

Impact Assessment and Level of Take

4.1 Introduction

This chapter addresses the effects of the covered activities described in Chapter 2, *Land Use and Covered Activities*, on covered species and natural communities. Direct impacts are assessed quantitatively and indirect impacts are assessed qualitatively. The cumulative effects of projects in or near the Plan area and impacts on critical habitat are also analyzed. Additional detail on the activities listed in Chapter 2 is provided to facilitate the evaluation of impacts.

The PCCP estimates impacts from covered activities over the entire 212,000 acre Plan area over a 50-year time frame. Extent of potential take is limited by the conditions on covered activities prescribed by this plan in Chapter 6. Those limitations are taken into account in estimating take under the Plan.

The main limitation affecting take is the designation of portions of the Plan area as Potential Future Growth (PFG) and others as Reserve Acquisition Area (RAA). A substantial portion is already in some form of existing conservation reserve (EXR) which will be supplemented by Plan activities in the RAA to create the reserve system described in Chapter 5.

These basic PCCP land status designations direct the geography of future growth and hence location of the majority of covered activities. The take estimates reflect the PCCP status as mapped in Chapter 5.

The PCCP provides information on covered activities to the extent that information is known. Estimates of future development are based on growth projections for the region and build-out projections within existing land use plans. Details for most projects, including some that would be triggered by future development, such as fire stations or sewage plant expansions, are not available. The PCCP is a programmatic document covering a long time frame and the estimated impacts on habitat and species are of necessity based to some extent on best professional judgment. During PCCP implementation, requirements for project-level

mitigation will be determined on the basis of the specifics of proposed projects.

Covered activity Impact and associated incidental take estimates presented in this chapter are intended to be the upper limit of take allowable under the Plan. Actual take may be less; mitigation will be based on actual impacts on the ground as reported for individual projects during Plan implementation.

Covered activities include projects sponsored or carried out by Permittees and any actions by Permittees that would authorize or induce urban development. Agriculture will not be included in the Plan analysis except for those circumstances where some aspects of agricultural practices are subject to the permit via reserve management plans for land acquired by the PCA.

Urban development in western Placer will range from large-scale conversion of agricultural land for urban uses to infill within established urban areas. The impact analysis was based on the following six major categories of covered activities described in Chapter 2 and listed below:

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

4.2 Definitions

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

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

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

Permanent impacts are direct impacts that permanently remove or alter a land-cover (e.g., creating a new road through grassland).

Temporary impacts are direct impacts that alter land-cover temporarily but that allow the disturbed area to recover to a natural state within one to three years (e.g., prescribed burning, construction staging areas).

Indirect impacts are defined by USFWS as “those that are caused by the proposed action and are later in time, but are still reasonably certain to occur” (50 CFR 402.02). Indirect impacts in the context of this Plan also include those impacts that occur at the time of the proposed action but beyond the footprint of a project or activity (i.e., beyond the area of land-cover disturbance). While more difficult to detect and track, indirect impacts can undermine species viability or habitat quality, especially if multiple indirect or direct impacts work cumulatively to impair the species or to degrade the habitat.

Cumulative impacts result from the proposed actions’ incremental impact when viewed together with past, present, and reasonably foreseeable future actions. Cumulative impacts are defined under both the ESA and NEPA. HCPs do not require a discussion of cumulative effects as analyzed under NEPA. However, as stated in the HCP handbook, “the applicant should help ensure that those considerations required of the Services by Section 7 have been addressed in the HCP” (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1996:3–15). Accordingly, the Plan addresses the cumulative effects of public or private activities that could result from individually minor, but collectively significant actions that take place over time. Cumulative effects of all projects with a federal nexus are analyzed under NEPA in the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) accompanying this Plan.

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

4.3 Impact Mechanisms

Impact mechanisms are grouped for the purposes of analysis and in accordance with the description of covered activities presented in Chapter 2 and Appendix G. Unlike Chapter 2, which provides details on the activities themselves, this section provides a description of how these groups of covered activities affect land-cover, covered species, and their habitat. Section 4.6 provides a more detailed analysis of impacts to covered species. This constitutes an overview of the direct and indirect effects that are likely to result from the categories of covered activities. The results, or impact estimates, of the analysis are discussed in Section 4.5, *Effects on Natural Communities/Land-cover*, and Section 4.6, *Effects on Covered Species*. Conditions on covered activities that will reduce the impacts described below are presented in Chapter 6, *Conditions on Covered Activities*. Avoidance and minimization measures are designed to minimize injury or death of all covered species during construction and to avoid death of no take species (i.e., bald eagle, American peregrine

falcon, and California black rail). Despite the regional and project-level avoidance and minimization measures, take of some covered species is expected to occur.

4.3.1 Urban Development

Urban development is one of the primary impact mechanisms considered in this Plan. A wide variety of construction activities within this area (see Chapter 2) will result in extensive ground disturbance and permanent conversion of most land-cover types. The major impact of new urban development is conversion from natural to developed land-cover types. In addition to the net loss of natural land-cover in the Plan area, such conversion may further isolate remaining natural habitat within the limit of urban growth in the Plan area, rendering it less suitable or unsuitable for covered species. Riparian and in-stream impacts may also occur as a result of urban development; however, these impacts are described and assessed under the categories of In-Stream Projects.

Urban development, which includes development of residential and non-residential uses as well as the infrastructure that supports it (new roadways, waste water and water supply projects within urban areas), is assumed to result in permanent direct impacts because it is assumed that, for most projects, complete conversion of natural land-cover types would occur at project sites in urban areas. Accordingly, no temporary direct impacts on land-cover are expected to result from urban development.

Urban development will have indirect effects on biological resources in protected open space within and outside the urban growth area, including the Reserve System, particularly if development is adjacent to these areas. Nitrogen deposition resulting from power plant emissions, increased traffic and other sources associated with urban development will potentially indirectly impact vernal pool complex communities. Nitrogen deposition and saturation can have several detrimental effects, including the leaching of nutrients (e.g., calcium) from the soil, which can cause a decrease in plant function, loss of fine root biomass, decreases in symbiotic mycorrhizal fungi, and promotion of nonnative invasive plant species at the expense of native plant biodiversity (USFWS 2005; Weiss 2006). The potential affect of nitrogen deposition may be limited by proximity to nitrogen emitting sources. The understory of oak woodlands and vernal pools are susceptible to invasion by annual grasses (USFWS 2005). Increases in nitrogen deposition will likely lead to an increase in the extent and intensity of invasion by annual grasses, given the well-documented responses of annual grasses to nitrogen deposition (Weiss 2006).

Annual grasses can be a major threat to native vernal pool species (see Chapter 3, Section 3.3.4, Natural Communities and Land-Cover Types, Vernal pool Grassland Complex and Non-vernal Pool Grassland for more

details on the impacts of invasive species to vernal pools), particularly in ungrazed pools (Marty 2005). Nonnative plants may compete with native plants for water, nutrients, light, and sites for germination. If left unmanaged, nonnative species can crowd out covered plants (i.e., Bogg's Lake hedge-hyssop, dwarf downingia, legenere, Ahart's dwarf rush, Red Bluff dwarf rush). Oak woodlands and savanna have understory grasslands, which are now dominated by nonnative annual grasses. The widespread lack of oak regeneration is a major threat to the long-term persistence of oak woodlands. Research on the cause of reduced regeneration has yet to identify a particular causal mechanism; however, annual grasses have been implicated in suppressing oak seedling regeneration (e.g., Gordon and Rice 2000).

Atmospheric nitrogen deposition in the Plan area is currently estimated to fall in the range from 6.8 lbs per acre per year to 8.9 lbs per acre per year (Weiss 2008). This amount is similar to that estimated in 2009 for the Santa Clara Valley HCP/NCCP Plan area. Future levels of nitrogen deposition are estimated to range from approximately 7 lbs per acre per year in 2035 to almost 9 lbs per acre per year by 2060 for Santa Clara Valley (Santa Clara Valley HCP/NCCP 2nd Administrative Draft 2009). While the rates of nitrogen deposition predicted for Santa Clara Valley are specific to that region, they provide a reasonable scenario for western Placer County for the same time frame. For comparison, some of the highest rates of nitrogen deposition in California in 2002 occurred in the Central Los Angeles Basin, estimated at a rate of approximately 11-14 lbs per acre per year and in the San Joaquin Valley near Modesto at 12 lbs per acre per year (Weiss 2006).

By increasing the extent of impermeable surfaces, urban development contributes to increased runoff, especially during storm events. Streams and wetlands may be particularly susceptible to increased runoff. Such increases can result in greater levels of scour and/or incision of local creeks, increased sediment loads, and alterations of downstream hydrology. Also, addition of new development may increase the amount of pollutants such as grease, oil, and lawn pesticides that can be transported from residences during wet weather. An increase in the quantity of pollutants reaching local creeks through higher runoff may affect the biological and physical characteristics of aquatic habitats. In addition, wetlands (e.g., vernal pools) near urban development may experience reduced function due to the loss and degraded quality of upland habitat surrounding them. Pollutants can also enter groundwater when development occurs over percolation zones in streams. In addition, if shallow, "perched" water tables occur, this groundwater can be discharged to surface water as part of summer stream flow. However, design guidelines (see Chapter 6) require construction in urban and rural areas to manage runoff so that existing runoff conditions (i.e., rate of runoff) are maintained and to reduce pollutants entering local streams.

Several other indirect impacts may be expected as urban development increases the human population of the Plan area. General use of the

Plan area, including units of the Reserve System where certain types of recreation are allowed, will increase. Increased human use within the Plan area may have adverse effects on biological resources in the form of:

- collection and harassment of native species, introduction or spread of diseases;
- competition from or predation by nonnative species,
- trash dumping;
- higher noise levels;
- increased light pollution at night;
- spills of hazardous materials,
- degradation of water quality from road runoff;
- increased frequency of wildfire ignitions; and
- increase in the local and regional populations will lead to additional vehicular traffic which in turn will increase the likelihood of take of certain covered species.

Human population growth can exacerbate the introduction or spread of nonnative species. Nonnative aquatic wildlife is known to have serious impacts on native amphibian populations. For example, aquarium species released in the wild may introduce new diseases to wild amphibian or fish populations. Feral cats pose a serious threat to native birds, especially those that nest on or near the ground, as well as to native reptiles. They can also cause a shift in small mammal populations from native to nonnative species. Ornamental plants and native cultivars may spread to protected areas adjacent to development or waterways, outcompeting and displacing native species. They can also hybridize (interbreed) with local native plants and thereby disrupt the genetics of the native population. Such hybridization can cause a number of problems for the native plant population, including poor growth and reproduction.

The final locations of Plan reserves are unknown at this time, but some reserves are expected to be near or adjacent to urban areas. The Plan conservation strategy includes measures to minimize some of the foregoing indirect effects through actions such as the creation of buffer zones and development of design guidelines that reduce impacts from development on natural lands. Despite these measures, however, indirect effects are still assumed to occur. Most of the indirect impacts of

urban development will occur along or near the boundary between new urban development and new reserves.

4.3.2 In-Stream Projects

Several types of in-stream projects will impact riverine, riparian, and to a lesser extent, adjacent resources. These are discussed below. While some trail construction will occur across streams or in riparian areas, the majority of trails will be designed to avoid these sensitive areas. Accordingly, impact mechanisms for trail construction are discussed in Section 4.3.3, *Capital Projects*.

Placer County has developed a County Aquatic Resources Program (CARP) as a component of the PCCP (Appendix M). This program is a multi-disciplinary approach for identifying, classifying, ranking, and protecting the aquatic resources of western Placer County. This program includes a process to comply with 404, 401 and 1602 permit requirements for impacts to water features within Placer County. The CARP is the process through which the Permittees will ensure compliance with all laws and regulations relating to aquatic resources. It is anticipated that this framework will assist in protecting aquatic resources to the extent possible within Placer County and the City of Lincoln.

Additionally, Placer County Department of Public Works has an existing Streambed Alteration Agreement with the California Department of Fish and Game (CDFG) that covers routine maintenance activities in unimproved and improved channels. This Streambed Alteration Agreement identifies five types of channels as follows:

- Type 1 – Improved channel without significant riparian habitat.
- Type 2 – Improved channel with significant riparian habitat.
- Type 3 – Improved mitigated channel.
- Type 4 – Unimproved channel without significant riparian habitat.
- Type 5 – Unimproved channel with significant riparian habitat.

Routine maintenance activities that are identified within the County Streambed Alteration Agreement may not require further consultation with the CDFG if they occur within certain areas of the County, if they implement agreed to mitigation measures, and if they occur during certain time frames. These measures will be implemented accordingly for those projects that qualify for inclusion in the Streambed Alteration Agreement.

Flood Protection Projects

The majority of flood protection projects described in Chapter 2 do not have final designs completed. Flood protection projects in the Plan area

are implemented by Placer County Flood Control and Water Conservation District (PCFCD) and its member agencies. The City of Lincoln and the City of Roseville also has regional flood control projects within the Plan area. Flooding throughout the region has sometimes resulted in damage to bridges, culverts, and private property. The continued urbanization in the County and in the surrounding areas has aggravated natural flooding problems and can cause downstream flooding problems.

As necessary, the PCFCD will construct such projects as regional detention basins, bridge and culvert improvements, onsite detention or retention basins, and stream channel maintenance (improve flows and remove sediment and vegetation). Whenever possible and economically feasible, environmentally sensitive design treatments such as off-channel basins, levee setbacks, and naturalized structural improvements are used instead of channelizing streams using concrete.

Agricultural conservation easements that include retention/detention facilities provide some habitat for wildlife species. Facilities that function as wetlands benefit waterfowl as well as the Bald eagle, frogs, insects, and other aquatic species. When not in use, stormwater basins will be maintained as managed grassland, and will consequently provide some habitat function for grassland wildlife species. Other flood control activities have permanent and temporary impacts to resources. The type and severity of both permanent and temporary impacts will vary considerably depending on the scope of specific projects.

Flood protection projects sometimes result in some permanent impacts associated with the use of hardscape where naturalized alternatives are not feasible, as well as some temporary impacts associated with construction. The type and severity of both permanent and temporary impacts will vary considerably depending on the scope of specific projects. Flood control design components that may be utilized include those listed below.

- Regrading bank slopes.
- Realignment of the historic full channel or active low-flow channel.
- Installation of hardscape (concrete or riprap).
- Installation of check dams to allow fish passage or other structural features to control erosive velocities.
- Temporary stream diversion during construction.
- Planting¹.
- Channel improvements.
- Floodplain modifications and contouring.

¹ All planting will be implemented to allow proper flood conveyance and will consist of hydroseeding on all earthen surfaces above the channel bed and tree planting at the top of bank, with a few additional trees planted on bank slopes and at toe-of-slope.

- Installation of floodwalls and/or levees.
- Bypass or diversion channel construction.
- Acquisition of right-of-way and maintenance road construction.
- Installation of culverts or outfall structures.
- Sediment removal and construction of sediment basins.

Permanent and temporary impacts, both direct and indirect, are expected to occur during implementation of flood protection projects. Riverine and riparian habitat may be permanently affected both during and after construction and some permanent loss of land-cover is expected during implementation of covered activities.

Permanent loss of land-cover may be attributed to installation of hardscape on the channel bed and banks; installation of levee walls, access roads, and outlet and inlet structures; maintenance road construction; and indirectly through increased recreational use. In addition, changes in sediment transport and deposition within the channel due to channel realignment and changes in channel substrates may occur. Loss of in-stream complexity due to installation of hardscape or channel straightening could lead to increased scour along earthen channels.

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

Project maintenance activities for flood control infrastructure includes but is not limited to the following: levee maintenance such as mowing to clear vegetation, debris removals; maintenance of flood control structures; clearing of drainage structures such as wasteways and drains; and maintenance of heavy equipment such as dozers, cranes, scrapers, loaders, and tractor-mowers. Storm related maintenance is conducted on an as-needed basis, usually during emergency conditions, to protect life and property.

These maintenance activities can have temporary impacts on riparian habitat and water quality. Removal of vegetation may cause an increase

or decrease in the stability of stream channels and create erosion as well as cause temporary reductions in fish habitat. Activities such as minor vegetation, silt, and debris removal could cause short-term temporary increases in turbidity and levels of total suspended solids that could adversely affect downstream fisheries. Although turbidity levels would decrease to normal levels within several hours after maintenance activities, the timing of maintenance activities could have significant short-term temporary impacts. Removal of vegetation within channels may also have impacts to anadromous fish by removing cover and potentially decreasing habitat for other aquatic insects that serve as potential prey for fish.

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

Where feasible, measures to decrease impacts to fish and aquatic habitats will be implemented that may include replanting riparian habitat, avoiding construction during certain time frames, gravel replacement and developing alternative designs. These projects may be multi-objective flood control projects that combine enhancements for flood control, recreation and restoration.

Bridge Construction and Replacement/Rehabilitation

As indicated in Chapter 2, the lifespan of a typical bridge is approximately 50 years. Many of the bridges within the Plan Area will likely need major repair or will be replaced within the permit time frame. Plan area (see Appendix A for a list of bridges identified for expansion and/or replacement). Some bridges are targeted for replacement due to problems with flooding. Approximately 24 bridges are anticipated to be replaced and many more will be rehabilitated within the next 50 years. However, not all of the identified bridges span waterways and therefore, many replacements will not impact riparian habitat or bed, bank and channels. Development within the Plan area will likely create the need for new bridges to be constructed within the next 50 years.

Due to federal and state guidelines for bridge rehabilitation and replacements, most bridges will need to be wider to accommodate shoulders and pedestrian crossings. The roads approaching the bridges will need to be widened as a result and may result in additional permanent and temporary impacts to waterways and adjacent lands. Similarly, as development within rural and urban areas progresses, new bridges will likely need to be constructed. New and rehabilitated bridges will be designed to federal and state guidelines that will be implemented during construction.

Rehabilitating existing bridges, as well as constructing new bridges, will result in impacts to natural communities and covered species. Where feasible, bridges will be constructed as free-span bridges. Where free-span bridges are not feasible, bridges will be built on pile foundation, cast-in-drilled-hole pile, or spread footing foundations. Excavation for foundations may be required. Installation of pilings, piers, and/or footings may contribute to roughness in the stream and slow flows in the vicinity of the pilings. Sediments and vegetation may become trapped on the upstream side of the piling, potentially causing further disruptions to flow. Also, scour may occur immediately downstream of pilings and contribute to channel erosion and downstream sedimentation. Slope paving will be included in the scope of work to protect/improve channel slopes at the bridge. Major bridge repair and rehabilitation may be similar to bridge replacement in scope, often requiring roadway widening, new deck support structures, and seismic retrofitting.

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

Construction of new bridges outside the urban growth area may result in indirect impacts associated with increased access to areas that are currently less accessible, including reserve lands that support natural land-cover types and/or covered species. As described above in Section 4.3.1, *Urban Development*, increased use of open space that is facilitated by new creek crossings may result in impacts on land-cover and covered species related to introduction of nonnative species, general use, and illegal activities such as trash dumping. However, indirect impacts related to bridge reconstruction are anticipated to be minimal. Reconstructed bridges are not anticipated to encourage additional traffic beyond that expected on the basis of existing and planned land use patterns. New bridges constructed in County and City parks or for access to parts of the Reserve System will be carefully managed for proper use on newly accessible lands.

Placer County Water Agency Raw Water Distribution System Operations

The potential direct and indirect impacts of the PCWA canal system operations on land-cover, habitats, and covered species in the Plan area are described below. More detailed descriptions of covered activities, impact analyses, and potential impacts (including potential impacts to species not covered by the PCCP) can be found in the PCWA Natural Resource Management Plan for Raw Water Distribution System Operations and Maintenance Activities, April 2009 (Appendix N).

