

4.1 Introduction

4.1.1 Approach

This chapter analyzes temporary and permanent impacts on habitat as well as both direct and indirect impacts of covered activities (see Section 4.1.2, *Impact Mechanisms*). For most covered activities, direct impacts are assessed quantitatively, and indirect impacts are assessed qualitatively. Temporary habitat disturbance is the primary impact of SFPUC-covered activities.

Impact assessments were divided into the four major areas listed below.

- Watershed O&M activities.
- Water supply and reservoir O&M.
- Water transmission and filtration system O&M.
- Lease permit and easement activities.

This chapter describes the approach used to estimate disturbance associated with covered activities and provides an impact estimate for each covered species. The estimated impact on each species was derived from impacts on the species' modeled habitat. These estimates were then used to develop the compensation measures described in Chapter 5, *Conservation Strategy*.

4.1.2 Definitions of Impact Categories

The following terms define the intensity and type of impacts that result from activities covered by this HCP.

Temporary impacts: a change in land cover resulting from soil disturbance, incidental vegetation damage, or intentional vegetation management that will recover or begin recovering to a natural land cover type within 1 year (e.g., prescribed burning or construction staging areas). Temporary impacts that occur

in the same location on an annual basis, such as roadside mowing, are considered permanent impacts under this HCP. However, it should be noted that, in many cases, areas that undergo temporary disturbance every year continue to provide habitat function for some covered species. For example, while mowing of grassland could result in incidental take of Callippe silverspot butterflies, this activity enhances habitat function of grassland for Western burrowing owl by keeping vegetation short. Thus, considering temporary annual impacts to the same location as permanent impacts overestimates impacts to covered species.

Permanent impact: A permanent habitat loss resulting from the construction of permanent structures (e.g., creating a new road through grassland). As noted above, this category will include temporary impacts that recur annually in the same location.

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

Indirect impacts. USFWS defines *indirect impacts* 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). The definition of indirect impacts in this Plan also includes those impacts that take place at the time of the proposed action but occur beyond the footprint of the project or activity (i.e., beyond the area of land disturbance). In short, indirect impacts are effects caused by the project and occurring later or away from the project site but that are reasonably certain to occur (e.g., impacts resulting from increased erosion or sedimentation in streams).

Cumulative impacts result from the proposed action’s incremental impact when viewed together with past, present, and reasonably foreseeable future actions. Cumulative effects can result from individually minor but collectively significant actions that take place over time. The HCP considers the cumulative effects of covered projects and activities in accordance with requirements of CEQA, NEPA, and Section 7 of the ESA.

Direct impacts (both temporary and permanent) on species are addressed in Section 4.2.1, *Direct Impacts on Covered Species*. Indirect impacts are evaluated in narrative section 4.2.2, *Indirect Impacts*. Cumulative impacts are evaluated in 4.3.4, *Cumulative Impacts*. Impacts of covered activities that could not be calculated using the quantitative methodologies described below (i.e., nursery O&M and golf course O&M) are described in narrative form in Section 4.2.1.2, *Qualitative Analysis*.

4.2 Methods

This section describes the approach used to estimate impacts of covered activities on covered species. The results of these analyses are used to determine the amount and type of mitigation required to offset impacts.

In any HCP, an applicant is required to estimate the amount of take that will occur for each covered species. Estimates of take can be made in a variety of ways, including numbers of individuals, numbers of populations, or the amount of suitable habitat that will be affected by covered activities. Basing estimates of take on the numbers of individuals or populations requires extensive survey data that are unavailable for this HCP. For most species, incidental take will be quantified on the basis of impacts on habitat assumed to be suitable for each species. These estimates of incidental take are based on species-habitat models developed for covered species. The estimates are likely to be inflated because (1) habitat models may overestimate the extent of suitable habitat, and (2) not all suitable habitat is occupied. This conservative approach ensures that all potential impacts on species are fully mitigated.

In order to quantify impacts on each species, an estimate of the footprint and, where possible, location of covered activities was developed. These impacts were then cross-referenced to the species-habitat models for a final estimate of species-specific impacts. Impacts of covered activities come in a variety of forms: temporary or permanent, direct or indirect. These terms are defined above. Each of these impact types influences the quantification of incidental take for individual species, which is measured as a loss of an acreage of suitable habitat. Where species-habitat models differentiate between different types of habitat (e.g., primary vs. secondary, or breeding vs. foraging), impacts to each category of habitat was quantified.

As described in Chapter 2, *Covered Activities*, the locations of some activities are well defined, while those of others are not. Where possible, impacts from covered activities were mapped and input into a GIS environment for analysis and calculation. In other cases, the precise location of impacts was unknown. For example, the locations of bridge replacements are known; this information was input into GIS. However, the exact locations of all vegetation management activities over the next 30 years are not known, but the general area and extent of vegetation management can be estimated. Consequently, habitat models were developed for some but not all species, and impacts were mapped for some but not all activities. Accordingly, the impact analysis was designed to address these differences in data specificity. The various approaches are described below.

4.2.1 Direct Impacts on Covered Species

Estimates of the area disturbed, the frequency of disturbance, and the type of impact (i.e., temporary versus permanent) were made for each covered activity. Some aspects of certain covered activities, such as monitoring for HCP

implementation, had little or no impact on species habitat or were entirely beneficial for covered species; such activities were dismissed from the impact analysis. Impacts of two covered activities—nursery O&M and golf O&M—could not be quantified and are described in Section 4.2.1.2, *Qualitative Analysis*.

4.2.1.1 Quantitative Analysis

If the location of a covered activity can be mapped, direct impacts are estimated through the process outlined in Figure 4-1. For such activities, the majority of the impact analysis was conducted using GIS. Examples of covered activities that can be mapped include bridge construction and road maintenance.

For activities that cannot be mapped in GIS, direct impacts have been estimated through the process outlined in Figure 4-2. For these activities, the acreage of impact has been quantified and the location of the impact approximated on the basis of information available for the activity. Both methods were combined using spreadsheets to provide acres of impact by activity type, by land cover, and ultimately by species. The combined methodology for quantifying impacts is described below. Table 4-1 lists the covered activities whose impacts were analyzed quantitatively, and classifies these activities based on whether or not they occur in known locations, and whether the impacts from the activities are temporary or permanent.

Step 1: Estimate Areas of Direct Disturbance

Where possible, activities were mapped and impacts were calculated using GIS. For example, a data layer containing the roads within the study area was created, an estimate of impacts resulting from road maintenance along either side of the roadbed was derived, and the size of impact was calculated using GIS (Figure 4-1 and Table 4-2). For the creation of new roads, mapping in GIS was not possible because the location of future roads is unknown. Consequently, the acreage of impact was estimated using best professional judgment (see Figure 4-2 and Table 4-2). The disturbance estimates for each activity as well as for the entire plan area are presented in Table 4-2. These estimates were based on the frequency of activities, the per-activity impact acreage and, where possible, the location of the activity.

It was also necessary to determine the proportion of temporary and permanent impacts associated with each activity. Temporary impacts were calculated annually, while permanent impacts were calculated over the lifetime of the plan. As noted above, some activities have temporary impacts but occur in the same place every year. Temporary impacts that recur annually in the same location were considered to be permanent impacts, because the recurring disturbance may compromise habitat suitability in these locations. Table 4-1 classifies covered activities based on whether they have temporary impacts that occur in different locations, temporary impacts that recur in the same location, and/or permanent impacts.

Step 2: Estimate Proportion of Land Cover

Once the size, frequency, and nature of the impact were defined (Step 1), the impact on specific land cover types was calculated (Step 2, see calculations in Table 4-3). Again, where possible, analysis of impacts on land cover type was performed in the GIS environment. For example, the area of impact associated with road maintenance was overlaid with a map of vegetation types, and the areal extent and proportion of impact on each land cover type was calculated. For activities that were not mapped in GIS, the proportion of impact on each land cover type was estimated using best professional judgment. For example, the impacts associated with new road construction were estimated by roughly tracking the proportion of terrestrial land cover types in the study area. (An above-average impact on riparian forest was estimated because roads often follow riparian corridors and disproportionately affect that land cover type.) The proportion of each land cover type affected by each activity is shown in Table 4-3.

Step 3: Estimate Impacts on Land Cover

The cumulative extent of impact on each land cover type was calculated in Table 4-4 by multiplying the proportion of land cover affected by each activity (Table 4-3) with the acres of impact (Table 4-2). The result of the calculation yielded an estimate of acres affected by each activity in each land cover type. Subsequently, the acres of impact on each land cover type were summed for all activities. Final results for cumulative acres of impacts (both temporary and permanent) are shown in Table 4-4.

Step 4: Estimate Proportion of Land Cover Suitable for Covered Species

Species habitat models were developed for all covered species except Townsend's big-eared bat and Callippe silverspot butterfly. Species habitat models parameterized suitable habitat for covered species on the basis of land cover type and associated variables governing the use of land cover as habitat for the species. The model parameters for each species can be found in the species accounts (Appendix D). For all species with models except Presidio clarkia, robust monardella, and Alameda whipsnake, species habitat models define parameters for primary and secondary habitat for plant species, or breeding/core habitat vs. habitat used for other purposes, such as foraging or dispersal, for wildlife species. Table 4-5 quantifies the acreage of each land cover type that provides habitat for the species.

For Townsend's big-eared bat, the effects of covered activities on individual land cover types in the plan area were estimated by approximating the percentage of a given land cover type in the permit area that is suitable habitat for the species. These estimates were based on best professional judgment and were conservative to ensure protection of the species. For Callippe silverspot butterfly, survey

results that quantified the amount of suitable habitat for the species in several land cover types were used. The total acres of suitable habitat are summed across all land cover types for each species in Table 4-5.

Step 5: Estimate Temporary and Permanent Impacts on Covered Species

In order to translate the impacts of covered activities on land cover type (step 3) to impacts on species habitat, the proportion of suitable habitat for a species within each land cover type (Table 4-5) was multiplied by the total acres of disturbance (Table 4-4) to yield temporary and permanent impacts (Table 4-6a and 4-6b). The end result is an estimate of the acres of impact for each species in each land cover type.

For example, 100% of nonnative grasslands is considered suitable habitat for western burrowing owl. Accordingly, all 178.4 acres of temporary impact on nonnative grasslands are considered impacts on the species. However, only 1.08% of nonnative grasslands are considered secondary habitat for Diablo helianthella. Therefore, approximately 1.08% of the 178.4 acres (1.92 acres) of temporary impacts in nonnative grassland is considered an impact on the species. It must be noted that the proportion of land cover/habitat in Tables 4-3, 4-5, 4-6a, and 4-6b is displayed to two decimal places, but the calculations are based on the actual number that exists in the cell. Therefore, calculations that do not utilize the underlying number but rather utilize the rounded numbers displayed in the table will not correspond to the results presented.

Impact on habitat in each land cover type is calculated for each species (Tables 4-6a and 4-6b). Where primary and secondary habitat, or breeding/core and other habitat, were modeled, impacts were calculated to each category of habitat. The total impact on species habitat is presented by summing impacts on habitats in all land cover types (Table 4-7).

Step 6: Summarize Impacts on Species

Table 4-7 summarizes the results of Tables 4-6a and 4-6b and presents total impacts on primary and secondary habitat for each species, as well as the percentage of impact on the species' habitat overall.

4.2.1.2 Qualitative Analysis of Direct Impacts

As described above, most activities were mapped in GIS, or quantitative impacts were estimated using best professional judgment. However, some activities—nursery O&M and golf course O&M—could not be quantified using either of these methods. For these activities, the impacts on overall land cover type or the

species themselves were estimated using best professional judgment. The rationale for these estimates is provided below.

Nursery O&M

Five nurseries are present within the Alameda watershed. O&M associated with these nurseries is a covered activity under this HCP. The risk of take of covered species associated with nursery O&M is low, although it does exist. Specifically, the use of black mesh landscaping material has the potential to trap migrating amphibians or snakes. Such injury would constitute take of individuals of the following covered species: California tiger salamander, California red-legged frog, and Alameda whipsnake. Measures to avoid the use of black mesh landscaping material and associated take of covered species are discussed in Chapter 5.

Golf Course O&M

The Sunol Valley golf course is located in the northern portion of the watershed. O&M activities such as mowing and water distribution are covered activities under this HCP. The application of herbicides and pesticides is not covered under this HCP. The potential take associated with golf course O&M is low. The chief potential risk is presumed to be take of covered amphibian species—California tiger salamander and California red-legged frog—associated with decreased water quality resulting from fertilizer input into water bodies. Measures to minimize water quality impacts from fertilizer inputs associated with golf course O&M are discussed in Chapter 5.

