Loss of up to 1 acre of mapped Heckard's pepper-grass habitat (Table 4-5a). The acreage of take
35 (i.e., harm) will be the amount of actual habitat that is located within the area of affected mapped

habitat. No occurrences of Heckard's pepper-grass will be removed in NHP mapped habitat within NHP conservation lands, although individual plants could be removed as the result of enhancement actions to improve habitat conditions for Heckard's pepper-grass. An additional small, but indeterminable, amount of direct impacts could be associated with the removal of individual plants from unknown occurrences outside of NHP conservation lands but within the footprints of permanent development covered activities if it is determined that the occurrence is not necessary to maintain the genetic diversity or regional distribution of the species (Table 4-4). Potential effects on occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.5.1.2 Temporary Direct Effects

Implementation of covered activities near Heckard's pepper-grass occurrences could generate air borne dust or sediment in runoff that could temporarily cover leaves and flowers of Heckard's pepper-grass individuals and impede their ability to photosynthesize or reproduce. Those disturbances could also increase the depth seed are buried in the soil or change soil surface characteristics that provide germination cues to the dormant seed bank. Potential temporary direct effects on Heckard's pepper-grass will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.5.1.3 Permanent Indirect Effects

Permanent indirect effects of the covered activities include increased human activity associated with new developments in and adjacent to occurrences of Heckard's pepper-grass, altered hydrology, and introduction of nonnative species (see Table 4-1). These effects could cause the direct removal of Heckard's pepper-grass plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Heckard's pepper-grass habitat. Additionally, the removal of vegetation near occurrences that support Heckard's pepper-grass pollinator habitat could reduce the number of available pollinators for Heckard's pepper-grass plants that are present near new permanent developments leading to reduced seed production.

4.4.5.2 Overall Impact Likely to Result from the Take

Recorded occurrences of Heckard's pepper-grass in the Plan Area are all within the alkali soils areas of the Putah Plains and Willow Slough (Figures 2-12 and 2-13) and in the vernal pools and playa pools on the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area. The vast majority of the acreage of these alkali soils areas has been developed or is in intensive agricultural production. Extant occurrences are mostly found on PEHL: Spring Lake Alkali Preserve (Category 1), and the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area (Category 1), but unprotected occurrences are at Woodland Regional Park/Mavis Henson Field (Dean 2009). There have been historical occurrences on highly disturbed areas on these alkaline soils.

The covered activities will result in the loss of up to 1 acre of mapped Heckard's pepper-grass habitat in Planning Unit 13 Colusa Basin Plains, representing less than 1 percent of the current extent of mapped habitat (Table 4-5c). Within this impact area the acreage of actual habitat removed will be less because mapped habitat overestimates the actual acreage of habitat in the Plan Area. The ongoing operation of infrastructure maintenance (e.g., water supply, flood control, and transportation) and farming-related equipment could result in the removal of occurrences or individual plants at unknown locations. There may be impacts on individuals and some temporary reduction of habitat function with implementation of habitat enhancement actions on NHP conservation lands. The purpose of those actions, however, is to enhance overall habitat conditions and the abundance of Heckard's pepper-grass plants within protected occurrences.

Based on the available information regarding the status and distribution of Heckard's pepper-grass (see Appendix A, *Covered Species Accounts*), it is likely that the mapped habitat that is removed by the covered activities is unoccupied by Heckard's pepper-grass. Should a project be proposed, project-level botanical surveys would be required under AMM1 to determine if habitat is present and occupied. Implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*) permits the removal of newly discovered occurrences unless the Implementing Entity in coordination with USFWS and DFW determine that those occurrences are necessary for the survival and recovery of Heckard's pepper-grass. Limits to take and implementation of applicable AMMs will serve to further minimize impacts on Heckard's pepper-grass (see Tables 4-8 and 5-20).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Heckard's pepper-grass or adversely affect its Plan Area distribution or abundance.

4.4.6 Baker's Navarretia

No mapped Baker's navarretia habitat will be directly and permanently affected (i.e., removed) by permanent development covered activities (Table 4-5a). No known occurrences of Baker's navarretia will be removed by the covered activities. Unknown occurrences or individual plants outside of NHP conservation lands but within the footprints of permanent development covered activities could be affected only with concurrence from USFWS and DFW (Table 4-4). Occurrences could be periodically affected by ongoing maintenance of water supply, flood control, and transportation infrastructure and farming practices that also maintain conditions necessary to maintain occurrences on highly disturbed sites. Implementation of the covered activities could result in temporary direct and permanent indirect effects on Baker's navarretia if present near where covered activities are implemented.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction or habitat restoration) could result in damage or destruction of Baker's navarretia occurrences or individual plants if they are present in affected habitat areas. For example, plants

and seed could be removed from soil with construction of new structures and plants could be crushed by construction equipment. Plants and seed could suffer mortality from the accidental introduction of contaminants (e.g., equipment fuel spills) or changes in the hydrology of its habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.6.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of Baker's navarretia within the Plan Area.

4.4.6.1.1 Permanent Direct Effects

No mapped Baker's navarretia habitat will be directly and permanently affected (i.e., removed) by permanent development covered activities (Table 4-5a). No occurrences of Baker's navarretia will be removed in NHP mapped habitat within NHP conservation lands, although individual plants could be removed as the result of enhancement actions to improve habitat conditions for Baker's navarretia. An additional small, but indeterminable, amount of direct impacts could be associated with the removal of individual plants from unknown occurrences outside of NHP conservation lands but within the footprints of permanent development covered activities if it is determined that the occurrence is not necessary to maintain the genetic diversity or regional distribution of the species (Table 4-4). Potential effects on occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.6.1.2 Temporary Direct Effects

Implementation of covered activities is too distant from all occurrences or mapped habitat to cause temporary direct effects. Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves, flowers, or seed of Baker's navarretia plants and impede their ability to photosynthesize or produce seed or affect the ability for dormant seed to germinate. The potential for temporary direct effects on Baker's navarretia is very unlikely and will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.6.1.3 Permanent Indirect Effects

Covered activities are not expected to be implemented near known occurrences or mapped habitat and, therefore, are not expected to result in permanent indirect effects on Baker's navarretia. However, those activities could affect unknown occurrences of Baker's navarretia located outside of known occurrences and mapped habitat. Restoration of fresh emergent wetland land cover and giant garter snake habitat could result in the spread of large native

wetland plants to areas of vernal pool complex and crowding or shading out any Baker's navarretia plants that may be present. Potential permanent indirect effects on Baker's navarretia are very unlikely and will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.6.2 Overall Impact Likely to Result from the Take

Recorded occurrences of Baker's navarretia in the Plan Area are all within the vernal pool complex areas of the Putah Plains (Figure 2-13) and in the vernal pools and playa pools on the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area. Extant occurrences in the Plan Area are exclusively found on the Tule Ranch Unit of the DFW Yolo Basin Wildlife Area PEHL. There may be impacts on individuals and some temporary reduction of habitat function with implementation of habitat enhancement actions on NHP conservation lands if unknown occurrences are present. The purpose of those actions, however, is to enhance overall habitat conditions and the abundance of Baker's navarretia plants within protected occurrences.

Based on the available information regarding the status and distribution of Baker's navarretia (see Appendix A, Covered Species Accounts), none of the vernal pool complex mapped habitat will be removed by the covered activities. Implementation of AMM3 (see Section 5.4.4) permits the removal of newly discovered occurrences unless the Implementing Entity in coordination with USFWS and DFW determine that those occurrences are necessary for the survival and recovery of Baker's navarretia. Limits to take and implementation of applicable AMMs will serve to further minimize impacts on Baker's navarretia (see Tables 4-8 and 5-20).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Baker's navarretia or adversely affect its Plan Area distribution or abundance.

4.4.7 Colusa Grass

No Colusa grass habitat will be directly and permanently affected (i.e., removed) by permanent development and operations and maintenance and other ongoing activities (Table 4-5a). No occurrences of Colusa grass will be removed by the covered activities; however implementation of conservation measures to enhance its habitat conditions and to maintain and increase the abundance of Colusa grass could result in removal of individual plants and temporary direct effects on the species.

4.4.7.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of Colusa grass within the Plan Area.

4.4.7.1.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to maintain and enhance Colusa grass habitat conditions and to maintain and increase its abundance in occurrences at Grasslands Regional Park and the Davis Communications Facility could result in take of individual Colusa grass plants (e.g., burying or crushing plants or seed) (Table 4-1). The Implementing Entity will avoid removal of any Colusa grass occurrences and the overall effect on Colusa grass will be beneficial. Implementation of the remaining covered activities will not result in permanent direct effects on Colusa grass. Potential permanent direct effects on Colusa grass occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.7.1.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to maintain and enhance Colusa grass habitat conditions and to maintain and increase its abundance in occurrences at Grasslands Regional Park and the Davis Communications Facility could cause localized erosion and sedimentation that could temporarily cover leaves, flowers, or seed of Colusa grass plants and impede their ability to photosynthesize or produce seed or affect the ability for dormant seed to germinate. The overall effect of enhancement activities on Colusa grass, however, will be beneficial. Implementation of the remaining covered activities will not result in temporary direct effects on Colusa grass. Potential temporary direct effects on Colusa grass occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.7.1.3 Permanent Indirect Effects

Implementation of the covered activities is not expected to result in permanent indirect effects on Colusa grass.

4.4.7.1.4 Effects on Critical Habitat

A total of 440 acres of designated critical habitat for Colusa grass, 1 acre of which supports NHP mapped habitat (Table 4-5c), are present in the Plan Area at the Grasslands Regional Park and Davis Communications Facility site in Critical Habitat Unit 1. The PCEs essential for this species' conservation are:

Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously or intermittently flowing surface water in the depressional features, including swales connecting the pools described in PCE (ii), providing for dispersal and promoting hydroperiods of adequate length in the pools.

Depressional features, including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and continuously hold water, or whose soils are saturated

for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

The only covered activity proposed within the designated critical habitat is the implementation of conservation measures to manage and enhance its habitat within Critical Habitat Unit 1 to achieve its recovery within the Plan Area. The purpose of these actions is to enhance overall habitat conditions on Colusa grass designated critical habitat.

Based on this assessment, the covered activities are not expected to impact PCEs of designated critical habitat and will not preclude the ability to recover Colusa grass.

4.4.7.2 Overall Impact Likely to Result from the Take

Recorded occurrences of Colusa grass in the Plan Area are all within the alkali soils areas of the Putah Plains (Figure 2-13) and all occurrences and mapped habitat are located within Category 2 PEHL at Grasslands Regional Park and the Davis Communications Facility site (see Appendix A.7). Conservation measures to enhance Colusa grass could result in take of a small, but indeterminable, number of individual Colusa grass plants and seed. These enhancement actions, however, are expected to maintain and increase the abundance of Colusa grass and maintain and improve the condition of its habitat. Implementation of the remaining applicable AMMs (see Tables 4-8 and 5-20) will avoid and minimize impacts of the covered activities on Colusa grass.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Colusa grass or adversely affect its Plan Area distribution or abundance.

4.4.8 Solano Grass

No Solano grass habitat will be directly and permanently affected (i.e., removed) by permanent development and operations and maintenance and other ongoing activities (Table 4-5a). No occurrences of Solano grass will be removed by the covered activities; however implementation of conservation measures to enhance its habitat conditions and to maintain and increase the abundance of Solano grass could result in removal of individual plants and temporary direct effects on the species.

4.4.8.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of Solano grass within the Plan Area.

4.4.8.1.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to maintain and enhance Solano grass habitat conditions and to maintain and increase its abundance in occurrences at Grasslands Regional Park and the Davis Communications Facility could result in take of individual Solano grass plants (e.g., burying or crushing plants or seed) (Table 4-1). The Implementing Entity will avoid removal of any Solano grass occurrences and the overall effect on Solano grass will be beneficial. Implementation of the remaining covered activities will not result in permanent direct effects on Solano grass. Potential permanent direct effects on Solano grass occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.8.1.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to maintain and enhance Solano grass habitat conditions and to maintain and increase its abundance in occurrences at Grasslands Regional Park and the Davis Communications Facility could cause localized erosion and sedimentation that could temporarily cover leaves, flowers, or seed of Solano grass plants and impede their ability to photosynthesize or produce seed or affect the ability for dormant seed to germinate. The overall effect of enhancement activities on Solano grass, however, will be beneficial. Implementation of the remaining covered activities will not result in temporary direct effects on Solano grass. Potential temporary direct effects on Solano grass occurrences and individual plants will be avoided and minimized with implementation of the applicable AMMs in Table 4-8.

4.4.8.1.3 Permanent Indirect Effects

Implementation of the covered activities is not expected to result in permanent indirect effects on Solano grass.

4.4.8.1.4 Effects on Critical Habitat

A total of 440 acres of designated critical habitat for Solano grass, 1 acre of which supports NHP mapped habitat (Table 4-5c), are present in the Plan Area at the Grasslands Regional Park and Davis Communications Facility site in Critical Habitat Unit 1. The PCEs essential for this species' conservation are:

Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously or intermittently flowing surface water in the depressional features, including swales connecting the pools described in PCE (ii), providing for dispersal and promoting hydroperiods of adequate length in the pools.

Depressional features, including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and continuously hold water, or whose soils are saturated

for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

The only covered activity proposed within the designated critical habitat is the implementation of conservation measures to manage and enhance its habitat within Critical Habitat Unit 1 to achieve its recovery within the Plan Area. The purpose of these actions is to enhance overall habitat conditions on Solano grass designated critical habitat.

Based on this assessment, the covered activities are not expected to impact PCEs of designated critical habitat and will not preclude the ability to recover Solano grass.

4.4.8.2 Overall Impact Likely to Result from the Take

Recorded occurrences of Solano grass in the Plan Area are all within the alkali soils areas of the Putah Plains (Figure 2-13) and all occurrences and mapped habitat are located within Category 2 PEHL at Grasslands Regional Park and the Davis Communications Facility site (see Appendix A.8). Conservation measures to enhance Solano grass could result in take of a small, but indeterminable, number of individual Solano grass plants and seed. These enhancement actions, however, are expected to maintain and increase the abundance of Solano grass and maintain and improve the condition of its habitat. Implementation of the remaining applicable AMMs (see Tables 4-8 and 5-20) will avoid and minimize impacts of the covered activities on Solano grass.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Solano grass or adversely affect its Plan Area distribution or abundance.