Yearly Outages

PCWA's main source of water is delivered through Pacific Gas & Electric Company (PG&E) canals which must be kept in good working order. In the fall of most years, usually in mid-October to mid-November, after the irrigation season, PG&E shuts down various canals for routine maintenance work. The yearly outages that occur within the PCWA canal system result in reductions in the amount of water available to PCWA's Zone 1 customers. Yearly outages are not expected to have substantial effects on terrestrial habitats and species. Historic decreases in water delivery during the PG&E outages could impact giant garter snake by temporarily reducing the extent of aquatic habitat for this species. The impacts are expected to be minimal, as giant garter snakes also use other habitats at this time (e.g., ricelands) and begin to enter winter retreats in upland habitats by October 1, with most individuals in upland winter retreats by November 1 (Brode 1990; Hansen and Brode 1993; USFWS 1999).

PCWA operations during PG&E's yearly outages are not expected to have substantial effects on terrestrial land-cover and covered species. Decreases in water delivery during the PG&E outages could result in temporary minimal decreases in the extent of wetland habitats that may be indirectly supported by canal deliveries. This could have minimal effects on species that use wetland habitats such as foraging birds, amphibians, and northwestern pond turtle by decreasing the amount of available habitat, but these effects are representative of historic conditions within the Plan area.

Furthermore, the outages will not likely impact amphibian reproduction, as the typical timing of the outage period from mid-October to mid-November is outside of the breeding period for covered amphibians. California red-legged frog breeding occurs between late November and March, though most frogs lay eggs in March (USFWS 2002, Stebbins 2003). The foothill yellow-legged frog breeds mid-March through early June, and the western spadefoot toad breeds late January through July (Stebbins 2003).

Other changes in water quality, such as increased water temperature, decreased dissolved oxygen, and increased pH and alkalinity could have

some negative effects on plants and wildlife on the margins of canals and tributaries; however, any effects are expected to be temporary, conditions should revert to baseline once flows are restored, and very minimal because these changes are anticipated to be very small.

Aquatic habitat and species in Auburn Ravine may be affected by PCWA operations during the PG&E annual outages since the operations do not alter hydrologic and water quality conditions in Auburn Ravine.

Decreased and intermittent canal system flows during the PG&E yearly outages result in reduced flow contributions from the PCWA canal system and flow reductions in Clover Valley Creek, Antelope Creek, Secret Ravine, and Miners Ravine (all part of the Dry Creek watershed). These flow reductions likely affect aquatic habitat and species in these streams. The reduced canal system contributions, and resultant decreased flow in Clover Valley Creek, Antelope Creek, Secret Ravine, and Miners Ravine are dictated by the PG&E annual water delivery outages. PCWA's reliance on stored water in surface reservoirs and water delivered through the American River Pump Station (ARPS) to supplement flow to Water Treatment Plants (WTPs) and canal customers during the yearly outages limits PCWA's ability to maintain canal system flows. Antecedent hydrologic conditions may reduce or accentuate the effects of PCWA's operations during yearly outages on aquatic habitat and species in Clover Valley Creek, Antelope Creek, Secret Ravine, and Miners Ravine.

Central Valley fall/late fall-run Chinook salmon and Central Valley steelhead spawn in both Secret and Miners ravines. Because streamflows are typically lower, and water temperatures higher in the Dry Creek watershed, spawning often occurs later than in other Central Valley streams. Historic reductions in streamflow contributions from the canal system during PG&E's yearly outages may also delay the spawning migration.

Central Valley fall/late fall-run Chinook salmon may begin spawning activities from early November to December, which may, in some years, coincide with the tail end of PG&E's yearly outages and the resulting streamflow reductions. If the reduction of canal system contributions to streamflow occurs after spawning has begun, there is a potential for redd dewatering, providing the flow and stage decrease occurs where spawning has occurred.

Central Valley steelhead typically do not start their upstream migration until after a large storm event, typically after the PG&E yearly outages are completed. Spawning also occurs after the outages, so spawning and egg incubation would not be affected by the outages. Juvenile outmigration typically occurs before the PG&E outages. Steelhead do, however, rear year round, especially in Secret Ravine, and may be affected by the PG&E yearly outages through the reduction or loss of rearing habitat, and the potential increase in predation rates. The extent

of impacts to rearing Central Valley steelhead is dependent upon how low the flows drop during the annual outages, and if the water temperatures increase. If flows decrease too much, or if water temperatures rise too high, Central Valley steelhead will move to locations more suitable, most likely downstream into Dry Creek.

Seasonal Customer Delivery Schedule Changes

The PCWA conducts delivery schedule changes and routine flow adjustments throughout the canal system through use of check boards, temporary weirs, valve controls and debris removal. PCWA's customer delivery schedule changes typically take 1 week to complete, with minimal interruptions to service. Post-irrigation season customer delivery schedule changes coincide with yearly outages, and usually occur in mid-October to mid-November.

No direct impacts are likely to occur to terrestrial habitats and species. Minimal temporary impacts may occur, mostly associated with trampling vegetation while orifices are being changed.

Aquatic habitat and species are not affected by seasonal customer delivery schedule changes. Hydrology and water quality conditions in Plan area streams are not likely affected by seasonal customer delivery schedule changes.

Effects on covered plant species are unlikely to occur because they are not expected to be present along canal banks. Some potential negative effects could occur to covered bird species if they are nesting near work areas that may be disturbed by noise. Impacts to covered birds are unlikely to occur, however, as seasonal customer delivery changes tend to occur during the non-nesting season for raptors and songbirds. Potential impacts to nesting raptors will be minimized by providing buffers around nests (see Chapter 6), if customer delivery changes occur during the breeding season.

Because hydrology and water quality conditions in Plan area streams supporting salmonids are not altered, Central Valley steelhead and fall/late fall-run Chinook salmon are not affected by seasonal customer delivery schedule changes.

Seasonal Flood Management Practices

PCWA releases stormwater from canals with high flows at selected outlet locations during precipitation events for flood management. Such stormwater releases have the potential to affect covered species and natural resource conditions in the Plan area.

PCWA stormwater releases are expected to have minimal direct impacts to aquatic and terrestrial habitats and covered species. Potential impacts of stormwater releases from canals are primarily indirect. Stormwater

releases would reduce the effects of bank erosion along canals and would therefore lessen potential negative impacts resulting from flood flows. The increased flows in many unnamed drainages within the Plan area may erode banks near the canal outlet releases, and by potential sediment loading to receiving waters. This would have the potential to wash away northwestern pond turtles and amphibian eggs, if present in the outlet areas, or bury wetland or riparian vegetation or any covered plant species that may be present. California red-legged frog breeding occurs between late November and March, though most frogs lay eggs in March (USFWS 2002, Stebbins 2003). Foothill yellow-legged frog breeds mid-March through early June, and western spadefoot toad breeds in late January through July (Stebbins 2003). Giant garter snake could occur in the area of the canal outlets; however, it is unlikely they would be there when the PCWA releases stormwater, as giant garter snakes tend to be in upland winter retreats during the period of winter storms (they tend to emerge from winter retreats around April 1 [USFWS 1999]). Central Valley steelhead and fall/late fall-run Chinook salmon will not likely be affected by PCWA flood management practices, as high flows in Plan area streams are more likely to affect aquatic habitat and species compared to PCWA operations during precipitation events.

Overall, the potential effects of PCWA stormwater releases are expected to be minimal, as the releases are expected to create conditions similar to conditions generally exhibited across those in Plan area streams during periods of high precipitation runoff.

Routine Operations

Development of PCWA's routine operations to be covered by the PCCP is in process, however Appendix N, Natural Resources Management Plan for Raw Water Distribution System Operations and Maintenance Activities, provides BMPs to be implemented for PCWA's routine operations.

Placer County Water Agency Raw Water Maintenance Activities

Canal Cleaning and Flushing

PCWA's canal cleaning and flushing activities have the potential to impact land-cover and habitats for covered species in the Plan area. The following sections describe potential impacts of canal cleaning and flushing activities on land-cover and habitats for covered species.

Minimal decreases in Plan area streams due to a short duration reduction of flows in the PCWA canal system could result in temporary, minimal decreases in the extent of wetland habitats that may be indirectly supported by canal deliveries. This could have minimal effects on

species that use these wetland habitats, such as California black rail, giant garter snake, California red-legged frog, foothill yellow-legged frog, northwestern pond turtle, by decreasing the amount of available habitat. Reductions in water levels could expose amphibian eggs in the shallow, vegetated margins of drainages or adjacent wetlands. Potential effects from temporary water reductions on species that use these habitats are expected to be minimal. Flushing after canal cleaning could erode banks and wash away amphibian eggs and juvenile northwestern pond turtles that may be present on stream margins. Increased sedimentation from flushing activities could bury amphibian eggs. The typical timing of the cleaning period in the early part of the year occurs within the breeding period for several amphibian species.

Changes in water quality could indirectly affect terrestrial habitats and species. Increases in trace elements (such as aluminum and copper) could have some negative effects on plants and wildlife on the margins of canals and tributaries. Amphibians in particular are known to be sensitive to such water quality changes, although effects vary dramatically by type and concentration of contaminant, species, and life stage.

Habitats and species could potentially be affected directly or indirectly by impacts to soils and sediments from equipment, including compaction, erosion, and introduction of petroleum products. Impacts to habitats and species could include plant mortality or decreased plant growth. These types of impacts are expected to be relatively minimal and small in aerial extent. If equipment is used for removal of debris, damage could be caused to habitats by movement of equipment or by placement of debris and soil near canals. Some potential negative effects could occur if covered bird species are nesting near work areas that may be disturbed by noise. Impacts to covered bird species will be minimized by providing buffers around nests (see Chapter 6). Conditions are provided to avoid impacts to nesting California black rail, a fully protected species (see Chapter 6).

Changes in water quality conditions observed in Plan area streams following canal cleaning activities may affect aquatic habitat and species. Most aquatic organisms are relatively unaffected by suspended zinc (Eisler 1993). However, high levels of zinc could result in destruction of the gill epithelium and tissue hypoxia. The temporary increases in zinc in Miners Ravine were still below the acute toxicity levels, and would not substantially affect the fish in Miners Ravine.

Increased levels of aluminum and copper in Plan area streams during and after canal cleaning activities could potentially affect steelhead and Chinook salmon. Aluminum can affect gill function and growth rates. Aluminum bioavailability is closely tied to pH levels. At elevated aluminum concentrations and pH between 5.5 and 7.0, fish and invertebrates may suffer asphyxiation caused by aluminum adsorption on gill surfaces (NMFS 2006). At lower pH levels, aluminum toxicity can result in erosion of gill epithelium and mortality (NMFS 2006). The EPA

standard for the 1-hour maximum concentration exposure of fish to aluminum is 750 µg/L, while the 4-day maximum continuous concentration is 87 µg/L (NMFS 2006). The level of effect is dependent upon other environmental conditions, such as pH and water temperature. Higher pH levels in the water increase the buffering capacity for the effects of aluminum on fishes.

The increase in the aluminum concentration observed at Miners Ravine at Moss Lane following canal cleaning on March 15, 2007 may result in negative effects to covered fish species. Because the increases in the aluminum concentration (maximum measured at 710 µg/L) were likely short-lived, and because the pH levels were above 6.5, the long-term effect on the fish present was probably minimal. An increase in aluminum concentrations in Plan area streams as a result of canal cleaning activities to levels above 750 µg/L for a prolonged period of time may affect fish, but the degree of effects would be dependent on the length of time and pH levels.

Potential effects of copper on fish include reduced olfactory sensors, and possibly temporary decreased feeding activity. The toxicity of copper on fish is dependent on the chemical form, water hardness, and the lifestage and species exposed. Elevated copper concentrations can result in reduced olfactory sensitivity, affecting the ability to detect predators and prey. Elevated copper concentrations could also reduce survival of benthic macroinvertebrates – prey for many fish species.

Pacific salmonids are considered susceptible to copper toxicity, with a mean acute toxicity level at 29.11 µg/L (NMFS 2006). Avoidance by Chinook salmon can occur at levels as low as 0.7 µg/L, and at 1.6 µg/L for rainbow trout. Increased copper levels can result in diminished olfactory sensitivity, which affects the fishes' ability to detect predators, prey, and also to affect imprinting of smolts on their natal stream (NMFS 2006). Exposure to levels at 25 µg/L for 1 and 4 hours indicate a substantial decrease in the number of receptors in the olfactory bulb due to cellular necrosis (cell death) in Chinook salmon. Rainbow trout can tolerate higher concentrations at the 1-hour increment, but have similar effects at the 4-hour interval. Social interactions can also be impaired with copper exposure. Increased stress levels of subordinate fish may also lead to increased copper uptake across the gills. Elevated copper concentrations could also reduce survival of benthic macroinvertebrates – prey for juvenile salmonids.

Temporary increases in total suspended solids and/or turbidity levels in streams may impact aquatic species and habitat. Increased sedimentation and turbidity resulting from erosion and/or flushing of sediment associated with canal cleaning activities may result in short-term, temporary effects on fish. Prolonged exposure to high levels of suspended sediment can create a loss of visual capability, leading to a reduction in feeding and growth rates; a thickening of the gill epithelium, potentially causing the loss of respiratory function; a clogging and abrasion of gill filaments; and increases in stress levels, reducing the

tolerance of fish to disease and toxicants (Waters 1995). In addition, high suspended sediment levels will cause the movement and redistribution of fish populations and can affect physical habitat. Once the suspended sediment is deposited, it can reduce water depths in pools, decreasing the amount of physical habitat for juvenile and adult fish (Waters 1995). Deposited sediment will also fill in the interstitial spaces between gravels, reducing water flow and thus the oxygen levels surrounding salmonid eggs. Increased sediment loading can also degrade food-producing habitat downstream of the project area. Sediment loading can interfere with photosynthesis of aquatic flora and result in the displacement of aquatic fauna.

Many fish, including juvenile salmonids, find and capture prey by sight. Turbid waters reduce the fish's efficiency in locating and feeding on prey. Some fish, particularly juveniles, can get disoriented and leave areas where their main food sources are located, which can result in reduced growth rates.

Avoidance is the most common result of increases in turbidity and sedimentation. Fish will not occupy areas that are not suitable for survival, unless they have no other option. Therefore, habitat can become limiting in systems where high turbidity precludes a species from occupying habitat required for specific life stages.

Covered plant species could potentially be impacted by canal cleaning and flushing activities; however, these species are unlikely to be present along canals unless suitable habitat is adjacent. Vernal pools are the primary habitat for covered plant species (Bogg's Lake hedge-hyssop, dwarf downingia, legenera, Ahart's dwarf rush, and Red Bluff dwarf rush) as they require moist habitats. If present along the PCWA canal system, covered plants could potentially be affected directly or indirectly by impacts to soils and sediments from equipment, including compaction, erosion, and introduction of petroleum products. Effects on species could include plant mortality or decreased plant growth. These types of effects are expected to be unlikely to occur.

Weed and Brush Control

PCWA performs cleans canals on an annual basis. Maintenance activities to control weeds and brush include cleaning debris and controlling vegetative growth in the canals and on the canal berms through physical removal or algaecide and herbicide applications. Cleaning is performed during the winter months and is scheduled a month or more in advance. Algaecide and herbicide applications are scheduled in advance and are performed on a monthly or as-needed basis during the irrigation season. Application of pesticides, including algaecides and herbicides will not be covered under the Section 10(a)(1)(B) permit, but will covered under the state permit (see Section 2.4, Projects and Activities Not Covered by this Plan, for more detail). However, PCWA is

in compliance with Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) regulations, has an active General Permit for discharges of Aquatic Pesticides, and has an extensive Aquatic Weed Management Program.

Physical Removal

PCWA staff physically removes vegetation by periodically mowing, disking, trimming and/or removing vegetation along canals on an as-needed basis. Physical removal of vegetation within or along canals would not generally disrupt flows within canals. Therefore, physical removal of vegetation is not likely to affect hydrological conditions and habitat for aquatic species within canals and receiving streams.

Physical removal of vegetation is expected to have minimal to no impacts to water quality. Minimal effects on total suspended solids and turbidity may occur if the removal of vegetation results in the dislodging or loosening of soil along canal banks causes loose sediment to be deposited into the canals. During this activity, the removed vegetation is either deposited away from canals or hauled away in trucks, which prevents from potential deposition of debris in the canals. No dewatering or flushing activities are associated with the physical removal of vegetation.

Physical removal of vegetation could potentially have minor impacts to soils and sediment quality, though actual impacts depend on the equipment used for removal, and type and location of vegetation. Equipment used along canal banks may increase erosion, and motorized equipment may introduce petrochemicals to soils and affect sediment quality.

Physical removal of vegetation would result in direct loss of vegetation and habitat. Native trees may be trimmed or removed. Bird nests or eggs in vegetation to be trimmed or removed may be disturbed or destroyed. Habitats and covered species could potentially be affected directly or indirectly by impacts to soils and sediments from equipment used for vegetation removal, including compaction, erosion, and introduction of petroleum products. Potential effects on habitats and species may include plant mortality or decreased plant growth. Covered species that may potentially use aquatic habitats associated with canals (i.e., giant garter snake, northwestern pond turtle, foothill yellow-legged frog, California red-legged frog, and covered plant species) could potentially be crushed by equipment used for vegetation removal. These types of impacts are expected to be relatively minimal and small in aerial extent.

If equipment is used to remove vegetation, some potential negative effects could occur if covered raptors and other covered bird species are nesting near work areas are disturbed by noise. Impacts to covered species will be minimized according to the conditions specified in Chapter 6.

Physical removal of vegetation could result in direct loss of or damage to elderberry shrubs that may host the valley elderberry longhorn beetle, if present. Conditions to minimize and avoid impacts to valley elderberry longhorn beetle are described in Chapter 6.

Algaecide Application

The growth of algae and other submerged aquatic weeds in the canal system can reduce capacity and flow velocity, as well as clog screens, pipes, siphons, and delivery outlets. To control algae and other submerged aquatic weeds, an aqueous copper-based algaecide (e.g., Cutrine-Plus®) is applied throughout the system on a monthly basis beginning in April and continuing through the summer delivery season. Copper sulfate, a stronger algaecide, is applied as needed to areas with acute algae growth.

The aquatic weed control program is conducted under strict guidelines and supervised by a DPR-certified applicator and applied by DPR Qualified Applicators. PCWA maintains an application log for each of the application sites (see Appendix N, PCWA Natural Resources Management Report, for locations of application sites). PCWA's algaecide applications in their raw water distribution system have the potential to affect natural resource conditions in the Plan area.

Copper in applied algaecides could have some negative effects on covered plant and wildlife species, should they occur on the margins of canals and tributaries. Exposure routes for copper through dietary consumption of contaminated prey items or direct contact with contaminated sediments may affect a broad range of terrestrial species (NMFS 2007). Heavy metals, especially copper, have been found to be very toxic to amphibians, particularly at the egg and tadpole life stages, although effects vary dramatically by species, life stage, and contaminant (U.S. EPA 2008, B.C. Ministry of Water, Land and Air Protection 2004). Algaecides are typically applied starting in April through summer, which coincides with the breeding season and tadpole stages for California red-legged frog, foothill yellow-legged frog, and western spadefoot toad. Birds and mammals appear to be less sensitive to copper than aquatic organisms; however, toxic effects have been documented, including reduced growth rates, lowered egg production, and developmental abnormalities in birds, and various physiological effects on mammals, such as liver cirrhosis, damage to kidneys and the brain, and fetal mortality (U.S. EPA 2008, EXTOXNET 1994a).

Algaecides are released directly to water supplies at PCWA canal system locations by staff; therefore, effects of applications on soils and sediment quality in the study area are minimal. Potential effects are likely associated with unintentional discharges to the environment during transport of algaecides to application sites and/or leaks from algaecide storage vessels at application sites. These potential effects are not likely due to training and qualifications requirements for staff involved in

algaecide applications. Additionally, very minimal effects could occur to terrestrial habitats and species associated with trampling of vegetation at application points while algaecides are being applied. If present, however, covered plant species could be trampled while algaecide is being applied.

Based on the results of water quality monitoring, aquatic habitat and species in Plan area streams are not likely affected by PCWA activities during algaecide application events (see Appendix N, PCWA Natural Resources Management Report, for results from monitoring efforts). Potential indirect effects are associated with mobilization of constituents associated with fine sediment and organic material that had settled when canals were dewatered during the outage, as described above for canal cleaning activities.