4.2.2 Indirect Impacts

Typically, indirect impacts do not cause direct take (death) of individuals. Rather, they decrease the suitability of habitat and may have a cumulative effect on the viability of populations of covered species. As defined above (see Section 4.1.2, *Definitions of Impact Categories*), indirect impacts are effects caused by the project that occur later or away from the project site but that are reasonably certain to occur. Examples of indirect impacts include increased erosion or sedimentation in streams. A complete list of the indirect impacts potentially associated with each covered activity are shown in Table 4-8 *Indirect Impacts by Activity*. A list of the potential indirect impacts by species is shown in Table 4-9.

4.2.3 Effects of Activities on Covered Species

The estimates of disturbance by land cover type form the basis for quantifying habitat loss for covered wildlife and plant species. Tables 4-3 and 4-4 show the impact of each covered activity on the land cover types. Permanent impacts to

species habitat discussed below include temporary impacts that recur annually in the same locations.

4.2.3.1 Wildlife

Callippe Silverspot Butterfly

Callippe silverspot butterfly occurs in grasslands, including hilly terrain with a mixture of topographic relief. Adults visit the margins of oak woodlands and riparian areas in search of nectar, as well as disturbed areas if favored nectar plants grow there. Extensive surveys were conducted to quantify suitable habitat for the taxon in the study area. Results of these surveys indicated that 5% of nonnative grasslands, 1% of serpentine bunchgrass grasslands, 2% of oak savanna, and 1% of riparian forest should be considered suitable habitat (Table 4-5). Including areas temporarily impacted each year, such as mowed roadsides, an estimated 13.37 acres of primary habitat (1.45% of the total primary habitat in the permit area) would be permanently lost over the permit term. An estimated 0.49 acre of primary habitat (0.05% of the total primary habitat) would be temporarily lost per year (Table 4-7). Indirect impacts on the butterfly include increased dust from vehicle traffic, livestock and human disturbance, as well as spread of nonnative invasive species and potential changes in fire regime (Table 4-9).

California Tiger Salamander

California tiger salamander uses both aquatic and upland habitat types. The availability of suitable aquatic breeding habitat is likely a factor limiting occupancy in otherwise suitable upland habitat. It is estimated that 11.9% of freshwater marsh and 95% of ponds provide suitable breeding habitat (Table 4-5). As discussed in the species profile, California tiger salamander sometimes use freshwater marsh areas for breeding. Potential movement and aestivation habitat includes nonnative grassland, serpentine bunchgrass grassland, mixed evergreen forest/oak woodland, oak savanna, riparian forest, sycamore and alluvial woodland, willow riparian/forest scrub, freshwater marsh, pond, cultivated agricultural, and nursery. The estimated temporary and permanent impacts on suitable breeding habitat comprise 0.18 acre (0.44% of total in permit area) and 5.62 acres (13.71% of total), respectively. The estimated temporary and permanent impacts on migration and aestivation habitat comprise 15.69 acres (0.05% of total) and 366.42 acres (1.16% of total), respectively (Table 4-7). Indirect impacts on California tiger salamander include increased vehicle traffic, increased human disturbance, and an overall degradation of water quality (e.g., increased sediment, contaminant runoff) (Table 4-9).

California Red-Legged Frog

California red-legged frogs have been known to occupy a variety of habitats, but they are restricted to areas in the vicinity of aquatic habitats, suitable for breeding, in grassland and woodland communities. Suitable aquatic habitats support emergent and riparian vegetation and may lack substantial populations of competing and predatory fish and bullfrogs. Although O&M activities are not expected to disrupt dispersal, activities with the potential to affect these suitable land cover types were quantified as impacts. One hundred percent of permanent streams and intermittent/ephemeral streams were quantified as suitable habitat for breeding; 100% of ponds were so designated (Table 4-5). Other land cover types suitable for breeding include nonnative grasslands, mixed evergreen forest/oak woodland, riparian forest, sycamore and alluvial woodland, willow riparian/forest scrub, and reservoir. All these land cover types were assumed to contain aquatic habitat suitable for breeding at a scale finer than that used to map the study area. Totals of 1.65 acres (0.22% of total) of temporary impacts per year and 22.99 acres (3.07% of total) of permanent impacts over the permit term were estimated for breeding habitat; 16.14 acres (0.05% of total) of temporary impacts and 368.41 acres (1.15% of total) of permanent impacts were estimated for dispersal and aestivation habitat (Table 4-7). Indirect impacts on California red-legged frog include increased vehicle traffic, increased human disturbance, and an overall degradation of water quality (e.g., increased sediment, contaminant runoff) (Table 4-9).

Foothill Yellow-Legged Frog

Foothill yellow-legged frogs require shallow, fast flowing streams with a cobblestone substrate. Activities with the potential to affect streams or associated habitat were quantified as impacts on breeding and dispersal habitat. Ninety-nine percent of permanent streams, 5% of freshwater marsh, and 8% each of sycamore and alluvial woodland and willow riparian/forest scrub were quantified as suitable habitat for breeding (Table 4-5). Land cover types suitable for dispersal include those mentioned above as breeding habitat as well as ponds and intermittent/ephemeral streams. Terrestrial land cover types were included because they incorporate aquatic habitat suitable for frogs at a scale finer than that used for mapping land cover types for this impact analysis. Totals of 0.41 acres (0.29% of total) of temporary impacts and 4.29 acres (3.01% of total) of permanent impacts were estimated for breeding habitat, and 1.01 acres (0.71% of total) of temporary impacts and 13.71 acres (9.62% of total) of permanent impacts were estimated for dispersal habitat (Table 4-7). Indirect impacts on foothill yellow-legged frog include increased vehicle traffic, increased human disturbance, and an overall degradation of water quality (e.g., increased sediment, contaminant runoff) (Table 4-9).

Alameda Whipsnake

Ideal habitat for Alameda whipsnake includes communities that support mixed chaparral and coastal scrub, and annual grassland and oak woodland habitats adjacent to scrub habitats. Alameda whipsnake forages in a variety of communities, including grassland and open woodland. Small mammal burrows, rock outcrops, talus, and similar types of shelter provide alternative habitat for temperature regulation, protection from predators, sites for egg laying, and hibernation dens. Thirty-seven percent of nonnative grassland, 22% of serpentine bunchgrass grassland, 68% of Diablan sage scrub, 59% of mixed evergreen forest/oak woodland, 50% of oak savanna, 18% of riparian forest, 7% of sycamore alluvial woodland, 7% of willow riparian forest/scrub, 63% of rock outcrop, 30% of pond, and 2% of disturbed/ developed land were considered suitable habitat for Alameda whipsnake (Table 4-5). An estimated 8.24 acres (0.05% of total) of suitable habitat would be temporarily lost per year and 153.73 acres (1.01% of total) would be permanently lost over the permit term (Table 4-7). Indirect impacts on Alameda whipsnake snake include increased traffic and human disturbance as well as potential changes in fire regime (Table 4-9).

Western Pond Turtle

Western pond turtles occupy rivers, streams, lakes, ponds, wetlands, reservoirs, and brackish estuarine waters as high as 6,500 feet above sea level. They prefer habitats with large areas of cover and suitable basking sites. These turtles also require refugia for overwintering, such as rocks, logs, mud, submerged vegetation, and undercut areas along banks. Twenty three percent of riparian forest, 4% of mixed evergreen forest/oak woodland, 20% of willow riparian forest/scrub, 23% of freshwater marsh, 74% of pond, and 100% of permanent streams provide suitable core habitat (Table 4-5). One hundred percent of intermittent/ ephemeral streams provide movement and overwintering habitat (Table 4-5). An estimated 1.27 acres (0.09% of total) of core habitat would be temporarily lost annually and an estimated 24.19 acres (1.79% of total) of core habitat would be permanently lost over the permit term. In addition, an estimated 4.28 acres (0.32% of total) of movement and overwintering habitat would be temporarily lost and an estimated 86.04 acres (6.37% of total) would be permanently lost per year (Table 4-7). Indirect impacts to western pond turtle include increased vehicle traffic, human disturbance, and an overall degradation of water quality (e.g., increased sediment, erosion, and elevated temperatures) (Table 4-9).

Tricolored Blackbird

Tricolored blackbirds nest in highly localized colonies in emergent wetlands, wet Himalaya blackberry patches in irrigated pastures, and rice fields. Tricolored blackbirds may use open grasslands for foraging during breeding season. One hundred percent of nonnative grassland and serpentine grassland and cultivated agricultural grasslands and more than 50% of freshwater marsh were considered

foraging habitat for tricolored blackbird (Table 4-5). More than 20% of ponds were considered suitable breeding habitat. An estimated 0.08 acre (0.35% of total) of core breeding habitat would be temporarily lost annually and 1.69 acres (7.75% of total) of core breeding habitat would be permanently lost over the permit term. An estimated 9.22 acres (0.05% of total) of primary foraging habitat would be temporarily affected and 259.82 acres (1.41% of total) would be permanently affected (Table 4-7). Indirect impacts on tricolored blackbird include increased light, noise, and vehicle traffic, as well as changes in surface and groundwater hydrology (Table 4-9).

Western Burrowing Owl

Western burrowing owls need open, well-drained terrain with sparse vegetation with available burrows (e.g., California ground squirrel) for refuge and nesting. In central California, they typically forage and breed in areas such as grasslands, vernal pool grasslands, fallow agricultural fields, and open oak woodlands. During the breeding season, they may also need enough permanent cover and taller vegetation within their foraging range to find prey. One hundred percent of nonnative grassland and 100% of serpentine bunchgrass grassland were considered suitable for breeding and foraging (Table 4-5). An estimated 9.21 acres (0.05% of total) of primary habitat would be temporarily lost per year and an estimated 258.06 acres (1.49% of total) of breeding and foraging habitat would be permanently lost over the permit term. In addition, an estimated 0.02 acre (<0.01% of total) of occasional or limited use habitat would be temporarily lost per year and 0.08 acre (<0.01% of total) would be permanently lost over the permit term (Table 4-7). Indirect impacts on western burrowing owl include increased light, increased vehicle traffic, increased human disturbance, and potential changes in fire regime (Table 4-9).

Townsend's Western Big-Eared Bat

Townsend's western big-eared bats can occur in a variety of habitats throughout California, but they are most commonly associated with desert scrub, mixed conifer forest, and piñon-juniper or pine forest habitat. In the study area, suitable breeding habitat for Townsend's big-eared bat may be found in caves, tunnels, mines, and buildings in rock outcrop land cover types away from human disturbance. Suitable foraging habitat may be found in Diablan sage scrub, oak woodland, riparian woodland, evergreen oak woodland, and serpentine pine woodland chaparral land cover types. There are no CNDDDB records for this species within the study area, but it has the potential to exist there. Because covered activities are not anticipated to affect the rock outcrop land cover type, no impacts on breeding habitat are anticipated. There would be an estimated 6.29 acres (0.05% of total) of temporary impacts on foraging habitat and 100.68 acres (0.85% of total) of permanent impacts (Table 4-7). Indirect impacts on this species include increased noise and human disturbance (Table 4-9).

4.2.3.2 Plants

Tiburon Indian Paintbrush

Tiburon Indian paintbrush occurs on rock outcrops and north- to west-facing slopes in serpentine grassland at elevations between 350 and 1,300 feet. Thirty-nine percent of serpentine bunchgrass grassland provides suitable habitat and 60% provides secondary habitat (Table 4-5). An estimated 0.07 acre (0.08% of total) of primary habitat would be temporarily lost per year and an estimated 0.66 acre (0.70% of total) of primary habitat would be permanently lost over the permit term. There are an estimated 0.11 acre (0.08% of total) of temporary impacts per year and 1.03 acres (0.70% of total) of permanent impacts on secondary habitat over the permit term (Table 4-7). Indirect impacts on plants include increased dust, livestock and human disturbance, spread of nonnative invasive species, pesticide application, change in fire regime, and changes to surface and groundwater hydrology (Table 4-9).

Presidio Clarkia

Presidio clarkia occurs on serpentine outcrops, usually in grassland, but sometimes in openings in coastal sage scrub or maritime chaparral. Serpentine foothill pine–chaparral woodland and grassland is also potential habitat, although this has not been observed in the field. Forty-seven percent of serpentine bunchgrass grassland and 100% of serpentine foothill pine provides suitable habitat (Table 4-5). An estimated 0.28 acre (0.15% of total) of suitable habitat would be temporarily lost per year and an estimated 2.62 acres (1.41% of total) of suitable habitat would be permanently lost over the permit term. Indirect impacts on plants include increased dust, livestock and human disturbance, spread of nonnative invasive species, pesticide application, change in fire regime, and changes to surface and groundwater hydrology (Table 4-9).

