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4.8 TERRESTRIAL BIOLOGICAL RESOURCES

This section describes special-status species, vegetation communities, and wildlife habitats within the Project area and addresses potential Project-specific and cumulative impacts to these resources. Impacts evaluated include the potential for loss of special status (endangered, threatened rare or protected) species associated with terrestrial habitats, potential for loss of sensitive vegetation communities and wildlife habitats, blockage of major migration corridors, potential detrimental effects to nesting raptors and ecological risk to terrestrial wildlife resources from toxicity or bioaccumulation. The section also identifies mitigation measures that, upon implementation, will reduce the magnitude of significant impacts.

IMPACTS EVALUATED IN OTHER SECTIONS

The following items are related to the Terrestrial Biological Resources but are evaluated in other sections of this document.

- **Impacts to Aquatic Biological Resources.** Aquatic plant and wildlife species are those species which spend all or an important part of their life cycle within an aquatic system. Some aquatic species also spend part of their life cycle in terrestrial systems. Impacts associated with these species and their habitats are discussed in Section 4.9, Aquatic Biological Resources.
- **Impacts to Wetlands.** Impacts caused by the discharge of dredge and fill material into jurisdictional wetlands, or the inundation of wetlands at storage reservoir sites with reclaimed water, are discussed in Section 4.10, Jurisdictional Wetlands Resources.

AFFECTED ENVIRONMENT (SETTING)

The affected environment for the alternatives includes the biological resources within the Area of Indirect Impacts (Figure 4.8-1a, 1b, 1c) and Area of Direct Impacts. The Area of Indirect Impacts encompasses the watersheds potentially affected by Project components such as storage reservoirs, discharge, and agricultural irrigation areas. Watersheds located within the Area of Indirect Impacts include the areas drained by the Laguna de Santa Rosa, Russian River, Petaluma River, Tolay Creek, Stemple Creek, and Americano Creek. The Area of Direct Impacts only includes the construction boundary zones of the Project components.

The affected environment of the Area of Indirect Impacts and Area of Direct Impacts includes various terrestrial biological resources which are described in terms of plant

communities (including sensitive natural communities), wildlife habitats, and special-status plant and animal species.