Copper in applied algaecides could have some negative effects on covered species, if present, on the margins of canals and tributaries. Covered amphibians (California red-legged frog, foothill yellow-legged frog, and western spadefoot toad) in particular are known to be sensitive to such water quality changes, although effects vary dramatically by species, life stage, and contaminant. Algaecide applications typically start during April through summer, which coincides with the breeding season and tadpole stages for several special status amphibians.

Based on water quality monitoring results, covered fish species in Plan area streams are not likely affected by PCWA activities during algaecide application events. Potential indirect effects on covered fish species are associated with mobilization of constituents associated with fine sediment and organic material that had settled when canals were dewatered during the outage.

Herbicide Application

The growth of plants on canal berms can damage the berms by destabilizing the canal banks, as well as by decreasing canal flow velocities. Plant growth is controlled, as needed, with the application of herbicides. This is typically performed in the late spring at the beginning of the summer delivery season, when plants have emerged. Glyphosate and triclopyr herbicides are used in the PCWA system. Specific herbicides typically include Garlon4™ (triclopyr), Rodeo® (glyphosate), Roundup® (glyphosate), or AquaMaster™ (glyphosate). Applications usually involve a tank mix of herbicides to control the growth of different types of vegetation. PCWA also performs a pre-emergent application on the walking side of berms for the lower portion of the canal system after the first soaking rain of the wet season; sometime between October and January. The tank mix for pre-emergent applications includes Drexel-Diuron (Diuron-80) or Milestone® (aminopyralid), Roundup® (glyphosate), and Dimension® (dithiopyr). Surfactants are also added to the tank mix to enable herbicide penetration of plant cuticles. R-11®, a non-ionic alkylphenol ethoxylate surfactant, is added to the tank mix whenever glyphosate is used in aquatic systems. Alkylphenol ethoxylates

may break down into a variety of metabolites, including nonylphenol (Ferguson et al. 2001). See Appendix N, PCWA Natural Resources Management Report, for locations of application sites, and for more detailed discussion of PCWA's herbicide application practices.

PCWA's application of herbicides along canal berms likely temporarily affects on soil chemistry. Chemical constituents of herbicides applied by PCWA may include triclopyr, glyphosate, dithiopyr, diquat dibromide, and non-ionic alkylphenol ethoxylate surfactants. These constituents, with the exception of diquat dibromide, degrade rapidly to inert compounds or products with low toxicity. Diquat dibromide is tightly adsorbed to soil particles, persistent, and toxic to fish and wildlife.

Application of herbicide may result in indirect mortality or damage to non-target vegetation. Herbicides may also affect covered animal species, particularly amphibians. Glyphosate herbicides, which are used near water, are generally less toxic to wildlife than other types of herbicide; however, effects vary dramatically by concentration of contaminant, species, and life stage.

Some studies of glyphosates on amphibians have found negative effects at various life stages, including mortality, developmental defects, and behavioral abnormalities (B.C. Ministry of Water, Land and Air Protection 2004). Other components, such as surfactants, commonly contained in glyphosate formulations, including Roundup®, have also been found to cause severe negative effects to amphibians (USFWS 2002). Herbicides are typically applied in early spring through summer, which coincides with the breeding season for several amphibian species. Glyphosates have been found to be only slightly toxic to birds and mammals (EXTOXNET 1994b, Tu et al. 2001). Triclopyr was also found to be only slightly toxic to birds and mammals (EXTOXNET 1994b, Tu et al. 2001). According to these sources, triclopyr is not expected to bioaccumulate in wildlife. A study in Canada, however, found triclopyr to be harmful to amphibians under normal field use (Thompson et al. 2007). Based on results from water quality monitoring during herbicide applications, aquatic habitat and species in Plan area streams are not likely affected by the application of AquaMaster™ glyphosate aquatic herbicide at PCWA reservoirs (see Appendix N, PCWA Natural Resources Management Report, for results from monitoring efforts). Glyphosate herbicides designed for aquatic use, such as AquaMaster™, have minimal surfactants, and thus have a low toxicity level to fish. Glyphosate dissipates in water by binding to soil particles and organic material or through microbial degradation. Any fish present in reservoirs are likely to suffer minimal effects resulting from the use of AquaMaster™ as an herbicide.

Application of herbicide may result in indirect mortality or damage to untargeted covered plant species or elderberry shrubs hosting valley elderberry longhorn beetle, if present, near the application area. Impacts to elderberry shrubs and valley elderberry longhorn beetle from herbicide application will be minimized according to conditions on herbicide

application near elderberry shrubs (see Chapter 6, Condition 24). Herbicides may also affect covered wildlife species, particularly amphibians, if present. Herbicides are typically applied in early spring through summer, which coincides with the breeding season for California red-legged frog, foothill yellow-legged frog, and western spadefoot toad.

Covered fish species are not likely affected by the application of the herbicides within the canal system. Herbicides applied by PCWA have a relatively short half-life, and AquaMaster™ is relatively nontoxic to fishes. Other covered species, particularly amphibians, may be negatively affected by applications of herbicides if in close proximity to the application. Water quality monitoring results during the herbicide application event do not show effects to stream habitat.

As-Needed Site-Specific Maintenance Activities

This section addresses potential effects of PCWA's as-needed site-specific maintenance activities on natural resource conditions in the Plan area. These activities include canal lining/guniting, canal repair, and pipe repair.

Canal Lining/Guniting

Canal lining is typically performed during winter months, when water demands are lower, to reduce erosion and sloughing of canal banks, improve the efficiency of water delivery in canal segments, and to repair and prevent leaks in canal sections that may cause damage to infrastructure and/or property. Canal sections are also lined outside of winter months in areas that are inaccessible during winter, to address leaks that arise during the year, and to continue canal lining activities that were not completed during winter. Canals are lined with gunite, a dry-mix concrete material blown through a nozzle where water is injected immediately before application. Gunite is applied to canals to reduce seepage from the canal channel to adjacent soils. Small cracks in the guniting canals are repaired with Burke Plug, a hydraulic cement manufactured by Edoco©.

To line and apply gunite to canals, water is diverted from the segment to be lined, and the canal segment is dewatered by pumping any remaining water in the canal segment out of the canal and releasing the water to storm drains, ditches, drainage swales, or the ground surface adjacent to the canal. The segment is then cleaned and reinforced with wire mesh laid into the bottom of the canal before spraying with gunite. Several hundred feet of canal are lined with gunite at a time, and allowed to cure for several hours. Canal flows are restored to the newly lined segments during the evening after the segment has cured. The newly lined canal segment is flushed to remove any accumulated debris and sediment in the canal using the nearest intermediate canal outlet downstream from the lining activities, as described for canal cleaning.

Canal lining requires relatively dry weather and is not performed during or just after heavy rain, as runoff can wash out fresh gunite from the channel. Therefore, the canal-lining schedule, developed a month or more in advance of the activities, is subject to changes and delays according to weather.

Canal lining operations cause minimal decreases in streamflow in Plan area streams, as flows in the canal system are reduced only for a short duration. Such decreases could result in temporary or in some cases permanent decreases in the extent of wetland habitats that may be directly or indirectly supported by canal system operations. This could have effects on species that use these wetland habitats, such as California black rail, covered amphibians, northwestern pond turtle, and giant garter snake, by decreasing the amount of available habitat.

Reductions in water levels could expose amphibian eggs in the shallow, vegetated margins of drainages or adjacent wetlands. Any potential effects from temporary water reductions on species that use these habitats are expected to be minimal because canal system contributions to flow within Plan area streams through unregulated releases from canal outlets are generally brief. The typical timing of canal lining is during winter, generally outside of the breeding period for most amphibian species; however, canal lining activities can occur throughout the year.

Lining sections of unlined canals may indirectly affect adjacent habitat and species historically supported by canal seepage. Through lining sections of previously unlined canals, oak trees and wetlands may be negatively affected by reducing the amount of seepage along the sections, thereby reducing soil moisture and geochemical conditions. Covered species that depend on such wetlands and could potentially be impacted include California black rail (see below), Modesto song sparrow, tricolored blackbird, covered plant species, and covered amphibians. Wetlands supported by seepage from canals that are lost because canal repairs eliminate the supply of water to wetlands will be replaced (through in-kind and out-of-kind restoration and creation) to insure no net loss of wetlands (see Chapter 6).

Repairing leaks in canal systems could eliminate the primary source of water to wetlands that supports the Sierra Nevada metapopulation of California black rails (Richmond et al. 2008), a California fully protected species. California black rails use wetlands with water less than 1.2 inches deep that do not fluctuate substantially in depth during the year (Eddleman 1994; Tecklin 1999). Eliminating water to wetlands that support California black rail would effectively render those sites unsuitable for California black rail. California black rail could potentially abandon a wetland and its nest if canal repairs eliminate the source of water to the wetland during the nesting season and cause water levels to fall below those needed by California black rails. Take of California black rail will be avoided by restricting canal lining/guniting activities that could

potentially eliminate the supply of water to occupied wetlands during the nesting season (see Chapter 6).

Potential impacts to water quality could indirectly affect terrestrial habitats and species. Increased loading of sediments and sedimentation from flushing activities could bury amphibian eggs. Increased concentrations of trace elements (such as aluminum and copper) could have some negative effects on plants (including covered plants, if present) and covered animals on the margins of canals and tributaries.

Amphibians in particular are known to be sensitive to changes in water quality, although effects vary dramatically by type and concentration of contaminant, species, and water quality parameters. Elevated pH values are toxic to amphibians, and may be particularly harmful in combination with other contaminants, such as heavy metals or herbicides, particularly glyphosates (Pesticide Action Network U.K. 1996, Edginton et al. 2004, Horn and Dunson 1995). However, glyphosates and triclopyr have been found to break down faster under higher pH conditions (Tu et al. 2001).

Habitats and species could potentially be affected directly or indirectly by impacts to soils and sediments from equipment used during canal lining, including compaction, erosion, and introduction of petroleum products. Effects on habitats and species could include plant mortality or decreased plant growth. These types of impacts are expected to be relatively minimal and small in aerial extent.

Noise from canal lining activities could potentially impact covered raptors and other covered birds if they are nesting near canal lining work areas that may be disturbed by noise.

Sediment loading to streams after flow is restored to canals following canal lining activities may bury eggs of covered amphibians, if present. Increases in concentrations of trace elements, such as aluminum and copper, could have some negative effects on covered plants and wildlife, if present, on the margins of canals and tributaries.

Amphibians in particular are known to be sensitive to changes in water quality conditions, although effects vary dramatically by species, life stage, and water quality parameters. Also, increases in pH levels, which were observed at sites after canal lining activities during water quality monitoring events, have been found to be toxic to amphibians, and may be particularly harmful in combination with other contaminants, such as heavy metals or herbicides (Pesticide Action Network U.K. 1996, Edginton et al. 2004, Horn and Dunson 1995).

Covered plant species, if present, could potentially be affected directly or indirectly by impacts to soils and sediments from equipment used during canal lining, including compaction, erosion, and introduction of petroleum products. Effects on covered plant species could include mortality or

decreased growth. These types of impacts are expected to be unlikely to occur.

Potential effects of canal lining activities on Chinook salmon and steelhead, aquatic habitats, and other covered species are similar to those discussed for canal cleaning activities.

Canal Repair and Pipe Repair

PCWA performs repair and/or replacement of canals, flumes, outlet structures, flow-control structures, and customer delivery points throughout the PCWA canal system on a scheduled and as-needed basis. Pipe repair activities include repair and/or replacement of pipes, culverts, and siphons throughout the PCWA canal system on a scheduled and as-needed basis. These activities may involve minor repairs with minimal disturbance to customer deliveries and minor impacts to land-cover, habitats, and covered species, while others requiring onsite construction may become more involved.

Most canal and pipe repair activities would result in short-duration interruptions to water flow within segments of the raw water distribution system. These short-duration interruptions to flow are likely to affect hydrologic conditions in Plan area streams. The potential effects of canal and pipe repair activities on land-cover, habitats, and covered species are dependent of the nature and extent of the canal and pipe repair, as well as the specific environmental setting for the activity. These activities should require project specific environmental resources analyses to assess the potential effects of the activity on land-cover, covered species and their habitats, and an evaluation to determine measures to minimize potential negative effects. For example, canal and pipe repair activities requiring onsite construction and canal dewatering for more than a day should warrant a project-specific evaluation to determine potential effects on hydrologic conditions and covered species in Plan area streams. The following provides an overview of the types of effects on natural resources that may occur during PCWA's canal and pipe repair activities.

Effects on terrestrial habitats and covered species from canal and pipe repair would vary based on the type of repair required, but would be similar to those from canal lining, though generally less severe and smaller in scale. As with canal lining, canal and pipe repair activities that require a short-duration reduction of flows in the PCWA canal system would result in minimal decreases in streamflow in Plan area streams. Minimal decreases of flows in streams could result in temporary and very minimal decreases in the extent of wetland habitats that may be directly or indirectly supported by canal system operations. This could have minimal effects on covered bird species that use these wetland habitats, such as tricolored blackbird and California black rail, and breeding amphibians (i.e., California red-legged frog, foothill yellow-legged frog, and western spadefoot), by decreasing the amount of available habitat.

Reductions in water levels could expose amphibian eggs in the shallow, vegetated margins of drainages or adjacent wetlands. Any potential effects from temporary water reductions on wetland communities and the species that use these habitats are expected to be minimal.

As with canal lining, canal repair activities potential could indirectly affect aquatic and terrestrial communities. Increased loading of sediments and sedimentation from flushing activities could bury amphibian eggs. Deposited sediment will also fill in the interstitial spaces between gravels, reducing water flow and thus the oxygen levels surrounding salmonid eggs. Increased concentrations of trace elements (such as aluminum and copper) could have some negative effects on plants (and therefore, natural communities) and wildlife on the margins of canals and tributaries. Amphibians in particular are known to be sensitive to such water quality changes, although effects vary dramatically by type and concentration of contaminant, species, and water quality parameters.

Habitats and covered species could potentially be affected directly or indirectly by impacts to soils and sediments from equipment used during canal and pipe repair, including compaction, erosion, and introduction of petroleum products. Covered plant species, if present, could also be damaged or killed during limited trimming or removal of vegetation necessary to access repair areas. Effects on natural communities and covered species could include plant mortality or decreased plant growth. These types of impacts are expected to be relatively minimal and small in aerial extent.

Minimal loss of habitat and covered plants could occur due to limited trimming or removal of vegetation necessary to access repair areas. Some potential negative effects could occur if covered birds are nesting near canal or pipe repair work areas that may be disturbed by noise. Impacts to covered bird species will be minimized by providing buffers around nests (see Chapter 6).

The potential impacts of canal and pipe repair activities on aquatic habitat and species are similar to those described above for canal cleaning activities. In addition, construction-related contaminants could result in a reduction in the growth, survival, and reproductive success of aquatic species including covered amphibians, Chinook salmon, steelhead, and northwestern pond turtle. The potential exists for fuel and concrete to spill into the waterway during construction. Various contaminants introduced into the water system, either directly or through surface runoff, may be toxic to fish or cause altered oxygen diffusion rates and acute and chronic toxicity to aquatic organisms, thereby reducing growth and survival.

4.3.3 Capital Projects

Most capital projects will occur within the Potential Future Growth (PFG) area. However, some may occur within the Reserve Acquisition Area (RAA). Capital projects within the RAA may have a greater overall impact to existing community types because of their more undisturbed conditions.

Major Transportation Projects

Major transportation projects within the Plan area will likely be new roadways, highways or bypasses, or significant improvements and expansions to existing roadways in rural areas. Transportation projects within urban areas are a part of urban development (Section 4.3.1 *Urban Development*). Rural transportation projects provide infrastructure that supports existing and future urban development planned under current general plans. All of these projects will have permanent direct impacts on natural land-cover types, and therefore on covered species.

Indirect impacts may also occur as a result of expanded roads. In the absence of designs to minimize these effects, wider highways, already difficult for wildlife to navigate, will intensify road crossing hazards for wildlife. Transportation projects typically fragment habitat and disrupt wildlife movements by creating more extensive and obstructive barriers between populations and habitats. New or expanded roads that support a higher volume of traffic may also result in increased runoff automobile pollutants (e.g., oil, grease, radiator fluid) and debris (e.g., tires, litter, car parts), which may be hazardous to wildlife. Increasing the total amount of roads, especially dirt roads, can lead to increased sediment production in the watershed. Roads are impervious and can cause hydrologic impacts as well. Higher peak flows in streams can contribute to bank erosion. In addition, new and expanded roads and associated traffic can create substantial noise and physical disturbance that may disturb or disrupt covered species far from the road. Finally, as discussed above in Section 4.3.1, *Urban Development*, increases in vehicular traffic will result in increased nitrogen deposition in areas adjacent to roadways.

New roads or expansion of existing roads adjacent to cultivated agricultural areas are expected to have less severe direct and indirect effects than road projects adjacent to natural land-cover types because the habitat value of cultivated agriculture is lower.

Routine or emergency operations and maintenance activities are expected to have minimal permanent or temporary impacts on covered species because the vast majority of these activities occur within the road or shoulder. Vegetation management along road shoulders and rights-of-way has the potential to disturb a narrow strip of habitat for covered species and possibly to injure or kill individuals that occur in this habitat.

Measures to avoid and minimize the impacts of covered transportation projects, including design measures for new and expanded rural roads, are described in Chapter 6.

Placer Parkway – South Placer Regional Transportation Authority

The Placer Parkway will connect State route (SR) 99 in Sutter County to SR 65 in Placer County. The project is a part of the Sacramento Area Council of Governments (SACOG) Metropolitan Transportation Plan and the Placer County Regional Transportation Plan. It is envisioned to reduce anticipated traffic congestion on both the local and regional transportation systems and to advance economic development goals in south Sutter and western Placer counties. This transportation connector project is proposed for coverage under this Plan.

The Placer Parkway corridor Preservation's Final EIS/Program EIR (FHWA-CA-FEIS-2009-46 and SCH No. 2003092069) evaluated the selection of a 500- to 1,000-foot-wide corridor among five Build Alternatives and a No Build Alternative. The Final Tier 1 EIS/Program EIR identified Alternative 5 (connections at SR 99/Sankey Road and SR 65 at Whitney Ranch Parkway) with a no-access buffer as the Preferred Alternative (NEPA) and the Environmentally Superior Alternative (CEQA). On December 3, 2009, the SPRTA Board certified the Final Program EIR and selected the Placer Parkway Corridor. The Federal Highway Administration (FHWA) released the Record of Decision in March 2010. Placer and Sutter counties are taking steps to preserve this corridor via map/text amendments to their respective general plans.

The Tier 1 document analyzed the selection of a corridor as well as the potential effects of construction and operation of a future four- to six-lane facility with up to five interchanges. Discussion of roadway impacts was limited because only general design/operational concepts were outlined. Selection of the precise roadway alignment within the selected corridor and construction/operation impacts will be analyzed in a later Tier 2/Project level environmental review(s). The Placer Parkway may be designed and constructed by others incrementally in phases and with interim two- to four- lanes with signalized intersections until improvements (e.g., six-lanes with grade-separated interchanges) are warranted.

Early Tier 1 consultation resulted in a 2003 agreement (among FHWA, Caltrans, SPRTA, USACE, and USEPA) to integrate NEPA and CWA Section 404 provisions for the corridor selection project. Because the corridor preservation project did not require construction permits, the NEPA/404 process was modified to ensure the Tier 1 project reflected careful consideration of CWA guidelines to eliminate the need to re-visit Tier 1 decisions during later Tier 2 environmental review(s) and permitting. The USFWS participated informally in portions of this process. As part of it, concurrence on a number of points was reached.

This included concurrence that the Preferred Alternative with a no-access buffer was the corridor most likely to contain the Least Environmentally Damaging Practicable alternative (LEDPA).

The project vicinity includes some of the fast growing communities in the six-county SACOG region – Roseville, Rocklin, Lincoln, and the Sunset Industrial Plan Area. Undeveloped areas support a mix of cultivated rice fields, grasslands, agricultural fields, intermittent streams, riparian woodland, freshwater marsh, vernal pools, and other seasonal wetlands. Developed areas are located intermittently throughout the project area. Large commercial developments generally are found in the southwestern and northeast corners of the project area. If implemented, the Parkway would result in significant environmental effects, which cannot be mitigated to a less than significant level on land use, farmlands, visual character/quality, cultural resources, traffic/transportation, air quality, noise, hydrology/water quality, biological resources, and growth.