Round-Leaved Filaree

Round-leaved filaree generally occurs in grassland on friable clay or clay loam soils. It has also been found in nonnative grassland on north- or east-facing slopes on clay soils with relatively low cover of annual grasses. Eighteen percent of nonnative grassland and 2% of ponds provides suitable habitat for round-leaved filaree. Less than 1% of the following habitat types can also provide suitable habitat: serpentine bunchgrass grassland, Diablan sage scrub, mixed evergreen forest/oak woodland, oak savanna, riparian forest, sycamore alluvial woodland, willow riparian forest scrub, freshwater marsh, quarry pond, turf, and disturbed/developed lands. Twelve percent of nonnative grassland provides secondary habitat (Table 4-5). An estimated 1.70 acres (0.05% of total) of primary habitat would be temporarily lost per year, and an estimated 47.23 acres (1.51% of total) would be permanently lost over the permit term. In addition, an estimated 1.13 acres (0.05% of total) of secondary habitat would be temporarily lost, and 31.88 acres (1.49% of total) would be permanently lost. Indirect

impacts on plants include increased dust, livestock and human disturbance, spread of nonnative invasive species, change in fire regime, and changes to surface and groundwater hydrology (Table 4-9).

Fragrant Fritillary

Fragrant fritillary occurs in grassland and coastal scrub, often on serpentine soil. Serpentine grassland in the study area is also potential habitat for this species. Fifty-three percent of serpentine bunchgrass grassland provides suitable habitat, and 46% provides secondary habitat (Table 4-5). An estimated 0.10 acre (0.08% of total) of primary habitat would be temporarily lost per year and an estimated 0.91 acre (0.70% of total) would be permanently lost over the permit term. In addition, an estimated 0.09 acre (0.08% of total) of secondary habitat would be temporarily lost, and 0.79 acre (0.70% of total) would be permanently lost (Table 4-7). Indirect impacts on plants include increased dust, livestock and human disturbance, spread of nonnative invasive species, change in fire regime, and changes to surface and groundwater hydrology (Table 4-9).

Diablo Helianthella

Diablo helianthella is associated with thin, rocky, well-drained soils on east-facing slopes. It is found in grassy openings in woodland, chaparral, and coastal scrub, often at the transition zone between woodland and chaparral areas. The population located in the study area was found in the transition zone between coast live oak woodland and Diablan sage scrub at 1,240 feet on a north-facing slope. Fifty-eight percent of mixed evergreen forest/oak woodland, 44% of nonnative grassland, 1.4% of Diablan sage scrub, 2.6% of riparian forest, 1.4% of sycamore alluvial woodland, 2.1% of willow riparian forest/scrub, and 5% of ponds provide suitable habitat. Five percent of mixed evergreen forest provides secondary habitat (Table 4-5). An estimated 7.01 acres (0.05% of total) of primary habitat would be temporarily lost per year, and an estimated 152.90 acres (1.06% of total) would be permanently lost over the permit term. In addition, an estimated 0.36 acres (0.04% of total) of secondary habitat would be temporarily lost and 6.23 acres (0.76% of total) would be permanently lost (Table 4-7). Indirect impacts on plants include increased dust, livestock and human disturbance, spread of nonnative invasive species, change in fire regime, and changes to surface and groundwater hydrology (Table 4-9).

Robust Monardella

Robust monardella occurs in openings in northern coastal scrub, chamise chaparral, serpentine chaparral, and mixed evergreen forest; it also occurs in grassland adjacent to these plant communities. The plants are often found on rock outcrops, steep slopes, or road banks at elevations of 100–2,240 feet. Ninety-seven percent of Diablan sage scrub, 81% of mixed evergreen forest/oak woodland, and 3% of riparian forest provide suitable habitat. Less than 2% of

the following land cover types provide suitable habitat: nonnative grassland, oak savanna, sycamore alluvial woodland, willow riparian forest/scrub, freshwater marsh, ponds, reservoirs, and disturbed/developed areas (Table 4-5). An estimated 4.96 acres (0.04% of total) of suitable habitat would be temporarily lost per year, and an estimated 63.28 acres (0.55% of total) would be permanently lost over the permit term (Table 4-7). Indirect impacts on plants include increased dust, livestock and human disturbance, spread of nonnative invasive species, change in fire regime, and changes to surface and groundwater hydrology (Table 4-9).

Most-Beautiful Jewelflower

Most-beautiful jewelflower is generally found in grassland dominated by native perennial grasses or in open grassland dominated by nonnative annual grasses with relatively low cover of nonnative grasses. It is also found on rock outcrops or grassy openings in serpentine chaparral or where serpentine grassland or chaparral habitats transition to oak woodland. One hundred percent of serpentine foothill pine and 12% of serpentine bunchgrass grassland provide suitable habitat. Eighty-seven percent of serpentine bunchgrass grassland and 97% of Diablan sage scrub provide secondary habitat (Table 4-5). An estimated 0.22 acre (0.76% of total) of primary habitat would be temporarily lost per year, and 2.01 acres (7.11% of total) would be permanently lost over the permit term. In addition, an estimated 1.00 acre (0.05% of total) of secondary habitat would be temporarily lost, and 8.92 acres (0.45% of total) of would be permanently lost (Table 4-7). Indirect impacts on plants include increased dust, livestock and human disturbance, spread of nonnative invasive species, change in fire regime, and changes to surface and groundwater hydrology (Table 4-9).

4.2.4 Effects of Activities on Ponds, Wetlands and Streams

[placeholder pending discussion of 404 permitting]

4.2.5 Effects on Critical Habitat

Critical habitat is designated in final rules by USFWS and NMFS for specific areas that have the physical and biological features essential to the conservation of listed species. Section 7 of the ESA prohibits the destruction or adverse modification of designated critical habitat by any activity authorized by any federal agency. California red-legged frog and California tiger salamander are the only species with designated critical habitat that are covered by this HCP.

USFWS originally designated critical habitat for California red-legged frog on March 13, 2001. A lawsuit challenging the designation was filed in the U.S. District Court for the District of Columbia on June 8, 2001. Most of the 2001

designation was vacated by the District Court in a November 6, 2002, consent decree. USFWS re-proposed critical habitat for this species on April 13, 2004. A final rule was issued in April 2006 (71 FR 19243–19346). The HCP study area was located in Critical Habitat Unit ALA-1C of the proposed critical habitat. However, this unit was excluded from the final designation. Accordingly, there is no designated critical habitat for California red-legged frog in the HCP study area.

California tiger salamander has been divided into three geographically separate populations. Each of the three populations has a different status with unique designations. Critical habitat was finalized for the central population on August 23, 2005 (70 FR 49379). The East Bay Critical Habitat Unit 3 falls within the HCP study area. This unit is located just east of Calaveras Reservoir in Santa Clara County.

USFWS designated critical habitat for Alameda whipsnake in March 2000 (65 FR 12155). The critical habitat designation was challenged in court and withdrawn as a result of a court order in May 2003. A new draft rule of critical habitat was published in October 2005 (70 FR 60607) and reopened for comment on May 4, 2006 (71 FR 26311).

Other federally listed species covered by the HCP are Callippe silverspot butterfly, Presidio clarkia, and Tiburon Indian paintbrush, none of which currently have critical habitat designated or proposed.

4.2.6 Cumulative Impacts

The impacts of covered activities were assessed on the basis of existing conditions in the study area. Covered activities were broadly defined to encompass a wide variety of projects related to O&M on SFPUC lands. Some activities and projects that are outside the scope of this HCP may nonetheless contribute to cumulative impacts on covered species. Specific projects and activities not covered by this Plan that may, in conjunction with the covered activities, have impacts on covered species are described below. Additional discussion of potential cumulative impacts can be found in the EIR/EIS for this Plan.

Table 4-10 lists the reasonably foreseeable projects and activities within the proposed permit area, providing a brief description and anticipated schedule. The table also identifies the potential areas of cumulative impacts (or the reasons that no cumulative effects are expected). The potential for cumulative effects due to implementation of the proposed project in combination with the cumulative projects listed in Table 4-10 is discussed below.

4.2.6.1 SFPUC Alameda Watershed Water System Improvement Program Projects

Water System Improvement Program (WSIP) projects in the Alameda Creek watershed would affect annual grassland, woodlands, coastal scrub, wetlands, streams, and riparian areas and may affect covered species including California red-legged frog, California tiger salamander, Alameda whipsnake, and burrowing owls, among other species. WSIP projects that could contribute to impacts in the permit area include: the New Irvington Tunnel, Calaveras Dam, the Alameda Siphons Upgrade Project; projects that utilize spoils disposal areas in Sunol Valley (SVWTP 40-mgd Treated Water Supply, SVWTP New Treated Water Reservoirs, and SAPS Upgrade); and the Alameda Creek Fisheries Enhancement Project. In general, most of the cumulative impacts of the WSIP projects in the Alameda watershed can likely be mitigated. The WSIP projects would not be expected to result in wholesale conversion of habitats on a landscape level nor would they likely permanently harm populations of common or special-status species within the watershed, although local impacts may be significant. There are extensive areas of high quality habitat throughout the Alameda Creek watershed that would not be affected by WSIP projects that provide refugia for species in the area.

However, some impacts may be significant and unavoidable. The New Irvington Tunnel project has the potential for significant and unavoidable impacts on covered species utilizing riparian woodland due to the long time to recovery of sycamore alluvial woodland removed for spoils disposal access route (if no feasible alternative is implemented). The Calaveras Dam project may have a potential significant and unavoidable impact on wetlands. Project-level analysis may identify other significant and unavoidable impacts associated with WSIP projects.

Irvington Tunnel Project

The project area contains habitat for a number of covered species, including the Alameda whipsnake, the California tiger salamander, and the California red-legged frog. The project also contains sensitive vegetation communities including sycamore alluvial woodland and jurisdictional wetlands. Project implementation may disturb and/or result in loss of native habitat for common and rare species during construction and direct effects on species where they are present. If groundwater levels are affected during construction, creeks, wetlands, and ponds dependent on groundwater may be affected.

Calaveras Reservoir Expansion Project

Construction of the project could impact rare vegetation communities and covered species by potential habitat losses and disturbance. Rare vegetation communities that could be affected include sycamore alluvial woodland,

wetlands, and riparian areas. Covered species whose habitat could be affected include Callippe silverspot butterfly habitat, California red-legged frog, foothill yellow-legged frog, California tiger salamander, Alameda whipsnake, most beautiful jewel flower, Townsend's western big-eared bat, golden eagle, and western pond turtle. In addition, there are 26 federally or state-listed "species of concern" that have the potential to occur in the project area.

Alameda Siphons Upgrade Project

Construction of the siphons project would affect mostly disturbed areas east of Alameda Creek and would affect the same construction areas as the New Irvington Tunnel Project west of Alameda Creek near the Alameda West Portal. The siphons project contains the same permanent access road and bridges as the New Irvington Tunnel Project. The Initial Study for the siphons project (IPJV 2006) concluded that the biological impacts of the siphons project can be mitigated to a less-than-significant level.

Sunol Valley Projects/Spoils Disposal

The SFPUC may use proposed spoils areas in the Sunol Valley for a number of projects, including the New Irvington Tunnel project, the 40-mgd Treated Water Supply project, and the SVWTP New Treated Water Reservoir project. Spoils transport and disposal activities near Alameda Creek would have potential adverse effects on covered species such as California red-legged frog, California tiger salamander, and Alameda whipsnake. Loss of sycamore alluvial woodland due to spoils access roads/bridges and conveyors to Spoils Area No. 1 is considered a significant and unavoidable impact where woodland recovery would take more than five years.

San Antonio Pump Station and San Antonio Pipeline projects

Temporary construction associated with these projects would affect disturbed areas in the Sunol Valley. Where special-status species habitat or sensitive vegetation communities are disturbed temporarily or permanently, there is the potential for significant cumulative impacts to biological resources. Of particular concern would be the combined effect of the San Antonio Pipeline and the New Irvington Tunnel on the potential migration of common and special-status species across Sunol Valley in the natural area south of the Alameda siphons. Given the scale of construction activity, this natural corridor could be substantially disrupted for a number of years, which could affect migration of special-status species such as Alameda whipsnake, California red-legged frog, California tiger salamander and other species.