4.4.9 Vernal Pool Shrimp Species

The maximum acreage of NHP mapped Conservancy fairy shrimp, vernal pool fairy shrimp, midvalley fairy shrimp, California linderiella, and vernal pool tadpole shrimp (referred to hereafter as vernal pool shrimp species) habitat that will be directly and permanently affected (i.e., removed) by permanent development covered activities is 1 acre (Table 4-5a). Following implementation of the permanent development covered activities, 99.8 percent of the existing mapped vernal pool shrimp species habitat will remain in the Plan Area (Table 4-5a). One known occurrence of vernal pool fairy shrimp and 1 occurrence of vernal pool tadpole shrimp outside of NHP mapped habitat will be removed by the covered activities. No take of Conservancy fairy shrimp is allowed under the NHP (Table 4-4). Unknown occurrences of the remaining vernal pool shrimp species outside of NHP mapped habitat conservation lands but within the footprints of permanent development covered activities could be affected only with concurrence from USFWS and DFW (Table 4-4). Occurrences could be periodically affected by ongoing maintenance of water supply, flood control, and transportation infrastructure and

1 farming practices that also maintain conditions necessary to maintain occurrences on highly
2 disturbed sites. Implementation of the covered activities could result in temporary direct and
3 permanent indirect effects on vernal pool shrimp species if present near where covered activities
4 are implemented.

5 Actions undertaken to implement the covered activities (e.g., operation of equipment for
6 construction or habitat restoration) could result in injury or mortality of individual vernal pool
7 shrimp species in affected habitat areas, with the exception that implementation of AMM3
8 precludes take of Conservancy fairy shrimp by the covered activities. For example, individual
9 vernal pool shrimp species could be crushed by construction equipment. Individuals could suffer
10 mortality from the accidental introduction of contaminants (e.g., equipment fuel spills) or
11 changes in the hydrology of its habitat, and invasive nonnative species could be introduced and
12 negatively affect its habitat. These potential impacts will be avoided and minimized with
13 implementation of the applicable AMMs indicated in Table 4-8.

14 **4.4.9.1 Estimated Level of Take**

15 Implementation of NHP covered activities will result in the following level of estimated take of
16 vernal pool shrimp species within the Plan Area.

17 **4.4.9.1.1 Permanent Direct Effects**

18 Loss of up to 1 acre of mapped vernal pool shrimp species habitat (Table 4-5a). The acreage of
19 take (i.e., harm) will be the amount of actual habitat that is located within the area of affected
20 mapped habitat. One known occurrence of vernal pool fairy shrimp and vernal pool tadpole
21 shrimp will be removed in Planning Unit 22 in a large excavated area on the decommissioned
22 City of Davis landfill site will be removed and one known occurrence of vernal pool tadpole
23 shrimp in Planning Unit 20 will be removed (Table 4-5c); neither occurrence is on mapped
24 habitat. No known occurrences of the remaining vernal pool shrimp species will be removed and
25 AMM3 precludes the take of Conservancy fairy shrimp. An additional small, but
26 indeterminable, amount of take of vernal pool shrimp species (except Conservancy fairy shrimp)
27 could be associated with the removal of currently unknown occurrences within the footprint of
28 permanent development and operations and maintenance and ongoing activities. Potential
29 effects on occurrences will be avoided and minimized with implementation of the applicable
30 AMMs in Table 4-8.

31 **4.4.9.1.2 Temporary Direct Effects**

32 Construction, restoration, and maintenance-related activities (e.g., operation of equipment) near
33 vernal pool shrimp occurrences could generate air borne dust or sediment in runoff that could
34 negatively affect vernal pool shrimp individuals by impeding their growth or reproductive
35 capability. Potential temporary direct effects on vernal pool fairy shrimp species will be avoided
36 and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.9.1.3 Permanent Indirect Effects

Permanent indirect effects of permanent development activities include increased human activity associated with new developments in and adjacent to occurrences of vernal pool shrimp species, altered hydrology, and introduction of nonnative species (see Table 4-1). Any such indirect effects, with the exception of Conservancy fairy shrimp, could kill or injure an indeterminable number vernal pool shrimp individuals as result of increased human access to occupied habitat adjacent to new permanent developments, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could reduce the function of vernal pool shrimp species habitat. Potential permanent indirect effects on vernal pool shrimp species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.9.2 Effects on Critical Habitat

In the Plan Area, critical habitat has been designated by USFWS only for the vernal pool tadpole shrimp. A total of 440 acres of designated vernal pool tadpole shrimp critical habitat, 45 acres of which supports NHP mapped habitat (Table 4-5c), are present at the Grasslands Regional Park and Davis Communications Facility site in Critical Habitat Unit 1. The PCEs essential for this species' conservation are:

1. Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described in PCE 2, providing for dispersal and promoting hydroperiods of adequate length in the pools.
2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains, and that continuously hold water for a minimum of 41 days, in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.
3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed or as a result of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
4. Structure within the pools described in PCE 2, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

The only covered activity proposed within the designated critical habitat is the implementation of conservation measures to manage and enhance its habitat within Critical Habitat Unit 1 to

1 achieve its recovery within the Plan Area. The purpose of these actions is to enhance overall
2 habitat conditions in vernal pool tadpole designated critical habitat.

3 Based on this assessment, the covered activities are not expected to impact PCEs of designated
4 critical habitat and will not preclude the ability to recover vernal pool tadpole shrimp.

5 **4.4.9.3 Overall Impact Likely to Result from the Take**

6 Recorded occurrences of vernal pool shrimp species in the Plan Area are in the vernal pools and
7 playa pools on the DFW Yolo Basin Wildlife Area, the alkali soils areas of Willow Slough and
8 the Putah Plains (Figures 2-12 and 2-13), the Davis Communications Facility, Grasslands
9 Regional Park, in an abandoned old channel of Putah Creek/Dry Slough, a farmed channel
10 tributary to Dry Slough, and in borrow pits and ditches along Interstate 80 (see Appendices A.9
11 through A.13 for the location of each of the vernal pool shrimp species known occurrences).

12 The covered activities will result in the loss of up to 1 acre of mapped vernal pool shrimp species
13 habitat, representing less than 1 percent of the current extent of mapped habitat, and removal of 1
14 vernal pool fairy shrimp and 1 vernal pool tadpole shrimp occurrence (Table 4-5a). No known
15 occurrences of vernal shrimp species are present in the mapped habitat that could be removed by
16 the covered activities. Within these impact areas, because mapped habitat overestimates the
17 actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The
18 ongoing operation of infrastructure maintenance (water supply, flood control, and transportation)
19 and farming-related equipment could result in take of individuals but are not expected to remove
20 habitat. There may be take of individuals and some temporary reduction of habitat function with
21 implementation of habitat enhancement actions on NHP conservation lands. The purpose of
22 those actions, however, is to enhance overall habitat conditions and the abundance of vernal pool
23 shrimp species within protected occurrences.

24 Based on this evaluation, implementation of the covered activities is not expected to result in
25 take, or adverse population-level effects on vernal pool shrimp species, or adversely affect their
26 Plan Area distribution or abundance.

27 **4.4.10 Valley Elderberry Longhorn Beetle**

28 The maximum acreage of modeled valley elderberry longhorn beetle habitat that will be directly
29 and permanently affected (i.e., removed) by the covered activities, including conservation
30 measures, is 909 acres representing 4.7 percent of the current acreage of modeled habitat in the
31 Plan Area (Table 4-9). Following implementation of the covered activities, 95.3 percent of the
32 existing modeled valley elderberry longhorn beetle habitat will remain in the Plan Area
33 (Table 4-5a).

34 Temporary direct effects include disturbances associated with construction and maintenance-
35 related operation of equipment in modeled habitat that could result in noise and ground
36 vibrations that could temporarily alter the use of affected habitat by valley elderberry longhorn

beetle. Permanent indirect effects include ongoing noise-related disturbances that could affect exposure of adult beetles to predation and increased risk for the introduction of nonnative competitors and predators (e.g., Argentine ant) into its habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities, aggregate mining operations) could result in removal of elderberry shrubs and mortality of valley elderberry longhorn beetle. For example, 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 potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

Implementation of the applicable AMMs indicated in Table 4-8 provide for rapid containment and cleanup of releases that may occur, thus reducing exposure risk and the period that elderberry shrubs and valley elderberry longhorn beetle individuals would be exposed to contaminants.

4.4.10.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of valley elderberry longhorn beetle within the Plan Area.

4.4.10.1.1 Permanent Direct Effects

Loss of up to 326 acres of modeled valley elderberry longhorn beetle riparian habitat and 583 acres of modeled nonriparian habitat¹⁰ (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual valley elderberry longhorn beetles could be associated with contamination; maintenance removal of individual shrubs; and collisions with vehicles and other equipment used to construct permanent development activities, conduct operations and maintenance and other ongoing activities, and manage NHP conservation lands. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.10.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of valley elderberry longhorn beetle if present. Habitat enhancement and management-related activities could result in temporary direct effects on valley elderberry

¹⁰ Includes up to 143 acres of modeled habitat that could be restored to valley foothill riparian.

longhorn beetle where it is present within the 2,665 acres of modeled valley elderberry longhorn beetle habitat that will be protected under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by valley elderberry longhorn beetle. Temporary direct effects valley elderberry longhorn beetle will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.10.1.3 Permanent Indirect Effects

A permanent reduction in the functions of modeled valley elderberry longhorn beetle habitat would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. These disturbances and the potential for establishment of the nonnative Argentine ant, a valley elderberry longhorn beetle predator, could also result in increased levels of predation where occupied habitat is present and affected. Permanent indirect effects on valley elderberry longhorn beetle will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.10.2 Overall Impact Likely to Result from the Take

The greatest historical threat to valley elderberry longhorn beetle has been the loss and modification of its habitat by urban, agricultural, industrial development, and other activities that reduce or eliminate its host plants (Talley et al. 2006). Currently the greatest threat to the species is from the invasive nonnative insects (e.g., Argentine ant (*Linepithema humile*) and European earwig (*Forficula auricularia*)) (Talley et al. 2006). It is unclear how the continuing spread of these nonnative species in Central Valley riparian systems will impact valley elderberry longhorn beetle, but it appears that the Argentine ant may have caused the disappearance of some populations (Talley et al. 2006). Numerous records of occupied and potential valley elderberry longhorn beetle habitat occur in the Plan Area along the Sacramento River corridor (see Appendix A, *Covered Species Accounts*). Due to lack of surveys, the population size and locations of valley elderberry longhorn beetle species in the Plan Area are not fully known.

The covered activities, including conservation measures, will result in the loss of up to 909 acres of modeled valley elderberry longhorn beetle habitat, representing approximately 4.7 percent of the current acreage of modeled habitat (see Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Implementation of the AMMs listed in Table 4-8 will minimize any potential impacts to occupied valley elderberry longhorn beetle habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on valley elderberry longhorn beetle or adversely affect its Plan Area distribution or abundance.

4.4.11 California Tiger Salamander

The maximum acreage of modeled California tiger salamander habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 2,092 acres representing approximately 2.4 percent of the current acreage of modeled habitat in the Plan Area (see Table 4-9). Within these impact areas, up to 33 seasonal ponds supporting modeled California tiger salamander aquatic breeding habitat could be removed, representing 3.7 percent of the current number of modeled pond habitat (Table 4-9). Temporary direct effects include noise, visual, and ground disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by California tiger salamander. Permanent indirect effects include ongoing noise-related disturbances and increased risk for pet-related (e.g., loose dogs and cats) predation and risk for the introduction of nonnative aquatic predators into breeding habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of new and existing facilities, livestock operations) could result in injury or mortality of California tiger salamander. For example, individual California tiger salamanders could be crushed by moving construction, maintenance, and ranching-related equipment and grazing livestock. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8. Outside of the breeding season, California tiger salamanders typically aestivate in rodent burrows and, consequently, the likelihood that adults could be crushed by construction equipment is low during this period. With the exception of the Dunnigan Specific Plan Area (Figure 3-1), which is located adjacent to known occupied habitat in Planning Unit 4, the likelihood for injury or mortality of individuals is considered to be is considered low because the covered activities will be implemented in areas that are not currently known to be occupied by California tiger salamander (see Appendix A, Section A.15).

The potential for the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) to adversely affect individual California tiger salamander will be minimized with the implementation of the applicable AMMs indicated in Table 4-8 that provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.11.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of California tiger salamander within the Plan Area.

4.4.11.1.1 Permanent Direct Effects

Loss of up to 59 acres of modeled California tiger salamander aquatic breeding habitat, including up to 33 ponds, and 2,033 acres of modeled upland habitat¹¹ (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual eggs, larvae, juvenile and adult California tiger salamander could be associated with contamination or adverse changes in aquatic habitat structure and conditions and collisions with vehicles and other equipment used to construct permanent development activities, conduct operations and maintenance and other ongoing activities, and manage NHP conservation lands. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.11.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of California tiger salamander, if present. Habitat enhancement and management-related activities could result in temporary direct effects on California tiger salamander where it is present within the 26,733 acres of modeled California tiger salamander habitat that will be protected under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by California tiger salamander. Temporary direct effects on California tiger salamander will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.11.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied California tiger salamander habitat would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. Permanent indirect effects on California tiger salamander habitat will be minimized with implementation of the applicable AMMs indicated in Table 4-8. A small, but indeterminable, amount of direct take of individual California tiger salamander (eggs, larvae, and adults) could be associated with collisions with vehicles and other human uses adjacent to permanent development activities (e.g., illegal harvest), adverse changes in aquatic habitat structure and environmental conditions, and predation caused by increased numbers of nonnative species associated with occupancy of new permanent developments.

4.4.11.1.4 Effects on Critical Habitat

A total of 2,730 acres of designated California tiger salamander critical habitat, 1,050 acres of which supports NHP modeled habitat (Table 4-5a), are present in California tiger salamander

¹¹ Includes up to 143 acres of modeled habitat that could be converted to restore valley foothill riparian.

Critical Habitat Unit 1 in Planning Units 5 and 13 (see Appendix A.15). NHP AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*) prohibits the removal of California tiger salamander habitat by covered activities within the boundary of Critical Habitat Unit 1. The NHP biological objective SPEC7.3 provides for protecting at least 800 acres of the 1,151 acres of modeled habitat in Critical Habitat Unit 1 (see Section 5.3, *Biological Goals and Objectives*). These lands will be managed to maintain and enhance habitat conditions to specifically benefit California tiger salamander. Based on this assessment, the covered activities are not expected to impact PCEs of designated critical habitat and will not preclude the ability to recover California tiger salamander.

4.4.11.2 Overall Impact Likely to Result from the Take

The primary threat to California tiger salamander has been the historical loss of its aquatic breeding and associated upland habitat due to urban development and agriculture (see Appendix A, *Covered Species Accounts*). Recorded occurrences of California tiger salamander in Yolo County include an occurrence of several larvae in a stock pond on the west slope of the Capay Hills east of Rumsey Rancheria and five occurrences in the northern end of the Solano-Colusa vernal pool region, west and northwest of Dunnigan. Four recorded occurrences were located within an area bounded by Interstate 5 to the east, Bird Creek to the south, and Buckeye Creek to the north and west. These four occurrences are from within an area that now comprises the Dunnigan Creek Unit (Central Valley Region Unit 1) of designated critical habitat. Land ownership within this unit is entirely private.¹² A fifth recorded occurrence, from 1993, represents an individual found in the Willows apartment complex in Davis, adjacent to a wildlife habitat area managed by the Yolo Audubon Society (see Appendix A, *Covered Species Accounts*).