The Placer Parkway would result in the following direct habitat losses: 4.9 acres of riparian habitat, 268.2 acres of potential giant garter snake habitat, 3.6 acres of Swainson's hawk nesting habitat, 759.4 acres of potential Swainson's foraging habitat, 1.2 acres of potential valley elderberry longhorn beetle habitat, 28 acres of wetlands, and 124 acres of vernal pool grasslands.

Construction of the Parkway is unlikely to affect steelhead or fall-run Chinook salmon adversely, as these species are not likely to be present in the project area except for occasional transient occurrences of adult steelhead or Chinook salmon that may reach the project area via two drainage canals. Crossings of major streams and drainage canals would be accomplished via bridges that would be constructed to avoid impedance of fish passage. Best management practices to control erosion and minimize degradation of water quality will be implemented during construction of a future road facility at the water crossings to protect aquatic habitats in the streams.

Construction and operation of the Parkway could result in indirect impacts on biological resources. Land use in the Parkway corridor will change as adjacent areas are converted to urban development and current agricultural land uses become less feasible. Current agricultural practices that are beneficial to covered species and other wildlife could be abandoned if changes in land use cause agriculture to become less viable. For example, agricultural land currently cultivated for rice with flood-irrigation could be allowed to go fallow, and grazing may be removed from vernal pool grassland complexes. Flood-irrigation of rice provides quality habitat for waterfowl and shorebirds - prey for Bald eagle and American peregrine falcon. Grazing helps to maintain habitat for vernal pool plants and invertebrates, in part by controlling invasive non-native plant cover in vernal pools. Loss of natural and semi-natural communities to urban development would convert wildlife habitat into unsuitable developed land. Changes in land management activities,

however, might benefit nesting Swainson's hawks, valley elderberry longhorn beetle, and riparian habitats that are affected adversely by intensive agriculture.

The existence of a new roadway would affect the surrounding natural and semi-natural communities and covered species adversely in a variety of ways. Covered species and other wildlife could be killed by traffic. Traffic and roadside maintenance activities would reduce the quality of habitat for covered species immediately adjacent to the roadway. The increased noise and lights associated with the roadway probably would decrease the value of that habitat for nesting and foraging, causing disturbance and potentially affecting natural breeding cycles and behavior.

Construction of the Parkway would result in various indirect effects associated with habitat fragmentation. The selected corridor and the future roadway would be a major linear feature that crosses three watersheds (Pleasant Grove Creek, Curry Creek, and the NEMDC/Steelhead Creek). Riparian areas associated with creeks are particularly valuable in providing foraging, nesting, and migratory habitat for covered species and other wildlife. In comparison to surrounding grasslands or agricultural areas, riparian corridors can provide water, shade, and a multi-level canopy of vegetation in which to forage and rest. In addition, species can use these corridors to travel between other suitable but geographically isolated patches of habitat. A 350-foot-wide roadway across a riparian corridor could potentially create a barrier to wildlife movement.

Fragmentation caused by a new roadway could also impact vernal pool complexes. Development can affect the hydrology of vernal pools, including pools that are not directly impacted. Covering land surfaces with concrete and/or deep ripping the hardpan layer can affect the amount and quality of water available to the perched water tables characteristic of vernal pool areas. Changes to the perched water table can lead to alterations in the rate, extent, and duration of inundation (water regime) of remaining habitat (USFWS, 1996). Survival of vernal pool branchipods is directly linked to the water regime of their habitat. Roads in or near vernal pools can create additional impacts through the introduction of chemically laden runoff (i.e., petroleum products). Traffic on roads can also lead to an increased deposition of nitrogen in vernal pools. Increased nitrogen levels could potentially make vernal pool habitat more suitable to nonnative species and less suitable to native species (USFWS 2005). Development also may produce conditions that are favorable for exotic predators such as bullfrogs and mosquito fish (USFWS, 1996). The USFWS typically considers any ground-disturbing activities within 250 feet of a vernal pool to constitute an indirect impact.

Landscaping would be installed within the Parkway's no-development buffer zones (i.e., the portions of the 500- and 1,000-foot-wide corridors not used as part of the roadway cross section) depending on its final width, as well as within the median. The landscaping would provide some degree of buffer between the roadway and adjacent vegetation; however,

there is also the potential for the spread of nonnative landscaping materials. If the appropriate species were used, the potential for the spread of nonnative landscaping materials would be reduced. Native vegetation currently within the buffer area would be especially vulnerable to the introduction and spread of weedy or aggressively spreading species that are not dependent on supplemental irrigation.

I-80/SR 65 Interchange Improvements – South Placer Regional Transportation Authority

Interstate 80 (I-80) is the principal east-west route in northern and central California. It is the only freeway crossing for the Sierra Nevada range. State Route (SR) 65 is an important regional route that serves both local and regional traffic. The I-80/SR 65 interchange is a freeway-to-freeway interchange, which was constructed in 1985 and requires improvements. The purpose of the modifications to I-80, SR 65, and the interchange at their junction is to reduce congestion, improve traffic operations and enhance safety.

A number of proposed revisions have been identified, including the construction of a bi-directional high-occupancy vehicle direct connector between I-80 and SR 65, replacement of the eastbound I-80 to northbound SR 65 loop-connector with a flyover connector, structure widening of the East Roseville Viaduct and replacement of the Taylor Road overcrossing, widening of the southbound SR 65 to westbound I-80 and westbound I-80 to northbound SR 65 connectors with associated auxiliary lanes and ramp realignments.

The project area is mostly comprised of urban development, so there will be minimal direct impacts on natural communities. Both freeways run through relatively flat terrain in a heavily urbanized area with frequent interchanges. Most of the anticipated work will occur within existing right-of-way, though some habitats, including wetlands, may be impacted.

If implemented, the interchange and freeway improvements could have many direct and indirect impacts on wetlands. The project will also include work within Antelope Creek and Secret Ravine Creek. Construction and operation could result in minor secondary and indirect impacts on biological resources. Best management practices to control erosion and minimize degradation of water quality will be implemented during construction to protect aquatic habitats in the streams.

Waste Management Projects

The Placer County Department of Facility Services operates and maintains ten separate sanitary sewer systems within the County. The City of Lincoln operates and maintains its own sanitary sewer system. Changes to these facilities will likely occur over the term of the Plan due to expected urban growth. In addition, landfill and transfer stations will

likely be expanded or constructed within the permit time frame. The involved capital projects include treatment plant construction or expansion, effluent discharge, force main and effluent line construction or maintenance, discharge and reclamation line installation and maintenance, pump station construction, and landfill or transfer station construction.

Urban development will place additional demands upon the wastewater systems necessitating new plants, expansion of existing plants and new lines. Expanding existing and constructing new landfill and waste management systems will permanently impact land-cover and habitats within the Plan area. Additionally, lines that are installed to expand these facilities will most likely have temporary impacts, as areas that are disturbed will be revegetated. Specific impacts will need to be determined on a project level basis.

Water Supply Projects

Water supply projects within the Plan area are implemented by PCWA and the City of Lincoln (in coordination with Nevada Irrigation District). Several relatively large projects will be constructed within the permit time frame. The largest project, the Sacramento River Water Diversion Study, is not a covered activity. The projects within the Plan area that use this additional water are covered activities. In essence, the projected growth of the population within the Plan area will require more water and this projected growth is covered under the Plan. PCWA will analyze impacts caused by the Sacramento Water Diversion Project in an EIR/EIS, where they will be required to analyze indirect impacts, which among other things includes impacts, such as those to natural resources, caused by inducing further growth. Because the growth indirectly related to increased water supply is associated with the projected increases in growth covered by the PCCP, the indirect impacts related to increased water supply are also covered as part of the direct and indirect impacts of growth covered by the PCCP. The larger projects that have been analyzed for impacts are included within this section. For a more complete listing of projects that will be constructed by PCWA, please refer to appendix G, *Covered Activities Project Lists*.

Sacramento River Water Diversion Study

As described in Chapter 2, PCWA, in coordination with Sacramento Suburban Water District (SSWD), City of Roseville and the City of Sacramento prepared a Sacramento River Water Reliability Study (SRWRS) to analyze long-term water supplies that would be available by diverting water from the Sacramento River. The goal of the SRWRS is to develop a water supply plan that is consistent with the Water Forum Agreement (April 24, 2000) objectives of pursuing a Sacramento River diversion to meet water supply needs of the Placer-Sacramento region and promoting ecosystem preservation along the lower American River.

Biological Assessments were completed but, the Environmental Impact Statement/Environmental Impact Report (EIS/EIR) has not been completed. This project will be pursued sometime within the time frame of the PCCP. Biological Assessments were submitted to NMFS and USFWS, but because the project has been put on hold, consultation has not been initiated.

Impacts

The direct project impacts from the SRWRS will be evaluated in a permitting process outside of the PCCP and are not analyzed in the PCCP. However, indirect impacts caused by growth indirectly induced by an increase in available water, and other indirect impacts associated with the proposed Sacramento River diversion, are covered activities.

The future development in western Placer County would require provision of water from the SRWRS partners, and the proposed project may be considered to induce growth in the area. This growth is analyzed as part of the urban development that the County and City is covering with the PCCP. This growth could negatively impact land-cover and covered species that may be present by converting natural and semi-natural land-cover into urban land-cover and/or degrading habitat (see Section 4.3.1 for discussion of the direct and indirect impacts of urban development). Projects included within urban development will adhere to specific conditions laid out in Chapter 6, Conditions on Covered Activities, conservation measures, and other requirements outlined in the permit obtained from the regulatory agencies.

Operations and maintenance activities that could occur in the future will also indirectly impact land-cover and covered species. The operations and maintenance activities and their impacts will likely be similar to those discussed in Section 4.3.2, *In-Stream Projects*. Additionally, more information is provided on the impacts of covered activities, including indirect impacts, in Section 4.6, *Effects on Covered Species*.

Other PCWA Projects

Various other capital projects will be constructed by PCWA over the permit term (Appendix G). The direct and indirect impacts have not been analyzed for the majority of these projects; however, it is anticipated that they will have potential impacts to water quality, riparian and oak woodlands, vernal pool grassland complexes, streams and waters of the United States, as well as effects on terrestrial and aquatic habitats.

Two of PCWA projects have already received permits from regulatory agencies and have already paid in-lieu fees for mitigation. These are included in Appendix G as they have not been constructed due to lack of funds and risk losing permit status during the permit term.

City of Lincoln

As indicated in Chapter 2, the City negotiated a supply of treated surface water to be provided by the Nevada Irrigation District (NID) within its service boundaries that coincide with the City's 2008 General Plan area. In August 2005, the City of Lincoln and NID had a preliminary study conducted to determine potential sites for the untreated water supply, water treatment plant, and finished water storage. This report was prepared by ECO:LOGIC engineering (August 2005) and considered, at a broad level, what potential environmental issues would need to be evaluated. Based on this study, the proposed project would impact valley foothill riparian, oak woodlands, and annual grasslands. Actual impacts will need to be analyzed when the project is further developed. Since the project is currently in the planning stages, further refinement would be necessary to determine specific project impacts. This project is a covered activity and will have detailed impact analysis conducted as part of the environmental review. All applicable PCCP measures will be implemented accordingly.

Flood Control Projects

Larger flood control projects may be necessary to construct as additional areas are developed. As urbanization continues over the life of the Plan, additional stormwater management facilities will be required. Changes in regulations and practices in recent years will dictate the design of these facilities to a large degree.

One of the bigger capital flood control projects within the unincorporated portion of Placer County includes the Lakeview Farms volumetric mitigation facility that will be constructed by the City of Lincoln.

The City of Lincoln has purchased 456 acres of land north of Waltz Road in the unincorporated portion of Placer County to construct an off channel retention facility for flood control purposes. The project is being constructed in phases to passively capture flood water during a 100-year event. Phase one of the project would be developed on 160 acres of rice fields to impound 1,030 acre feet of storm-water, with phase two being developed on 160 acres retaining an additional 1,570 acre feet of water. The site would function as a retention basin only in extreme storm events during the rainy season of December through April and would remain in rice production from approximately March through September.

These larger stormwater retention facilities, such as the one described above, can provide habitat for some wildlife during both the dry and wet seasons. However, large concentrations of stormwater can increase the amount of pollutants delivered to, and subsequently concentrated in, retention basins. If retention facilities contain vernal pool habitat, vernal pool animals and plants could be impacted by higher levels of pollutants. Furthermore, the duration of inundation will likely be increased for vernal

pools, if present within a retention basin. Increased periods of inundation can reduce habitat suitability for vernal pool fairy shrimp as they are commonly found in only the smaller shorter-lived pools (Eriksen and Belk 1999). Creation of a retention basin can alter the hydrology of the landscape, potentially reducing hydrological connectivity amongst vernal pools, if present, within or adjacent to retention basins. Furthermore, the changes in landscape during construction can often displace species.

Park Facilities and Trail Construction

As indicated in Chapter 2, new park facilities, trails, parks, golf courses and other amenities will be constructed within the permit term of the Plan. The City and County have developed plans for several trails within the Projected Future Growth (PFG) areas and the Reserve Acquisition Area (RAA).

The City of Lincoln proposes to construct approximately 60 miles of bikeways within their general plan area (City of Lincoln, Bikeways Master Plan, 2001). The system would connect residential areas with major activity centers in the City of Lincoln, and also provides some regional connections to communities east and south of the city. Additionally, Placer County has a Placer County Regional Bikeway Plan (PCTPA, 2002), that inventories existing bikeways and identifies over 100 miles of upgrades and new paths, including connections to communities within the county.

New trail construction will have permanent and temporary direct impacts similar to those of other capital projects (i.e., permanent conversion of land-cover beneath the footprint of the project, with temporary impacts occurring in a buffer zone around the project site). Ground disturbance due to trail construction could encourage the spread of nonnative species. New trails will be sited to avoid streams and adjacent riparian vegetation to the extent possible in accordance with the conditions identified in Chapter 6. However, some new trails will require creek crossings that may result in removal of riparian vegetation and construction of bridges. While some temporary impacts on streams are likely to occur during project construction, many impacts can be avoided through implementation of BMPs and other mitigation measures (see Chapter 6). Permanent impacts on streams can be avoided through use of appropriate design of crossings (e.g., free-span bridges). Indirect impacts related to development of trails are largely related to their use, and potential for inappropriate behavior (e.g., off-trail hiking, illegal dumping). Indirect impacts related to public use of regional parks and open space as described above in Section 4.3.1, Urban Development, may result from improved trail access to new open spaces, including areas in the Reserve System. These impacts may be minimized through supervision of regional trail use, education of open space users, and restricted or managed access to open space.

Hidden Falls Regional Park Project

Development at Hidden Falls Regional Park has the potential to adversely affect habitats and covered species. The project is currently under environmental review and a Draft EIR has been prepared (June 2009). The proposed project occurs on a 1,200-acre park that has recently been modified to accommodate trails and a parking lot. The ultimate project will be implemented in phases (Chapter 2, Section 2.2.5) that will provide passive and active recreational activities. The improvements include trails (paved and natural), equestrian staging areas, utilities, restrooms, emergency access and pedestrian bridges and picnicking areas.

The Park contains 89 acres of annual grassland, 683 acres of interior live oak woodland, 105 acres of blue oak woodland, 53 acres of black oak woodland, 46 acres of valley foothill riparian woodland, and six acres of freshwater marsh. Coon and Deadman Creek's run through the project site. The area supports suitable habitat for a wide variety of resident and migratory wildlife species. Covered species that could occur on the project site include loggerhead shrike, yellow-breasted chat, yellow warbler, tricolored blackbird, Modesto song sparrow, Cooper's hawk, California red-legged frog, foothill yellow-legged frog, and northwestern pond turtle. Covered species that could occur within Coon Creek and its tributaries include Central Valley fall-/late fall-run Chinook salmon and Central Valley steelhead.

Construction of proposed trails, roads, foot bridges across drainages, viewing boardwalks, septic system, and other structures will impact land-cover directly by converting land-cover beneath the footprint of the project, and indirectly with temporary impacts occurring in a buffer zone around the project site. In addition, such projects could result in temporary and long-term degradation of aquatic habitats, loss of important shaded riverine aquatic habitat functions, and increased injury or mortality of fishes related to increased angling pressure. Other aquatic species also have the potential of being significantly impacted. Additionally, removal of vegetation could impact covered birds.

A draft EIR has been prepared to address impacts of future development at the Park. Several potentially significant impacts were identified in the EIR. Mitigation measures proposed to offset adverse effects include avoiding construction at times when species are most vulnerable, undertaking habitat rehabilitation and restoration, and conducting surveys and monitoring during construction periods. The project will need to obtain permits from the regulatory agencies as needed for future project components. It is anticipated that these activities will be covered by the PCCP. In addition to the required mitigation measures indicated in the EIR, the project would need to implement any additional measures identified in Chapter 6 the PCCP for purposes of permit issuance.

4.3.4 Operations and Maintenance

Infrastructure requiring maintenance includes trails, roads, buildings, pipelines, and park staging areas. Maintenance activities are generally expected to have minimal permanent or temporary direct impacts because the vast majority of these activities occur within the disturbed roadbed or shoulder or in other areas that have been previously disturbed. Operational and maintenance activities are generally minor in terms of disturbance and are mainly designed to extend the life of a particular facility or infrastructure system.

Facility and Utility Maintenance

This is the maintenance of existing facilities such as roads, trails, parking lots, airport property, etc.. A large component of this maintenance is vegetation management. Vegetation management along road shoulders and rights-of-way may have the potential to disturb a narrow strip of habitat for covered species and possibly to injure or kill individuals that occur in this habitat. Impacts can be associated with accessing areas, clearing vegetation in order to perform maintenance activities, or managing vegetation to prevent overgrowth and for fire prevention. Vegetation management conducted during the migratory bird breeding season could also result in the loss of habitat for migratory birds. Impacts related to vegetation management may be permanent or temporary (e.g., trees completely removed may not reestablish, while mowed vegetation will likely regrow in a short time). Maintenance work involving minor grading or soil disturbance could cause increased sediment discharge into watercourses. Implementation of standard BMPs will help reduce temporary impacts of such activities.

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

Existing utility lines, including pipelines, in the Reserve System will likely require maintenance and possibly replacement during the permit term. Most of these lines will be underground and may require excavation to access them. Direct temporary impacts include ground disturbance resulting from excavation, access, and staging. It is assumed that all natural areas disturbed by maintenance activities will be returned to pre-project conditions upon completion of the activity in accordance with the conditions in Chapter 6. Indirect impacts would be similar to those of

other ground-disturbing work and can be avoided and minimized with use of appropriate BMPs.

Vegetation management conducted during the migratory bird breeding season could result in the loss of habitat for covered migratory bird species such as Swainson's hawk, western burrowing owl, ferruginous hawk, yellow warbler, yellow-breasted chat, and tricolored blackbird. Vegetation management will occur outside the migratory bird nesting period, or surveys will be conducted before clearing to avoid these impacts.

Rodent, pest, and invasive plant species abatement activities may be conducted for facilities maintenance using animal traps, pesticides, and herbicides. Pesticides and herbicides have strict handling and application requirements. Applications may have indirect effects on non-target species. These potential effects will not be covered under the Section 10(a)(1)(B) permit (See Section 2.4, Projects and Activities Not Covered by this Plan for more details).

Sewage Pipeline Maintenance

On May 2, 2006, the State Water Resources Control Board adopted the Statewide General Waste Discharge Requirements for Sanitary Sewer Systems, which required sanitary sewer systems to begin reporting all Sewer System Overflows on a State maintained web site and to develop a Sewer System Master Plan (SSMP).

Placer County has prepared a SSMP that outlines maintenance activities associated with the 278 total miles of sewer pipeline and 42 lift stations that serve unincorporated portions of: North Auburn, Granite Bay, Loomis, western Placer County (Dry Creek), Livoti, Sunset Industrial area, Sheridan, Applegate and Blue Canyon.