Alameda Creek Fisheries Enhancement Project

The project would install an inflatable rubber dam across Alameda Creek upstream of the proposed project site to capture and redistribute flows from the Calaveras Reservoir. Flow releases from Calaveras Reservoir would be adjusted

to enhance fish habitat in upstream reaches of Alameda Creek. The rubber dam would be operated to allow passage of high volume, channel-forming flows to reaches further downstream, including the proposed project site. Construction of this project may affect fish and other common and special-status wildlife species associated with Alameda Creek and its riparian corridor. Construction impacts from this project can be managed through project-specific mitigation. The Enhancement Project is expected to improve fish habitat for resident rainbow trout such that no permanent cumulative impact would be expected.

4.2.6.2 Zone 7 Water Agency—Stream Management Master Plan, Reach 10 Improvements

Zone 7 Water Agency's Stream Management Master Plan calls for improvements to Reach 10, which includes Arroyo de la Laguna. Proposed activities include bank stabilization and protection features, grading and terracing of eroded banks, riparian corridor enhancement for 3,000 feet, and removal of barriers to steelhead fish migration. Construction of these improvements may result in the temporary disturbance of riparian and aquatic habitats. Long-term effects of this project are likely to enhance aquatic habitat for some covered species.

4.2.6.3 Apperson Ridge Quarry

Proposed quarry activity, blasting, and truck traffic could disturb and drive away nesting golden eagles and peregrine falcons, and damage habitat and disrupt migration for covered species such as the California red-legged frog, Alameda whipsnake, California tiger salamander and western burrowing owl.

4.2.6.4 Chevron Pipeline Relocation and Watershed Protection Project

This project would relocate an approximately 7.5-mile pipeline segment through Sunol Valley area to replace an existing pipeline near San Antonio Reservoir and reduce the risk of water supply impact in the event of a pipeline rupture or leak. The project would result in temporary disturbance of natural communities, primarily grassland and woodlands.

Table 4-1. Impact Classification by Activity

Activity	Location Known or Unknown	Type of Direct Impact		
		Temporary in different locations	Temporary and recurs in same location ¹	Permanent
Watershed O & M Activities				
Road Maintenance	Unknown	X		X
Road Construction/Reconstruction	Unknown	X		X
Bridge Replacement/Construction	Known bridge locations, unknown staging areas	X		X
Fence Installation and Repair				
Fence repair	Unknown	X		X
Fencing installation	Unknown	X		X
Gate Repair and Installation	Unknown	X		X
Vegetation management				
Veg Mgmt around roads - grass	Known		X	
Veg Mgmt around roads -woodland	Known		X	
Veg Mgmt around roads-scrub	Known		X	
Mowing/Blading for fuel management	Known		X	
Weather Station/Sludge Pond/Facilities	Known		X	
Pond Spillway Repair	Unknown	X		X
Recreation				
Land managed by SFPUC	Unknown			X
Sunol Valley Recreation Plan	Known		X	X
Water Supply/Reservoir O&M				
Inundation/Desiccation of Reservoir Margin Habitat	Known		X	
Boat Launch Construction	Unknown		X	X
Veg and Debris Mgmt on Dams	Known		X	
Maintenance of Sludge Ponds	Known		X	
Water Transmission and Filtration System O&M				
Valve Exercises	Known		X	
Pipeline maintenance				
Minor maintenance	Unknown	X		
Major Maintenance	Unknown	X		
Lease/Permit and Easement Activities²				
Telecom sites O & M	Known		X	

Notes

¹ Temporary impacts that recur annually in the same location are calculated as permanent impacts.

² Livestock grazing, nursery O&M and golf course impacts are covered qualitatively in the text.

Table 4-2. Estimated Ground Disturbance by Activity

Activity	(formulas and notes and basis for estimate)	Type of Direct Impact (%)		Frequency Per Year ¹	Loss per Event (acres)		Annual Loss in HCP Permit Area (acres)		Perm. Loss over Permit Term ²
		Temp	Perm		Temp	Perm	Temporary	Permanent	
Watershed O & M Activities									
Road Maintenance	147 miles of roads maintained by SFPUC; 3' shoulder on two sides = 106.9 acres	90%	10%	0.5	96.21	10.69	48.11	5.35	160.35
Road Construction/Reconstruction	see analysis below	10%	90%	1	0.17	0.79	0.17	0.79	23.76
Bridge Replacement/Construction	Calculated using GIS. Assumes replacement or construction of 5 bridges over permit term.	60%	40%	0.17	0.79	0.53	0.13	0.09	2.64
Fence Installation and Repair									
Fence repair	200 miles of fencing replaced every 20 years * 10-ft-wide impact area	95%	5%	1	11.52	0.61	11.52	0.61	18.18
Fencing installation	1 miles/yr @10ft wide=1.25 acres	95%	5%	1	1.19	0.06	1.19	0.06	1.88
Gate Repair and Installation	Assumes impact of gate replacement = 0.35 acre with 5 gates replaced/year	85%	15%	5	0.30	0.05	1.49	0.26	7.88
Vegetation management³									
Veg Mgmt around roads - grass	83.5 acres (grass, marsh, savannah)	100%	0%	1.5	83.50	0.00	125.25	0.00	0.00
Veg Mgmt around roads -woodland	137.2 acres (all woodland & ephemeral streams)	100%	0%	0.2	137.20	0.00	27.44	0.00	0.00
Veg Mgmt around roads-scrub	3.8 acres (sage and serpentine chaparral)	100%	0%	0.1	3.80	0.00	0.38	0.00	0.00
Mowing/Blading for fuel management	26.1 acres	100%	0%	1.5	26.10	0.00	39.15	0.00	0.00
Weather Station/Sludge Pond/Facilities	4.63 acres total	100%	0%	1.5	4.63	0.00	6.95	0.00	0.00
Pond Spillway Repair	Assumes 1.5 spillway repairs per year for the term of the HCP; 0.05 acre of impact/pond	80%	20%	1.5	0.04	0.01	0.06	0.02	0.45
Recreation									
Land managed by SFPUC	see New Trails below	0%	100%	0.03	0.00	8.87	0.00	0.30	8.87
Sunol Valley Recreation Plan	Assumes 840.75 acres of impact	85%	15%	0.03	714.64	126.11	23.82	4.20	126.11

Activity	(formulas and notes and basis for estimate)	Type of Direct Impact (%)		Frequency Per Year ¹	Loss per Event (acres)		Annual Loss in HCP Permit Area (acres)		Perm. Loss over Permit Term ²	
		Temp	Perm		Temp	Perm	Temporary	Permanent		
Water Supply/Reservoir O&M										
Inundation/Desiccation of Reservoir Margin Habitat	Impact was estimated using high (705.5 ft.) and low (690 ft) levels for Calaveras; San Antonio not anticipated to impact species habitat	100%	0%	1	168.00	0.00	168.00	0.00	0.00	
Boat Launch Construction	Assumes construction of two boat launches, one in each reservoir	33%	66%	0.07	0.50	1.00	0.03	0.07	2.00	
Veg and Debris Mgmt on Dams	Assumes 2 acres of impact once every 2 yrs	100%	0%	0.5	2.00	0.00	1.00	0.00	0.00	
Maintenance of Sludge Ponds	8 sludge ponds totaling 6.2 acres w/ 5 ponds dredged every 2 years (see analysis below)	100%	0%	2.50	0.78	0.00	1.95	0.00	0.00	
Water Transmission and Filtration System O&M										
Valve Exercises	Assumes regular releases can be timed to avoid impacts; two unplanned releases every 3 years. Additional analysis below.	100%	0%	0.67	7.25	0.00	4.83	0.00	0.00	
Pipeline maintenance										
Minor maintenance	# provided by O&M staff	100%	0%	1	0.01	0.00	0.01	0.00	0.00	
Major Maintenance	# provided by O&M staff	100%	0%	0.13	0.95	0.00	0.13	0.00	0.00	
Lease/Permit and Easement Activities⁴										
Telecom sites O & M	assumes size of 40*40 ft once per year mowing * 4 sites	100%	0%	1	0.15	0.00	0.15	0.00	0.00	
Total					1,259.85	150.66	461.88	13.67	410.12	
									Total Impact as % of Watershed Area	1.1%

Notes

- 1 Frequency assumed per year over 30 year period; X = one time action
- 2 Permit term assumed to be 30 years
- 3 Calculated using GIS
- 4 Livestock grazing, nursery O&M and golf course impacts are covered qualitatively in the text.

Table 4-3. Estimated Impact by Land Cover (proportion)

Activity	Estimation Method ^a	Non-native Grassland	Serpentine Bunchgrass Grassland	Diablan Sage Scrub	Mixed Evergreen Forest/Oak Woodland ^b	Oak Savanna	Riparian Forest ^c	Sycamore Alluvial Woodland	Willow Riparian Forest/Scrub ^e	Freshwater Marsh ^e	Pond	Quarry Pond	Reservoir	Turf	Developed/disturbed	Cultivated Agriculture	Nursery	Per Stream	Int/Eph Stream	Serpentine-Foothill Pine	Rock Outcrop	Total
Watershed O & M Activities																						
% of total HCP Study Area		0.45	0.01	0.05	0.36	0.03	<.02	0.01	<.01	<.01	<.01	0.00	0.05	<.01	0.01	0.01	<.01	NA	NA	0.01	<.01	0.99
Road Maintenance	2	0.05	0.00	0.00	0.02	0.01	0.00	0.00	0.00						0.90		0.00	0.00	0.01	0.00		1.00
Road Construction	1	0.42	0.01	0.05	0.35	0.04	0.04	0.03	0.03						0.01				0.01	0.01		1.00
Bridge Replacement/Construction	2	0.34			0.10		0.07	0.06	0.32						0.05			0.02	0.04			1.00
Fencing Installation and Repair																						0.00
Fence repair (see math in B)	1	0.42	0.01	0.05	0.30	0.04	0.04	0.03	0.03		0.01		0.03		0.01			0.01	0.01	0.01		1.00
Fencing installation	1	0.30	0.02	0.05	0.25	0.02	0.10	0.02	0.10		0.02		0.05					0.03	0.03	0.01		1.00
Gate Repair and Installation	1	0.75		0.02	0.10	0.02	0.01	0.01	0.01						0.05	0.01	0.01			0.01		1.00
Vegetation management																						0.00
Combo Veg mang't-grass	2	0.99				0.01				0.00												1.00
Combo Veg mang't-woodland	2				0.77		0.11	0.05	0.07													1.00
Combo Veg mang't-scrub	2			0.80																0.20		1.00
Mowing/Blading	2	0.90	0.01	0.01	0.02	0.02	0.01	0.01	0.01											0.01		1.00
Weather Station/Sludge Pond/Facilities	1	1.00																				1.00
Pond Spillway Repair	1	0.25			0.03	0.02			0.10		0.60											1.00
Recreation	1																					0.00
Land owned and managed by SFPUC ^d	1	0.49	0.01	0.05	0.36	0.03	0.01	0.01	0.00					0.01	0.01					0.01	0.00	1.00
Sunol Valley Recreation Plan	2	0.18			0.01			0.02	0.02	0.01	0.01	0.08			0.60		0.06		0.01			1.00
Water Supply/Reservoir O&M																						
Inundation/Desiccation of Reservoir Margin Habitat	1								0.10	0.01					0.89							1.00
Boat Launch Construction	1	0.43		0.02	0.30	0.04	0.04		0.04	0.03			0.10									1.00
Veg and Debris Mgmt on Dams	1	0.05							0.15						0.80							1.00
Dredging of Sludge Ponds	1										1.00											
Water Transmission and Filtration System O&M																						
Valve Exercises	1							0.47	0.47	0.07												1.00
Pipeline maintenance																						0.00
Minor maintenance	1	0.15			0.15	0.01	0.20	0.15	0.10	0.01	0.02				0.10	0.01	0.05	0.02	0.03			1.00
Major Maintenance	1	0.15			0.15	0.01	0.20	0.15	0.10	0.01	0.02				0.10	0.01	0.05	0.02	0.03			1.00
Lease/Permit and Easement Activities																						
Telecom sites O & M	1	1.00																				1.00

^a Estimation Method:

- 1 = Estimated based on knowledge of SFPUC field staff;
- 2 = Known or estimated location(s) overlaid with land cover in GIS database

^b Includes all types of oak woodlands (blue oak, valley oak, and mixed)

^c Includes the following riparian types: live oak riparian, white alder riparian

^d 100% of staging-area impacts (parking spaces, displays, bathrooms) were assumed to be in nonnative grasslands. Impacts from trails were distributed in proportion to occurrence in the study over the following terrestrial land-cover types (nonnative grassland, serpentine bunchgrass, diablan sage scrub, mixed evergreen/oak, oak savanna, riparian, sycamore alluvial, willow riparian/scrub, serpentine foothill pine, and rock outcrop). Other land-cover types were unsuitable/unlikely candidates for new trails.