The covered activities, including conservation measures, will result in the loss of up to 2,092 acres of modeled California tiger salamander habitat, representing 2.4 percent of the current extent of modeled habitat (Table 4-9). Within these impact areas, up to 33 ponds supporting modeled breeding habitat could be removed, representing 3.7 percent of the current number of modeled pond habitat. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of California tiger salamander (see Appendix A, *Covered Species Accounts*), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by California tiger salamander. Implementation of AMM3 (see Section 5.4.4) requires that all impacts on breeding habitat supporting breeding by California tiger salamander (i.e., occupied) will be avoided until at least 4 newly discovered or established breeding occurrences are protected. Consequently, any potential impacts on the reproductive potential of California tiger salamander will be

¹² 70 FR 49380.

1 minimized. Implementation of the remaining applicable AMMs (see Table 4-8) will serve to
2 further minimize impacts on California tiger salamander.

3 Based on this evaluation, implementation of the covered activities is not expected to result in
4 adverse population-level effects on California tiger salamander or adversely affect its Plan Area
5 distribution or abundance.

6 **4.4.12 Western Spadefoot Toad**

7 The maximum acreage of modeled western spadefoot toad habitat that will be permanently
8 affected, directly and indirectly, with implementation of the covered activities is 377 acres
9 representing approximately 0.7 percent of the current acreage of modeled habitat in the Plan
10 Area (see Table 4-9). Within these impact areas, up to 4 seasonal ponds supporting modeled
11 western spadefoot toad aquatic breeding habitat could be removed, representing 1.2 percent of
12 the current number of modeled pond habitat (Table 4-9). Temporary direct effects include noise
13 and visual disturbances associated with construction and maintenance-related operation of
14 equipment in modeled habitat that could result in noise and ground vibrations that could
15 temporarily alter the use of affected habitat by western spadefoot toad. Permanent indirect
16 effects include ongoing noise-related disturbances and increased risk for pet-related (e.g., loose
17 dogs and cats) predation and risk for the introduction of nonnative aquatic predators into
18 breeding habitat adjacent to new permanent developments following human occupancy.

19 Actions undertaken to implement the covered activities (e.g., operation of equipment for
20 construction of new developments, and for maintenance of existing facilities, livestock
21 operations) could result in direct injury or mortality of Western spadefoot toad. For example,
22 individual western spadefoot toads could be crushed by moving construction, maintenance, and
23 ranching-related equipment and grazing livestock. These potential impacts will be avoided and
24 minimized with implementation of the applicable AMMs indicated in Table 4-8. Outside the
25 reproductive season, western spadefoot toads typically are underground and largely immobile.
26 Excessive ground vibrations may cause early emergence of western spadefoot toads and thus
27 could expose toads to mortality risks. However, the likelihood for injury or mortality of
28 individuals is considered to be is considered low because the covered activities will be
29 implemented in areas that are not currently known to be occupied by the species.

30 The potential for the accidental introduction of contaminants associated with construction,
31 operations, and maintenance activities (e.g., fuel spills) to adversely affect individual western
32 spadefoot toad will be minimized with the implementation of the applicable AMMs indicated in
33 Table 4-8 that provide for containment and rapid cleanup of releases that may occur, thus
34 reducing exposure risk and the period that individuals could be exposed to contaminants.

35 **4.4.12.1 Estimated Level of Take**

36 Implementation of NHP covered activities will result in the following level of estimated take of
37 western spadefoot toad within the Plan Area.

4.4.12.1.1 Permanent Direct Effects

Loss of up to 7 acres of model western spadefoot toad aquatic breeding habitat including up to 4 ponds and 370 acres of modeled upland habitat may occur as a result of implementing covered activities (Table 4-5a). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual juvenile and adult western spadefoot toad could be associated with collisions with vehicles and other equipment used to construct permanent development activities, conduct operations and maintenance and other ongoing activities, and manage NHP conservation lands. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.12.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of western spadefoot toad if present. Habitat enhancement and management-related activities could result in temporary direct effects on western spadefoot toad where it is present within the 18,320 acres of modeled western spadefoot toad habitat that will be protected under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by western spadefoot toad. Temporary direct effects on Western spadefoot toad will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.12.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied western spadefoot toad breeding habitat would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. Permanent indirect effects on western spadefoot toad habitat will be minimized with implementation of the applicable AMMs indicated in Table 4-8. A small, but indeterminable, amount of direct take of individual Western spadefoot toad (eggs, larvae, and adults) could be associated with collisions with vehicles and other human uses adjacent to permanent development activities (e.g., illegal harvest), adverse changes in aquatic habitat structure and environmental conditions, and predation caused by increased numbers of nonnative species associated with occupancy of new permanent developments.

4.4.12.1.4 Overall Impact Likely to Result from the Take

Western spadefoot toad was probably never a common species in the Plan Area, and the primary threat to western spadefoot toad has been the historical loss of its aquatic breeding and associated upland habitat due to urban development and agriculture (see Appendix A, *Covered Species Accounts*). Recorded occurrences of western spadefoot toad in the Plan Area are limited to one recent occurrence northwest of Dunnigan.

The covered activities, including conservation measures, will result in the loss of up to 377 acres of modeled western spadefoot toad habitat, representing approximately 0.7 percent of the current extent of modeled habitat. Within these impact areas, up to 4 ponds supporting modeled breeding habitat could be removed, representing approximately 1.3 percent of the current number of modeled pond habitat (Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of western spadefoot toad (see Appendix A, *Covered Species Accounts*), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by western spadefoot toad. Implementation of AMM3 (see Section 5.4.4) requires that all impacts on aquatic habitat supporting breeding by western spadefoot toad will be avoided until at least 4 newly discovered or established breeding occurrences are protected. Consequently, any potential impacts on the reproductive potential of western spadefoot toad will be minimized. Implementation of the remaining applicable AMMs (see Table 4-8) will serve to further minimize impacts on western spadefoot toad.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on western spadefoot toad or adversely affect its Plan Area distribution or abundance.

4.4.13 Foothill Yellow-Legged Frog

The maximum acreage of modeled Foothill yellow-legged frog habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 1 acre representing approximately 0.1 percent of the current acreage of modeled habitat in the Plan Area (see Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could result in noise and ground vibrations that could temporarily alter the use of affected habitat by foothill yellow-legged frog. Permanent indirect effects include ongoing noise-related disturbances and increased risk for pet-related (e.g., loose dogs and cats) predation.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of new and existing facilities; livestock operations) could result in injury or mortality of foothill yellow-legged frog. For example, individual foothill yellow-legged frogs could be crushed by moving construction, maintenance, and ranching-related equipment and grazing livestock. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8. The likelihood for injury or mortality of individuals is considered to be low because the covered activities will be implemented in areas that are not currently known to be occupied by foothill yellow-legged frog.

The potential for accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) to adversely affect individual foothill yellow-legged frog is considered low because frogs are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.13.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of foothill yellow-legged frog within the Plan Area.

4.4.13.1.1 Permanent Direct Effects

Loss of up to 1 acre of modeled foothill yellow-legged frog upland habitat (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual adult foothill yellow-legged frog could be associated with collisions with vehicles and other equipment used to construct permanent development activities, conduct operations and maintenance and other ongoing activities, and manage NHP conservation lands. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.13.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of foothill yellow-legged frog associated with covered activities. Habitat enhancement and management-related activities could result in temporary direct effects on California tiger salamander where it is present within the 115 acres of modeled foothill yellow-legged frog habitat that will be protected under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by foothill yellow-legged frog. Temporary direct effects on Foothill yellow-legged frog will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.13.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied foothill yellow-legged frog habitat would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. Permanent indirect effects on foothill yellow-legged frog habitat will be minimized with implementation of the applicable AMMs indicated in Table 4-8. A small, but indeterminable, amount of direct take of individual foothill yellow-legged frog (eggs, larvae, and adults) could be associated with collisions with vehicles and other human uses adjacent to permanent development activities (e.g.,

illegal harvest), adverse changes in aquatic habitat structure and environmental conditions, and predation caused by increased numbers of nonnative species associated with occupancy of new permanent development.

4.4.13.2 Overall Impact Likely to Result from the Take

The primary threat to foothill yellow-legged frog has been the historical loss of its aquatic breeding and associated upland habitat due to urban development and agriculture (see Appendix A, *Covered Species Accounts*). The foothill yellow-legged frog has been documented in five occurrences in the Plan Area. Three of these records (also represented as an historical locality by Jennings and Hayes 2004) represent 1997 observations in the northwestern Plan Area on Davis Creek both upstream and downstream of Davis Creek Reservoir. The species was observed in 1999 in two ponds in the central stretch of the Blue Ridge Mountains (CNDDDB 2008). Two additional 1925 occurrences within Putah Creek, 8 miles west of Winters in the southern Plan Area are presumed extirpated (Jennings and Hayes 1994). Though prevalent within the foothills west of Capay Valley and within adjacent Lake County, the paucity of recorded occurrences at lower elevations suggests that the foothill yellow-legged frog may never have been a common species throughout much of the Plan Area.

The covered activities will result in the loss of up to 1 acre of modeled foothill yellow-legged frog upland habitat, representing 0.1 percent of the current extent of modeled habitat (Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Based on the available information regarding the status and distribution of foothill yellow-legged frog (see Appendix A, *Covered Species Accounts*), it is likely that the modeled habitat that is removed by the covered activities is unoccupied by Foothill yellow-legged frog. Implementation of the remaining applicable AMMs (see Table 4-8) will serve to further minimize impacts on foothill yellow-legged frog.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on foothill yellow-legged frog or adversely affect its Plan Area distribution or abundance.

4.4.14 Western Pond Turtle

The maximum acreage of modeled western pond turtle habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 6,729 acres representing approximately 3.5 percent of the current acreage of modeled habitat in the Plan Area (see Table 4-9). Within these impact areas, up to 40 perennial ponds supporting modeled breeding habitat could be removed, representing 20.5 percent of the current number of modeled perennial pond habitat (Tables 4-5a and 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by western pond turtle. Permanent indirect effects include ongoing noise-related

disturbances and increased risk for pet-related (e.g., introduced pet turtles) diseases transmission and risk for the introduction of nonnative aquatic predators into breeding habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of new and existing facilities, aggregate mining operations, ranching and farming operations) could result in injury or mortality of western pond turtle. For example, individual western pond turtle could be crushed by moving construction, maintenance, ranching, and farming-related equipment. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual western pond turtle is considered low because turtles are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.14.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of western pond turtle within the Plan Area.

4.4.14.1.1 Permanent Direct Effects

The estimated level of take associated with covered activities is the loss of up to 3,639 acres of modeled western pond turtle aquatic habitat, including up to 40 ponds, and 3,090 acres of modeled upland habitat (Table 4-9).¹³ These impacts, however, include conversion of 483 acres of modeled habitat to other land cover types that also support western pond turtle habitat (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual juvenile and adult western pond turtle could be associated with collisions with vehicles and other equipment used to implement the covered activities. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.14.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites that could

¹³ Includes up to 483 acres of modeled habitat that could be restored valley foothill riparian and giant garter snake habitat .

1 result in harassment of western pond turtle if present. Habitat restoration, enhancement, and
2 management-related activities could result in temporary direct effects on western pond turtle
3 where it is present within the 11,780 acres of modeled western pond turtle habitat that will be
4 protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat
5 located adjacent to NHP conservation lands that is occupied by western pond turtle. Temporary
6 direct effects on western pond turtle will be minimized with implementation of the applicable
7 AMMs indicated in Table 4-8.

8 4.4.14.1.3 Permanent Indirect Effects

9 A permanent reduction in the functions of occupied western pond turtle habitat (i.e., harassment)
10 will result from noise, visual, and other disturbances associated with human occupancy of
11 permanent developments (e.g., residential developments) if the habitat is present nearby. A
12 small, but indeterminable, amount of direct take of individual western pond turtle could be
13 associated with collisions with vehicles and other human uses adjacent to permanent
14 developments. Permanent indirect effects on western pond turtle will be minimized with
15 implementation of the applicable AMMs indicated in Table 4-8.

16 4.4.14.2 Overall Impact Likely to Result from the Take

17 The primary threat to western pond turtle has been the historical loss of its aquatic breeding and
18 associated upland habitat due to urban development and agriculture (see Appendix A.18). The
19 species is well distributed with the NHP Plan Area. Recorded occurrences of western pond turtle
20 in the Plan Area include records from Davis Creek, near Davis Creek Reservoir, University of
21 California Davis Arboretum and Arboretum Waterway, along Putah Creek and an unnamed
22 tributary, within Cache Creek and at the Cache Creek Nature Preserve. Additional records exist
23 for the Sacramento River Basin, along the southeastern boundary of the Plan Area, and for the
24 Willow Slough Bypass (see Appendix A.18).

25 The covered activities, including conservation measures, will result in the loss of up to 6,729
26 acres of modeled western pond turtle habitat, representing approximately 3.5 percent of the
27 current extent of modeled habitat (see Table 4-9). Within these impact areas, up to 40 ponds
28 supporting modeled aquatic habitat could be removed, representing approximately 20.5 percent
29 of the current number of modeled pond habitat. Because modeled habitat overestimates the
30 actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.
31 Based on the available information regarding the status and distribution of western pond turtle
32 (see Appendix A.18), it is common and likely well distributed in suitable Plan Area habitats.
33 Consequently, implementation of the covered activities is not expected to result in adverse
34 population-level effects on western pond turtle or adversely affect its Plan Area distribution or
35 abundance.