Placer County has an extensive list of sewer maintenance equipment in inventory for repairing sewer pipes and sewage pump stations. Some of the equipment includes:

- High pressure sewer cleaners;
- A roding machine;
- Backhoes;
- Dump trucks;
- Maintenance trucks;
- Generators; and
- Trailers.

Furthermore, Placer County has a mutual aid agreement with two neighboring agencies the South Placer Municipal Utility District and the

City of Roseville. The agreement includes an equipment list from each agency that can be dispersed to the above listed agencies in case of an emergency.

Sewage pipe maintenance and replacement could have a number of direct permanent and temporary impacts caused by staging, off-road access, pipeline drainage, excavation, repair and/or replacement of sections. Additional maintenance occurs on pump stations, and may include replacement of various components of the station and structure, or the complete replacement of the entire pump station. Depending upon the location of pipes and pump stations, maintenance actions may affect aquatic resources and riparian or upland natural communities. Staging, excavation and off-road access may cause temporary impacts on upland vegetation around accessed pipelines or on riparian vegetation. Off-road access may cause temporary impacts on upland vegetation around accessed pipelines or on riparian vegetation where creek access points are established. Blow-off may cause disturbed soil and vegetation at blow-off locations, increased flows in the receiving channel, and channel erosion. Excavation may be required to access buried pipelines in upland or riparian areas.

Indirect impacts associated with implementation of the SSMP maintenance activities include temporary increases in dust and noise around project areas. Other indirect impacts may result from temporarily altered flows downstream of the site where pipeline water is discharged, such as altering aquatic habitat and temporarily displacing animals from areas with higher streamflows. Additionally, indirect impacts could occur if blow-off water is a different temperature than stream flow, causing a temperature fluctuation in the stream. Impacts would likely be much confined to relatively small areas and would be mitigated by implementation of BMPs. All of the sewage pipeline maintenance projects will implement BMPs that will decrease the extent and severity of impacts.

Sewage pump stations are not manned continuously. They are fully automated and only need to be checked when regular preventative maintenance is performed. Depending on their age and condition, they are checked by maintenance workers as frequently as three times per week and not less than once a week. With the exception of maintenance involving repair or reconstruction, previously described, it is anticipated that routine sewage pump maintenance would not have any adverse impacts on habitat or species. Indirect impacts may include temporary increases in dust and noise around project areas.

4.3.5 Rural Development

@@Rural low-density development within the Plan area is mainly associated with larger sized parcels outside the urban areas. This type of development is expected to be most concentrated in the northeastern

portion of the Plan area over the term of the permit. It is expected that rural development will primarily impact oak woodlands in the northeastern portion of the Plan area directly, through conversion of natural land-cover, and indirectly, through habitat fragmentation and secondary impacts associated with human occupation. The direct and indirect impacts of rural development on natural resources are similar to those discussed above in Section 4.3.1 for urban development. However, because rural development occurs in landscapes less disturbed than those in urban areas, impacts to natural and semi-natural communities and covered species tend to be greater.

Development of homes and associated structures (e.g., roads, garages, barns, stables, vineyards) and non-residential development (e.g., telecommunications facilities, agricultural structures, rural commercial development, recreational use areas) in rural areas will have direct impacts on natural land-cover types in areas where structures and infrastructure are built. While the total footprint of development per acre may be lower than urban development, the impact of habitat fragmentation is higher in rural areas than in urban areas, because the existing landscape is generally less disturbed.

Private roads and driveways are often required to access rural homes. These roads further fragment the landscape, by splitting larger blocks of contiguous habitat into smaller blocks. Roads can potentially degrade movement corridors for covered species. New roads can also create new hazards or barriers to movement for other native species that depend on long-distance dispersal and movement for survival (e.g., black-tailed deer, bobcat, and mountain lion). In addition, roads create corridors for nonnative plants to disperse, which can have an additional impact on native vegetation.

The impacts of fragmentation on wildlife can be variable and species-specific. At the landscape level, fragmentation can reduce habitat quality for species that require large, contiguous patches of habitat, or species that are sensitive to human inhabitation (e.g., songbirds that are susceptible to predation by feral cats). For example, in Placer County, Stralberg and Williams (2002) found that abundance of some wildlife species increased whereas some decreased on oak woodland fragments 40 acres or less. They recommended retaining oak woodland patches at 40 acres or more to further wildlife conservation objectives. In un-fragmented oak woodland, Stralberg and Burnett (2007) found that some birds of high conservation concern had positive associations with the amount of blue oak woodland and montane hardwood woodland at scales of 3-6 mile radius. They concluded that large, un-fragmented blocks of habitat were important to many species but that the diversity of natural habitat types was also important. All of the above activities related to rural development may decrease the health of natural communities and result in harm of covered species. Cumulatively, these rural development projects fragment the landscape and make it more likely that wildlife populations will become segmented and isolated.

Impacts from light pollution and noise may also be significant when introduced into relatively natural areas. Noise from vehicle traffic can disrupt nesting birds and movement patterns of terrestrial animals. New sources of light in formerly unpopulated areas can affect the ability of some species—especially birds, bats, and many species of insects—to navigate at night. Wildlife may also be affected by introduced predators, such as cats or dogs.

Rural development will create new impermeable surfaces that will indirectly impact natural land-cover, including streams, and covered species. Impacts from the creation of new impermeable surfaces are similar to those described above in Section 4.3.1, *Urban Development*. Within the Plan area, impacts to water quality may arise from the use of pesticides and/or fertilizers on small “hobby” orchards or vineyards close to streams. Similarly, new agricultural facilities, such as commercial stables, equestrian event facilities, and wineries, may also produce waste that is rich in nutrients or other potential pollutants to local streams. However, existing County ordinances, as well as strict NPDES permits overseen by the Regional Boards, require many avoidance and minimization measures targeted at protecting water quality in local streams.

Location, number, and capacity of groundwater wells installed at a given site may have indirect impacts on stream flow and riparian vegetation health. If a well(s) is placed in such a manner that it draws down groundwater levels along a reach of stream, that reach may experience reduced flows. Reduced flows can occur either from a reduction in groundwater supporting the streamflow or from the more rapid percolation of flows from the upper watershed into the channel substrate, filling the space once occupied by groundwater. Reduced flows may degrade aquatic habitat for covered fish, amphibians, northwestern pond turtle, and other wildlife, inhibit migration of covered fish, or prevent riparian vegetation from obtaining adequate water.

Cumulative impacts on groundwater levels could occur if multiple wells are drilled into the same aquifer. This impact could be aggravated if residents develop water-intensive agriculture such as vineyards. Water table drawdown could result in changes to vegetation composition. Moreover, lowering of the groundwater table could result in the drying up of seasonal wetlands or seeps and result in the loss of specialized natural communities that they support.

4.3.6 Conservation Strategy Implementation and other Placer County Conservation Programs

The analyses of impacts of conservation actions are separated into two groups: implementation of the PCCP conservation strategy; and other

Placer County conservation programs that are separate from the PCCP. Actions related to the implementation of the PCCP conservation strategy will occur on and off Reserve System lands. Placer County also administers ongoing conservation programs that are separate from the PCCP. These actions will occur primarily outside the Reserve System. All activities within streams and other aquatic resources within Placer County and the City of Lincoln will be implemented according to the CARP. In-stream and riparian conservation activities may occur within and outside reserves.

PCCP Activities within the Reserve System

Activities within Plan reserves are expected to have a net benefit on all covered species (see Chapter 5, *Conservation Strategy*); nevertheless, some conservation actions may have temporary or limited permanent adverse impacts on covered species, resulting in take. In some cases, activities that are designed to benefit one or more covered species may harm other covered species. For example, removal of invasive species to benefit some covered species could temporarily impact covered species that use the invasive species for habitat. Himalayan blackberry is an invasive species that out-competes native vegetation and can dominate the understory of riparian woodlands. Tricolored blackbird colonies, however, use large stands of Himalayan blackberry for nesting. Removing stands of Himalayan blackberry to restore native vegetation can reduce the availability of tricolored blackbird nesting habitat until native nesting habitat (e.g., cattails in marshes) is restored. Overall, the Plan Reserve System is designed to be large and diverse enough to ensure that the net effect of all reserve activities is beneficial to all covered species across the system.

Some habitat enhancement, restoration, and creation activities may temporarily and adversely affect wildlife habitat. For example, planting emergent vegetation in stock ponds could temporarily disturb amphibians occupying the pond. Enhancement of riparian and valley oak woodland may have temporary impacts on terrestrial species. Placement of large woody debris and/or rock structures for fish cover can disturb aquatic species and insects within the stream channel. Cleaning and replacement of spawning gravels may temporarily alter hydraulics desired for spawning and may cause localized sediment transport and deposition downstream. Areas cleared of invasive non-native plants may be re-colonized before native vegetation establishes.

Enhancement of fish habitat may result in inadvertent take. For example, removal of barriers to fish passage can result in temporary re-transport of trapped heavy sediment and smothering of downstream gravels following construction. Activities to remove invasive species from streams and riparian habitats (e.g., *Sesbania punicea*) and to enhance stream habitat (e.g., installation of spawning gravel, coarse woody debris, and rocks) can temporarily add sediment into the water column.

Monitoring and research required by the Plan (see Chapter 7, *Monitoring and Adaptive Management Program*) may also disturb wildlife. For example, in order to determine the presence of some covered species (e.g., California red-legged frog tadpoles), individuals must be handled by a qualified biologist. Such handling constitutes harassment—a form of take—under ESA and requires authorization. All biologists conducting monitoring under the Plan (i.e., PCA staff or their consultants) will be covered for their monitoring activities should any take occur.

Vegetation management to reduce fire hazard, eradicate exotic plants or remove trees hazardous to recreationists all have the potential to disturb or inadvertently harm covered species. Of these, fire hazard reduction is of most importance and is addressed in more detail, below. Guidelines for fire hazard reduction in reserves have been prepared and are included in Appendix E. Recreation or other facilities built by the PCA to support the Plan reserves could result in a small amount of habitat removal. Facilities will be sited and built to avoid or minimize their effects on covered species, but a small amount of take may nevertheless occur. Recreational activities allowed on reserves are expected to have little impact on covered species. Heavily used trails would result in some permanent indirect impacts on wildlife habitat connectivity. Since wildlife is most active at dawn and dusk or at night, disruptions of wildlife movement are not anticipated to be significant. Trails can fragment otherwise intact landscapes and can also facilitate predator movements and invasion by nonnative animals (e.g., feral cats, dogs, pigs). Trails are often a source of invasion by nonnative plant species that are transported into the reserve by trail users. As described in Chapter 5, *Conservation Strategy*, recreational uses will be limited to low-intensity activities such as hiking and wildlife observation. Any new trails will be carefully sited and maintained to minimize the disturbance of habitat and wildlife. Despite these restrictions, some take in the form of harassment associated with recreational activities is expected to affect covered species that are sensitive to human disturbance.

As described in Chapter 2, emergency situations may arise within the Reserve System that could have impacts to covered species and natural communities. However, these activities are anticipated to be rare, and therefore, impacts to covered species are anticipated to be negligible. Most emergency activities, such as evacuation of injured persons or repair of structures, will likely have very few impacts, either because the activity is not ground disturbing, the activity is contained in a small geographic area, or because the activity occurs in already developed areas. Fighting of small wildfires or structure fires may have impacts associated with fire containment such as access to the burn site, construction of fire breaks, and use of fire retardant. Natural sites disturbed by such activities will be restored to pre-emergency conditions or allowed to recover naturally, as appropriate, once the emergency has ended.

Fuel Management

Each reserve will have a fire management component included within the PCCP reserve management plans. The fire management component will describe site-specific conditions and actions required to: 1) reduce existing fuel loads; 2) re-introduce fire as a natural process of the ecosystem (if relevant); 3) minimize environmental impacts and protect sensitive resources; and 4) enhance and/or restore natural community characteristics.

The type of fuels treatment to be applied to a specific area depends on the type of vegetation, the amount of existing fuel, and the potential for development of ladder fuels. Of the natural communities to be protected within the Reserve System, oak woodlands and some riparian woodland have the greatest potential for having high fuel loads. Oak woodland, in particular, may have relatively high inherent fire risk because of fuel loads, steep terrain, and limited accessibility.

In vernal pool grasslands, fine surface fuels are predominant. Management may entail using prescribed fire, grazing or mowing to keep fuel loads under control. Environmental impacts of fuel management will be limited, but could temporarily reduce the extent of available foraging and nesting habitat for grassland birds such as Swainson's hawk, western burrowing owl, loggerhead shrike, northern harrier, ferruginous hawk, and grasshopper sparrow. Actual impacts will depend on the seasonal timing of controlled burns; however, controlled burns will be conducted outside of the nesting season to minimize take of birds (see Appendix E). Other covered species, if present in vernal pool grassland habitats, could be impacted by prescribed fire. Prescribed burning is intended to provide a net benefit for natural communities and covered species by enhancing and maintaining beneficial conditions for covered species. For most vernal pools grassland complexes, however, grazing will be the predominant fuel management tool since it has the ability to maintain native plant and aquatic organism diversity, to have beneficial hydrologic impacts and to minimize invasions by invasive non-native species (Marty 2004; Marty 2005; Marty 2007; Pyke and Marty 2005). An additional benefit is reduced fuel loads.

Treatments intended to reduce fuel loads in forest and woodland settings are more complex. Surface, ladder and canopy fuels are often all present. Highest priority is usually placed on reducing ladder and surface fuels because they connect the tree canopy with the ground. Recommendations for oak woodlands and riparian woodlands include installation of "shaded fuel breaks" (zones in which ladder fuels and overall density is reduced) and strategically placed areas of fuel reduction within reserve parcels. Methods used to conduct these operations fall into four general categories: 1) mechanical (mechanized) harvesting; 2) hand harvesting; 3) prescribed fire; and 4) grazing and browsing mainly to reduce surface fuels. Creating and maintaining fuel breaks will have minor direct impacts on natural communities by clearing habitat and

disturbing grounds on and around staging areas. Creating and maintaining fuel breaks may result in take of some covered species, if they are present in the area to be cleared for fuel breaks, and do not flee. In the context of managing conservation reserves, considering these impacts and mitigating them is of equal or greater priority to reducing fire risk. A principal constraint on fuels management is maintaining the habitat and ensuring that there are no significant impacts on covered species or biodiversity, generally. For this reason, extensive best management practices have been developed for fuels treatments in reserves (see Appendix E). Some recommendations included restricting removal of large trees and snags, limiting times and types of operations, and avoiding mechanized treatments in sensitive areas.

The overarching desired outcome of the PCCP fuels management program is to reduce the risk of habitat destruction caused by moderate to high severity wild fires. Risk reducing treatments must be undertaken without sacrificing the ecological values of conservation reserves or having significant impacts on PCCP covered species. Although temporary impacts to natural communities and covered species will occur during treatments, ignoring the hazard and gambling on avoiding future fires may ultimately have more severe, permanent impacts. In all cases where fuels treatments are proposed, site-specific assessments and prescriptions will be required.

PCCP Activities outside the Reserve System

The Plan may include conservation actions that will occur on private lands outside the Reserve System. As discussed in Chapter 5, these actions will require agreements to be reached with landowners regarding the installation and maintenance of the conservation actions. Actions that occur outside the Reserve System will occur primarily along stream and riparian areas. Conservation actions outside the Reserve System are listed below (see Chapter 5 for details).

- Stream barrier removal or modification;
- Landowner outreach and education programs that target landowners along streams. Willing landowners may receive technical assistance from the PCA to reduce erosion and sedimentation into nearby streams;
- Removal of invasive weeds in streams;
- Installation of woody debris or rocks to enhance aquatic habitat in streams; and
- Installation of spawning gravel.

Monitoring for covered species and natural communities may also occur outside the Reserve System, particularly on streams. Some monitoring actions may result in temporary harassment of covered species in order to identify, measure, or tag individuals.

Placer County Conservation Programs

Placer County, through the Placer Legacy Plan, is committed to protecting and managing open space for the preservation of agricultural and rangeland heritage, scenic vistas, recreation opportunities, and native habitat. Implementation of the Placer Legacy Plan includes property acquisition, easement negotiation, stewardship promotion, and restoration and enhancement actions.

The Auburn Ravine/Coon Creek Ecosystem Restoration Plan (ARCCERP) and the Dry Creek Coordinated Resource Management Plan (DCCRMP) were written, by a consortium of watershed stakeholders, including Placer County, to inform the watershed restoration and enhancement component of the Placer Legacy Plan. The ARCCERP and the DCCRMP provide the rationale for, and prioritization of, specific upland, riparian, and in-stream actions to benefit ecosystem function and riverine and riparian special status species. Because impacts associated with each of the three above-mentioned plans overlap considerably, they will be discussed together in this section.

The action of acquiring property, obtaining easements, or promoting stewardship, as described in the Placer Legacy Plan (Placer County 2000), do not have direct, on-the-ground impacts. The indirect impacts of stewardship promotion are similar to those that would occur directly from the restoration and enhancement components of the Placer Legacy Plan, and by extension, the ARCCERP and the DCCRMP.

Implementation of the Placer Legacy Plan, ARCCERP, and DCCRMP will generally have temporary impacts caused by construction or restoration activities. Overall, these projects will provide a net benefit to natural and semi-natural communities and covered species by improving ecosystem integrity, resiliency, and connectivity. All anticipated impacts are listed below, followed by a short discussion describing their nature and persistence, as well as any associated mitigation techniques such as BMPs or LIDs.

- In-stream or near-stream activities such as grading, heavy equipment use, soil moving, or vegetation removal will temporarily increase the amount of suspended sediment in streams;
- Removal of streamside vegetation for streambank restoration or invasive species management will result in the temporary loss of shade, cover, and soil stability;
- Temporary dewatering of aquatic habitat for gravel augmentation, fine sediment removal, barrier or diversion modification, streambank stabilization, channel realignment, etc. will temporarily reduce or eliminate habitat for covered species;
- Construction equipment working within or near streams could spill petrochemicals which could pollute soils and waters;

- Handling and relocation of rare and protected species to avoid mortality during temporary construction activities
- The construction of impermeable surfaces such as trails, trail connectors, nature and heritage centers, scenic byways, etc. will cause an increase in runoff during periods of rain; and
- Introduction of human-generated noise and litter introduced into previously inaccessible areas with the creation of recreational trails in acquired open space areas.

Sedimentation, vegetation removal, and the temporary dewatering of stream reaches are the standard result of riparian and in-stream restoration projects. Stream channel realignment, stream bank setback, invasive weed eradication, gravel augmentation, and in-stream barrier modification projects all have the potential to require use of heavy equipment, which leads to sedimentation, vegetation removal, and stream reach dewatering.

Sediment input into streams, in particular those fine sediments mobilized during construction, impact aquatic species by increasing turbidity, filling important deep pool habitat, and clogging the interstitial spaces between cobbles and gravels. Increases in turbidity decreases the foraging success of fish and can create negative physiological and behavioral responses which lead to increased susceptibility to predation and disease. The loss of complex habitat, such as deep pools, due to sediment infilling, decreases the overall diversity of in-stream habitat for Central Valley steelhead and Chinook salmon, and the aquatic plants and insects that make up the foundation of the riverine food chain.

Removal of vegetation not only increases the risk of erosion by destabilizing soils, but also decreases shade, cover, and habitat complexity for Central Valley steelhead and Chinook salmon. The removal of plants and their associated root structures loosens soils and increases the potential for sedimentation. The decrease in tree and shrub canopy, and the shade it provides, can result in increased stream temperatures which can have negative physiological and behavioral implications for salmonids and other aquatic species. Vegetation removal can also remove cover for small mammals, birds, and reptiles. Intact riparian forests provide the bank stability necessary to create complex habitat such as undercut banks, back channels, runs, riffles, pools, as well as the large woody debris necessary to create scour pools, in-stream shade, and escape cover, all of which are very important habitat characteristics for healthy salmonid streams.