^e Assumptions underlying impacts to Willow Riparian Scrub and freshwater marsh are under review and may be reduced in future drafts.

Table 4-4. Estimate of Impacts by Land Cover (in acres)¹

Activity	Impact Type	Non-native Grassland	Serpentine Bunchgrass Grassland	Diablan Sage Scrub	Mixed Evergreen Forest/Oak Woodland ²	Oak Savanna	Riparian Forest ³	Sycamore Alluvial Woodland	Willow Riparian Forest/ Scrub ¹	Freshwater Marsh	Pond	Quarry Pond	Reservoir	Turf	Developed/ disturbed	Cultivated Agriculture	Nursery	Per Stream	Int/Eph Stream	Serpentine-Foothill Pine	Rock Outcrop
Watershed O & M Activities																					
Road maintenance	Temporary (annual)	2.50	0.05	0.14	0.91	0.24	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	43.49	0.00	0.05	0.10	0.43	0.05	0.00
	Permanent (total)	8.34	0.16	0.48	3.05	0.80	0.16	0.16	0.16	0.00	0.00	0.00	0.00	0.00	144.96	0.00	0.16	0.32	1.44	0.16	0.00
Road construction	Temporary (annual)	0.13	0.00	0.02	0.11	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	34.34	0.82	4.09	28.62	3.27	3.27	2.45	2.45	0.00	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.00	0.82	0.82	0.00
Bridge replacement	Temporary (annual)	0.04	0.00	0.00	0.01	0.00	0.01	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
	Permanent (total)	0.90	0.00	0.00	0.26	0.00	0.18	0.16	0.84	0.00	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.05	0.11	0.00	0.00
Fencing repair and installation	Temporary (annual)	5.19	0.14	0.64	3.75	0.48	0.58	0.37	0.46	0.00	0.14	0.00	0.40	0.00	0.12	0.00	0.00	0.15	0.15	0.13	0.00
	Permanent (total)	8.20	0.22	1.00	5.92	0.76	0.91	0.58	0.73	0.00	0.22	0.00	0.64	0.00	0.18	0.00	0.00	0.24	0.24	0.20	0.00
gate repair and installation	Temporary (annual)	1.12	0.00	0.03	0.15	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.01	0.00	0.00	0.01	0.00
	Permanent (total)	5.91	0.00	0.16	0.79	0.16	0.08	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.39	0.08	0.08	0.00	0.00	0.08	0.00
Vegetation management	Temporary (annual)	166.18	0.39	0.70	21.91	2.04	3.41	1.76	2.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.00
combo veg mgmt (also mowing/blading & sludge)	Permanent (total)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pond Spillway Repair	Temporary (annual)	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	0.11	0.00	0.00	0.01	0.01	0.00	0.00	0.05	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Recreation																					
Land managed by SFPUC	Temporary (annual)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	4.36	0.09	0.44	3.18	0.27	0.13	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.09	0.04
Sunol Valley Recreation Plan	Temporary (annual)	4.29	0.00	0.00	0.24	0.00	0.00	0.48	0.48	0.24	0.24	1.91	0.00	0.00	14.29	0.00	1.43	0.00	0.24	0.00	0.00
	Permanent (total)	22.70	0.00	0.00	1.26	0.00	0.00	2.52	2.52	1.26	1.26	10.09	0.00	0.00	75.67	0.00	7.57	0.00	1.26	0.00	0.00
Water Supply/Reservoir O&M																					
Inundation/dessication of Margin Habitat	Temporary (annual)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.80	1.06	0.00	0.00	0.00	0.00	150.14	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boat Launch Construction	Temporary (annual)	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	0.86	0.00	0.04	0.60	0.08	0.08	0.00	0.08	0.06	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Veg and Debris Mgmt on Dams	Temporary (annual)	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dredging of Sludge Ponds	Temporary (annual)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance of water transmission and filtration system																					
Valve exercises	Temporary (annual)	0.00	0.00	0.00	0.00	0.00	0.00	2.25	2.25	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pipeline maintenance	Temporary (annual)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Minor maintenance	Permanent (total)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Major Maintenance	Temporary (annual)	0.02	0.00	0.00	0.02	0.00	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00
	Permanent (total)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lease/Permit and Easement Activities																					
Telecom sites O & M	Temporary (annual)	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Permanent (total)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	Temporary (annual)	9.0	0.2	0.8	5.0	0.8	0.7	0.5	0.6	0.0	0.2	0.0	0.4	0.0	43.7	0.0	0.1	0.3	0.6	0.2	0.0
Total	Permanent (total)	256.4	1.7	6.9	65.9	7.4	8.2	10.5	28.9	3.0	3.9	12.0	0.8	0.1	387.5	0.1	9.2	0.6	4.1	1.8	0.0

Notes:

¹ Impact acreages are under review and may be reduced in future drafts.

² Includes all types of oak woodlands (blue oak, valley oak, and mixed)

³ Includes the following riparian types: both live oak riparian and white alder riparian

Table 4-5. Proportion of Land Cover Type Providing Suitable Habitat

Species	Habitat Type	Estimation Method ¹	Non-native Grassland	Proportion of total land cover type	Serpentine Bunchgrass Grassland	Proportion of total land cover type	Diablan Sage Scrub	Proportion of total land cover type	Mixed Evergreen Forest/Oak Woodland ²	Proportion of total land cover type	Oak Savanna	Proportion of total land cover type	Riparian Forest ³	Proportion of total land cover type	Sycamore Alluvial Woodland	Proportion of total land cover type	Willow Riparian Forest/ Scrub
Total acreage in HCP study area			17,086.00		242.00		1,693.00		11,995.00		1,194.00		368.00		276.00		157.00
Plants																	
Diablo helianthella	<i>primary habitat</i>	A	7,485.43	0.44	0.93	0.00	23.57	0.01	6,900.16	0.58	8.62	0.01	9.60	0.03	3.97	0.01	3.36
	<i>secondary habitat</i>		183.90	0.01	0.00	0.00	0.12	0.00	630.50	0.05	0.99	0.00	0.00	0.00	0.00	0.00	0.00
Fragrant fritillary	<i>primary habitat</i>	A	1.50	0.00	127.82	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>secondary habitat</i>		1.29	0.00	110.54	0.46	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Most beautiful jewel-flower	<i>primary habitat</i>	A	0.33	0.00	27.95	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>secondary habitat</i>		29.85	0.00	210.99	0.87	1,633.32	0.96	46.91	0.00	1.19	0.00	1.41	0.00	0.03	0.00	0.17
Presidio Clarkia	<i>total modeled habitat</i>	A	2.01	0.00	112.73	0.47	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Robust monardella	<i>total modeled habitat</i>	A	129.03	0.01	0.00	0.00	1,646.76	0.97	9,724.95	0.81	11.66	0.01	10.56	0.03	2.65	0.01	2.76
Round-leaved filaree	<i>primary habitat</i>	A	3,094.02	0.18	0.42	0.00	2.79	0.00	23.01	0.00	2.69	0.00	2.27	0.01	1.09	0.00	0.31
	<i>secondary habitat</i>		2,106.76	0.12	0.50	0.00	4.74	0.00	25.91	0.00	0.86	0.00	0.65	0.00	0.04	0.00	0.00
Tiburon Indian paintbrush	<i>primary habitat</i>	A	1.06	0.00	93.54	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>secondary habitat</i>		1.73	0.00	144.82	0.60	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wildlife																	
Alameda whipsnake	<i>total modeled habitat</i>	A	6,249.75	0.37	53.15	0.22	1,156.78	0.68	7,076.76	0.59	602.94	0.50	67.69	0.18	20.17	0.07	10.51
Callipe silverspot butterfly*	<i>total modeled habitat</i>	B	865.20	0.05	3.48	0.01	3.48	0.00	24.96	0.00	22.10	0.02	3.48	0.01	0.00	0.00	0.00
California red-legged frog	<i>Breeding Habitat</i>	A	137.65	0.01	1.65	0.01	1.97	0.00	374.43	0.03	11.33	0.01	69.54	0.19	54.70	0.20	30.08
	<i>Migration and Aestivation Habitat</i>		16,947.74	0.99	240.54	0.99	4.28	0.00	11,619.27	0.97	1,182.64	0.99	298.99	0.81	221.15	0.80	127.18
California tiger salamander	<i>Breeding Habitat</i>	A	0.00	0.00	0.00	0.00	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>Migration and Aestivation Habitat</i>		16,024.20	0.94	205.24	0.85	0.00	0.00	11,089.17	0.92	1,184.53	0.99	331.34	0.90	252.76	0.92	155.86
Foothill yellow-legged frog	<i>Core Habitat</i>	A	11.39	0.00	0.00	0.00	1.60	0.00	66.50	0.01	0.87	0.00	30.04	0.08	22.57	0.08	8.59
	<i>Low-use Habitat</i>		115.52	0.01	1.65	0.01	16.56	0.01	299.65	0.02	9.75	0.01	39.71	0.11	30.50	0.11	20.90
Pacific Townsend's (Western) bat	<i>Breeding Habitat</i>	B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>Foraging Habitat</i>		170.86	0.01	2.42	0.01	1,354.40	0.80	9,596.00	0.80	11.94	0.01	294.40	0.80	220.80	0.80	125.60
Tricolored blackbird	<i>Core Breeding Habitat</i>	A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>Primary Foraging Habitat</i>		17,085.52	1.00	242.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Western burrowing owl	<i>Breeding and Foraging habitat</i>	A	17,085.51	1.00	242.20	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>Occasional or Limited Use Areas</i>		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Western pond turtle	<i>Core (includes nesting) Habitat</i>	A	438.25	0.03	2.56	0.01	33.07	0.02	432.41	0.04	22.96	0.02	83.93	0.23	64.50	0.23	30.74
	<i>Movement and Overwintering Habitat</i>		2,187.14	0.13	27.45	0.11	305.45	0.18	3,045.36	0.25	240.46	0.20	162.04	0.44	174.62	0.63	91.00

Notes:

Method A = See species model; Method B = estimate based on professional judgement of senior wildlife biologists at Jones & Stokes

¹ Includes all types of oak woodlands (blue oak, valley oak, and mixed)

² Includes the following riparian types: both live oak riparian and white alder riparian

³ numbers developed using D. Arnold report on butterflies. Suitable habitat acreage from "other" category was distributed evenly among the following 1c types listed in his report: cost live oak riparian, blue oak woodland, valley oak woodland, diablo sage scrub, and serpentine grassland

Table 4-5. Proportion of Land Cover Type Providing Suitable Habitat

Species	Habitat Type	Proportion of total land cover type	Freshwater Marsh	Proportion of total land cover type	Pond	Proportion of total land cover type	Quarry Pond	Proportion of total land cover type	Reservoir	Proportion of total land cover type	Turf	Proportion of total land cover type	Developed/ Disturbed	Proportion of total land cover type	Cultivated Agriculture	Proportion of total land cover type	Nursery (177)	Proportion of total land cover type
Total acreage in HCP study area			21.00		36.00		96.00		2,216.00		215.00		523.00		379.00		177.00	
Plants																		
Diablo helianthella	primary habitat	0.02	0.17	0.01	1.74	0.05	0.14	0.00	6.30	0.00	0.33	0.00	1.76	0.00	0.92	0.00	0.19	0.00
	secondary habitat	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fragrant fritillary	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Most beautiful jewel-flower	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	secondary habitat	0.00	0.10	0.00	0.04	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Presidio Clarkia	total modeled habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Robust monardella	total modeled habitat	0.02	0.10	0.00	0.33	0.01	0.00	0.00	3.79	0.00	0.02	0.00	0.34	0.00	0.45	0.00	0.12	0.00
Round-leaved filaree	primary habitat	0.00	0.07	0.00	0.75	0.02	0.14	0.00	1.05	0.00	0.30	0.00	0.52	0.00	0.04	0.00	0.00	0.00
	secondary habitat	0.00	0.00	0.00	0.53	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.21	0.00	0.00	0.00
Tiburon Indian paintbrush	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wildlife																		
Alameda whipsnake	total modeled habitat	0.07	0.00	0.00	10.86	0.30	0.00	0.00	0.00	0.00	0.00	0.00	9.23	0.02	0.00	0.00	0.00	0.00
Callipe silverspot butterfly*	total modeled habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
California red-legged frog	Breeding Habitat	0.19	2.06	0.10	36.00	1.00	1.40	0.01	1.29	0.00	9.17	0.04	0.61	0.00	0.04	0.00	0.16	0.00
	Migration and Aestivation Habitat	0.81	18.74	0.89	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	378.69	1.00	0.00	0.00
California tiger salamander	Breeding Habitat	0.00	11.90	0.57	36.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Migration and Aestivation Habitat	0.99	8.90	0.42	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	368.72	0.97	176.41	1.00
Foothill yellow-legged frog	Core Habitat	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
	Low-use Habitat	0.13	0.03	0.00	0.99	0.03	0.00	0.00	0.07	0.00	0.03	0.00	0.43	0.00	0.00	0.00	0.03	0.00
Pacific Townsend's (Western) bat	Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Foraging Habitat	0.80	1.05	0.05	0.36	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.90	0.10	0.00	0.00
Tricolored blackbird	Core Breeding Habitat	0.00	0.00	0.00	15.44	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Primary Foraging Habitat	0.00	11.90	0.57	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	378.74	1.00	0.00	0.00
Western burrowing owl	Breeding and Foraging habitat	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Occasional or Limited Use Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	378.74	1.00	0.00	0.00
Western pond turtle	Core (includes nesting) Habitat	0.20	4.72	0.22	32.80	0.91	0.00	0.00	179.24	0.08	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00
	Movement and Overwintering Habitat	0.58	0.00	0.00	0.00	0.00	19.16	0.20	15.31	0.01	0.00	0.00	0.00	0.00	2.76	0.01	0.00	0.00