4.4.15 Giant Garter Snake

The maximum acreage of modeled giant garter snake habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 1,941 acres representing 3.1 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). A total of 1,669 acres of the affected habitat supports modeled aquatic rice and freshwater emergent habitat (Table 4-9). Using the methods described in Appendix A.19, *Giant Garter Snake*, for calculating the number of giant garter snakes that can be supported by rice land and fresh emergent wetland land cover comprised of managed wetland, implementation of the covered activities will remove habitat supporting an estimated 36 giant garter snakes in Planning Units 11–13 and 19, which are the areas supporting the core Colusa Basin and Willow Slough/Yolo Bypass giant garter snake subpopulations in the Plan Area that will be affected by the covered activities (Table 4-10, *Estimated Number of Giant Garter Snakes affected by Permanent Development and Habitat Restoration Activities*). Of the 1,669 acres of affected aquatic habitat, 340 acres of existing rice habitat will be removed to restore giant garter snake habitat. The 340 acres of affected rice habitat is estimated to support 14 giant garter snake and the habitat restored on the affected rice land is expected to support an estimated 71 giant garter snakes at maturity, thus resulting in a net increase in giant garter snake habitat function sufficient to support a net increase of about 57 giant garter snakes following maturation of the restored habitat (Table 4-10).¹⁴ Temporary direct effects include noise, visual, and other disturbances (e.g., ground vibrations) associated with construction, maintenance, and farming-related operation of equipment in modeled habitat that could alter the use of affected habitat by giant garter snake. Permanent indirect effects include ongoing noise and visual disturbances and increased risk for pet-related (e.g., loose dogs and cats) predation and risk for the introduction of nonnative aquatic predators into habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of new and existing facilities, agricultural and water infrastructure operations) could result in injury or mortality of giant garter snake. For example, individual giant garter snakes or their nests could be crushed by moving construction, maintenance, and farming-related equipment and juvenile and adult snakes. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

¹⁴ Table 4-10 includes restoration of 203 acres of fresh emergent wetland that will be restored to support high value giant garter snake habitat in addition to the 340 acres of giant garter snake habitat restoration that will result in conversion of existing aquatic giant garter snake habitat. Restoration of the fresh emergent wetland habitat is estimated to support habitat for an additional 43 giant garter snakes.

Table 4-10. Estimated Number of Giant Garter Snakes affected by Permanent Development and Habitat Restoration Activities

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The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual giant garter snake is considered low because snakes are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.15.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of giant garter snake within the Plan Area.

4.4.15.1.1 Permanent Direct Effects

Loss of up to 1,941 acres of modeled giant garter snake habitat (Table 4-9).¹⁵ The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. These impacts, however, include conversion of 340 acres of modeled habitat to other land cover types that also support giant garter snake habitat. The net effect of implementing all of the covered activities, including restoration of 340 acres giant garter snake habitat and 203 acres of restored fresh emergent wetland designed as giant garter snake habitat, is expected to be a net increase in the capacity of Plan Area modeled habitat to support a net increase of an estimated 71 giant garter snakes (Table 4-10).¹⁶ A small, but indeterminable, amount of direct take of individual juvenile and adult giant garter snake could be associated with collisions with or crushing of hibernating individuals by operation of construction, farming, and maintenance-related equipment. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.15.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites that could result in harassment of giant garter snake if present. Habitat restoration, enhancement, and management-related activities could result in temporary direct effects on giant garter snake where it is present within the 7,244 acres of modeled giant garter snake habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by giant garter snake. Temporary direct effects on giant garter snake will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

¹⁵ Includes up to 340 acres of modeled rice habitat that could be restored to non-rice giant garter snake habitat.

¹⁶ Methods used to calculate the per acre capacity of giant garter snake habitat types to support giant garter snakes is described in Appendix A.19.

4.4.15.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied giant garter snake habitat (i.e., harassment) will result from noise, visual, and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. A small, but indeterminable, amount of direct take of individual giant garter snake could be associated with collisions with vehicles and other human uses adjacent to permanent developments. Permanent indirect effects on giant garter snake will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.15.2 Overall Impact Likely to Result from the Take

The primary threat to giant garter snake has been the historical loss of its aquatic breeding and associated upland habitat due to urban development, flood control, and agriculture (see Appendix A, *Covered Species Accounts*). Conversion of wetlands for agricultural, urban, and industrial development has caused the loss of over 90 percent of suitable giant garter snake habitat in the Central Valley. Loss of habitat functions (including predation and competition by nonnative species), fragmentation and disturbances associated with human activities is a major stressor of giant garter snake in the Plan Area (USFWS 1999). Maintenance of flood control and irrigation canals, rodent control, pesticide use, and improper grazing of wetlands or streamside habitats are known to affect giant garter snake habitat function and populations (Brode and Hansen 1992; G. Hansen 1988; Hansen and Brode 1993). Nonnative predators (e.g., bullfrog, largemouth bass and catfish), have been identified as significant predators of giant garter snake (Bury and Whelan 1984; Treanor 1983) and compete with giant garter snake for smaller forage species (G. Hansen 1986; Schwalbe and Rosen 1989). Disease transmission and competition from nonnative turtle species is locally significant (Spinks et al. 2003). Giant garter snakes are sensitive to the loss of upland habitat adjacent to aquatic habitats, where young are hatched and where some adult giant garter snakes retreat for the winter.

The covered activities, including conservation measures, will result in the loss of up to 1,941 acres of modeled giant garter snake habitat, representing 3.1 percent of the current extent of modeled habitat (see Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Based on the available information regarding the status and the highly patchy distribution of giant garter snake (see Appendix A.19, *Giant Garter Snake*), it is likely that most of the modeled habitat to be removed by the covered activities is unoccupied by giant garter snake. Implementation of the applicable AMMs (see Table 4-8) will serve to further minimize impacts on giant garter snake. Conversion of 340 acres of lower functioning giant garter snake rice habitat to a mosaic higher functioning open water, fresh emergent wetland, and upland habitat designed and managed specifically as giant garter snake habitat, in conjunction with 203 acres of restored fresh emergent wetland habitat, is expected to result in a net increase in the capacity of Plan Area habitats to support giant garter snakes by an estimated 76 individuals following implementation of the permanent development and habitat restoration activities (Table 4-10).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on giant garter snake or adversely affect its Plan Area distribution or abundance.

4.4.16 Swainson's Hawk

The maximum acreage of modeled Swainson's hawk habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 17,734 acres representing 5.4 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). In addition, 45 recorded nest sites will be directly and permanently affected, representing 12.7 percent of current recorded nest sites in the Plan Area (Table 4-9). The NHP, however, includes AMMs to avoid removal of nest trees during the nesting season (see Table 4-8 and Section 5.4.4, *Avoidance and Minimization Measures*). Temporary direct effects include noise and visual disturbances associated with construction, farming, and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by Swainson's hawk. Permanent indirect effects include ongoing noise and visual disturbances adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities, farming and ranching operations) could result in injury or mortality of Swainson's hawk. For example, 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. Implementation of AMM8 and AMM22 (see Section 5.4.4, *Avoidance and Minimization Measures*), however, specifically preclude removal or pruning of nest trees during the breeding season and provides for minimizing the potential for disturbance-related impacts on nesting Swainson's hawks. Construction of above ground transmission lines may also cause mortality of Swainson's hawk from strikes and electrocution. The potential for these effects will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual Swainson's hawk is considered low because Swainson's hawk are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, the only time Swainson's hawk spend on the ground is immediately after killing prey, which is either quickly consumed or carried to a perch. Implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that Swainson's hawk individuals could be exposed to contaminants.

4.4.16.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of Swainson's hawk within the Plan Area.

4.4.16.1.1 Permanent Direct Effects

Loss of up to 2,150 acres of modeled Swainson's hawk nesting habitat, 3,681 acres of natural foraging habitat,¹⁷ 11,903 acres of agricultural foraging habitat,¹⁸ and 45 recorded Swainson's hawk nest sites (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. The potential for take of active nest sites, including eggs, juvenile and adult Swainson's hawk, will be avoided with implementation of AMM8 and AMM22 (see Section 5.4.4, *Avoidance and Minimization Measures*), which precludes impacts on occupied nest sites during the breeding season. A small, but indeterminable, amount of take of individuals could be associated with electrocution and collisions with power lines. The potential for permanent direct effects Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.16.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of Swainson's hawk if present. Habitat restoration, enhancement, and management-related activities could result in temporary direct effects on Swainson's hawk where it is present within the 36,284 acres of modeled Swainson's hawk habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by Swainson's hawk. Temporary direct effects to Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.16.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied Swainson's hawk habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. The potential for permanent indirect effects on Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

¹⁷ Includes up to 143 acres of modeled natural foraging habitat that could be restored to valley foothill riparian land cover type.

¹⁸ Includes up to 643 acres of modeled agricultural foraging habitat that could be restored to valley oak woodland, valley foothill riparian, and fresh emergent wetland.

4.4.16.2 Overall Impact Likely to Result from the Take

Swainson's hawk faces different threats in different portions of its range. In California, causes of population decline are thought to be loss of nesting habitat (Schlorff and Bloom 1984), loss of foraging habitat to urban development, and conversion of suitable agricultural foraging habitat to unsuitable agriculture such as orchards and vineyards (England et al. 1997; England et al. 1995). Fluctuations in prey populations and use of rodenticides, insecticides, and herbicides in their summer and winter ranges may also affect Swainson's hawk. The species is distributed throughout the low elevation agricultural region of the Plan Area. Swainson's hawk distribution is closely associated with agricultural cover type, and generally follows the pattern of hay, grain, and row crops. The highest nesting concentrations are 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).

The covered activities, including conservation measures, will result in the loss of up to 17,734 acres of modeled Swainson's hawk habitat, representing approximately 5.4 percent of the current extent of modeled habitat (Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. In addition, covered activities will result in the loss of up to 45 recorded Swainson's hawk nest sites, representing approximately 12.7 percent of existing recorded nest sites in the Plan Area. Implementation of the AMMs listed in Table 4-8 will minimize any potential impacts on occupied Swainson's hawk habitat.

The Plan Area supports very high densities of Swainson's hawk, with surveys conducted in 2007 identifying total of 290 Swainson's hawk nesting territories in the Plan Area, located primarily within the agricultural matrix of the central and eastern Plan Area. Results of ongoing studies of the Plan Area population indicate an upward trend (see Appendix A.20, *Swainson's Hawk*). Based on the level of impact of the covered activities and an apparent increase in the Plan Area population in recent years, it is unlikely that the covered activities will result in an adverse population-level effect on Swainson's hawk or adversely affect its Plan Area distribution or abundance.

4.4.17 Northern Harrier

The maximum acreage of modeled northern harrier habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 16,810 acres representing approximately 5.2 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by northern harrier. Permanent indirect effects include ongoing noise-related disturbances and increased risk for pet-related (e.g., loose

dogs) disturbance in breeding habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities, ranching and farming operations) could result in injury or mortality of northern harrier. For example, individual northern harrier nests could be crushed by moving construction, farming, ranching, and maintenance-related equipment and nests or juveniles could be abandoned due to disturbance to nest sites, leading to nest failure or juvenile mortality. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual northern harrier is considered low because harriers are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that northern harrier individuals could be exposed to contaminants.

4.4.17.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of northern harrier within the Plan Area.

4.4.17.1.1 Permanent Direct Effects

Loss of up to 401 acres of modeled northern harrier primary nesting/foraging habitat, 9,004 acres of secondary nesting/foraging habitat,¹⁹ and 7,404 acres of foraging habitat²⁰ (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual eggs, juvenile and adult northern harrier could be associated with operation of equipment to construct permanent development activities and conduct operations and maintenance and other ongoing activities. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.17.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result

¹⁹ Includes up to 563 acres of modeled secondary nesting/foraging habitat that could be restored to valley foothill riparian land cover type.

²⁰ Includes up to 563 acres of modeled foraging habitat that could be restored to valley oak woodland, valley foothill riparian, fresh emergent wetland land cover types, and giant garter snake habitat.

in harassment of northern harrier if present. Habitat restoration, enhancement, and management-related activities could result in temporary direct effects on northern harrier where it is present within the 14,711 acres of modeled northern harrier habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by northern harrier. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects northern harrier will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.17.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied northern harrier habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. Permanent indirect effects on northern harrier will be minimized with implementation of the applicable AMMs indicated in Table 4-8. A small, but indeterminable, amount of direct take of individual northern harrier could be associated with collisions with vehicles, nest predation by loose pets, and other human-related uses adjacent to permanent developments.

4.4.17.2 Overall Impact Likely to Result from the Take

The continued widespread destruction of freshwater and estuarine wetlands is the primary threat to breeding and wintering northern harrier populations in the United States (MacWhirter and Bildstein 1996). In addition, conversion of native grassland for monotypic farming has contributed to declines of local populations. Within the Plan Area, threats to northern harriers are the result of continued urbanization of grassland and agricultural lands, as well as conversion to unsuitable crop types. Northern harriers occur throughout all of the lowland areas of the Plan Area and in the foothill grasslands. In general, their distribution is associated with irrigated cropland and irrigated pastureland common to the interior of the Plan Area, the seasonal wetlands and pasturelands of the Yolo Basin and southern panhandle, and the grassland foothills on the western edge of the valley floor.

The covered activities, including conservation measures, will result in the loss of up to 16,810 acres of modeled northern harrier habitat, representing approximately 5.2 percent of the current extent of modeled habitat (Table 4-9). The northern harrier's highest functioning nesting and foraging habitat types consist of permanent and seasonal wetlands, which comprise 1.5 percent of the total habitat affected and less than 3 percent of the total affected habitat area. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Implementation of the AMMs listed in Table 4-8 will minimize any potential impacts to occupied northern harrier habitat..

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on northern harrier or adversely affect its Plan Area distribution or abundance.

4.4.18 White-Tailed Kite

The maximum acreage of modeled white-tailed kite habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 18,535 acres representing 5.5 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). In addition, 1 recorded nest site will be directly and permanently affected, representing 33.3 percent of current recorded nest sites in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction, farming, and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by white-tailed kite. Permanent indirect effects include ongoing visual and noise-related disturbances adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities, farming and ranching operations) could result in injury or mortality of white-tailed kite. For example, individual white-tailed kite 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. Take of individual white-tailed kite, however, is not permitted under the NHP (Table 4-4). Implementation of AMM8 and AMM22 (see Section 5.4.4, *Avoidance and Minimization Measures*), specifically preclude removal or pruning of nest trees during the breeding season and provides for minimizing the potential for disturbance-related impacts on nesting white-tailed kites. Construction of above ground transmission lines may also cause mortality of white-tailed kite from strikes and electrocution. The potential for these effects will be avoided with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual white-tailed kite is considered low because white-tailed kite are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, the only time white-tailed kite spend on the ground is immediately after killing prey, which is either quickly consumed or carried to a perch. Implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that white-tailed kite individuals could be exposed to contaminants.

4.4.18.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of white-tailed kite within the Plan Area.

4.4.18.1.1 Permanent Direct Effects

Loss of up to 2,172 acres of modeled white-tailed kite nesting habitat, 16,363 acres of primary (4,732 acres) and secondary (11,631 acres) foraging habitat,²¹ and 1 recorded white-tailed kite nest site (see Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. Take through direct injury or mortality of individual white-tailed kite, however, is not permitted under the NHP (Table 4-4). The potential for take of nest sites, including eggs, juvenile and adult white-tailed kite, will be avoided with implementation of AMM8 and AMM22 (see Section 5.4.4, *Avoidance and Minimization Measures*), which preclude impacts on occupied nest sites during the breeding season. A small, but indeterminable, amount of take of individuals could be associated with electrocution and collisions with power lines. The potential for permanent direct effects white-tailed kite will be avoided minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.18.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of white-tailed kite if present. Habitat restoration, enhancement, and management-related activities could result in temporary direct effects on white-tailed kite where it is present within the 38,185 acres of modeled white-tailed kite habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by white-tailed kite. Temporary direct effects white-tailed kite will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.18.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied white-tailed kite habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. The potential for permanent indirect effects on white-tailed kite will be minimized with implementation of the applicable AMMs indicated in Table 4-8. .