Dewatering of stream-reaches causes the temporary loss of habitat and requires the collection, handling, and relocation of any rare aquatic species, most notably salmonids. The handling of rare species is considered harassment by the USFWS and can lead to an increased risk of predation, disease, and mortality. Further discussion on the handling

of rare species can be found in Section 4.3.6, *Conservation Strategy Implementation*. More information on the impacts of sedimentation, vegetation removal, and dewatering can be found in Section 4.3.2, *In-stream Projects*. BMPs, LIDs, and other mitigation measures meant to limit, minimize, or avoid the above-mentioned impacts are discussed in Chapter 6.

Petrochemical pollution associated with the use of heavy, motorized equipment during in-stream and riparian construction activities can cause direct mortality of aquatic species or cause less severe, less obvious problems such as increased susceptibility to predation and/or disease.

The Placer Legacy Plan calls for the creation of cultural heritage and nature interpretive centers. These buildings and their associated parking lots will slightly increase the impervious surface footprint of the PCCP. The impacts associated with impervious surfaces include faster water flows which can result in modified stream geomorphology, increased stream temperatures, and the loss of soil biofiltration capabilities. Many of the impacts associated with the addition of impervious surface can be mitigated with the use of low-impact development strategies discussed in Chapter 6.

The creation of increased public access to open space will bring increased litter and noise into areas where they had previously not been. Litter can not only end up in waterways, but can increase the incidence of scavenger species such as corvids, rats, and pigeons. These species can have negative impacts on other native species, by depredating bird nestlings. An increase in noise can cause certain species to vacate historical nesting or foraging habitats, leading to a regional decline.

4.4 Impact Assessment Methods

Implementation of covered activities will result in some incidental take of covered species. The amount of take must be discussed, and where possible, quantified to meet regulatory requirements, to properly mitigate effects, and to distribute fees equitably. The allowable amount of take from permanent direct impacts is described quantitatively by estimating impacts on land-cover and identifying a cap on impacts by land-cover, as necessary (see Table 4-1, Estimated Land Conversion Impacts Over Permit Term).

Future take of covered species is estimated by assessing permanent direct impacts on modeled habitat for covered species (Table 4-2, Estimated Permanent Impacts on Covered Species Habitat). The amount of take from indirect and temporary impacts is discussed qualitatively. A discussion of how the impact estimates were derived is provided below in Sections 4.4.1, Direct Effects, and 4.4.2, Indirect Effects.

Because of the broad geographic and temporal scope of the Plan, the impact assessment has been conducted at a programmatic level. The impact numbers presented in this Plan are intended to reflect approximate losses and impacts rather than a precise quantification of impacts on land-cover types. The impacts described in the Plan (see Tables 4-2) are proposed as the maximum take allowable under the permit. Once these impact levels are reached, no further take is permitted pursuant to the Plan. The PCA tracks impacts during plan implementation to ensure that no covered activities are conducted beyond the capped impacts. As covered activities are implemented, specific impacts will be more accurately quantified. Quantification of project-specific impacts will generally occur in conjunction with the CEQA process and/or the development permit application process with a local jurisdiction (see Chapter 6). The goal of the impact analysis is to identify practical, appropriate, yet conservative impact assumptions to ensure the Permittees full coverage for implementing covered activities throughout the permit term and to adequately fund the conservation strategy.

4.4.1 Direct Effects

Assessment of take of natural communities and covered species is based on estimates of conversion of land-cover types due to predicted urban and suburban growth over the next 50 years. Predicted future growth was based on demographic projections general plans, other land use development proposals, and assumptions of future land-use densities (see Appendix J for detailed methods). The estimate of land conversion is based on allocation of predicted growth to the present landscape using assumptions on urban in-fill planned and proposed new development areas, rural residential development trends, and developability of various land-cover types.

Impacts to natural communities were inferred from impacts to the land-cover types that characterize each natural community (see Table 3-3 for natural communities and their corresponding land-cover types). Impacts to covered species were inferred by quantitatively evaluating impacts to modeled species habitats, which used land-cover types as proxy of habitat affinities for covered species.

The take assessment is intended to provide an estimate of the magnitude, character, and location of land conversion and associated take. The take assessment is also intended to show the approximate form of actions under the Plan to allow a financial analysis, to show the approximate proportionality between take and mitigation, and to demonstrate the feasibility of attaining biological goals. The same methodology was used to identify the magnitude, character, and location of land suitable as mitigation of take and incorporation into the regional Reserve System. That regional Reserve System is evaluated according to the biological objectives to see how it may serve natural community and covers species conservation needs.

The Plan is intended to accommodate a certain amount of take of natural communities and covered species. Actual conditions will differ from the predictions based on present data and assumptions. In particular, growth patterns over the next 50 years may differ from those used in the analysis. Impact in excess of that described in the take assessment may not be accommodated, however, and will not be covered by the permit without amendment. The analysis is conducted in 10-year increments. The 10-year analytical increments establish milestone points which will guide Plan implementation based on revised projections of take and required mitigation.

Effects on Covered Species Habitat

Covered species were assumed to be directly impacted by urban and rural development if such development was projected to occur, based on the growth projection model, on the modeled habitats for covered species. This method uses habitat models that identify the location and amount of specific land-cover types assumed to be suitable for each species (see Tables 3-3 and 3-3 and species model descriptions in Appendix D). As described in Chapter 3, these estimates of suitable habitat are likely to be somewhat inflated because (1) habitat models may overestimate the actual extent of suitable habitat, and (2) not all suitable habitat is occupied by the subject species. Therefore, species habitat (modeled as land-cover types) is used as a proxy for species occurrence because of the limitations of survey data. For covered plants, impacts were also assessed based on modeled habitat and occurrence data, when available. The amount of potential permanent impacts (in acres) to modeled habitat for covered species is shown in Table 4-2.

4.4.2 Indirect Effects

Unlike direct impacts, which are estimated quantitatively, indirect impacts are assessed qualitatively. The indirect impacts on covered species are discussed in narrative form in Section 4.6, below, and above in Section 4.3, Impact Mechanisms, for specific covered activities.

4.5 Effects on Natural Communities/Land-cover

The quantitative measure of take of biological resources and subsequent conservation is the estimated areal extent of land-cover affected by urban and rural development. Table 4-1 summarizes the amount of permanent impacts, in terms of acreage, to each land-cover type that is projected to be converted to urban and rural development over the 50 year term of the permit. These land conversion acreages are the primary guide used for assessing mitigation requirements, and the methods and timing of assembling reserve lands in the conservation area. Mitigation for this take is discussed in Chapter 5.3.1, *Land Acquisition Actions*. Other covered activities such as pipeline maintenance or trail construction may

have long- or short-term impacts on small amounts of habitat. Such covered activities are expected to be less than 1% of the forecasted land conversion impacts. The acreages in Table 4-1 account for all permanent habitat conversion under the PCCP.

In most cases, the data provided and assumptions made were reasonable worst case assumptions of future project impacts. The actual impacts of specific projects over the permit term of 50 years may vary from those presented in the tables; they will likely be less than the estimated impacts.

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

4.6 Effects on Covered Species

This section describes the potential direct and indirect effects and level of incidental take of covered species. The amount of incidental take of covered species has been estimated in accordance with the methods described in Section 4.4, *Impact Assessment Methods*.

Estimated quantitative impacts on covered species are provided in Table 4-2. Qualitative descriptions of direct and indirect impacts are provided below. Estimated impacts are likely to be inflated because they do not account for project-by-project avoidance and minimization measures that will be applied to comply with the conditions detailed in Chapter 6. For example, buffers around Swainson's hawk nests will minimize and avoid potential take of Swainson's hawk (i.e., eggs and nestlings). Estimated impacts are also inflated because the habitat models for the covered species may overestimate the actual extent of suitable habitat and because a species may not fully occupy its modeled suitable habitat. Mitigation obligations are based on habitat loss rather than loss of known populations of the species due the lack of data on species occurrences. Under the Endangered Species Act, take of species can occur as a result of inflicting harm. "Harm" is defined by regulation as "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering" (50 CFR 17.3).

Consistent with this definition, take of covered species will occur under the PCCP's covered activities primarily through significant habitat

modification or degradation stemming from urban development. Covered activities could result in the conversion to urban use of an estimated 50,000 acres of undeveloped natural and agricultural lands in western Placer County by Year 2060.

Take could occur from infrastructure improvements that support existing or new development, and from the long-term indirect effects of development. These activities may result in death or injury due to habitat loss.

Take could also occur through the direct killing, injury, or harassment of individual animals. Construction activities on vernal pools will crush vernal pool crustaceans and draining or filling of wetted areas will cause desiccation. During construction activities, fossorial animals (e.g., western spadefoot and western burrowing owl) could be struck or crushed on the ground surface by construction related vehicles or heavy equipment, or entombed inside their burrows during surface disturbing activities such as grading or trenching. Aquatic animals such as fish, vernal pool invertebrates and California red-legged frog, could die or be displaced as a result of draining of their wetland habitats, alteration of hydrological regimes, or habitat degradation through sedimentation or pollution. For plants, adverse effects could occur as a result of direct removal, crushing, or burial by vehicles and construction related activities (e.g., grading), eaten or trampled by livestock, or from the alteration of hydrological regimes.

Some animals may survive initial site disturbance and habitat loss and be forced onto adjacent areas but may ultimately die as a result of starvation, exposure, or predation if such areas do not provide suitable habitat. Even if these animals reach other habitats, they may still face competition and reproductive exclusion if such habitats are already at carrying capacity. In some cases, individual animals (e.g., Swainson's hawk nestlings) could die of starvation because of the loss of foraging habitat in a given area or near a given nesting territory. In other cases, indirect effects of development on remaining adjacent habitats will occur through increased water pollution, traffic and pet populations, (which prey on some of the covered species), and inadvertent alteration of hydrological regimes (e.g., converting an ephemeral stream to a perennial stream). Each of these effects, in the long-term, can contribute to death or injury to covered species or declines in their populations.

4.6.1 Vernal Pool Crustaceans and Plants

Crustaceans: Vernal Pool Fairy Shrimp, Vernal Pool Tadpole Shrimp, Conservancy Fairy Shrimp

Plants: Bogg's Lake hedge-hyssop, Dwarf Downingia, Legenere, Ahart's Dwarf Rush, Red Bluff Dwarf Rush

Vernal pool crustaceans and plants utilize vernal pools year round, since they may be present as cysts (clumps of eggs that remain dormant when vernal pools are dry), seeds, or adults during the wet season when pools are flooded. Covered vernal pool species are restricted primarily to vernal pools, vernal pool complexes, and seasonal wetlands, thus the impact on these species are directly related to the impacts on these land-cover types. The distribution of covered vernal pool species within the Plan area is poorly known, due to the fairly low level of survey effort throughout the Plan area. Therefore, direct impacts are assessed primarily to modeled habitat.

Direct Effects

Expansion of urban and suburban development into vernal pool habitat is expected to have the most significant direct effect on the vernal pool species through the elimination, loss, or modification of vernal pool complexes. Within the Plan area, 20,000 acres of existing vernal pool habitat, including 3,222 acres of grassland with a high density of pools, is contained within the Potential Future Growth area. Another 17,800 acres of vernal pool habitat, including 2,966 acres of grassland with a high density of pools, is contained within the Reserve Acquisition Area. It is estimated that approximately 12,000 acres of vernal pool habitat in the Potential Future Growth area has the potential to be impacted over the 50 year permit term. This represents approximately 48% of the habitat within the Plan area.

Vernal pool complex land was mapped recording attributes of density and level of present disturbance. For high density vernal pool complexes (greater than 5% wetland) the surrounding area of contributing hydrology was mapped using a 250 foot default buffer. Table 4-3, (Attributes of Affected Vernal Pool Complex Lands), provides more detail on characteristics of potentially affected areas.

Direct impacts to modeled habitat for each vernal pool species are provided in Table 4-2. Direct impacts to modeled habitat differ between some species as their modeled habitat reflects species-specific habitat requirements.

The establishment of the Reserve System will make more vernal pool habitat accessible to the public. Plan implementation will increase access to vernal pool habitats when they are added to the Reserve System.

Recreational activities will be restricted to avoid impacts to vernal pools, and new trails will be sited to avoid direct impacts to vernal pools; however, visitors may go off designated trails and trample vernal pool species.

Covered vernal pool crustaceans and plants are also susceptible to losses due to construction, operations and maintenance of infrastructure, and all forms of vegetation management. Operations and maintenance activities that require accessing areas off established roadways could cause individuals to be crushed or habitat to be altered. If such activities require vegetation clearing or ground disturbance, they could remove suitable habitat for covered plant species. Additionally, Plan implementation activities, such as controlled burns, could affect covered vernal pool species. However, the net effect of such Plan implementation activities would be beneficial for all these species by protecting and expanding habitat within the Reserve System.

Indirect Effects

As future development occurs throughout western Placer County, indirect impacts can be substantial. These impacts may occur from many sources, but typically occur as a result of runoff and erosion associated with impervious surfaces and construction, habitat fragmentation, and the introduction of non-native plant species.

Any type of development or covered activity that alters the hydrology in a watershed that supports vernal pools and vernal pool complexes could indirectly impact vernal pools and therefore, vernal pool covered species. Impacts that change drainage patterns can disrupt pool hydrology, including the magnitude and duration of inundation. Changes in hydrological patterns could also curtail the movement of nutrients into the pool from overland flow (Rogers 1998). Covered species could be impacted if ponds no longer receive enough water or too much water to support their physiological and life history requirements (e.g., reproduction, survival). Changes to the hydrological regime of pools could also make vernal pool habitat more amenable to invasive plants, which out-compete native species for resources and can crowd out native vernal pool plants.

Non-native invasive species may also be introduced as a result of human encroachment and neighboring development and are a threat to vernal pool invertebrate communities. There is concern that bullfrogs (*Rana catesbeiana*) may feed upon federally protected vernal pool crustaceans (Balfour & Morey 1999). Additionally, exotic manna grass (*Glyceria declinata*) and Italian rye grass (*Lolium multiflorum*) may invade vernal pools and create heavy thatch that decomposes and oxidizes the water within the pools (Rogers 1998), subsequently reducing habitat quality for vernal pool crustaceans and plants. Finally, people may introduce the non-discriminating predatory mosquito fish (*Gambusia affinis*) into vernal pools to control perceived local mosquito problems.

Run-off from roads into vernal pools may carry petroleum products or sediment derived from vehicles, paving or road maintenance activities. Pesticide, fertilizer, and sediment from developed areas may also be conveyed to occupied habitat. Lastly, ground disturbance from development activities may loosen soil that may enter the watershed and be conveyed to occupied habitat as sediment. Non-point source pollution of this nature may be injurious to vernal pool invertebrates and plants.

Habitat fragmentation can indirectly impact vernal pool invertebrates by reducing movement of cysts and seeds between pools and complexes, effectively reducing genetic interchange between populations. Fragmentation creates patches of smaller vernal pools, which may be less attractive to foraging waterfowl and shorebirds. These birds transport cysts of vernal pool invertebrates, which may make fewer visits to isolated or small complexes, and transport fewer cysts to and from such pools. Habitat fragmentation can also isolate vernal pools, potentially reducing the transfer of pollen between wind and animal pollinated species, thereby reducing reproductive success. None of the covered plants rely on animals for pollination; Ahart's dwarf rush and Red Bluff dwarf rush are wind pollinated.

Expansion of urban development into areas that support vernal pool habitats will likely cause an increase in recreational use of vernal pool habitats. Off-trail use of vernal pools (hiking, bicycling, horse-back riding, and vehicle-use) damage vernal pools by causing erosion and crushing or displacing organisms in the pools. Many vernal pool wetlands are used for "mud bogging", where off road vehicles are driven around and through a pool; this activity is especially damaging to vernal pools, as it causes great damages to pool topography and crushes organisms in the pools. Off-road vehicles cut deep ruts, compact soil, destroy native vegetation, and alter vernal pool hydrology (USFWS 2007). Because vernal pool fairy shrimp cysts appear to be easily crushed (Hathaway et al. 1996), the abundance of this species in affected pools could be especially reduced by off-trail disturbance (USFWS 2007).

4.6.2 Covered Fish

Central Valley Fall/Late Fall-Run Chinook Salmon, Central Valley Steelhead

Fish species are highly susceptible to loss and fragmentation of riverine and riparian habitats. Species that occur in these habitats are usually affected by changes in land use adjacent to the riparian corridor and by the development of permanent infrastructure within the natural floodplain. Riverine and adjacent riparian habitats support resident species that complete their life cycles in an aquatic environment; these areas also provide critical movement corridors for several wide-ranging species as they move between habitats seasonally or use river/riparian corridors to disperse.

Direct Effects

Covered and other native fish species will be affected by any projects implemented within the stream channel or that result in the removal of riparian vegetation. Ground-disturbing activities, such as maintenance of stream banks, levees, and channel rights-of-way (e.g., bank repair, vegetation management), could increase erosion and sediment discharge, degrading water quality. Projects that involve permanent infrastructure (e.g., bridges and roads) could further decrease habitat value, both in the immediate project vicinity and downstream.

Flood protection and levee reconstruction may directly impact covered fish species if stream corridor habitat is converted from natural or earthen to hardscape (e.g., concrete or riprap). However, whenever possible, flood protection projects will incorporate habitat enhancements for fish such as low-flow channels that maintain deeper, faster flows throughout the year and channel bank setbacks that provide a floodplain area that can support riparian vegetation. It is possible that a flood protection project, once completed, will provide better habitat for covered fish than previously existed. In addition, no new fish passage barriers will be constructed. However, the net effect of such Plan implementation activities would be beneficial for all these species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Some impacts to covered fish species caused by in-stream activities are discussed above in Section 4.3.2, Impact Mechanisms, In-Stream Projects, and Section 4.3.6, Conservation Strategy Implementation and other Placer County Conservation Programs. Indirect effects will include impacts to hydrology and water quality caused by greater levels of urbanization in watersheds drained by streams supporting anadromous fishes. Non-point source pollution has the potential to degrade water quality to the extent that fish, especially juveniles, are adversely affected. Changes in peak flows or sediment discharge to streams could have incremental impacts on in-stream habitat quality. Intensified land uses adjacent to streams can cause disturbance to species due to increased human uses and associated noise and light.

Temperature

The loss of riparian cover resulting from covered activities could contribute to a net increase in stream water temperatures throughout the Plan area. The localized loss of vegetation and the concomitant loss of shade could result in elevated water temperatures and warmer flows downstream.

Sediment Dynamics and Channel Substrate (Geomorphology)

Most studies of salmonids indicate that behavioral and/or physiological responses to suspended sediment loads occur at concentrations of about 250 mg/l or more and that mortality occurs only at much higher concentrations (Griffin 1938; Phillips 1970; Whitman et al. 1982; Newcombe and Flagg 1983). Stress from suspended sediment is therefore associated only with larger, heavier sediment and not with the fine particulates associated with turbidity plumes. However, the accumulation of fine sediment in gravels used for spawning can reduce the permeability of gravel to dissolved oxygen, thereby suffocating eggs. The filling of interstices of stream gravels (embeddedness) and the filling of pools can reduce the availability and/or quality of rearing habitat. Such pools provide suitably cool temperature and refuge for young-of-year and yearling steelhead. Fine sediment can also reduce insect abundance and increase stream turbidity, both of which reduce feeding success by juvenile salmon and steelhead.

Increases in peak flows can alter sediment transport processes in a stream. The potential effects are complex and vary from stream to stream. They can include increased bed and bank erosion, scouring and deposition and even channel avulsions (changes in channel location). Naturally occurring extreme peak flows in unregulated watersheds will have similar impacts. Effects on covered fish species can include sedimentation in spawning gravels, scouring of redds (spawning nests for salmonids) and consequent impacts on eggs and loss of rearing habitat.

Covered activities that require instream work, as described in Chapter 2 (e.g., channel maintenance, bridge construction, barrier removal, and stream restoration) will generate increased turbidity in areas downstream of the work performed. BMPs will reduce the potential for most suspended sediments to be transported downstream, but very fine particulates may remain suspended in the water column. Because BMPs will be implemented during construction, repair, and maintenance of facilities, and because work will be restricted to the dry season or to areas where the work is isolated from the active stream with temporary barriers, the short-term and narrowly distributed increase in concentration of suspended sediment will be below levels that would cause stress.