Notes:

Method A = See species model; Method B = estimate based on professional judgement of senior wildlife biologists at Jones & Stokes

¹ Includes all types of oak woodlands (blue oak, valley oak, and mixed)

² Includes the following riparian types: both live oak riparian and white alder riparian

³ numbers developed using D. Arnold report on butterflies. Suitable habitat acreage from "other" category was distributed evenly among the following 1c types listed in his report: cost live oak riparian, blue oak woodland, valley oak woodland, diablo sage scrub, and serpentine grassland

Table 4-5. Proportion of Land Cover Type Providing Suitable Habitat

Species	Habitat Type	Per Stream	Proportion of total land cover type	Int/Eph Stream	Proportion of total land cover type	Serpentine-Foothill Pine	Proportion of total land cover type	Rock Outcrop	Proportion of total land cover type	Total acres
Total acreage in HCP study area		144.34		577.17		70.91		16.00		
Plants										
Diablo helianthella	<i>primary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.02	14,447.43
	<i>secondary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	815.59
Fragrant fritillary	<i>primary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	129.33
	<i>secondary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	111.93
Most beautiful jewel-flower	<i>primary habitat</i>	0.00	0.00	0.00	0.00	70.91	1.00	0.00	0.00	28.28
	<i>secondary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,924.93
Presidio Clarkia	<i>total modeled habitat</i>	0.00	0.00	0.00	0.00	70.91	1.00	0.00	0.00	114.78
Robust monardella	<i>total modeled habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.02	11,533.80
Round-leaved filaree	<i>primary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	3,129.55
	<i>secondary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	2,140.29
Tiburon Indian paintbrush	<i>primary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.60
	<i>secondary habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	146.65
Wildlife										
Alameda whipsnake	<i>total modeled habitat</i>		0.00	0.00	0.00	0.00	0.00	10.09	0.63	15,267.94
Callipe silverspot butterfly*	<i>total modeled habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	922.70
California red-legged frog	<i>Breeding Habitat</i>	144.34	1.00	577.17	1.00	0.00	0.00	0.00	0.00	732.08
	<i>Migration and Aestivation Habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31,039.23
California tiger salamander	<i>Breeding Habitat</i>	0.00	0.00		0.00	0.00	0.00	0.00	0.00	49.78
	<i>Migration and Aestivation Habitat</i>	0.00	0.00		0.00	0.00	0.00	0.00	0.00	29,797.14
Foothill yellow-legged frog	<i>Core Habitat</i>	142.62	0.99	0.00	0.00	0.00	0.00	0.00	0.00	141.59
	<i>Low-use Habitat</i>	0.00	0.00	542.03	0.94	0.00	0.00	0.00	0.00	535.81
Pacific Townsend's (Western) bat	<i>Breeding Habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.10	1.60
	<i>Foraging Habitat</i>	0.00	0.00	0.00	0.00	56.73	0.80	0.00	0.00	11,815.73
Tricolored blackbird	<i>Core Breeding Habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.44
	<i>Primary Foraging Habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17,718.17
Western burrowing owl	<i>Breeding and Foraging habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17,327.73
	<i>Occasional or Limited Use Areas</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	378.74
Western pond turtle	<i>Core (includes nesting) Habitat</i>	144.34	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1,325.39
	<i>Movement and Overwintering Habitat</i>	0.00	0.00	577.17	1.00	0.00	0.00	0.79	0.05	6,271.53

Notes:

Method A = See species model; Method B = estimate based on professional judgement of senior wildlife biologists at Jones & Stokes

¹ Includes all types of oak woodlands (blue oak, valley oak, and mixed)

² Includes the following riparian types: both live oak riparian and white alder riparian

³ numbers developed using D. Arnold report on butterflies. Suitable habitat acreage from "other" category was distributed evenly among the following 1c types listed in his report: cost live oak riparian, blue oak woodland, valley oak woodland, diablo sage scrub, and serpentine grassland

Table 4-6a. Impacts to species by Land Cover Type - Temporary

Species	Habitat	Impact to Non-native Grassland	Proportion of total land cover type	Serpentine Bunchgrass Grassland	Diablan Sage Scrub	Mixed Evergreen Forest/Oak Woodland ¹	Oak Savanna	Riparian Forest ²	Sycamore Alluvial Woodland	Willow Riparian Forest/ Scrub ³	Freshwater Marsh ³	Pond	Quarry Pond	Reservoir	Turf	Developed/ Disturbed
Total acres by Land Cover Type		17,086.00		242.00	1,693.00	11,995.00	1,194.00	368.00	276.00	157.00	21.00	36.00	96.00	2,216.00	215.00	523.00
Plants																
Diablo helianthella	primary habitat	3.95	0.44	0.00	0.01	2.85	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.15
	secondary habitat	0.10	0.01	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fragrant fritillary	primary habitat	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	secondary habitat	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Most beautiful jewel-flower	primary habitat	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	secondary habitat	0.02	0.00	0.17	0.80	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Presidio Clarkia	modeled habitat	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Robust monardella	modeled habitat	0.07	0.01	0.00	0.80	4.02	0.01	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.03
Round-leaved filaree	primary habitat	1.63	0.18	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
	secondary habitat	1.11	0.12	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tiburon Indian paintbrush	primary habitat	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	secondary habitat	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wildlife																
Alameda whipsnake	modeled habitat	3.30	0.37	0.04	0.56	2.92	0.39	0.13	0.03	0.04	0.00	0.05	0.00	0.00	0.00	0.77
Callipe silverspot butterfly	modeled habitat	0.46	0.05	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
California red-legged frog	Suitable Breeding Habitat	0.07	0.01	0.00	0.00	0.15	0.01	0.13	0.09	0.11	0.00	0.18	0.00	0.00	0.00	0.05
	Potential Migration and Aestivation Habitat	8.94	0.99	0.19	0.00	4.80	0.76	0.56	0.38	0.48	0.00	0.00	0.00	0.00	0.00	0.00
California tiger salamander	Suitable Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00
	Potential Migration and Aestivation Habitat	8.46	0.94	0.16	0.00	4.58	0.76	0.62	0.43	0.59	0.00	0.00	0.00	0.00	0.00	0.00
Foothill yellow-legged frog	Core Habitat	0.01	0.00	0.00	0.00	0.03	0.00	0.06	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	Low-use Habitat	0.06	0.01	0.00	0.01	0.12	0.01	0.07	0.05	0.08	0.00	0.00	0.00	0.00	0.00	0.04
Pacific Townsend's (Western) bat	Breeding habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Foraging habitat	0.09	0.01	0.00	0.66	3.96	0.01	0.55	0.38	0.48	0.00	0.00	0.00	0.00	0.00	0.00
Tricolored blackbird	Core Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00
	Primary Foraging Habitat	9.02	1.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Western burrowing owl	Suitable Breeding and Foraging habitat	9.02	1.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Occasional or Limited Use Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Western pond turtle	Core (includes nesting) Habitat	0.23	0.03	0.00	0.02	0.18	0.01	0.16	0.11	0.12	0.00	0.16	0.00	0.03	0.00	0.00
	Potential Movement and Overwintering Habitat	1.15	0.13	0.02	0.15	1.26	0.15	0.30	0.30	0.35	0.00	0.00	0.00	0.00	0.00	0.00

Notes:

Method A = See species model; Method B = estimate based on professional judgement of senior wildlife biologists at Jones & Stokes

¹ Includes all types of oak woodlands (blue oak, valley oak, and mixed)

² Includes the following riparian types: live oak riparian and white alder riparian

³ Impact acreages for willow riparian scrub and freshwater marsh are under review and may be reduced in future drafts.

Table 4-6a. Impacts to species by Land Cover Type - Temporary

Species	Habitat	Proportion of total land cover type	Cultivated Agriculture	Nursery (177)	Per Stream	Int/Eph Stream	Serpentine-Foothill Pine	Rock Outcrop	Total acres
Total acres by Land Cover Type			379.00	177.00	144.34	577.17	70.91	16.00	
Plants									
Diablo helianthella	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.01
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36
Fragrant fritillary	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
Most beautiful jewel-flower	primary habitat	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.22
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00
Presidio Clarkia	modeled habitat	0.00	0.00	0.00	0.00	0.00	0.19	0.00	0.28
Robust monardella	modeled habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.96
Round-leaved filaree	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.70
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.13
Tiburon Indian paintbrush	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
Wildlife									
Alameda whipsnake	modeled habitat	0.02	0.00	0.00	0.00	0.00	0.00	0.00	8.24
Callipe silverspot butterfly	modeled habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49
California red-legged frog	Suitable Breeding Habitat	0.00	0.00	0.00	0.25	0.60	0.00	0.00	1.65
	Potential Migration and Aestivation Habitat	0.00	0.02	0.00	0.00	0.00	0.00	0.00	16.14
California tiger salamander	Suitable Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18
	Potential Migration and Aestivation Habitat	0.00	0.02	0.07	0.00	0.00	0.00	0.00	15.69
Foothill yellow-legged frog	Core Habitat	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.41
	Low-use Habitat	0.00	0.00	0.00	0.00	0.56	0.00	0.00	1.01
Pacific Townsend's (Western) bat	Breeding habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Foraging habitat	0.00	0.00	0.00	0.00	0.00	0.15	0.00	6.29
Tricolored blackbird	Core Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
	Primary Foraging Habitat	0.00	0.02	0.00	0.00	0.00	0.00	0.00	9.22
Western burrowing owl	Suitable Breeding and Foraging habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.21
	Occasional or Limited Use Areas	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.02
Western pond turtle	Core (includes nesting) Habitat	0.00	0.00	0.00	0.25	0.00	0.00	0.00	1.27
	Potential Movement and Overwintering Habitat	0.00	0.00	0.00	0.00	0.60	0.00	0.00	4.28

Notes:

Method A = See species model; Method B = estimate based on professional judgement of senior wildlife biologists at Jones & Stokes

¹ Includes all types of oak woodlands (blue oak, valley oak, and mixed)

² Includes the following riparian types: live oak riparian and white alder riparian

³ Impact acreages for willow riparian scrub and freshwater marsh are under review and may be reduced in future drafts.