4.4.18.2 Overall Impact Likely to Result from the Take

Urbanization is one of the principal causes of continuing habitat loss for white-tailed kite and is a continuing threat to remaining populations, particularly in rapidly urbanizing areas in the Sacramento Valley. The species is intolerant of noise and human activities and will abandon nesting areas that are subject to increasing levels of human disturbances or habitat fragmentation.

²¹ Includes up to 786 acres of modeled primary and secondary foraging habitat that could be restored to valley oak woodland, fresh emergent wetland, and valley foothill riparian land cover types.

Kite populations have recovered to some extent in California due in part to the expansion of compatible agricultural types. The conversion to crop patterns that do not support sufficient rodent prey or that restrict accessibility to prey can result in the abandonment of traditionally active territories. White-tailed kite has been reported from most of the open, lowland habitats in the Plan Area.

The covered activities, including conservation measures, will result in the loss of up to 18,535 acres of modeled white-tailed kite habitat, representing approximately 5.5 percent of the current extent of modeled habitat (Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. In addition, covered activities will result in the loss of up to 1 recorded white-tailed kite nest site, representing approximately 33.3 percent of existing recorded nest sites in the Plan Area. Implementation of the AMMs listed in Table 4-8 will avoid and minimize any potential impacts to occupied white-tailed kite habitat. Survey information indicates that California white-tailed kite populations, including those in the Plan Area, have increased substantially since the 1960s (see Appendix A.22). Based on the available data, it is unlikely that white-tailed kite is limited by the availability of foraging or nesting habitat in the Plan Area.²²

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on white-tailed kite or adversely affect its Plan Area distribution or abundance.

4.4.19 Black Tern

The maximum acreage of modeled black tern habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 1,453 acres representing approximately 3.6 percent of the current acreage of modeled habitat in the Plan Area (see Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction, maintenance, and farming-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by black tern. Permanent indirect effects include ongoing noise-related disturbances and increased risk for pet-related (e.g., loose dogs and cats) predation in breeding habitat adjacent to new permanent developments following human occupancy.

Black terns historically nested in the Plan Area and are known to nest in rice fields. If black tern were to reestablish as a nesting species in the Plan Area during the term of the NHP, actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities, farming operations) could result in injury or mortality of black tern. For example, individual black tern

²² For example, a total of 13 nest sites were located in Plan Area surveys conducted in 2007. White-tailed kite typically forage within 0.8 square miles of nest sites (based on a mean foraging distance of 0.8 km from nest sites; see Appendix A.22). Based on this value, the extent of primary foraging habitat remaining in the Plan Area after implantation of the covered activities (126,205 acres) would support up to 197 nest sites.

1 nests, if present, could be crushed by moving construction and farming-related equipment and
2 nests or juveniles could be abandoned due to disturbance, leading to nest failure or juvenile
3 mortality. Implementation of AMM8 (see Section 5.4.4, *Avoidance and Minimization*
4 *Measures*), however, specifically precludes non-farming-related disturbance of nest sites.

5 The probability that the accidental introduction of contaminants associated with construction,
6 operations, and maintenance activities (e.g., fuel spills) will adversely affect individual black tern
7 is considered low because terns are expected to avoid work sites with ongoing noise and visual
8 construction-related disturbances and they are a highly mobile species that can readily avoid
9 such hazards. In addition, implementation of the applicable AMMs indicated in Table 4-8
10 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure
11 risk and the period that black tern individuals could be exposed to contaminants.

12 **4.4.19.1 Estimated Level of Take**

13 Implementation of NHP covered activities will result in the following level of estimated take of
14 black tern within the Plan Area.

15 **4.4.19.1.1 Permanent Direct Effects**

16 Loss of up to 103 acres of modeled black tern freshwater marsh habitat and 1,355 acres of
17 modeled rice field and isolated rice patch habitat²³ (Table 4-9). The acreage of take (i.e., harm)
18 will be the amount of actual habitat that is located within the area of affected modeled habitat.
19 Currently, black tern is not known to breed in the Plan Area. If they were to establish as a
20 breeding species in the Plan Area during the term of the NHP, a small, but indeterminable,
21 amount of direct take of individual eggs, juvenile and adult black tern could be associated with
22 implementation of the covered activities. Permanent direct effects of these impacts will be
23 minimized with implementation of the applicable AMMs indicated in Table 4-8.

24 **4.4.19.1.2 Temporary Direct Effects**

25 A temporary reduction in the functions of modeled habitat resulting from operation of equipment
26 to implement covered activities on modeled habitat located adjacent to project sites could result
27 in harassment of black tern if present. Habitat restoration, enhancement, and management-
28 related activities could result in temporary direct effects on black tern where it is present within
29 the 6,503 acres of modeled black tern habitat that will be protected and restored under the NHP
30 (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation
31 lands that is occupied by black tern. Temporary direct effects black tern will be minimized with
32 implementation of the applicable AMMs indicated in Table 4-8.

²³ Includes up to 340 acres of modeled rice habitat that could be restored to giant garter snake habitat.

4.4.19.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied black tern habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. Permanent indirect effects on black tern will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.19.1.4 Overall Impact Likely to Result from the Take

Black tern currently faces few major threats. However, because the species has such a limited local distribution and is dependent on flooded rice fields for breeding in the Sacramento Valley, conversion of rice fields to other crops would pose a significant threat to the Plan Area migrant population. While black terns may have once nested historically in the eastern portion of Yolo County, there have been no recent nesting records in the Plan Area (Yolo Audubon Society Checklist Committee 2004). Presumed migrants can often be observed foraging over flooded rice fields in the Yolo Bypass.

The covered activities, including conservation measures, will result in the loss of up to 1,453 acres of modeled black tern habitat, representing approximately 3.6 percent of the current extent of modeled habitat (Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Based on the available information regarding the status and distribution of black tern (see Appendix A, *Covered Species Accounts*), it is likely that most of the modeled habitat that is removed by the covered activities is unoccupied by black tern. Black terns also only occur as a migrant and is not likely habitat-limited within the Plan Area. Consequently, the probability for adverse effects of the covered activities on black tern in the Plan Area is considered low. Implementation of the AMMs listed in Table 4-8 will minimize any potential impacts to occupied black tern habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on black tern or adversely affect its Plan Area distribution or abundance.

4.4.20 Western Yellow-Billed Cuckoo

The maximum acreage of modeled western yellow-billed cuckoo habitat that will be directly and permanently affected with implementation of the covered activities is 76 acres representing approximately 1.6 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by western yellow-billed cuckoo. Permanent indirect effects include ongoing noise and visual-related disturbances in occupied habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities) could result in injury or mortality of western yellow-billed cuckoo. For example, individual cuckoo nests could be crushed by moving construction-related equipment or nests or juveniles could be abandoned due to disturbance, leading to nesting failure or juvenile mortality. The western yellow-billed cuckoo, however, is not currently known to nest in the Plan Area and, should it become established as a breeding species in the Plan Area in the future, AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*) precludes impacts on nest sites and the potential for noise and visual disturbances on its behaviors will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual western yellow-billed cuckoo is considered low because cuckoos are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that western yellow-billed cuckoo individuals could be exposed to contaminants.

4.4.20.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of western yellow-billed cuckoo within the Plan Area.

4.4.20.1.1 Permanent Direct Effects

Loss of up to 76 acres of modeled western yellow-billed cuckoo nesting/foraging habitat (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. The potential for take of nest sites, including eggs, juvenile and adult western yellow-billed cuckoo, will be avoided with implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*), which precludes impacts of the covered activities on nest sites.

4.4.20.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of western yellow-billed cuckoo if present. Habitat enhancement and management-related activities could result in temporary direct effects on western yellow-billed cuckoo where it is present within the 866 acres of modeled western yellow-billed cuckoo habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by western yellow-billed cuckoo. The likelihood for these effects, however, is considered low because western yellow-

1 billed cuckoo currently only occurs as an infrequent migrant in the Plan Area. Temporary direct
2 effects western yellow-billed cuckoo will be minimized with implementation of the applicable
3 AMMs indicated in Table 4-8.

4 4.4.20.1.3 Permanent Indirect Effects

5 A permanent reduction in the functions of occupied western yellow-billed cuckoo habitat (i.e.,
6 harassment) will result from noise, visual, and other disturbances associated with human
7 occupancy of permanent developments (e.g., residential developments) if the habitat is present
8 nearby. The likelihood for these effects, however, is considered low because western yellow-
9 billed cuckoo currently only occurs as an infrequent migrant in the Plan Area. Permanent
10 indirect effects on western yellow-billed cuckoo will be minimized with implementation of the
11 applicable AMMs indicated in Table 4-8.

12 4.4.20.2 Overall Impact Likely to Result from the Take

13 Historical declines of western yellow-billed cuckoo have been due primarily to the loss and
14 degradation of riparian forest and this continues to be the main threat to the species.
15 Fragmentation reduces the ability of an area to sustain a population, leading to local extirpations
16 and the loss of dispersal corridors (66 FR 38611). The range of western yellow-billed cuckoo
17 historically extended from southern British Columbia to the Rio Grande in northern Mexico, and
18 east to the Rocky Mountains (Bent 1940). Currently the only known populations of breeding
19 western yellow-billed cuckoo are several disjunct locations in California, Arizona, and western
20 New Mexico (Halterman 1991). Since 1965, there have been only nine records of western
21 yellow-billed cuckoo in the Plan Area, all presumed migrants or nonbreeding individuals.

22 The covered activities, including conservation measures, will result in the loss of up to 76 acres
23 of modeled western yellow-billed cuckoo habitat, representing approximately 1.6 percent of the
24 current extent of modeled habitat (Table 4-9). Because modeled habitat overestimates the actual
25 acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The effect
26 of the habitat loss on western yellow-billed cuckoo is likely minimal as it currently only occurs
27 as an infrequent migrant in the Plan Area and, if western yellow-billed cuckoo were to become
28 established as a breeding species in the Plan Area in future years, implementation of AMM3 (see
29 Section 5.4.4, *Avoidance and Minimization Measures*) will preclude impacts of the covered
30 activities on nest sites. Implementation of the applicable AMMs indicated in Table 4-8 will
31 further serve to minimize potential impacts of the covered activities on occupied western yellow-
32 billed cuckoo habitat.

33 Based on this evaluation, implementation of the covered activities is not expected to result in
34 adverse population-level effects on western yellow-billed cuckoo or adversely affect its Plan
35 Area distribution or abundance.

4.4.21 Western Burrowing Owl

The maximum acreage of modeled western burrowing owl habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 4,434 acres representing 4.4 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction, farming, and maintenance-related operation of equipment in modeled habitat that could result in noise that could temporarily alter the use of affected habitat by western burrowing owl. Permanent indirect effects include ongoing noise-related disturbances in occupied habitat if present adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for farming construction of new developments, maintenance of new and existing facilities, livestock grazing) could result in direct injury or mortality of western burrowing owl. For example, eggs and nestlings in burrows could be crushed by operation of construction, maintenance, and farming-related equipment. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8. Visual and noise disturbances 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. Because adult western burrowing owls are highly mobile, actions associated with implementation of the covered activities (e.g., operation of construction equipment) will not result in mortality or injury of adult individuals.

Western burrowing owls are sensitive to disturbances of nesting burrows during the reproductive period. The ecological functions of Western burrowing owl nesting and foraging habitat adjacent to new permanent developments could be diminished as a result of ongoing visual, noise, pet-related, and other disturbances associated with occupancy of new infrastructure and developments. Domestic cats and loose-running dogs especially cause considerable disturbance to nesting pairs, which may reduce productivity. Native or nonnative predators supported by human developments (e.g., raccoons, skunks) could cause mortality of western burrowing owl nestlings or fledglings located if nesting burrows are present near new permanent developments. These effects will be avoided and minimized with the applicable AMMs indicated in Table 4-8, which include measures to avoid removal of occupied nesting burrows.

The probability that the accidental introduction of contaminants associated with construction, maintenance, ranching, and farming activities (e.g., fuel spills) will adversely affect individual western burrowing owls is considered low because they are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.21.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of western burrowing owl.

4.4.21.1.1 Permanent Direct Effects

Loss of up to 1,983 acres of modeled western burrowing owl primary habitat and up to 2,451 acres (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of take of individuals could result from crushing of occupied burrows associated with operation of construction, maintenance, restoration, ranching and farming equipment. The potential for this permanent direct effect will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.21.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of western burrowing owl if present. Habitat enhancement and management-related activities could result in temporary direct effects on western burrowing owl where it is present within the 14,500 acres of modeled western burrowing owl habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by western burrowing owl. Temporary direct effects on western burrowing owl will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.21.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied western burrowing owl habitat (i.e., harassment) will result from noise, visual, and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. Permanent indirect effects on western burrowing owl will be minimized with implementation of the applicable AMMs indicated in Table 4-8. A small, but indeterminable, amount of direct take of individual western burrowing owl could be associated with collisions with vehicles and other human uses adjacent to new permanent development activities.

4.4.21.2 Overall Impact Likely to Result from the Take

The primary threat to western burrowing owl is urbanization, including residential and commercial development and infrastructure development (roads and oil, water, gas, and electrical conveyance facilities) that causes of habitat loss for burrowing owls and is a continuing threat to remaining northern California populations. Burrowing owls, however, have shown a high level of tolerance for human encroachment, degradation of native habitats, and

fragmentation of habitats (Gervais et al. 2008). The current distribution of burrowing owls in the Plan Area is localized primarily into remaining low elevation uncultivated areas, such as the grasslands along the western edge of the Central Valley, the pasturelands in the southern panhandle, and the Yolo Bypass Wildlife Area. Other sites include some urban and semi-urban areas and other scattered locations associated with edges of cultivated lands. The majority of known burrowing owl breeding locations are in the southern portion of Yolo County, centered in and around the City of Davis, the Yolo Bypass Wildlife Area, and the southern panhandle. A total of 50 breeding pairs were reported in Yolo County in 2007 (see Appendix A.25).

The covered activities, including conservation measures, will result in the loss of up to 4,434 acres of modeled western burrowing owl habitat, representing approximately 4.4 percent of the current acreage of modeled habitat in the Plan Area (see Table 4-9). Implementation of permanent development activities is expected to avoid habitat supporting reported occurrences of western burrowing owl in Planning Units 5 and 16–18, but will affect habitat supporting reported occurrences in the Cities of Davis and Woodland (Planning Units 19 and 20). Removal of occupied burrows, however, will be avoided. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Implementation of the applicable AMMs (see Table 4-8) will serve to further minimize impacts on western burrowing owl. Based on the available information regarding the status and distribution of western burrowing owl (see Appendix A, *Covered Species Accounts*), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by western burrowing owl.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on western burrowing owl or adversely affect its Plan Area distribution or abundance.