Urbanization

Urban development and other covered activities will result in increased impervious surface area in each watershed in the Plan area, leading to increased peak storm runoff. While restrictions on covered activities will help minimize runoff discharge from new impermeable surfaces, there may be some impact on covered fish species. An increase of impervious surfaces within a watershed due to urbanization may result in changes to in-stream flow, turbidity, temperature, and stream geomorphology.

Increases in impervious surfaces can also result in increased sedimentation and water pollutants in local streams, particularly during “first flush” rain events. Herbicides, pesticides, and other toxic materials can cause diminished reproductive rates or increase mortality rates of fish or their food sources. Fertilizers and other organic materials can cause algal blooms that decrease dissolved oxygen levels, while fine sediments may degrade spawning beds. Studies reveal that fish diversity declines with increasing development in a watershed; sensitive species tend to be lost and are replaced by more pollution-tolerant and/or non-native species (Center for Watershed Protection 2003; EOA, Inc. 2001).

Changes in land use that reduce natural land-cover and increase impervious surfaces in areas adjacent to riverine habitats can also lead to increased disturbance of species (e.g., reduced foraging and reproductive success) due to increased sources of noise, light, neighborhood runoff (e.g., fertilizers, oil), and introduced species.

Urban development and agriculture have historically been cited as the causes of degraded watershed health and fish habitat. A recent study also implicated exurban land use as a cause of watershed degradation (Lohse et al. 2008). This study found that increases in exurban development within a watershed resulted in losses of high quality in-stream habitat. In addition, the study indicates that exurban development may have a greater relative impact than urban development on stream conditions because exurban development generally occurs in areas that are less developed and have existing high quality habitat (Lohse et al. 2008).

4.6.3 Covered Amphibians

Foothill Yellow-Legged Frog, California Red-Legged Frog, and Western Spadefoot Toad

California red-legged frog and western spadefoot toad use a diversity of aquatic habitats, including vernal pools (primarily western spadefoot toad), fresh emergent and seasonal wetlands, stock ponds, and riverine and riparian habitats. Foothill yellow-legged frog primarily use riverine and riparian habitat. These species are also affected directly and indirectly by impacts to adjacent uplands because they use upland habitat near aquatic habitat for movement, aestivation, and other functions.

Direct Effects

Covered activities that remove or impact vernal pool complexes, fresh emergent wetlands, seasonal wetlands, marshes, ponds, or rivers and streams will directly affect these species, if present. In addition, the removal or degradation of upland habitat could prevent individuals from completing their life cycles or dispersing to other habitats. Control of ground squirrel populations (e.g., rodent control) or the removal or

excavation of rodent burrows would reduce the availability of aestivation habitat for these species. Removal or excavation of rodent burrows occupied by aestivating individuals could result in the direct mortality of these amphibians. Covered activities that remove vegetation from the edges of wetlands and riparian corridors or from within aquatic habitats will reduce habitat heterogeneity and adversely affect these species. Covered activities that fragment and isolate breeding pools from adjacent upland habitats will reduce the overall productivity of these species. Isolation of breeding populations could cause those populations to go extinct, if they rely on immigration of individuals to maintain their population.

These species, particularly foothill yellow-legged frog, will be affected by any projects implemented in the habitat range within the stream channel or that result in the removal of cobblestone substrate or riparian vegetation, particularly in reaches above reservoirs. Ground-disturbing activities, such as maintenance of stream banks, levees, and channel rights-of-way (e.g., bank repair, vegetation management), could increase erosion and sediment discharge that could disrupt breeding. Projects that place structures in channels (e.g., culvert installation), or that require stream access, may crush individuals and expose adults, metamorphs, and tadpoles to unsuitable conditions (e.g., predators, high temperatures).

Increased vehicular traffic following road widening or creation of new driveways/access roads within dispersal habitat for reptiles and amphibians will increase the number of individuals that are killed or injured on roadways.

Short-term construction-related impacts on covered amphibians include degradation of water quality and generation of dust. Amphibians have permeable, exposed skin and eggs that may readily absorb substances, including toxins, from the environment. Their eggs are laid in water or in moist areas, and their larvae live in aquatic habitats. Because amphibians are intimately tied to an aquatic or mesic environment, the quality of the water in which they live can affect their growth, development, and survival. Pollutants, runoff of pesticides, waterborne pathogens, and sediment can affect water quality, and which can in turn affect amphibians. Even when living their portion of the life cycle on land, the amphibian's skin is more-or-less freely permeable to water and to air and has no natural barrier to water loss. Thus, although they do have lungs, a portion of the oxygen that they require is acquired through diffusion through their skin. Dust settling directly on them or within areas where they may become covered with it has the potential to interfere with the oxygen diffusion process. Dust can also transport other compounds that may affect amphibians, and other substances can be tightly bound to dust particles. If settled dust, as sediment, is transported into aquatic ecosystems, these substances can be released and may be toxic to amphibians. Dust can also be bound to pesticides, and, if the dust settles directly on the animal, the chemical can be absorbed directly through their

skin. However, the net effect of such Plan implementation activities would be beneficial for all these species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Indirect effects resulting from urban development and other covered activities could degrade vernal pool wetland, pond, and riverine habitats that support these species. Urbanization and other covered activities could indirectly impact covered amphibians by increasing water temperatures and sedimentation of the waters which support this species. Changes in land use in areas adjacent to breeding sites can reduce the overall habitat quality of upland habitats for these species. Urban development adjacent to breeding habitat could result in increases in predation rates of covered amphibians by predators that thrive in human-dominated environments (i.e. domestic pets, raccoons, coyotes, and skunks). This predation can have a detrimental impact on local populations. Additionally, increased vehicular traffic from population growth and the development of new roadways to support new urban development could increase the number of individuals that are killed or injured on roadways.

Urban development and other covered activities may facilitate the introduction, establishment, and spread of nonnative invasive plant and animal species. Once established, some invasive species have the ability to displace or replace native plant and animal species, disrupt nutrient and fire cycles, and cause changes in the pattern of plant succession, all of which may impact covered amphibian habitat. Native amphibian populations may be threatened from exotic invasive species of plants and animals, including other reptiles and amphibians. As habitats are changed and plant community organization is modified by exotic species, the relationships between plants and animals may be altered or eliminated. Argentine ants are more aggressive than native ants and have been found to displace the natives and are now widespread throughout California. These ants may also play a role in disrupting and depressing the arthropod community within natural areas, and, therefore, might affect a number of amphibian species (Haas et al. 2002).

Urban development and other covered activities will cause an increase in the amount of runoff into aquatic systems, and therefore, habitat used by covered amphibians. Runoff may transport sediment and toxins into occupied habitat, which could impact covered amphibians, as described above. See Indirect Effects in Section 4.6.2, Covered Fish, for further discussion of the impacts caused by increased runoff and sedimentation.

The amount of artificial light will increase with urban development. Artificial light can affect the physiology and behavior of animals, leading to ecological consequences at the population, community, and ecosystem levels. Aquatic ecosystems may be particularly vulnerable to such effects

and nocturnally breeding animals such as frogs and other amphibians may be especially affected (Baker and Richardson 2006).

4.6.4 Northwestern Pond Turtle

Northwestern pond turtles utilize aquatic habitats, including wetlands, stock ponds, lacustrine, riverine, riparian, and canals for cover, foraging, and other functions. Northwestern pond turtle also uses adjacent upland habitats for nesting, dispersal, and aestivation. Impacts to aquatic and adjacent upland habitats will therefore directly and indirectly affect northwestern pond turtle.

Direct Effects

Urban development and other covered activities that eliminate aquatic and terrestrial habitats will directly impact northwestern pond turtle. Covered activities that remove or degrade wetlands, marshes, stock ponds, riverine, riparian, and canal habitat could directly affect this species. Covered activities that remove vegetation and basking sites from the edges of wetlands and riparian corridors or from within aquatic habitats will reduce habitat heterogeneity and adversely affect these species. In addition, the removal or degradation of upland habitat could prevent individuals from completing their life cycles or dispersing to other breeding habitat. Covered activities that move or disturb upland habitat could destroy eggs or overwintering hatchlings or kill overwintering adults. Covered activities that fragment and isolate breeding pools from adjacent upland habitats will reduce the overall productivity of this species. Increased vehicular traffic from population growth and the development of new roadways to support new urban development could increase the number of individuals that are killed or injured on roadways.

In-stream projects can also have negative impacts on northwestern pond turtle by reducing or eliminating flows in occupied stream or canal habitat during summer months, temporarily eliminating northwestern pond turtle habitat. Direct and indirect impacts to northwestern pond turtles inhabiting rivers, streams, and canals are described in more detail above in Section 4.3.2. However, the net effect of such Plan implementation activities would be beneficial for the turtle by protecting and expanding habitat within the Reserve System.

Indirect Effects

Indirect effects resulting from urban development and other covered activities could degrade aquatic habitats used by northwestern pond turtle. Urbanization and other covered activities could indirectly impact northwestern pond turtle by increasing water temperatures and sedimentation of the waters which support this species. Changes in land use in areas adjacent to breeding sites can reduce the overall habitat

quality of upland habitats for northwestern pond turtle. Urban development adjacent to nesting habitat could result in increases in predation rates, particularly of eggs and nestlings, by nonnative species introduced in urban/suburban environments and native species that thrive in human-dominated environments (e.g. domestic pets, raccoons, coyotes, and skunks). Additionally, increased vehicular traffic from population growth and the development of new roadways to support new urban development could increase the number of individuals that are killed or injured on roadways.

Urban development and other covered activities will cause an increase in the amount of runoff into aquatic systems, and therefore, habitat used by northwestern pond turtle. Runoff may transport sediment and toxins into occupied habitat, which could impact northwestern pond turtle. See Indirect Effects in Section 4.6.2, Covered Fish, for further discussion of the impacts to aquatic habitats caused by increased runoff and sedimentation.

4.6.5 Giant Garter Snake

Giant garter snakes use suitable wetland habitat and canals in the drainage network associated with agricultural fields in the western section of Placer County (USFWS 1999).

Direct Effects

Conversion of wetlands, particularly fields flooded for rice cultivation, for urban development and other covered activities will directly impact this species by removing or drastically altering their habitat. Direct impacts to giant garter snake could occur as a result of degradation of habitat, including maintenance of flood control and agricultural (e.g., canals) waterways, weed abatement, rodent control, discharge of contaminants into wetlands and waterways, and overgrazing in wetland, canal, and streamside habitats.

Covered activities may remove vegetative cover and basking sites necessary for thermoregulation, fill or crush upland burrows or crevices, dewater habitat and remove prey. Temporary dewatering of canals and waterways will remove giant garter snake habitat and may obstruct movement of giant garter snakes. Because giant garter snakes utilize small mammal burrows and soil crevices as retreat sites, giant garter snakes may be crushed, buried, or otherwise injured by covered activities. Giant garter snakes may be run over by construction equipment or other vehicles accessing construction sites. Disturbance from covered activities may also cause giant garter snakes to move into areas of unsuitable habitat where they will experience greater risk of predation or other sources of mortality. Silting, fill, or spill of oil or other chemicals could cause loss of prey items on or downstream of the project sites. Direct and indirect impacts to giant garter snakes inhabiting rivers,

streams, and canals are described in more detail above in Section 4.3.2. However, the net effect of such Plan implementation activities would be beneficial for this species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Construction and maintenance of infrastructure associated with urban development and in-stream activities such as utility lines, road improvements, drainage facility improvements, recreational structures such as boat ramps, and flood control projects may indirectly affect giant garter snakes. These impacts include: vehicular mortality; disturbance to giant garter snakes caused by human intrusion; predation from domestic and feral animals; predation from raccoons, skunks, opossum and other species attracted to suburban developments; dumping of garbage causing contamination or injury; reduced water quality from urban runoff contributing to a reduced prey base; and introduction of exotic species such as predatory game fish which may prey upon juveniles or compete with giant garter snakes for prey. Increases in severity and frequency of flooding may be associated with development and may inundate overwintering snakes or force snakes to seek new flood refugia during their inactive period. Other potential habitat alterations include changes in fluvial morphology and floodplain configurations for flood control, which could eliminate or reduce the availability of refugia and the loss of aquatic corridors, thereby restricting dispersal. Additionally, land conversions may change stream and wetland hydrology, which, for example, could make habitat less suitable by altering habitat structure and by reducing the availability of prey.

Conversion of seasonal wetlands to perennial wetlands may allow populations of non-native predatory game fish or bullfrogs, which may eat juvenile snakes and compete for prey, to become established or invade to nearby marshes, sloughs, and other wetlands supporting giant garter snake.

4.6.6 Valley Elderberry Longhorn Beetle

Valley elderberry longhorn beetle utilize host elderberry shrubs in valley foothill riparian and valley oak woodlands. Riparian and valley oak woodland that supports the valley elderberry longhorn beetle occurred historically along low-elevation creeks, streams, and rivers throughout western Placer County.

Direct Effects

Covered activities that remove valley foothill riparian and valley oak woodlands, or destroy host elderberry plants that occur within or outside of these natural communities will impact valley elderberry longhorn beetle directly by killing adults, larvae, and eggs, if present.

Covered activities with potential to affect on valley elderberry longhorn beetle individuals and/or suitable habitat include urban development, in-stream projects that impact riparian and valley oak woodlands, operations related to maintenance of culverts and road crossings, utility and water conveyance maintenance or repair, use of pesticides, and human presence and associated passive and active recreation that could result in habitat degradation. Application of pesticides to control invasive species could impact all life stages of valley elderberry longhorn beetle; however, impacts from pesticides and other covered activities will be minimized by conditions on covered activities (see Chapter 6). However, the net effect of such Plan implementation activities would be beneficial for the beetle by protecting and expanding habitat within the Reserve System.

Indirect Effects

Indirect impacts on valley elderberry longhorn beetle habitat include the accumulation of dust and sediment around shrubs resulting from upstream disturbances. Flood control practices could impact valley elderberry longhorn beetle by reducing habitat quality of host elderberry plants and by fragmenting habitat used by valley elderberry longhorn beetle. Valley elderberry longhorn beetle may be sensitive to habitat fragmentation, as evidence indicates that they may have limited dispersal capabilities (Collinge et al. 2001). Small, fragmented populations may be more susceptible to extinction if they are isolated from neighboring populations. Urban development could enhance the spread of invasive plants and animals that could impact valley elderberry longhorn beetle. Invasive plants could impact valley elderberry longhorn beetle by out-competing host elderberry shrubs, effectively reducing the availability of suitable habitat for valley elderberry longhorn beetle. Invasive animals, such as Argentine ants, could potentially negatively impact valley elderberry longhorn beetle (Huxel 2000) through competitive interactions or predation.

4.6.7 Western Burrowing Owl

Western burrowing owls are rare in western Placer County, usually overwintering in the Plan area, and they may no longer breed in western Placer County. Suitable nesting and foraging habitat for western burrowing owl includes short-grass prairies, vernal pool complexes, pastureland, oak woodland savannahs, and habitat adjacent to row-crops, rice and alfalfa. Although western burrowing owls only occur in a small fraction of this habitat as overwintering birds, these areas could potentially provide suitable habitat for colonization by western burrowing owls should their population increase and expand into the Plan area. Western burrowing owl habitat is primarily threatened by conversion of grasslands to agriculture and urban development and by poisoning of ground squirrels. Preservation of large tracts of relatively level grassland and pasture land that support populations of ground squirrels is critical to

maintaining and increasing the western burrowing owl population within the Plan area.

Direct Effects

Urban and rural development and other covered activities that remove overwintering and potential breeding habitat will directly impact western burrowing owls. Existing habitat adjacent to urban development and residential areas can provide foraging habitat and serve as a buffer between more suitable habitat and urban areas. Conversion of habitat to unsuitable land-cover (e.g., conversion of grassland to suburban development) will reduce the amount of overwintering and potential breeding habitat available to western burrowing owls and will potentially remove buffer areas between suitable habitat and urban areas. Ground-disturbing activities along stream courses or canals, including maintenance of stream banks, levees, and channel rights-of-way, could remove habitat for western burrowing owl. Ground squirrel control along levees to protect the integrity of the structures will remove available habitat for western burrowing owl. Designated Burrowing Owl reserve areas will be heavily grazed to the benefit of the species. Overall, the net effect of such Plan implementation activities would be beneficial for the recovery of the Burrowing owl by protecting and expanding habitat within the Reserve System.

Indirect Effects

Western burrowing owls and their habitat will be indirectly affected by human population growth and increased urbanization within the Plan area. Indirect effects related to human population growth include increased harassment from people, increased vehicle-related disturbances and potential for collisions, habitat fragmentation, and increased populations of predators that thrive in urbanized habitats (e.g., house cats, raccoons).

4.6.8 Bald Eagle

The bald eagle breeding population is continuing to increase in numbers and range in North America. There are currently no bald eagle pairs breeding in western Placer County. Individuals regularly occur in the Plan area during winter, though there has been no systematic monitoring of this wintering population.

Direct Effects

Covered activities that would remove large trees in the vicinity of water bodies (e.g., Folsom Lake and Camp Far West Reservoir) in the foothills of the Plan area would remove potential breeding habitat for this species. Rural residential development is the most likely covered activity to have

this type of impact. Changes in land use in rural residential areas, particularly those that involve rodent control, could also reduce the population of prey species. Over-wintering bald eagles forage for waterfowl on flooded agriculture fields (e.g., rice). Development on agricultural land that is flooded in the winter or changes to incompatible agriculture practices (e.g., vineyards) would remove foraging habitat for bald eagle. However, the net effect of such Plan implementation activities would be beneficial for the species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Any changes in land use that reduces the amount of agricultural land that is flooded in winter will reduce the prey base for over-wintering bald eagles and ultimately could affect the population of the species within the Plan area. Increases in the human population related to increased urban and rural development will result in associated indirect effects such as increased harassment from people, increased vehicle-related disturbance (e.g., of breeding habitat near roads), and increased exposure to humans throughout the Plan area, including within the Reserve System. Disturbance in this case can be defined as any human-caused alteration initiated around possible future nest sites that agitates or bothers a bald eagle to a degree that injures a bald eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

4.6.9 Swainson's Hawk, Northern Harrier, and Ferruginous Hawk

In California, Swainson's hawk require several thousand acres of open, flat, undeveloped landscapes that include suitable grassland and agricultural habitat for foraging and sparsely distributed trees, particularly in riparian habitats, for nesting. Suitable habitat for Swainson's hawk is limited to the western, Valley portion of the Plan area below 200 feet elevation. Northern harriers live year-round in the Plan area, primarily in open grassland, vernal pool complex, wetland habitats, agricultural lands, and pastures. Ferruginous hawks are a regular winter resident in grassland, vernal pool complex, pasture, and agricultural lands. There are no records of ferruginous hawks breeding in California.

Direct Effects

Swainson's hawks, northern harriers, and ferruginous hawks will be directly affected by the conversion of their habitat to rural and urban development. This would include foraging and nesting habitat in agricultural lands, grasslands, pastures, fresh emergent wetlands, and seasonal wetlands, and nesting habitat for Swainson's hawk in riparian woodland, oak woodland savanna, and valley oak woodland below 200

feet elevation. Additional impacts may occur as a result of habitat loss caused by riverbank protection projects, shooting, pesticide poisoning of prey animals, and human disturbance at Swainson's hawk and northern harrier nest sites (CDFG 2000). Individual projects that remove suitable nest trees will also impact Swainson's hawks. Grazing will be used to manage vegetation and fuels, particularly in grassland habitats, on Reserve System lands. Though unlikely, Northern harriers nest on the ground and could potentially be affected if livestock trample or otherwise disturb nesting northern harriers. The PCA will manage a variety of grazing regimens to benefit the particular needs of the cover species in question. Overall, the net effect of such Plan implementation activities would be beneficial for all these species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Any changes in land use that reduce the prey base for Swainson's hawks, northern harriers, and ferruginous hawks (e.g., rodent control associated with urban and rural development) could ultimately affect the population of the species within the Plan area. Increases in the human population related to increased urban and rural development will result in associated indirect effects such as increased harassment from people, increased vehicle-related disturbance (e.g., of breeding habitat near roads), and increased exposure to humans throughout the Plan area, including within the Reserve System. Since northern harriers nest on the ground, they are especially vulnerable to disturbance from predation. The increase in residential development could introduce feral cats, dogs, and other nest predators that could indirectly impact reproductive success near urban and rural development. Disturbance in this case can be defined as any human-caused alteration initiated around nest sites that agitates or bothers an individual to a degree that injures a covered raptor or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

4.6.10 Cooper's Hawk

Cooper's hawks breed in wooded habitats in the Plan area and are found in oak woodlands, valley foothill riparian, savanna and grassland edge, and at times within wooded urban and suburban areas.