Table 4-6b. Impacts to species by Land Cover Type - Permanent

Species	Habitat	Impact to Non-native Grassland	Proportion of total land cover type	Serpentine Bunchgrass Grassland	Diablan Sage Scrub	Mixed Evergreen Forest/Oak Woodland ¹	Oak Savanna	Riparian Forest ²	Sycamore Alluvial Woodland	Willow Riparian Forest/ Scrub ³	Freshwater Marsh ³	Pond	Proportion of total land cover type	Quarry Pond (96)	Reservoir
Total acres by Land Cover Type		17,086.00		242.00	1,693.00	11,995.00	1,194.00	368.00	276.00	157.00	21.00	36.00		96.00	2,216.00
Plants															
Diablo helianthella	<i>primary habitat</i>	112.33	0.44	0.01	0.10	37.88	0.05	0.21	0.15	0.62	0.02	0.19	0.05	0.02	0.00
	<i>secondary habitat</i>	2.76	0.01	0.00	0.00	3.46	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fragrant fritillary	<i>primary habitat</i>	0.02	0.00	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>secondary habitat</i>	0.02	0.00	0.77	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Most beautiful jewel-flower	<i>primary habitat</i>	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>secondary habitat</i>	0.45	0.00	1.46	6.66	0.26	0.01	0.03	0.00	0.03	0.01	0.00	0.00	0.00	0.00
Presidio Clarkia	<i>modeled habitat</i>	0.03	0.00	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Robust monardella		1.94	0.01	0.00	6.72	53.39	0.07	0.24	0.10	0.51	0.01	0.04	0.01	0.00	0.00
Round-leaved filaree	<i>primary habitat</i>	46.43	0.18	0.00	0.01	0.13	0.02	0.05	0.04	0.06	0.01	0.08	0.02	0.02	0.00
	<i>secondary habitat</i>	31.61	0.12	0.00	0.02	0.14	0.01	0.01	0.00	0.00	0.00	0.06	0.01	0.00	0.00
Tiburon Indian paintbrush	<i>primary habitat</i>	0.02	0.00	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>secondary habitat</i>	0.03	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wildlife															
Alameda whipsnake		93.78	0.37	0.37	4.72	38.85	3.73	1.51	0.77	1.94	0.00	1.19	0.30	0.00	0.00
Callipe silverspot butterfly		12.98	0.05	0.02	0.01	0.14	0.14	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
California red-legged frog	<i>Suitable Breeding Habitat</i>	2.07	0.01	0.01	0.01	2.06	0.07	1.56	2.09	5.55	0.29	3.94	1.00	0.18	0.00
	<i>Potential Migration and Aestivation Habitat</i>	254.32	0.99	1.67	0.02	63.79	7.32	6.69	8.44	23.45	2.64	0.00	0.00	0.00	0.00
California tiger salamander	<i>Suitable Breeding Habitat</i>	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	1.68	3.94	1.00	0.00	0.00
	<i>Potential Migration and Aestivation Habitat</i>	240.46	0.94	1.42	0.00	60.88	7.33	7.41	9.64	28.74	1.25	0.00	0.00	0.00	0.00
Foothill yellow-legged frog	<i>Core Habitat</i>	0.17	0.00	0.00	0.01	0.37	0.01	0.67	0.86	1.58	0.00	0.00	0.00	0.00	0.00
	<i>Low-use Habitat</i>	1.73	0.01	0.01	0.07	1.65	0.06	0.89	1.16	3.85	0.00	0.11	0.03	0.00	0.00
Pacific Townsend's (Western) bat	<i>Suitable Breeding Habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>Foraging Habitat</i>	2.56	0.01	0.02	5.53	52.69	0.07	6.59	8.43	23.16	0.15	0.04	0.01	0.00	0.00
Tricolored blackbird	<i>Core Breeding Habitat</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	0.43	0.00	0.00
	<i>Primary Foraging Habitat</i>	256.38	1.00	1.68	0.00	0.00	0.00	0.00	0.00	0.00	1.68	0.00	0.00	0.00	0.00
Western burrowing owl	<i>Suitable Breeding and Foraging habitat</i>	256.38	1.00	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	<i>Occasional or Limited Use Areas</i>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Western pond turtle	<i>Core (includes nesting) Habitat</i>	6.58	0.03	0.02	0.13	2.37	0.14	1.88	2.46	5.67	0.67	3.59	0.91	0.00	0.07
	<i>Potential Movement and Overwintering Habitat</i>	32.82	0.13	0.19	1.25	16.72	1.49	3.63	6.66	16.78	0.00	0.00	0.00	2.39	0.01

Notes:

Method A = See species model; Method B = estimate based on professional judgement of senior wildlife biologists at Jones & Stokes

¹ Includes all types of oak woodlands (blue oak, valley oak, and mixed)

² Includes the following riparian types: both live oak riparian and white alder riparian

³ Impact acreages for willow riparian scrub and freshwater marsh are under review and may be reduced in future drafts.

Table 4-6b. Impacts to species by Land Cover Type - Permanent

Species	Habitat	Turf	Developed/Disturbed	Cultivated Agriculture	Nursery (177)	Per Stream	Int/Eph Stream	Serpentine-Foothill Pine	Rock Outcrop	Total acres
Total acres by Land Cover Type		215.00	523.00	379.00	177.00	144.34	577.17	70.91	16.00	
Plants										
Diablo helianthella	primary habitat	0.00	1.30	0.00	0.01	0.00	0.00	0.00	0.00	152.90
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.23
Fragrant fritillary	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.79
Most beautiful jewel-flower	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	1.81	0.00	2.01
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.92
Presidio Clarkia	modeled habitat	0.00	0.00	0.00	0.00	0.00	0.00	1.81	0.00	2.62
Robust monardella		0.00	0.25	0.00	0.01	0.00	0.00	0.00	0.00	63.28
Round-leaved filaree	primary habitat	0.00	0.39	0.00	0.00	0.00	0.00	0.00	0.00	47.23
	secondary habitat	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	31.88
Tiburon Indian paintbrush	primary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66
	secondary habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03
Wildlife										
Alameda whipsnake		0.00	6.84	0.00	0.00	0.00	0.00	0.00	0.03	153.73
Callipe silverspot butterfly		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.37
California red-legged frog	Suitable Breeding Habitat	0.00	0.45	0.00	0.01	0.61	4.10	0.00	0.00	22.99
	Potential Migration and Aestivation Habitat	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	368.41
California tiger salamander	Suitable Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.62
	Potential Migration and Aestivation Habitat	0.00	0.00	0.08	9.20	0.00	0.00	0.00	0.00	366.42
Foothill yellow-legged frog	Core Habitat	0.00	0.02	0.00	0.00	0.60	0.00	0.00	0.00	4.29
	Low-use Habitat	0.00	0.32	0.00	0.00	0.00	3.85	0.00	0.00	13.71
Pacific Townsend's (Western) bat	Suitable Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Foraging Habitat	0.00	0.00	0.01	0.00	0.00	0.00	1.45	0.00	100.68
Tricolored blackbird	Core Breeding Habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69
	Primary Foraging Habitat	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	259.82
Western burrowing owl	Suitable Breeding and Foraging habitat	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	258.06
	Occasional or Limited Use Areas	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.08
Western pond turtle	Core (includes nesting) Habitat	0.00	0.00	0.00	0.00	0.61	0.00	0.00	0.00	24.19
	Potential Movement and Overwintering Habitat	0.00	0.00	0.00	0.00	0.00	4.10	0.00	0.00	86.04

Notes:

Method A = See species model; Method B = estimate based on professional judgement of senior wildlife biologists at Jones & Stokes

¹ Includes all types of oak woodlands (blue oak, valley oak, and mixed)

² Includes the following riparian types: both live oak riparian and white alder riparian

³ Impact acreages for willow riparian scrub and freshwater marsh are under review and may be reduced in future drafts.

Table 4-7. Impact to Species and Percentage Habitat Impacted

Species	Total habitat	Estimated Direct Impact Primary Habitat (acres) ¹				Total Habitat	Estimated Direct Impact Secondary Habitat (acres) ¹			
		Temporary (annual)	% total habitat	Permanent (total)	%total		Temporary (annual)	%total habitat	Permanent (total)	%total habitat
Plants										
Diablo helianthella	14,447.43	7.01	0.05%	152.90	1.06%	815.59	0.36	0.04%	6.23	0.76%
Fragrant fritillary	129.33	0.10	0.08%	0.91	0.70%	112.10	0.09	0.08%	0.79	0.70%
Most beautiful jewel-flower	28.28	0.22	0.76%	2.01	7.11%	1,997.00	1.00	0.05%	8.92	0.45%
Presidio Clarkia	185.70	0.28	0.15%	2.62	1.41%	na	na	na	na	na
Robust monardella	11,544.40	4.96	0.04%	63.28	0.55%	na	na	na	na	na
Round-leaved filaree	3,133.90	1.70	0.05%	47.23	1.51%	2,141.90	1.13	0.05%	31.88	1.49%
Tiburon Indian paintbrush	95.00	0.07	0.08%	0.66	0.70%	147.00	0.11	0.08%	1.03	0.70%
Wildlife										
Alameda whipsnake	15,288.10	8.24	0.05%	153.73	1.01%	na	na	na	na	na
Callipe silverspot butterfly	922.70	0.49	0.05%	13.37	1.45%	na	na	na	na	na
California red-legged frog	747.90	1.65	0.22%	22.99	3.07%	32,007.50	16.14	0.05%	368.41	1.15%
California tiger salamander	41.00	0.18	0.44%	5.62	13.71%	31,600.10	15.69	0.05%	366.42	1.16%
Foothill yellow-legged frog	142.50	0.41	0.29%	4.29	3.01%	142.50	1.01	0.71%	13.71	9.62%
Pacific Townsend's (Western) bat	1.60	0.00	0.00%	0.00	0.28%	11,815.73	6.29	0.05%	100.68	0.85%
Tricolored blackbird	21.80	0.08	0.35%	1.69	7.75%	18,437.30	9.22	0.05%	259.82	1.41%
Western burrowing owl	17,327.80	9.21	0.05%	258.06	1.49%	17,327.80	0.02	0.00%	0.08	0.00%
Western pond turtle	1,351.60	1.27	0.09%	24.19	1.79%	1,351.60	4.28	0.32%	86.04	6.37%

¹ Impact acreages are under review and may be reduced in future drafts.

Table 4-8. Indirect Impacts by Activity																		
Covered Activity	Direct		Indirect															
	Permanent	Temporary	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
			Increased light	Increased noise	Increased dust	Increase vehicle traffic	Livestock disturbance	Human disturbance ¹	Increased sediment	Increased erosion	Increased water temperature	Decreased water quality (toxins, pathogens, nutrients, etc)	Pesticide and herbicide application	Spread of exotic fish/wildlife	Spread of exotic plants	Change in fire regime	Change in surface hydrology	Change in ground water hydrology
Watershed O & M Activities																		
Road maintenance		X	X	X	X	X		X	X	X					X		X	
Road construction	X	X	X	X	X	X			X	X		X			X		X	
Bridge replacement and construction	X	X	X	X	X	X		X	X	X		X			X		X	
Fence installation and repair	X	X		X	X	X		X	X	X					X			
Vegetation management		X	X	X		X		X					X		X	X	X	
Pond spillway repair																		
Recreation																		
On Land managed by SFPUC	X	X		X	X	X		X										
Under Sunol Valley Recreation Plan	X	X		X	X	X		X	X	X		X					X	
Water supply/Reservoir O & M Activities																		
Inundation/Desiccation of Reservoir Margin Habitat																		
Boat launch construction	X	X		X	X	X		X				X						
Maintenance of sludge ponds																		
Vegetation and debris management on dams		X				X			X			X						
Water transmission and filtration system O & M Activities																		
Valve exercises		X							X		X	X						X
Pipeline maintenance		X		X	X	X		X	X	X								
Lease/Permit and Easement Activities																		
Nursery O & M		X	X			X		X				X	X		X			
Golf course O & M		X		X		X		X				X	X		X			
Telecom sites O & M	X	X	X	X		X		X										
HCP Implementation																		
HCP conservation measures		X	X	X	X	X	X	X	X	X	X	X			X	X	X	X
HCP monitoring		X	X	X				X										
Creek corridor restoration		X	X	X	X	X		X	X	X	X	X					X	X
Pond and riparian enhancement	X	X		X		X		X	X	X	X	X					X	
Grazing		X			X		X		X	X	X	X			X	X	X	

¹Impacts from trampling, collection, proximity to sensitive species, etc.

Table 4-9. Potential Indirect Impacts to Covered Species																
Species	Indirect Impact															
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	Increased light	Increased noise	Increased dust	Increase vehicle traffic	Livestock disturbance	Human disturbance ¹	Increased sediment	Increased erosion	Increased water temperature	Decreased water quality (toxins, pathogens, nutrients, etc)	Pesticide and herbicide application	Spread of exotic fish/wildlife	Spread of exotic plants	Change in fire regime	Change in surface hydrology	Change in ground water hydrology
Fish & Wildlife																
California tiger salamander	X			X	X	X	X	X		X	X	X		X	X	X
California red-legged frog	X			X	X	X	X	X		X	X	X		X	X	X
Foothill yellow-legged frog	X			X		X	X	X	X	X	X	X			X	X
Tricolored blackbird	X	X		X		X								X	X	X
Western burrowing owl	X	X		X		X								X		
Callippe silverspot butterfly			X	X	X	X	X	X			X		X	X	X	
Townsend's big-eared bat	X	X				X										
Alameda whipsnake	X			X		X								X		
Western pond turtle	X			X		X	X	X	X	X	X	X			X	X
Plants																
Tiburon Indian paintbrush			X		X	X		X			X		X	X	X	
Presidio clarkia			X		X	X		X			X		X	X	X	
Round-leaved filaree			X		X	X		X			X		X	X	X	
Fragrant fritillary			X		X	X		X			X		X	X	X	
Diablo helianthella			X		X	X		X			X		X	X	X	
Robust monardella			X		X	X		X			X		X	X	X	
Most beautiful jewel-flower			X		X	X		X			X		X	X	X	
¹ Impacts from trampling, collection, proximity to sensitive species, etc.																