4.4.22 Loggerhead Shrike

The maximum acreage of modeled loggerhead shrike habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 6,864 acres, representing 8.7 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by loggerhead shrike. Permanent indirect effects include ongoing noise and visual-related disturbances that could affect the behavior of individuals.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new development, mining of aggregate, ranching and farming operations, for restoration of habitat, and for maintenance of existing facilities) could result in direct injury or mortality of loggerhead shrike. For example, nests could be crushed by equipment moving through nesting habitat during the incubation period, or nestling birds could be injured or killed

by construction equipment. Disturbance of incubating or nesting adults could lead to abandonment of the nest, or a reduced brooding or feeding of young due to disturbance, which could lead to juvenile mortality. Because adult loggerhead shrikes are highly mobile, actions associated with implementation of the covered activities (e.g., operation of construction equipment) are not expected to result in mortality or injury of adult individuals. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, mining and maintenance activities (e.g., fuel spills) will adversely affect individual loggerhead shrikes is considered low because the species uses dense shrub cover for nesting and open grasslands for foraging. Loggerhead shrikes are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.22.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of loggerhead shrike within the Plan Area

4.4.22.1.1 Permanent Direct Effects

Loss of up to 1,635 acres of modeled loggerhead shrike nesting/perching habitat and 5,228 acres of modeled foraging habitat (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual juvenile and adult loggerhead shrike could be associated with collisions with vehicles and other equipment used to construct permanent development activities and conduct operations and maintenance and other ongoing activities. The potential for these permanent direct effects will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.22.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of loggerhead shrike if present. Habitat restoration, enhancement, and management-related activities could result in temporary direct effects on loggerhead shrike where it is present within the 18,000 acres of modeled loggerhead shrike habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by loggerhead shrike. Temporary direct effects on loggerhead shrike will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.22.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied loggerhead shrike habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. Permanent indirect effects on loggerhead shrike will be minimized with implementation of the applicable AMMs indicated in Table 4-8. A small, but indeterminable, amount of direct take of individual loggerhead shrike could be associated with collisions with vehicles and other human uses adjacent to permanent development activities. The potential for indirect effects on loggerhead shrike will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.22.2 Overall Impact Likely to Result from the Take

The primary threat to loggerhead shrike in the Plan Area is the loss of connected, high-functioning foraging and nesting/perching habitat due to urban development and conversion of agricultural lands from annual to permanent crop types (e.g., vineyards) (see Appendix A, *Covered Species Accounts*). In the Plan Area, loggerhead shrikes occupy grasslands, pasturelands, and farmlands. While considered fairly common in the lowland and foothill areas of the Plan Area, there is no reliable information on nesting distribution or nesting density in the Plan Area. Shrikes are considered to be fairly common during the nonbreeding season with up to 274 birds counted in one day during the 2004–2005 Sacramento and Putah Creek Christmas Bird Counts (about one-half of these count areas are in the Plan Area).

The covered activities, including conservation measures, will result in the loss of up to 6,864 acres of modeled loggerhead shrike habitat, representing approximately 8.3 percent of the current extent of modeled habitat in the Plan Area (see Tables 4-5a–4-5c and 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Most of the habitats impacts will be incurred on agricultural rather natural land cover types that support its modeled habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on loggerhead shrike or adversely affect its Plan Area distribution or abundance because loggerhead shrike is a relatively common and widespread species in the Plan Area.

4.4.23 Least Bell's Vireo

The maximum acreage of modeled least Bell's vireo habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 149 acres representing approximately 1.8 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could result in noise that could temporarily alter the use of affected habitat by least Bell's vireo.

Permanent indirect effects include ongoing noise and visual-related disturbances and increased risk for brood parasitism by brown-headed cowbird, which benefit from anthropogenically altered habitats, occupied habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities) could result in injury or mortality of least Bell's vireo. For example, individual vireo nests could be crushed by moving construction-related equipment, nests or juveniles could be abandoned due to disturbance, leading to nesting failure or juvenile mortality. The least Bell's vireo, however, is not currently known to nest in the Plan Area and, should it become established as a breeding species in the Plan Area in the future, AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*) precludes impacts on nest sites and the potential for noise and visual disturbances on its behaviors will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual least Bell's vireo is considered low because vireos are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that least Bell's vireo individuals could be exposed to contaminants.

4.4.23.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of least Bell's vireo within the Plan Area.

4.4.23.1.1 Permanent Direct Effects

Loss of up to 149 acres of modeled least Bell's vireo nesting/foraging habitat (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. The potential for take of nest sites, including eggs, juvenile and adult least Bell's vireo, will be avoided with implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*), which precludes impacts of the covered activities on nest sites.

4.4.23.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of least Bell's vireo if present. Habitat enhancement and management-related activities could result in temporary direct effects on least Bell's vireo where it is present within the 2,569 acres of modeled least Bell's vireo habitat that will be protected and restored under the

NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by least Bell's vireo. The likelihood for these effects, however, is considered low because least Bell's vireo currently only occurs as an infrequent visitor in the Plan Area. Temporary direct effects least Bell's vireo will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.23.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied least Bell's vireo habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. If least Bell's vireo were to establish as a breeding species in the Plan Area in future years, increased and the risk for nest parasitism of least Bell's vireo by brown-headed cowbird could be increased if brown-headed cowbird abundance increases in response to altered habitat conditions associated with new developments. The potential for these effects is considered low because, as described for permanent direct effects, least Bell's vireo only occurs as an infrequent visitor in the Plan Area. Permanent indirect effects on least Bell's vireo will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.23.2 Overall Impact Likely to Result from the Take

A major factor leading to declines in populations of least Bell's vireo is the loss and degradation of riparian habitat throughout the species' range. Brood parasitism by brown-headed cowbirds also has a major negative impact on least Bell's vireo, since a parasitized nest rarely fledges any vireo young (Goldwasser 1978; Goldwasser et al. 1980; Franzreb 1989; Kus 1999; Kus 2002). The historical distribution of the least Bell's vireo extended from coastal Southern California through the San Joaquin and Sacramento valleys as far north as Tehama County, but the species was in decline in the region since the 1930s due to riparian habitat loss and was considered extirpated by the 1970s. The first sightings of the species to occur in the Plan Area for many decades were two singing least Bell's vireo males in the southern portion of the Yolo Bypass Wildlife Area in Yolo County during the spring of 2010 and 2011.

The covered activities will result in the loss of up to 149 acres of modeled least Bell's vireo habitat, representing approximately 1.8 percent of the current extent of modeled habitat (see Tables 4-5a–4-5c and 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of least Bell's vireo (see Appendix A, *Covered Species Accounts*), it is likely that most of the modeled habitat that is removed by the covered activities is unoccupied by least Bell's vireo. Implementation of the AMMs listed in Table 4-8 will minimize any potential impacts to occupied least Bell's vireo nesting habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on least Bell's vireo or adversely affect its Plan Area distribution or abundance.

4.4.24 Bank Swallow

The maximum acreage of modeled bank swallow breeding and foraging habitat that will be permanently and directly affected with implementation of the covered activities is 3 acres, representing approximately 0.3 of the current acreage of modeled habitat in the Plan Area (Table 4-9). Removal of active nesting colonies by the covered activities will be avoided. Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could result in noise and ground vibrations that could temporarily alter the use of affected habitat by bank swallow. Permanent indirect effects include ongoing noise-related disturbances adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, mining of aggregate, and for maintenance of existing facilities) could result in direct injury or mortality of bank swallow. Because bank swallows usually nests in steep, eroding banks along streams, the likelihood that nests or nestling birds could be injured or killed by construction equipment is extremely low. However, 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 a reduced brooding or feeding of young due to disturbance, which could lead to juvenile mortality. Implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*), however, precludes impacts on nest sites and the potential for noise and visual disturbances on its behaviors will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, mining and maintenance activities (e.g., fuel spills) will adversely affect individual bank swallows is considered low because the species forages aerially for insects. Birds are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.24.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of bank swallow within the Plan Area.

4.4.24.1.1 Permanent Direct Effects

Loss of up to 3 acres of modeled bank swallow nesting habitat will occur as a result of the NHP covered activities (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. Impacts on nesting bank swallows and nesting habitat will be avoided with implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*).

4.4.24.1.2 Temporary Direct Effects

A temporary reduction in the functions of up to 3 acres of modeled bank swallow nesting habitat would result from harassment associated with covered activities. Habitat enhancement- and management-related activities on up to 700 acres of NHP conservation lands (Table 5-10) may result in temporary direct effects on a relatively small acreage of bank swallow habitat that cannot be estimated. Temporary direct effects on bank swallow will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.24.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied bank swallow habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. The potential for this effect is considered low because most permanent development activities will not be implemented near occupied bank swallow habitat. The potential for permanent indirect effects on bank swallow will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.24.2 Overall Impact Likely to Result from the Take

Bank swallow population size can vary greatly over relatively short time periods because of the poor durability of nesting sites and weather-influenced mortality on wintering grounds (see Appendix A, Covered Species Accounts). The biggest threat to bank swallows is the loss of steep eroding banks due to stream bank armoring, bank stabilization and channelization of streams. In the Plan Area, colonies ranging from 10 to 400 burrows were observed along the Sacramento River and Cache Creek in 1987 (CNDDDB 2005). Breeding occupancy was estimated as ranging 10 to 70 percent at the various colonies. However, many of the colonies were unoccupied or inactive. During a survey in 2000, four colonies totaling 488 burrows were found along the Sacramento River in the Plan Area between Verona and Knight's Landing. Assuming an occupancy rate of 45 percent this population was estimated at 202 pairs. An active colony persisted along Cache Creek in a gravel quarry until at least 2001 (Yolo Audubon Society 2004).

The covered activities will result in the loss of up to 3 acres of modeled bank swallow habitat, representing approximately 0.3 percent of the current extent of modeled habitat (Table 4-9).

Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Based on the available information regarding the status and distribution of bank swallow (see Appendix A, *Covered Species Accounts*), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by the species. Implementation of the applicable AMMs (see Table 4-8) requires that any potential impacts on the reproductive potential of bank swallow will be minimized.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on bank swallow or adversely affect its Plan Area distribution or abundance.

4.4.25 Yellow-Breasted Chat

The maximum acreage of modeled yellow-breasted chat habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 30 acres representing approximately 1.0 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could result in noise that could temporarily alter the use of affected habitat by yellow-breasted chat. Permanent indirect effects include ongoing noise and visual-related disturbances and increased risk for brood parasitism by brown-headed cowbird, which benefit from anthropogenically altered habitats, into breeding habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities) could result in injury or mortality of yellow-breasted chat. For example, individual chat nests could be crushed by moving construction-related equipment, nests or juveniles could be abandoned due to disturbance, leading to nest failure or juvenile mortality. However, the likelihood of such mortality is very small given that yellow-breasted chat currently only occurs as a visitor within the Plan Area and nesting in the Plan Area has not been confirmed in recent decades. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual yellow-breasted chat is considered low because chat are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that yellow-breasted chat individuals could be exposed to contaminants.

4.4.25.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of yellow-breasted chat within the Plan Area.

4.4.25.1.1 Permanent Direct Effects

Loss of up to 30 acres of modeled yellow-breasted chat nesting/foraging habitat (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual eggs, juvenile and adult yellow-breasted chat could be associated with collisions with vehicles and other equipment used to construct permanent development activities and conduct operations and maintenance and other ongoing activities. The likelihood for this effect is low because yellow-breasted chat currently only occurs in the Plan Area during migration. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.25.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of yellow-breasted chat if present. Habitat enhancement and management-related activities could result in temporary direct effects on yellow-breasted chat where it is present within the 1,210 acres of modeled yellow-breasted chat habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by yellow-breasted chat. The likelihood for these effects, however, is considered low because yellow-breasted chat currently only occurs as a visitor in the Plan Area during migration. Temporary direct effects yellow-breasted chat will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.25.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied yellow-breasted chat habitat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. If yellow-breasted chat were to establish as a breeding species in the Plan Area in future years, increased and the risk for nest parasitism of yellow-breasted chat by brown-headed cowbird could be increased if brown-headed cowbird abundance increases in response to altered habitat conditions associated with new developments. The potential for these effects is considered low because, as described for permanent direct effects, yellow-breasted chat only occurs as a visitor in the Plan Area during migration.

4.4.25.2 Overall Impact Likely to Result from the Take

Habitat loss and degradation of riparian habitat are the major factors threatening yellow-breasted chat and have caused a marked decline in the California breeding population in recent decades (Comrack 2008; Green 2005). Brood parasitism from brown-headed cowbirds may also significantly impact yellow-breasted chats (Gaines 1974; Remsen 1978; Ricketts and Kus 2000). Yellow-breasted chats are not currently known to breed in the Plan Area, however they occur as spring and fall migrant visitors and nests have been found along Putah Creek in Solano County.

The covered activities, including conservation measures, will result in the loss of up to 30 acres of modeled yellow-breasted chat habitat, representing approximately 1.1 percent of the current extent of modeled habitat (Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of yellow-breasted chat (see Appendix A, *Covered Species Accounts*), it is likely that most of the modeled habitat that is removed by the covered activities is unoccupied by yellow-breasted chat. Implementation of the AMMs listed in Table 4-8 will minimize any potential impacts to occupied yellow-breasted chat habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on yellow-breasted chat or adversely affect its Plan Area distribution or abundance.

4.4.26 Grasshopper Sparrow

The maximum acreage of modeled grasshopper sparrow habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 2,145 acres representing approximately 2.7 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual disturbances associated with construction and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by grasshopper sparrow. Permanent indirect effects include ongoing noise-related disturbances and increased risk for pet-related (e.g., loose cats) predation in breeding habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities, livestock grazing) could result in injury or mortality of grasshopper sparrow. For example, individual sparrow nests could be crushed by moving construction-related equipment, nests or juveniles could be abandoned due to disturbance, leading to nest failure or juvenile mortality, or individuals could suffer mortality from the accidental discharge of contaminants associated with equipment operation if they make contact with contaminants. The likelihood of these effects is low because the majority of its modeled habitat will be implemented in locations

not currently known to be occupied by grasshopper sparrow (see Appendix A.30). Potential impacts will also be avoided and minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual grasshopper sparrow is considered low because sparrows are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that grasshopper sparrow individuals could be exposed to contaminants.

4.4.26.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of grasshopper sparrow within the Plan Area.