Direct Effects

Cooper's hawks will be directly affected by the conversion and degradation of woodland habitats to rural and urban development and conversion to unsuitable agricultural uses such as vineyards. Prescribed burns conducted for reserve management could temporarily decrease the quality of foraging habitat. Unless a prescribed burn goes out of control, it is not anticipated that such a burn would affect nesting habitat (i.e., large

trees). Similarly, fuels management could temporarily disturb foraging and nesting individuals. However, the net effect of such Plan implementation activities would be beneficial for Cooper's hawk by protecting and expanding habitat within the Reserve System.

Indirect Effects

Increases in the human population related to increased urban and rural development will potentially result in associated indirect effects such as increased harassment from people, increased vehicle-related disturbance (e.g., of breeding habitat near roads), and increased exposure to humans throughout the Plan area, including within the Reserve System. Disturbance in this case can be defined as any human-caused alteration initiated around nest sites that agitates or bothers an individual to a degree that injures a Cooper's hawk or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment. Cooper's hawks appear to be adapting to breeding in urban areas, however, which may reduce indirect effects associated with interactions with humans.

4.6.11 Loggerhead Shrike

Loggerhead shrikes live primarily in annual grasslands, shrublands, pastures, and at the edge of oak woodlands and valley foothill riparian. Loggerhead shrikes require tall shrubs or trees, as well as fences and power lines, for hunting perches, territorial advertisement, and pair maintenance; open areas for hunting; and large shrubs or trees for nest placement. They also require sharp, thorny, or multi-stemmed plants and barbed-wire fences on which they impale their prey.

Direct Effects

Rural and urban development of grassland, pasture, and open woodland habitat has the potential to remove loggerhead shrike habitat. Conversion of grassland and pasture to unsuitable land uses such as vineyards would also remove habitat. Existing habitat adjacent to urban development and residential areas can provide foraging habitat and serve as a buffer between more suitable habitat and urban areas. Any development or conversion of habitat to unsuitable land-cover will potentially remove buffer areas between suitable habitat and urban areas. Rodent control associated with urban and rural development will reduce prey populations. However, the net effect of such Plan implementation activities would be beneficial for this species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Rural and urban development will fragment suitable habitat, which can reduce dispersal between habitats. Loggerhead shrikes could be indirectly affected by rural and urban development that attracts and supports predators of nest contents and young such as yellow-billed magpies, American crow, and other birds of prey, as well as snakes, feral cats, skunk and raccoon. Increases in the human population will potentially result in associated indirect effects such as increased harassment from people, increased vehicle-related disturbance (e.g., of breeding habitat near roads), and increased exposure to humans throughout the Plan area, including within the Reserve System.

4.6.12 American Peregrine Falcon

American peregrine falcon is primarily found over-wintering in the Plan area near wetlands, vernal pool complexes, and flooded agricultural fields where it hunts waterfowl and shorebirds. This species has a low potential to breed in the Plan area because there is little suitable nesting habitat.

Direct Effects

American peregrine falcon will be directly affected by the conversion of agricultural lands, specifically those flooded in winter (e.g., rice), vernal pool complexes, grasslands, and pasture to rural and urban development. However, the net effect of Plan implementation activities would be beneficial for this species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Rural and urban development could potentially reduce wetland and flooded agriculture habitat and water quality, thereby reducing prey availability. Increases in the human population related to increased urban and rural development will potentially result in associated indirect effects such as increased harassment from people, increased vehicle-related disturbance, and increased exposure to humans throughout the Plan area.

4.6.13 Yellow Warbler, Yellow-breasted Chat, and Modesto Song Sparrow

Yellow warblers have been largely extirpated as breeders from their riparian habitats in the Central Valley, though they likely still breed in valley foothill riparian in the foothills (> 200 ft elevation). They are common, however, in riparian woodlands and other wooded migration stopover sites during spring and fall migration. Yellow-breasted chats live

in valley foothill riparian, primarily in the foothills (> 200 ft elevation). Modesto song sparrows are common year-round residents of valley oak woodland and valley foothill riparian with an understory of blackberry, ruderal areas along levees and irrigation canals, and fresh emergent and seasonal wetlands throughout the Plan area.

Direct Effects

Covered activities that result in the removal or alteration of riparian habitat will directly affect yellow warblers, yellow-breasted chats, and Modesto song sparrows by reducing migratory stopover and breeding habitat. Examples of such activities include rural and urban development and bank stabilization and flood control projects. Alterations to hydrological regimes that eliminate or degrade water quality and/or quantity in wetlands can also impact Modesto song sparrow. Removal of non-native vegetation that is otherwise suitable for nesting (e.g., Himalayan blackberry, used as a nesting substrate by yellow-breasted chat and Modesto song sparrow), foraging, and cover could also impact these species. Habitat restoration and enhancement, however, is expected to provide a net benefit to covered species, and such impacts are expected to be minimal and temporary.

Indirect Effects

Urban and rural development can indirectly affect yellow warblers, yellow-breasted chats, and Modesto song sparrows by increasing populations of human associated predators (e.g., feral cats, raccoons) and brown-headed cowbirds, a brood parasite. Predators can kill adults or depredate eggs, nestlings, and juvenile birds. Brown-headed cowbirds can reduce the reproductive success of these species by inducing them to raise brown-headed cowbird young at the expense of their own young. Rural and urban development and conversion of habitat to unsuitable habitat (e.g., for row-crop agriculture) could fragment suitable habitat, which would affect these species by potentially reducing dispersal between subpopulations and colonization of unoccupied habitat. Livestock grazing in riparian habitats, which will be used to manage vegetation and fuels on Reserve System lands, can degrade habitat for these species by eliminating or altering important structural habitat features. Bank stabilization and flood control projects that change hydrological regimes can have negative consequences for riparian vegetation and habitat structure for these species.

4.6.14 California Black Rail

California black rails in the Sierra Nevada foothills are year-round residents in perennial wetlands that are dominated by rushes and cattails. These wetlands occur in open grasslands, pastures, or oak savannas.

Direct Effects

California black rail will be directly affected by any covered activities that result in the removal or permanent alteration of perennial fresh emergent wetland habitat that supports or potentially supports California black rails. Furthermore, covered activities that eliminate suitable habitat that is unoccupied by California black rails could cause direct impacts because the California black rail metapopulation in the Sierra Nevada foothills is likely maintained in part through colonization of unoccupied sites. Covered activities that could eliminate California black rail habitat include rural and urban development that eliminate or degrade standing water quality and/or quantity. Changes in land-use practices that increase grazing intensity in wetland habitat could also degrade, and hence, directly impact California black rail habitat. However, the net effect of Plan implementation activities would be beneficial for the rail by protecting and expanding habitat within the Reserve System.

Indirect Effects

Growth of the human population associated with rural and urban development will increase demands on water. As demands for water grows, there will be increasing pressure to increase efficiency and thereby reduce water loss (both intentional and unintentional) from water delivery systems (e.g., canals). Repairing leaks in canals could potentially eliminate the source of water to wetlands with suitable California black rail habitat (see Section 4.3.2, In-Stream Projects, As-Needed Site-Specific Maintenance Activities, Canal Lining/Guniting, for further discussion of impacts to wetlands) This habitat will be lost when a consistent source of water is eliminated. Furthermore, a California black rail could potentially abandon a wetland and its nest if the source of water to the wetland is eliminated during the nesting season. California black rail will be indirectly affected by covered land use activities that alter the quantity and quality of standing water in their wetland habitat. Rural and urban development could also cause an increase in predator populations that are associated with development (e.g., house cats, raccoons).

4.6.15 Bank Swallow

Bank swallows nest in burrows in nearly vertical banks/cliff faces and require substrates comprised of soft soils such as fine sandy loam, loam, silt loam, and sand. Rivers with natural flow and seasonal flooding provide the best habitat, as this helps to create and maintain suitable nest sites by eroding banks. Only one breeding colony currently persists in the Plan area, on the banks of the Bear River.

Direct Effects

Covered activities that include bank stabilization (e.g., control of bank erosion with rip-rap), channelization, and alteration of hydrological regimes of rivers and streams would impact nesting habitat for bank swallows. Such projects could eliminate suitable bank habitat for nesting and eliminate the natural hydrological flows and bank erosion processes that create and maintain bank habitat. However, the net effect of Plan implementation activities would be beneficial for the swallow by protecting and expanding habitat within the Reserve System.

Indirect Effects

Covered activities that result in increased demand for water could indirectly affect bank swallow nesting habitat by changing operations that affect stream flows. Rural and urban development near rivers and streams could cause increased demand for bank stabilization projects that destroys nesting habitat.

4.6.16 Grasshopper Sparrow

In the Plan area, grasshopper sparrows occur regularly in low numbers as migrants or over-wintering individuals. A breeding pair was sited off Nader Road in 2004 (Rogers et al 2004). Grasshopper sparrows require large tracts of grassland, vernal pool grassland complex, pasture, or oak woodland-savanna with extensive amounts of interspersed grassland. Grasshopper sparrow populations have declined primarily because of habitat loss and conversion to unsuitable land-cover (e.g., row-crops, vineyards, orchards).

Direct Effects

Grasshopper sparrow will be directly affected by the conversion of grasslands, vernal pool grassland complex, pastures, and oak woodland-savanna to rural and urban development. Grazing of livestock will be used on Reserve System lands to manage invasive vegetation and fuels, as well as for the particular habitat niche requirements of the target species the PCA is managing for, in this case Grasshopper sparrow. Overall, the net effect of such Plan implementation activities would be beneficial for this species by protecting and expanding habitat within the Reserve System.

Indirect Effects

Grasshopper sparrows appear to be area-sensitive, at least in part of their continental range, and require large tracts of grassland habitat (e.g., >30 hectares). Increased rural development and conversion of suitable habitat to incompatible agricultural uses (e.g., row-crops) could fragment

larger tracts of grasshopper sparrow habitat into patches that are not large enough to meet the species' area requirements. Increases in human population growth through rural and urban development could increase populations of predators of adult grasshopper sparrows and their nest contents (e.g., house cats, raccoons) that are associated with human populations.

4.6.17 Tricolored Blackbird

Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: open accessible water within 1,500 feet of a colony site; a protected nesting substrate, including either flooded or thorny or spiny vegetation (e.g., cattails, bulrushes, and blackberries); and suitable foraging habitat providing adequate insect prey within a few miles of the nesting colony. Grassland, vernal pool complexes, and rice fields characterize the landscape in much of the species' breeding range and preferred foraging habitats in western Placer County. Foraging habitats in all seasons include annual grasslands, vernal pools and other seasonal wetlands, valley foothill riparian, and agricultural fields (e.g., large tracts of alfalfa with continuous mowing schedules and recently tilled fields).

Direct Effects

Tricolored blackbirds will be directly affected by any covered activities that result in the removal or permanent alteration of breeding colony sites or potential breeding colony sites with suitable habitat. Furthermore, they will also be directly affected by any covered activity that removes or permanently alters standing water within 1,500 feet of colony sites, and suitable foraging habitat within three miles of nesting habitat. Covered activities that could eliminate tricolored blackbird habitat include rural and urban development and alterations to hydrological regimes that eliminate or degrade standing water quality and/or quantity. However, the net effect of Plan implementation activities will be beneficial for the tricolored blackbird by protecting and expanding habitat within the Reserve System.

Indirect Effects

Tricolored blackbirds will be indirectly affected by water flows and adjacent covered land use activities that alter the quantity and quality of standing water within 1,500 feet of nest colony sites. Breeding success could be indirectly affected by covered activities if such activities enhance populations of predators of eggs and chicks such as black-crowned night herons, common ravens, and coyotes. Tricolored blackbirds are sensitive to pesticides and could be potentially affected indirectly by expansion of rural and urban development if such expansion leads to mosquito or other pest control in occupied habitat. Other indirect effects of covered activities on tricolored blackbird include increased harassment from

people, increased vehicle-related disturbances and potential for collisions, and habitat fragmentation.

4.7 Effects on Critical Habitat

Six species covered by the Plan have designated critical habitat. Of these six, only vernal pool fairy shrimp and Central Valley steelhead have critical habitat designated within the Plan area. A discussion of effects of covered activities on critical habitat in the Plan area is provided below.

4.7.1 Vernal Pool Fairy Shrimp

In August 6, 2003, USFWS designated critical habitat for four vernal pool crustaceans and eleven vernal pool plants (68 FR 46683). A revised final rule for critical habitat, with a re-evaluation of non-economic exclusions, was published on March 8, 2005 (70 FR 11140). Economic exclusions from the 2003 final rule were published on August 11, 2005 (70 FR 46923). Administrative revisions with species-by-unit designations were published on February 10, 2006 (71 FR 7117), providing 35 critical habitat units for vernal pool species totaling 597,821 acres. On May 31, 2007, USFWS published a clarification of the economic and non-economic exclusions for the 2005 final rule designating critical habitat for four vernal pool crustaceans and eleven vernal pool plants in California and southern Oregon. Critical habitat was designated for the three vernal pool crustaceans covered by this Plan: vernal pool fairy shrimp, vernal pool tadpole shrimp, and Conservancy fairy shrimp. Of these three, however, only vernal pool fairy shrimp has critical habitat designated in the Plan area.

The Western Placer County core area comprises 36,260 acres, all in the Plan area. Only 7% of this core (2,580 ac) was designated as critical habitat.

Urban and rural development will have the greatest impacts, in terms of acreage, to vernal pool fairy shrimp critical habitat. Capital and in-stream projects (that have project footprints that extend beyond the riparian zone, into vernal pools) will impact critical habitat to a lesser extent.

Critical habitat designated for vernal pool fairy shrimp will be impacted by future growth under the PCCP (see Table 4-4, Critical Habitat and Core Area for Vernal Pool Fairy Shrimp). Areas designated Potential Future Growth (PFG) cover 60% of final critical habitat and 45% of the larger core area.

Critical habitat could be indirectly impacted by urban and rural development that alters the hydrology in a watershed that supports vernal pools. See Section 4.6.1, Effects on Covered Species, Vernal Pool Crustaceans and Plants for detailed discussion of impacts to vernal pool fairy shrimp habitat, which also apply to designated critical habitat.

4.7.2 Central Valley Steelhead

Critical habitat for the Central Valley steelhead distinct population segment was designated in 2005 for the Bear River to Camp Far West Reservoir, and the main stems of Coon Creek, Doty Ravine, Auburn Ravine, Dry Creek, Secret Ravine, and Miners Ravine (70 FR 52488).

Because critical habitat for this species is confined to rivers and streams, only covered activities that occur within these aquatic habitats have the potential to directly affect the critical habitat. Covered activities that occur in-stream and in riparian areas will directly impact critical habitat designated for Central Valley steelhead. In-stream activities include bridge replacements and retrofits, road widening, and culvert replacements. Covered activities that will impact riparian areas include the digging, grading, and building associated with the development of roads, buildings, parking lots, trails, parks, and other structures. These activities result in an increase in sedimentation rates and the modification of stream morphology.

Critical habitat will be indirectly impacted by urban and rural development. Urban and rural development will cause the hydromodification of streams and increased rates of sedimentation and pollution. Hydromodification is the alteration of the process under which runoff, primarily rainwater, moves over land. The addition of impervious surface and runoff control mechanisms such as culverts and storm drain systems will cause water to move more quickly over land to streams, result in less percolation and filtration to the ground water table, and more pollutants and garbage being transported to waterways.

Increased sedimentation rates into rivers and streams decreases the quality of spawning beds, minimizes the surface area of high-quality over-summering and over-wintering deepwater pools, and decreases the abundance and diversity of invertebrate prey species. Increased pollution increases water temperatures, nutrient loads, and the potential toxicity of the aquatic habitat, all of which decrease the quality of habitat for adult and rearing juvenile steelhead. Hydromodification of the landscape increases peak flood flows while minimizing the natural water storage capacity of the landscape, resulting in more “flashier” winter flows and lower spring and summer flows for migration and rearing of juveniles. See Section 4.6.2, Effects on Covered Species, Covered Fish, for detailed discussion of impacts to Central Valley steelhead, which also apply to designated critical habitat.

4.8 Cumulative Effects

The impacts of covered activities were assessed in the context of existing conditions in the Plan area. Some activities and projects that are outside the scope of this Plan may nonetheless contribute to cumulative impacts on covered species. An analysis of cumulative effects is not required in

an HCP or NCCP. However, we include an analysis here to support the federal Biological Opinion that will conclude the USFWS and NMFS Section 7 internal consultation process. The scope of the cumulative analysis in a Biological Opinion is limited to non-federal actions because federal actions (i.e., any federal project, project with federal funding, or project that requires a federal permit) will be the subject of future Section 7 consultations in which cumulative impacts can be considered more fully. To support this analysis, the cumulative projects evaluated in this section are limited to nonfederal projects that are not covered by the Plan. The EIR/EIS presents a thorough analysis of the cumulative effects of all projects, federal and nonfederal, when combined with the effects of the PCCP.

4.8.1 Future Potential Development by the City of Auburn

In Progress.

4.8.2 Future Potential Development by the City of Roseville

In 2008, the City of Roseville engaged in an urban limits definition process, referred to as the “City Edge”. The City Edge concept addresses potential development and flood retention/habitat lands. The PCCP addresses lands outside of the existing City of Roseville’s Sphere of Influence (SOI) and includes a mixture of conservation and potential development land. Placer County is currently engaged with the City of Roseville to insure that resource and potential development areas are consistent with the PCCP.

4.8.3 Future Potential Development by the City of Rocklin

The City of Rocklin is constrained in its ability to expand into adjacent lands. Rocklin is bordered by the City of Roseville and Lincoln, and the town of Loomis. The City does not have plans to expand outside of the areas that have already been designated within their General Plan.

4.8.4 Ongoing and Routine Agriculture

Ongoing and routine agricultural activities in the Plan area are not covered by this Plan. While it is anticipated that the effects of ongoing agricultural activities on covered species will be relatively low, there is the potential for cumulative effects on covered species to accrue. Ongoing ranching operations such as road construction, road maintenance, or intensive livestock grazing may limit or degrade habitat for species such as western

pond turtle, California red-legged frog, and foothill yellow-legged frog. (However, ranching activities such as pond maintenance and moderate livestock grazing are essential to the long-term survival of some covered species such as California red-legged frog, and vernal pool species). Rodent control on grazing lands may adversely affect northern harrier, ferruginous hawk, and western burrowing owl. Some ongoing cultivated agricultural activities may limit or degrade foraging habitat for tricolored blackbird and western burrowing owl. While cattle grazing is used as a tool to manage invasive species in vernal pools, overgrazing and inappropriately-timed grazing (e.g., during period when plants flower or set seed) can result in take of covered plants and can impact vernal pool ecosystems (USFWS 2005). Covered plants could be trampled by cattle in vernal pool grassland complexes, and habitat, particularly vernal pool habitat, could be lost due to agricultural practices that change the hydrology of an area. Conversion of agricultural land that support uses that are compatible with the sustainability of vernal pools and the species they support (e.g., rangeland) to intensive forms of agriculture (e.g., row crops, laser-leveled rice) has caused widespread loss and fragmentation of vernal pool habitat in the Central Valley, and continues to threaten vernal pool habitat in the Plan area (USFWS 2005; Holland 2009).

4.8.5 Use of Existing Roads

Construction of rural roads within the plan area is anticipated to increase the mortality of covered species. Continued use of existing rural roads (i.e., those not covered by the Plan) will contribute to a cumulative impact on these species through continued mortality and injury. The magnitude of this cumulative impact is unknown.