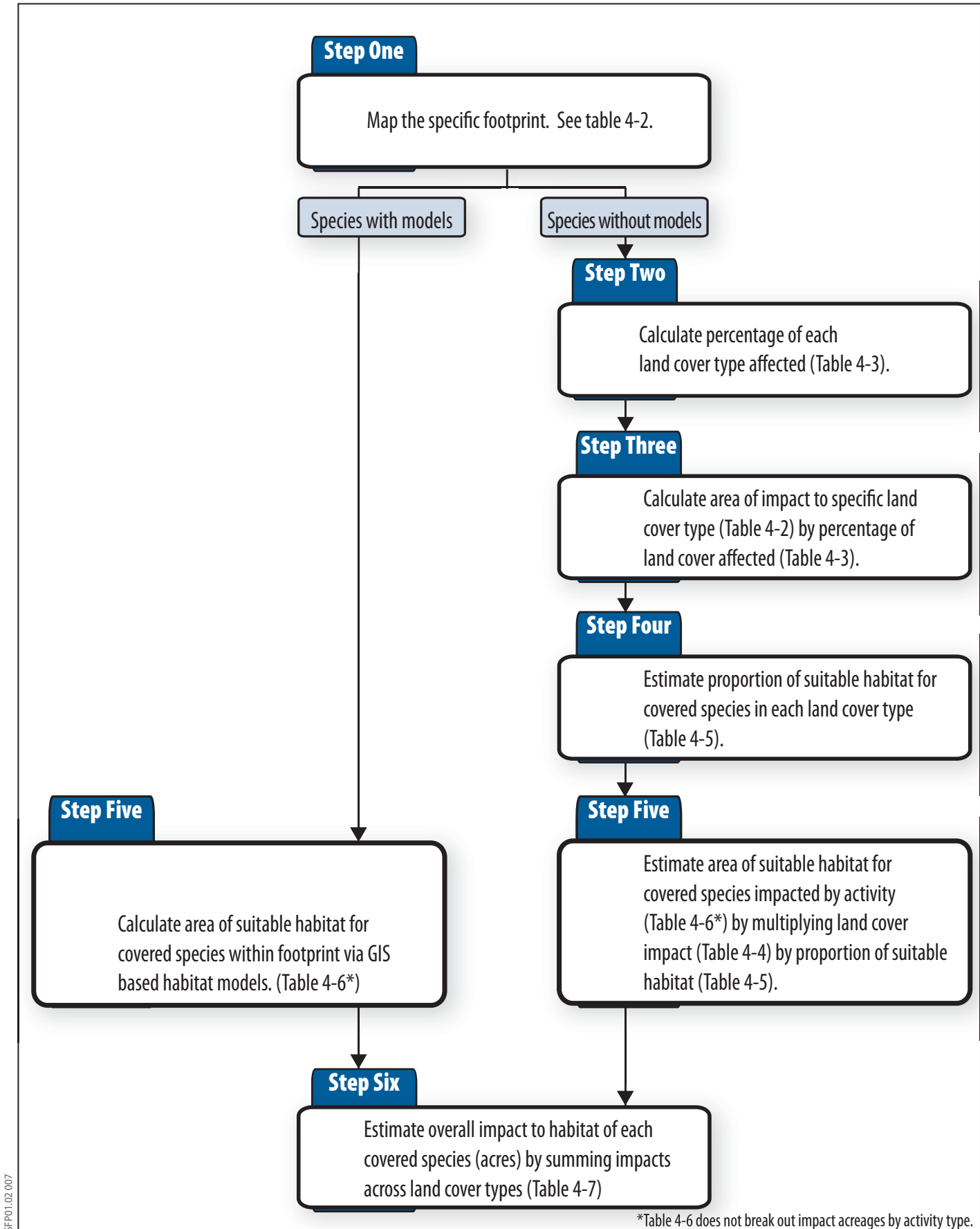
TABLE 4-10
PROJECTS CONSIDERED FOR CUMULATIVE IMPACTS

Project Name/Description	Schedule	Location	Areas of Potential Cumulative Impact
New Irvington Tunnel (WSIP)			
<p>This project would provide for the construction of a new Irvington Tunnel in the vicinity of the existing Irvington Tunnel. The new tunnel would be approximately 18,200 ft long and 10 ft in diameter, parallel to, and just south of, the existing tunnel. The project would meet the seismic reliability goal and the delivery and drought reliability goals of the SFPUC regional WSIP by allowing the existing tunnel to be taken out of service for maintenance without disrupting water supply. The preferred project would include:</p> <ul style="list-style-type: none"> • An 18,200-ft long tunnel excavated using a tunnel boring machine; • New portals at the east and west ends of the proposed tunnel; • New access roads to the portals for construction vehicles; • Demolition and rebuilding of the existing Irvington Portal; • Temporary spoils and groundwater processing activities during construction; • Spoils transportation and disposal activities; • Additional isolation valves and connections to the Alameda Siphons and Bay Division Pipelines on the tunnel's east and west ends. 	2009-2013	Sunol Valley	<p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub, riparian woodland, and wetland areas</p> <p>No in-creek activity or effects on creek flows</p> <p>Use of Spoils Disposal Areas could impact whipsnake and CTS habitat</p>
SFPUC Additional 40-mgd Treated Water (WSIP)			
<p>This project would provide for the planning, design, and construction of an additional 40 mgd of treatment capacity at the Sunol Valley WTP. The project would increase the sustainable capacity of the Sunol Valley WTP to 160 mgd. The planning level study will include studies to evaluate treatment operations protocol and evaluation of an alternative treatment process. The preferred project would include construction of:</p> <ul style="list-style-type: none"> • New flocculation and sedimentation system; • Three new filters and a new flow distribution chamber; • New filtered water and backwash piping; • New chemical feed and piping system; • Upgrade of the electrical supply system (i.e., upgrade of the Calaveras Substation); • Miscellaneous piping, valves, and mechanical and electrical work; • Approximately 2 miles of 78-inch diameter pipe to connect to the Alameda Siphons or Irvington Tunnel. 	2010-2013	Southern Sunol Valley	<p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub areas</p> <p>No in-creek activity or effects on creek flows or riparian habitat</p> <p>Use of Spoils Disposal Areas could impact whipsnake and CTS habitat</p>

Project Name/Description	Schedule	Location	Areas of Potential Cumulative Impact
SFPUC Alameda Creek Fishery Enhancement (WSIP)			
<p>This project would supplement Alameda Creek flows with water released from Calaveras Reservoir to enhance the fishery in Calaveras and Alameda Creeks and a number of structural and non-structural recovery alternatives are under consideration including: a water recapture facility downstream of Sunol Valley WTP, conjunctive groundwater use, horizontal collector wells, or other groundwater recovery systems yet to be defined. Other alternative designs for this project could be developed.</p>	Unknown	Southern Sunol Valley	<p>Disturbance to aquatic and riparian habitat and associated special status species</p> <p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub areas</p>
SFPUC Calaveras Dam Replacement (and associated projects) (WSIP)			
<p>This project would provide for the planning, design, and construction of a replacement dam at the Calaveras Reservoir to meet seismic safety requirements. The new dam would provide for a reservoir with the same storage capacity as the original reservoir (96,850 acre-feet), but the replacement dam would be designed to accommodate enlargement of the dam in the future. The preferred project would include construction of:-</p>	2009-2011 Flow release after 2011	Southern Sunol Valley	<p>Disturbance/loss of aquatic and riparian habitat and associated special status species</p> <p>Disturbance/loss (through inundation) of annual grassland, woodlands, Diablan sage scrub areas</p>
<ul style="list-style-type: none"> • New earth-fill dam; • New intake tower and new outlet valve for water releases for instream flow requirements; • New or rehabilitated outlet works for seismic safety and improved operations and maintenance. Communications tower not included as part of Calaveras Dam Project 			
SFPUC San Antonio Pump Station Upgrade (WSIP)			
<p>This project would upgrade and rehabilitate the San Antonio Pump Station. This project would allow the facility to sustain the existing pumping capacity of 160 mgd, including periods of time when utility power may be unavailable. The project would include:</p>	2009-2011	Sunol Valley	<p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub areas</p> <p>Use of Spoils Disposal Areas could impact whipsnake and CTS habitat</p>
<ul style="list-style-type: none"> • Replacement of three existing electric pumps with three new electric pumps; • Backup power for the three electric pumps; • Seismic retrofit of the main pump building to correct structural deficiencies. 			
SFPUC SVWTP - New Treated Water Reservoirs (WSIP)			

Project Name/Description	Schedule	Location	Areas of Potential Cumulative Impact
<p>This project would provide for the planning, design, and construction of new treated water storage reservoirs at the Sunol Valley WTP (SVWTP) to comply with requirements of the California Department of Health Services. The preferred project would include construction of:</p> <ul style="list-style-type: none"> • One five-million-gallon chlorine contact basin; • Two 8.75-million gallon storage basins; • New inlet and outlet piping and reservoir drainage system; • Pipe bridge over Alameda Creek; • Chemical (ammonia and chlorine) storage and feed system; • Backup filter wash water supply and filter washwater supply system; • Instrumentation and controls and miscellaneous pumping appurtenances to integrate the reservoirs into the existing treatment plant; • Electrical substation. 	2009-2011	Southern Sunol Valley	<p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub areas</p> <p>Construction period traffic</p> <p>Use of Spoils Disposal Areas could impact whipsnake and CTS habitat</p>
<p>SFPUC Alameda Siphons Reliability Upgrade (WSIP)</p>	2009-2012	Adjacent to the Irvington Portal	<p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub areas</p> <p>Use of Spoils Disposal Areas could impact whipsnake and CTS habitat</p>
<p>This project would construct a fourth, seismically resistant Alameda Siphon across the Sunol Valley along the same corridor as the three existing Alameda Siphons. The fourth siphon would be a redundant pipeline to the existing three Alameda Siphons. The preferred project would include construction of:</p> <ul style="list-style-type: none"> • New Alameda Siphon consisting of approximately 3,000 feet long, 78-inch diameter pipeline; • Manifold modifications at the existing Alameda East and Alameda West Portals to allow connection of the fourth Alameda Siphon; • Addition of line valves on the three existing Alameda Siphons or a large gate in the downstream end of the Coast Range Tunnel to allow for the isolation of the fourth siphon. 			
<p>Zone 7 Water Agency—Stream Management Master Plan, Reach 10 Improvements</p>	Unknown	Upstream from permit area along Alameda Creek tributaries	<p>Temporary stream and riparian habitat disturbance.</p>
<p>Apperson Ridge Quarry</p>			

Project Name/Description	Schedule	Location	Areas of Potential Cumulative Impact
<p>Apperson Ridge Quarry maintains an active surface mining permit for aggregate extraction, but has not yet acted on the permit. The SMP is valid through the construction period of the proposed project. No mining has yet occurred, but could be initiated at any time.</p>	Unknown	Apperson Rldge	<p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub areas , including potential disruption of golden eagle breeding</p>
<p>Chevron Pipeline Relocation and Watershed Protection Project</p>			
<p>Relocate approximately 7.5-mile pipeline segment through Sunol Valley area to replace existing pipeline near San Antonio Reservoir and reduce risk of water supply impact in the event of a pipeline rupture or leak. New pipeline segment to start in Livermore and connect with existing pipeline at Calaveras Road near San Antonio Creek. Abandon existing pipeline segment in place.</p>	Unknown	Northern Sunol Valley	<p>Disturbance/loss of annual grassland, woodlands, Diablan sage scrub areas</p>



SFP01.02.007

Step One

Estimate activity footprint (Table 4-2).

Step Two

Estimate percentage of each land cover type affected. (Table 4-3).

Step Three

Calculate area of impact to specific land cover type (Table 4-4) by multiplying footprint (Table 4-2) by percentage of land cover affected (Table 4-3).

Step Four

Calculate (if model exists) or estimate (if no model) proportion of suitable habitat for covered species in each land cover type. (Table 4-5)

Step Five

Estimate area of suitable habitat for covered species impacted by activity (Table 4-6*) by multiplying land cover impact (Table 4-4) by proportion of suitable habitat (Table 4-5).

Step Six

Estimate overall impact to habitat of each covered species (acres) by summing impacts across land cover types (Table 4-7)

*Table 4-6 does not break out impact acreages by activity type.

Figure 4-2
Methodology for estimating direct impacts on covered species for activities without a discrete, known footprint