4.4.26.1.1 Permanent Direct Effects

Loss of up to 2,145 acres of modeled grasshopper sparrow habitat²⁴ (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual eggs, juvenile and adult grasshopper sparrow could be associated with collisions with vehicles and other equipment used to construct permanent development activities and conduct operations and maintenance and other ongoing activities, and crushing of eggs and nestlings by operation of equipment and livestock grazing in occupied habitat. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.26.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of grasshopper sparrow if present. Habitat enhancement and management-related activities could result in temporary direct effects on grasshopper sparrow where it is present within the 17,900 acres of modeled grasshopper sparrow habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by grasshopper sparrow. Temporary direct effects grasshopper sparrow will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

²⁴ Includes up to 143 acres of modeled habitat that could be restored to valley foothill riparian.

4.4.26.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied grasshopper sparrow habitat (i.e., harassment) will result from noise, visual, and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. The likelihood for these effects, however, is considered low because most impacts of the covered activities are expected to be located in modeled habitat that is not currently known to be occupied by grasshopper sparrow. Permanent indirect effects on grasshopper sparrow will be minimized with implementation of the applicable AMMs indicated in Table 4-8. A small, but indeterminable, amount of direct take of individual grasshopper sparrows (eggs, juveniles, adults) could be associated with collisions with vehicles and other human uses adjacent to new permanent development activities and predation by loose pets (e.g., cats).

4.4.26.2 Overall Impact Likely to Result from the Take

The primary population threats to this species come from development of grasslands for housing and commercial buildings. Grasshopper sparrows avoid highly fragmented grasslands in California and elsewhere (J. Sterling pers. obs.; Vickery 1996). Grasshopper sparrows are considered rare and irregular (not annual) breeders in the Yolo Bypass and the grasslands in the lower foothills. Many large grassland areas in Dunnigan Hills, Capay Valley and Central Valley appear to be unoccupied, but apparently represent suitable habitat for grasshopper sparrow (J. Sterling pers. obs.), although most of these areas are privately owned and have not been thoroughly surveyed.

The covered activities, including conservation measures, will result in the loss of up to 2,145 acres of modeled grasshopper sparrow habitat, representing approximately 2.7 percent of the current extent of modeled habitat (see Tables 4-5a–4-5c and 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Based on the available information regarding the status and distribution of grasshopper sparrow (see Appendix A, *Covered Species Accounts*), it is likely that most of the modeled habitat that is removed by the covered activities is unoccupied by grasshopper sparrow. Implementation of the applicable AMMs in Table 4-8 will minimize any potential impacts to occupied grasshopper sparrow habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on grasshopper sparrow or adversely affect its Plan Area distribution or abundance.

4.4.27 Tricolored Blackbird

The maximum acreage of modeled tricolored blackbird habitat that will be directly and permanently affected with implementation of the covered activities, including conservation measures, is 13,715 acres representing approximately 5.0 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). Temporary direct effects include noise and visual

disturbances associated with construction, farming, and maintenance-related operation of equipment in modeled habitat that could temporarily alter the use of affected habitat by tricolored blackbird. Permanent indirect effects include ongoing visual and noise-related disturbances and increased risk for pet-related (e.g., loose dogs and cats) predation in breeding habitat adjacent to new permanent developments following human occupancy.

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, maintenance of new and existing facilities, and ranching and farming operations) could result in injury or mortality of tricolored blackbird. For example, individual tricolored blackbird nests could be crushed by moving construction-related equipment and nests or juveniles could be abandoned due to disturbance to nesting colonies, leading to nest failure or juvenile mortality. Implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*), however, precludes impacts on tricolored blackbird nest sites and the potential for noise and visual disturbances on its behaviors will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

The probability that the accidental introduction of contaminants associated with construction, operations, and maintenance activities (e.g., fuel spills) will adversely affect individual tricolored blackbird is considered low because blackbirds are expected to avoid work sites with ongoing noise and visual construction-related disturbances and they are a highly mobile species that can readily avoid such hazards. In addition, implementation of the applicable AMMs indicated in Table 4-8 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that tricolored blackbird individuals could be exposed to contaminants.

4.4.27.1 Estimated Level of Take

Implementation of NHP covered activities will result in the following level of estimated take of tricolored blackbird within the Plan Area.

4.4.27.1.1 Permanent Direct Effects

Loss of up to 162 acres of modeled tricolored blackbird nesting habitat and 13,533 acres of modeled foraging habitat²⁵ (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. The potential for take of nest sites, including eggs, juvenile and adult tricolored blackbird, will be avoided with implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*), which precludes impacts of the covered activities on nest sites. The potential for these permanent direct effects will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

²⁵ Includes up to 1,126 acres of modeled foraging habitat that could be restored to valley oak woodland, valley foothill riparian, and fresh emergent wetland land cover types, and giant garter snake habitat.

4.4.27.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities on modeled habitat located adjacent to project sites could result in harassment of tricolored blackbird if present. Habitat restoration, enhancement, and management-related activities could result in temporary direct effects on tricolored blackbird where it is present within the 27,101 acres of modeled tricolored blackbird habitat that will be protected and restored under the NHP (Table 5-10) and on an indeterminable acreage of habitat located adjacent to NHP conservation lands that is occupied by tricolored blackbird. Temporary direct effects on tricolored blackbird will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.27.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied tricolored blackbird habitat (i.e., harassment) will result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. A small, but indeterminable, amount of direct take of individual tricolored blackbird could be associated with collisions with vehicles and other human uses adjacent to permanent developments. The potential for indirect effects on tricolored blackbird will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.27.2 Overall Impact Likely to Result from the Take

The greatest threats to tricolored blackbird are the direct loss and degradation of its habitat by human activities (Beedy and Hamilton 1999). Most native habitats that once supported nesting and foraging tricolored blackbirds in the Central Valley have been replaced by urbanization and agricultural croplands unsuited to their needs. In addition, entire colonies (up to tens of thousands of nests) in cereal crops and silage are often destroyed by harvesting and plowing of agricultural lands (Beedy and Hamilton 1999; Hamilton 2004; Cook and Toft 2005). The concentration of a high proportion of the known population in a few breeding colonies increases the risk of major reproductive failures, especially in vulnerable habitats such as active agricultural fields. Fourteen colonies were documented in the Plan Area from 1994 to 2004, with populations estimated from 15 to 1,500 adults. Recent surveys revealed very few nesting colonies in Yolo County (Meese pers. comm.), however, surveys in 2007 revealed a highly successful colony of more than 30,000 breeding adults in milk thistle on the Conaway Ranch in the Yolo Bypass. This was one of only three documented colonies statewide that were large and successful, and this colony was estimated to have produced about 30,000 young (Meese 2007).

The covered activities, including conservation measures, will result in the loss of up to 13,715 acres of modeled tricolored blackbird habitat, representing approximately 5.0 percent of the current extent of modeled habitat in the Plan Area (Table 4-9). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Based on the available information regarding the status and distribution of

1 tricolored blackbird (see Appendix A, *Covered Species Accounts*), it is likely that most of the
2 modeled habitat that is removed by the covered activities is unoccupied by tricolored blackbird.
3 Implementation of the AMMs listed in Table 4-8 will minimize any potential impacts to
4 occupied tricolored blackbird habitat, including AMM3 which precludes impacts on tricolored
5 blackbird habitat..

6 Based on this evaluation, implementation of the covered activities is not expected to result in
7 adverse population-level effects on tricolored blackbird or adversely affect its Plan Area
8 distribution or abundance.

9 **4.4.28 Townsend's Big-Eared Bat**

10 The maximum acreage of modeled Townsend's big-eared bat habitat that will be directly and
11 permanently affected with implementation of the covered activities, including conservation
12 measures, is 12,085 acres of foraging habitat, representing approximately 4.3 percent of the
13 current acreage of modeled habitat in the Plan Area. No modeled mine roost habitat will be
14 affected (Table 4-9). Temporary direct effects include noise and visual disturbances associated
15 with construction and maintenance-related operation of equipment in modeled foraging and
16 roosting habitat that could result in noise, light pollution and visual disturbance that could
17 temporarily alter the use of affected foraging habitat by Townsend's big-eared bat. Permanent
18 indirect effects include the potential for disturbance of occupied roosts that are adjacent to new
19 permanent developments as a result of increased levels of human disturbance.

20 Actions undertaken to implement the covered activities (e.g., operation of equipment for
21 construction of new permanent developments, mining of aggregate, farming operations,
22 restoration of habitat, and for maintenance of existing facilities) could result in direct injury or
23 mortality of Townsend's big-eared bat resulting from removal of occupied roost sites or
24 abandonment of roost sites as a result of high levels of human disturbance associated with
25 implementation of the covered activities. The potential for this effect, however, is considered
26 low because all known Townsend's big-eared roost sites are located in tunnels and caves in the
27 extreme western portion of the Plan Area that will not be affected by permanent development
28 covered activities (see Appendix A.32). Furthermore, implementation of AMM3 (see Section
29 5.4.4, *Avoidance and Minimization Measures*) precludes impacts on occupied roost sites and the
30 potential for noise and visual disturbances on its behaviors will be minimized with
31 implementation of the applicable AMMs indicated in Table 4-8.

32 **4.4.28.1 Estimated Level of Take**

33 Implementation of NHP covered activities will result in the following level of estimated take of
34 Townsend's big-eared bat within the Plan Area.

4.4.28.1.1 Permanent Direct Effects

Loss of up to 12,085 acres of foraging and roosting habitat, representing approximately 4.3 percent of the current acreage of modeled habitat in the Plan Area (Table 4-9). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. The potential for take of individuals will be minimized with implementation of AMM3 (see Section 5.4.4, *Avoidance and Minimization Measures*), which precludes impacts of the covered activities on occupied roost sites.

4.4.28.1.2 Temporary Direct Effects

A temporary reduction in the functions of modeled habitat resulting from operation of equipment to implement covered activities of modeled habitat located adjacent to project sites could result in harassment of Townsend's big-eared bat if present. The likelihood for these effects, however, is considered low because most of the modeled habitat in the Plan Area is likely unoccupied (see Appendix A.32). Townsend's big-eared bat currently only occurs as an infrequent visitor in the Plan Area. Temporary direct effects on Townsend's big-eared bat will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.28.1.3 Permanent Indirect Effects

A permanent reduction in the functions of occupied least Townsend's big-eared bat (i.e., harassment) would result from noise and other disturbances associated with human occupancy of permanent developments (e.g., residential developments) if the habitat is present nearby. These disturbances could cause Townsend's big-eared bat to abandon occupied roost sites if present adjacent to new permanent developments. Currently, there are no known Townsend's big-eared bat roost sites located near the proposed permanent development activities (see Figure 4-1 and Appendix A.32). The potential for this permanent indirect effect will be minimized with implementation of the applicable AMMs indicated in Table 4-8.

4.4.28.2 Overall Impact Likely to Result from the Take

The primary threat to Townsend's big-eared bat population is most likely disturbance and the destruction of roost sites. Activities such as recreation in caves and mines, abandoned mine closure, and renewed mining at historical sites have all contributed to this species' decline. The Townsend's big-eared bat is vulnerable to human disturbance and colonies have abandoned roost sites, including newborn bats after human visitation. Other threats include the contaminated water (especially in contaminated mine tailings ponds), loss of roosting and foraging habitat, and by the disturbance or destruction of winter roosts. The impacts on insect prey availability from the use of pesticides and herbicides may also threaten populations of this species. In the Plan Area, this species is documented (CNDDDB 2007) at three mine sites in the Little Blue Ridge (Planning Unit 1), and likely occurs in other areas of the western portion of the Plan Area where caves and mines occur in the steeper canyons and rock outcrops. However, some populations of

Townsend's big-eared bat may be located in buildings and other anthropogenic structures such as tunnels and bridges.

The covered activities will result in the loss of up to 12,085 acres of modeled Townsend's big-eared bat foraging and roosting habitat, representing approximately 4.3 percent of the current extent of modeled habitat (see Table 4-9). Implementation of the AMMs precludes removal of occupied Townsend's big-eared bat roost sites. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Based on the available information regarding the status and distribution of Townsend's big-eared bat (see Appendix A.32), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Townsend's big-eared bats. Implementation of the applicable AMMs (see Table 4-8) will serve to further minimize impacts on Townsend's big-eared bats.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Townsend's big-eared bats or adversely affect its Plan Area distribution or abundance.

4.5 REQUESTED LEVEL OF TAKE AND PERMIT COVERAGE

This section describes the level of take of covered species requested under ESA section 10 and NCCPA section 2835 permits (referred to collectively as the "Permits") issued for the NHP. This request is based on the assessment of impacts of the covered activities on natural communities and covered species described in Sections 4.3, *Impacts on Natural Communities* and Section 4.4, *Impacts on Covered Species* with implementation of all applicable avoidance and minimization measures (Table 4-8, Section 5.4.4, *Avoidance and Minimization Measures*).

4.5.1 Natural Communities

Tables 4-3a to 4-3c, 4-6, and 4-7 present the maximum extent of removal of natural communities and agricultural habitats, as mapped in the NHP land cover mapping (Chapter 2, *Existing Ecological Conditions*), that would result from implementation of covered activities. These natural communities support occurrences and habitat of covered species and all take of covered species resulting from removal of these natural communities is requested for coverage under the take permits. Maximum allowable impacts for natural communities are by Planning Unit for permanent development covered activities with spatially defined footprints (Tables 4-3b and 4-3c) using the NHP GIS Land Cover dataset and by other bounded areas for covered activities, including NHP habitat restoration activities, with spatially undefined footprints (Tables 4-6 and 4-7).

4.5.2 Covered Species

Tables 4-5a to 4-5c and 4-9 present the maximum extent of removal of habitat for each covered species, as modeled for the NHP (Appendix A, *Covered Species Accounts*), requested under the take permits issued for the NHP. Maximum allowable habitat removal for covered species is by Planning Unit using the species habitat models generated from the NHP GIS dataset for covered activities (see Tables 4-5b and 4-5c for impacts of covered activities with spatially defined footprints) (see Table 4-9 for impacts of covered activities in other bounded areas, including NHP habitat restoration activities, with spatially undefined footprints).

All federal and state take of covered wildlife species and federal damage or destruction and state take of covered plant species associated with implementation of the covered activities as described in Section 4.4 *Impacts on Covered Species*, with application of the avoidance and minimization measures described in Section 5.4.4, *Avoidance and Minimization Measures* is requested for authorization under the take permits. Specific prohibitions on federal and state take for specific covered species described in Table 4-4, will be followed. Take of white-tailed kite, a fully protected species under the California Fish and Game Code, is requested as a part of the Section 2835 authorization, but only for deaths of individuals that might result from habitat removal by covered activities. No direct mortality of individuals from covered activities is anticipated nor requested to be covered by the permit.

Periodic and ongoing modification of habitat that supports covered species associated with implementation of operations and maintenance and other activities, including ongoing and future maintenance of existing and new development, facilities, infrastructure (e.g., mowing of road rights-of-way), aggregate mines, agricultural lands, range lands, and management of NHP conservation lands and implementation of NHP local conservation measures and Cooperating Entity conservation actions are requested to be covered under the take permits with implementation of applicable avoidance and minimization measures.

All direct and indirect effects of the covered activities (e.g., noise and visual disturbances that could result in take [i.e., harassment]) of covered wildlife species associated with implementing the covered activities with implementation of applicable avoidance and minimization measures are requested to be covered under the take permits.

4.6 CUMULATIVE EFFECTS

The ESA regulations define cumulative effects as “those 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.”²⁶ In the case of the NHP, the “federal action” is the issuance of incidental take permits by USFWS and the federal “action area” is the NHP Plan Area, as no impacts of covered activities on covered species are anticipated to extend beyond the Plan Area boundary. This definition of cumulative effects only applies to ESA

²⁶ 50 CFR §402.02.

section 7 analyses and differs from the broader definition under NEPA and CEQA. The NHP EIR/EIS presents a thorough analysis of the cumulative effects of all projects (i.e., federal and nonfederal) when combined with effects of the covered activities.

This section addresses the cumulative effects on covered species and their habitat from state, local, and private actions in the Plan Area that are not included in the NHP covered activities and NHP Conservation Strategy and could be implemented during the term of the NHP. This analysis of cumulative effects is not a requirement under ESA section 10 or the NCCPA, but serves to support the cumulative effects analysis required for the USFWS intra-agency ESA section 7 consultation on their NHP permit action.

Nonfederal actions assessed in this cumulative effects evaluation are grouped into these categories:

- Flood Control Infrastructure and Improvements
- Ongoing Management and Use of State Wildlife Areas
- Wind Energy Development
- Solar Energy Facilities
- Utilities Infrastructure
- Agricultural and Ranching Practices
- Commercial Firewood Harvest
- Existing and New Roadways
- Bay Delta Conservation Plan
- Tribal Lands Management

The following sections describe the probable effects, by category, of foreseeable nonfederal projects on covered species.

4.6.1 Flood Control Infrastructure and Improvements

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 term of the NHP. 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, yellow-breasted chat, and valley elderberry longhorn beetle between levee improvement and maintenance events. Ongoing maintenance of levees and channel banks will perpetuate conditions inhibiting the natural floodplain processes (i.e., sedimentation, erosion, and channel migration) that support the establishment of riparian vegetation that provides habitat for riparian-associated covered species. Effects of flood control

1 infrastructure maintenance and improvement activities implemented by local flood control
2 agencies (e.g., local reclamation and water districts) that are not covered under the NHP through
3 Certificates of Inclusion on covered species would be similar to those described for DWR
4 actions.

5 DWR's FloodSafe Program is in the process of developing the Central Valley Flood
6 Management Planning Program which will identify flood improvement projects to be
7 implemented over many years in the Central Valley (DWR 2010). The draft plan identified a
8 potential development of an expansion of the Yolo Bypass (DWR 2012). Expansion of the Yolo
9 Bypass capacity may remove agricultural lands from production of crop types that support
10 habitat for western pond turtle, giant garter snake, Swainson's hawk, northern harrier, white-
11 tailed kite, western burrowing owl, and tricolored blackbird. The proposed expansion could
12 affect the core occupied habitat area of the Willow Slough/Yolo Bypass giant garter snake
13 subpopulation adjacent to and west of the Bypass. Additional agricultural lands could be
14 removed from production during years the bypass is operated if the timing of flooding precludes
15 cultivation of crops or if the frequency of bypass operation is such that it becomes no longer
16 economically feasible to farm within the flood footprint of the bypass. Changes to the operation
17 of the bypass could also result in increases in drowning of giant garter snakes that hibernate
18 within the expanded bypass area and that cannot escape inundation.

19 **4.6.2 Ongoing Management and Use of State Wildlife Areas**

20 The Yolo Bypass Wildlife Area, Sacramento Bypass Wildlife Area, and Fremont Weir State
21 Wildlife Area are located within the Plan Area in the Yolo Bypass. These Wildlife Areas are
22 managed primarily for controlled recreation (e.g., bird watching, hunting) and environmental
23 education (e.g., school tours). The Yolo Bypass Wildlife Area is managed primarily to provide
24 habitat for wintering waterfowl and migratory shorebirds and for waterfowl viewing and hunting.
25 The Sacramento Bypass and Fremont Weir State Wildlife Area are generally passively managed
26 as natural habitat areas. Management of these Wildlife Areas includes maintenance of existing
27 recreational access and facilities. Any proposed expansion of these facilities could result in
28 removal of riparian, wetland, herbaceous, and agricultural land cover types that support modeled
29 habitat for valley elderberry longhorn beetle, California tiger salamander, western pond turtle,
30 giant garter snake, Swainson's hawk, white-tailed kite, black tern, western burrowing owl, least
31 Bell's vireo, tricolored blackbird, and covered plant and vernal pool shrimp species. Effects of
32 removing these habitats on associated covered species, however, are expected to be minimal
33 because DFW is expected to design any such expansion of facilities to avoid and minimize
34 impacts on sensitive resources. In addition, under NHP conservation CM9, Maintain and
35 Enhance Covered Species Habitat on Public and Easement Habitat Lands, the Implementing
36 Entity will work with DFW to identify means by which this wildlife area can be managed to
37 benefit covered species (see Section 5.4, *Conservation Measures*).

38 Habitat management practices (e.g., the areal extent of maintained habitat types, water and other
39 management practices) implemented on the Yolo Bypass Wildlife Area are expected to change

over the term of the NHP. 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, black tern, and tricolored blackbird. Under CM9, Maintain and Enhance Covered Species Habitat on Public and Easement Habitat Lands, the Implementing Entity will work with DFW to identify means by which this wildlife area can be managed to benefit covered species.

4.6.3 Wind Energy Development

The Yolo County General Plan Policies CC-4.5 and PF-10.2 encourage small and large scale wind energy development individual and community-based wind energy developments and Sec. 8-2.2418 of the County Code provides for the construction and operation of wind turbines on lands designated as agriculture within its jurisdiction (Yolo County 2009). 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 comprised of only one or a few small turbines.

Wind turbine farms are expected to include large commercial operations and smaller noncommercial operations comprised of only one or a few small turbines. Construction of wind turbine towers could remove agricultural, grassland, and woodland and forest land cover types within the footprint of towers and appurtenant facilities (e.g., maintenance roads and transmission lines). Removal of these land cover types, depending on their location, could remove habitat for covered species except those that are valley foothill riparian obligates (i.e., western yellow-billed cuckoo, least Bell's vireo, and yellow-breasted chat, and bank swallow). Operation of construction and maintenance equipment could result in death or injury of covered amphibian and reptile species and ground nesting covered bird species (e.g., northern harrier, western burrowing owl, and grasshopper sparrow) if present at project sites.

Rotating wind turbine blades are known to cause mortality or injury of birds and bats during seasonal migrations and local foraging flights. The susceptibility of each species for wind turbine fatalities is a function of their flight behavior (e.g., flying height above the ground), wind speed, and atmospheric conditions (e.g., foggy conditions). Operation of wind turbines in the Plan Area could result in injury and mortality of Townsend's big-eared bat and 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).

4.6.4 Solar Energy Facilities

During the term of NHP implementation, new solar energy facilities and infrastructure that are not covered under the NHP 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 covered bird, reptile, amphibian, invertebrate, and plant species could be removed. Operation of construction and maintenance equipment could

1 result in mortality and injury of covered amphibian and reptile species and ground nesting
2 covered bird species (e.g., northern harrier, western burrowing owl, and grasshopper sparrow) if
3 present at project sites.

4 **4.6.5 Utilities Infrastructure**

5 During the term of NHP implementation, new or replacement gas and electric utility
6 infrastructure and facilities (e.g., gas pipelines, electric transmission lines, and substations) that
7 are not covered under the NHP could be constructed and operated within the Plan Area.
8 Depending on where such facilities are located and the constructed footprints of these and
9 associated facilities (e.g., maintenance roads), habitat for covered bird, reptile, amphibian,
10 invertebrate, and plant species could be removed. Operation of construction and maintenance
11 equipment could result in mortality and injury of covered amphibian and reptile species and
12 ground nesting covered bird species (e.g., northern harrier, western burrowing owl, and
13 grasshopper sparrow) if present at project construction sites. New above ground electric
14 transmission lines would also create a collision and electrocution hazard for covered bird species,
15 although Swainson's hawk is likely to be more susceptible to these hazards because of its
16 foraging flight habits.

17 **4.6.6 Agricultural and Ranching Practices**

18 Routine cultivation practices on agricultural lands and grazing practices by agricultural and
19 ranching operations that are not covered under the NHP will continue over the term of the NHP.

20 Ongoing farming practices, such as the operation of farm equipment to till and harvest fields and
21 to maintain irrigation water delivery channels, can result in injury or mortality of western pond
22 turtle, giant garter snake, and nesting northern harriers if present when equipment is operated.
23 Ongoing ranching operations such as road construction, road maintenance, and livestock grazing
24 may limit or degrade habitat for covered species, including California tiger salamander, western
25 spadefoot toad, foothill yellow-legged frog, and western pond turtle. Ranching activities such as
26 pond maintenance and moderate livestock grazing, however, contribute to maintaining habitat
27 functions for associated covered species, such as western pond turtle and western spadefoot toad.
28 Rodent control on grazing may adversely affect western burrowing owl through reductions in
29 prey and nesting habitat. Some ongoing cultivated agricultural activities may limit or degrade
30 foraging habitat for tricolored blackbird and western burrowing owl. Covered species could be
31 trampled by cattle in ranchlands and habitat could be lost due to agricultural practices that
32 change the hydrology of an area.

33 Water transfers that result in fallowing or idling farm land or changing the mix of crop types
34 grown could remove, increase, or decrease the function of crop lands as habitat for agricultural-
35 associated covered species, such as western pond turtle, giant garter snake, Swainson's hawk,
36 and black tern. For example, fallowing or idling of rice land would remove habitat for western
37 pond turtle, giant garter snake, and black tern 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 can 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, grasshopper sparrow) 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).

4.6.7 Commercial Firewood Harvest

While not currently in practice in Plan Area, the commercial harvest of blue oak and other native trees in oak woodland and savanna communities could remove nesting and roosting habitat for bald eagle, Swainson's hawk, and white-tailed kite. The effects of commercial firewood harvest on the availability of habitat for these species, however, is expected to be minimal because these species commonly nest and roost in single or sparse stands of trees. The removal of active nest and roost sites could have adverse effects and result in injury or mortality.

4.6.8 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, foothill yellow-legged frog) 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).²⁷ Construction of new roadways not covered under the NHP 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 right-of-ways.

4.6.9 Bay Delta Conservation Plan

The Bay Delta Conservation Plan (BDCP) is an HCP/NCCP under development that is seeking ESA and NCCPA permits for the construction and operation of two underground tunnels to transport water from the Sacramento River in the north Delta to existing DWR and Reclamation pumping facilities in the south Delta and restore and enhance aquatic and terrestrial habitats across the Delta and nearby lands, including parts of the NHP Plan Area.²⁸ The BDCP Plan Area geographically overlaps with the NHP Plan Area in Planning Units 15–18 and 21. The following covered species under the BDCP overlap with NHP covered species.

²⁷ Note that vehicle operations on ranchland access roads are covered under the NHP where part of a certificate of inclusion.

²⁸ Additional information regarding BDCP is available at <http://baydeltaconservationplan.com/Home.aspx>.

- Alkali milk-vetch
- Brittsescale
- San Joaquin spearscale
- California linderiella
- Conservancy fairy shrimp
- Longhorn fairy shrimp
- Midvalley fairy shrimp
- Vernal pool fairy shrimp
- Valley elderberry longhorn beetle
- California tiger salamander
- Western pond turtle
- Giant garter snake
- Swainson's hawk
- White-tailed kite
- Western burrowing owl
- Western yellow-billed cuckoo
- Least Bell's vireo
- Yellow-breasted chat
- Tricolored blackbird

Effects of implementing the BDCP covered activities, including BDCP conservation measures, include the removal of habitat for the covered species listed above and the harassment, injury and mortality of these species. Restoration of riparian and fresh emergent wetland under the BDCP will maintain or increase the acreage of habitat for NHP covered species within the BDCP Plan Area and, depending on where restoration actions are implemented, in the NHP Plan Area. The BDCP proposes to protect, enhance, and manage over 60,000 acres of existing grassland, alkali sink, vernal pool, grassland, managed wetland, and cultivated lands for BDCP covered species; and these actions would benefit the NHP covered species listed above though not necessarily in the NHP Plan Area. The net effect of BDCP conservation actions on the NHP covered species is expected to be beneficial although the degree of benefit or impact on these species within the NHP Plan Area will be dependent on where BDCP habitat protection, restoration, and enhancement actions are implemented.

4.6.10 Tribal Lands Management

The Yocha Debe Wintun Nation is the only federally-recognized tribe with trust landholdings in the Plan Area. Deganawidah-Quetzalcoatl University, a private two-year college that is part of a federal trust for tribal colleges, is also 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 impacts on covered species as described in the above sections for these activities except, based on the location of tribal trust lands in the Plan Area, the potential for impacts on occurrences and habitat is likely limited to the following covered species.

- Vernal pool fairy shrimp
- Midvalley fairy shrimp
- California linderiella
- Vernal pool tadpole shrimp
- Valley elderberry longhorn beetle
- Western pond turtle
- Swainson's Hawk
- Northern harrier
- White-tailed kite
- Loggerhead shrike

- California tiger salamander
- Western spadefoot toad
- Foothill yellow-legged frog
- Tricolored blackbird
- Townsend's big-eared bat

4.6.11 Summary of the Effects of Covered Activities in Addition to Cumulative Effects

Effects of implementing the NHP covered activities, including NHP conservation measures, include removal of covered species habitat and the harassment, injury, and mortality of covered species. Though habitat for riparian- and fresh emergent wetland-associated covered species will be removed, implementation of habitat restoration actions will result in a net increase in habitat for these species. In addition, implementation of the NHP conservation measures will protect over 75,200 acres of existing currently unprotected upland and wetland natural communities that support habitat for the covered species (see Table 5-10). Restored and protected habitats will also be managed to maintain and improve habitat conditions for covered species and will be geographically distributed to ensure connectivity among protected and remaining unprotected habitat areas within and outside of the Plan Area. Providing this connectivity among habitat areas provides for the movement and genetic exchange of covered species across the Plan Area. As described in Section 5.6, *Conservation Provided for Covered Species*, the overall effect of implementing the NHP covered activities and NHP conservation measures on covered species is beneficial and, therefore, implementation of the NHP will not contribute to cumulative impacts.