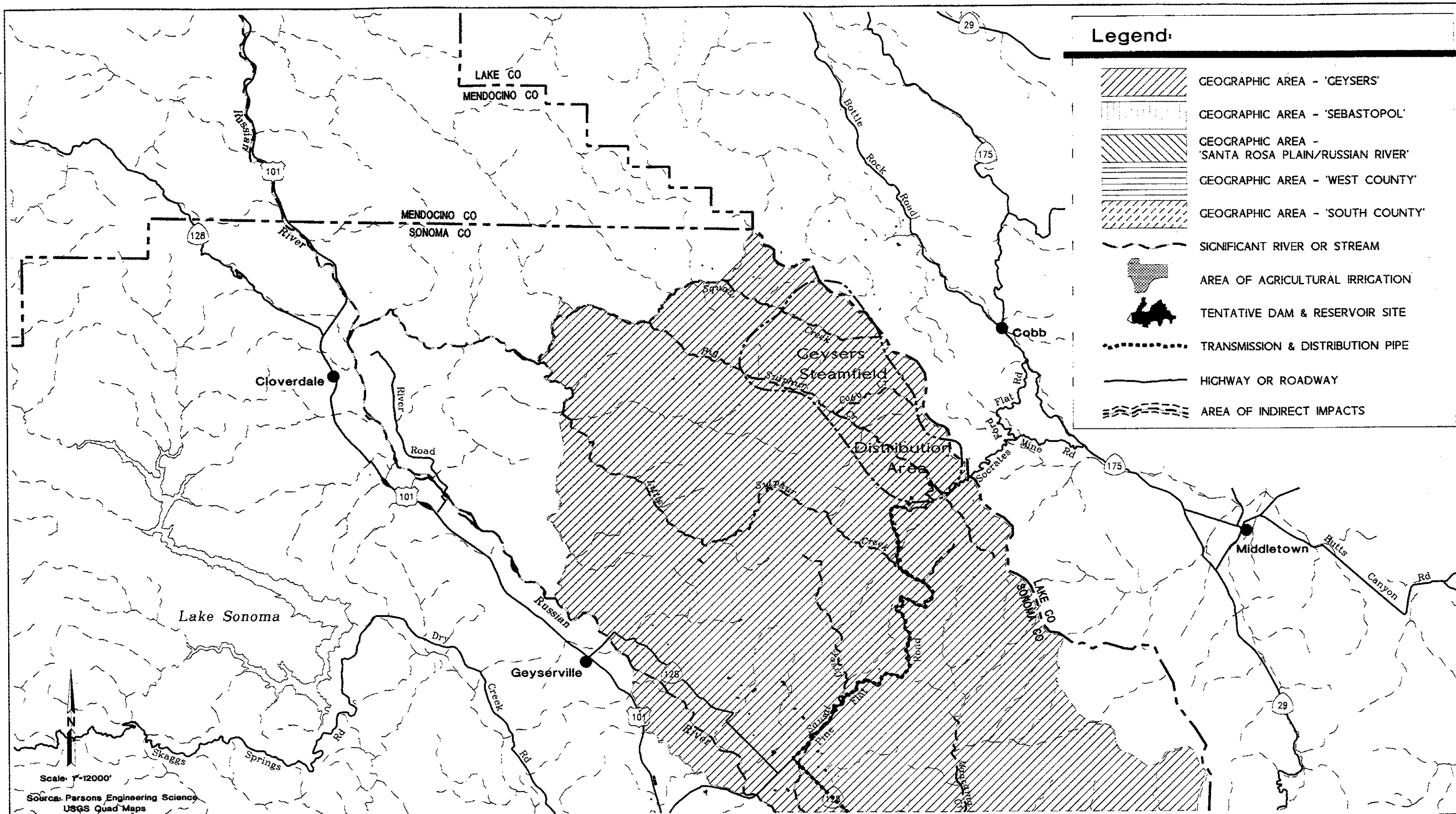
The terrestrial biological resources within the Area of Indirect Impacts are also included in several natural resource planning efforts. The goals and objectives of these planning efforts are considered as part of the affected environment in the following discussion. The terrestrial biological communities and natural resource planning efforts within the Area of Indirect Impacts are described below on a regional and local scale.

Regional Terrestrial Biological Resources

A variety of factors including historical and current development have reduced the abundance and diversity of the terrestrial resources associated with the major terrestrial ecosystems in the region, leading to the protection or the proposed protection of several species (i.e., special-status species). Lists of special-status species potentially occurring in the region were provided by the California Department of Fish and Game, the National Marine Fisheries Service, and the U.S. Fish and Wildlife Service. Additional information regarding special-status species was obtained from the California Native Plant Society and Madrone Audubon Society. The comprehensive special-status plant and wildlife lists generated by this process include 182 plant species and 102 wildlife species. The lists were consolidated and are included in *Biological Resources, Volume 2* (Harland Bartholomew & Associates 1996b). Professional judgment of the Project biologists and coordination with resource experts resulted in a reduced number of special-status species, those deemed most likely to occur within the Area of Indirect Impacts. An explanation of the screening process is provided in the *Biological Resources, Volume 2* (Harland Bartholomew & Associates 1996b).

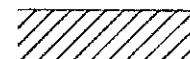



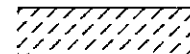



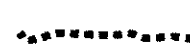

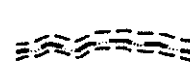
Approximately 131 special-status terrestrial plant and wildlife species have been identified as potentially occurring in the Area of Indirect Impacts and consequently are evaluated in this EIR/EIS (Tables 4.8-1 and 4.8-2). Special-status species include:

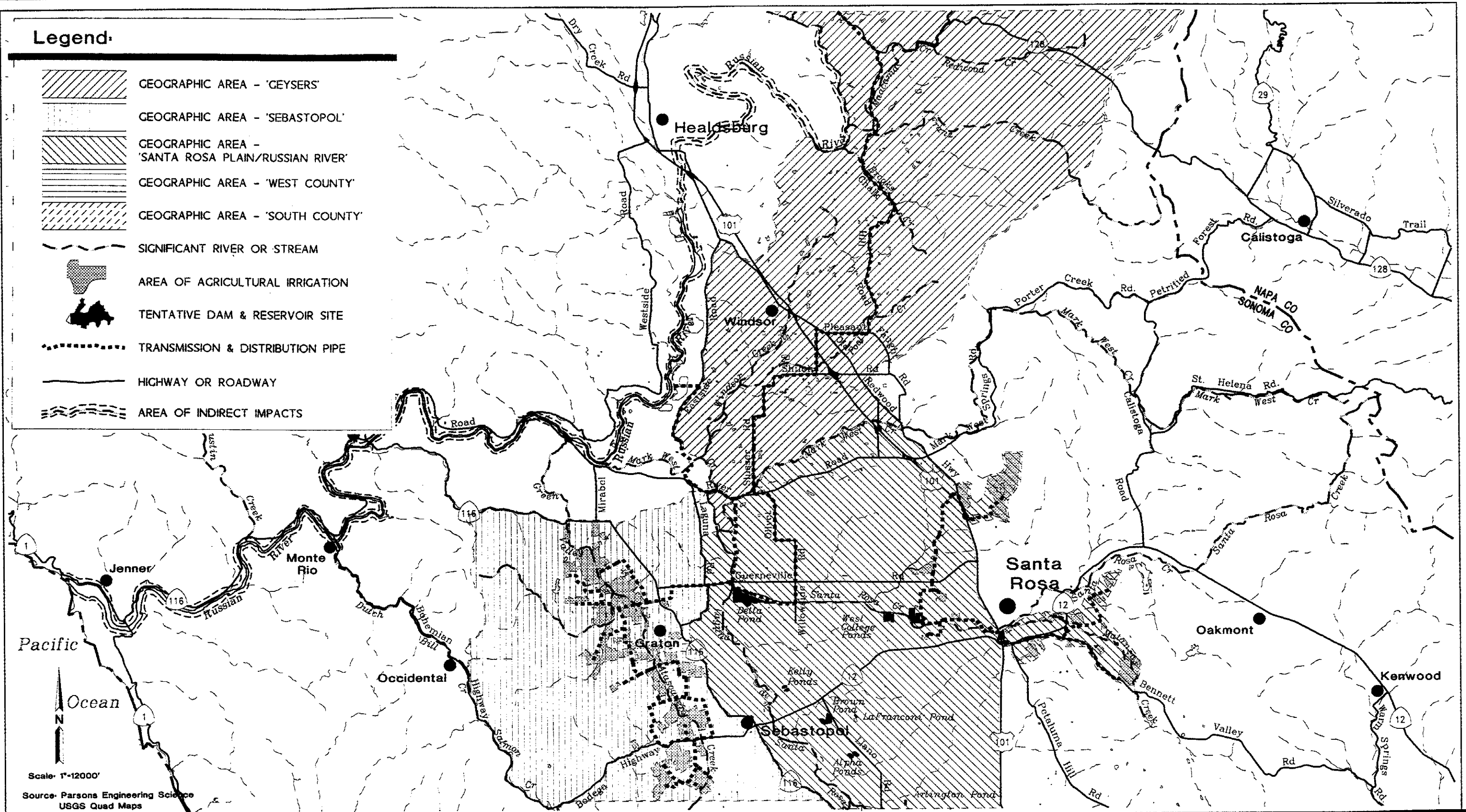
- those plants and animals that are legally protected, proposed, or candidates for protection under the California Endangered Species Act (CESA) and Federal Endangered Species Act (FESA);
- plants and animals defined as endangered or rare under the California Environmental Quality Act (CEQA);
- animals designated as species of special concern by the California Department of Fish and Game;



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Legend

-  GEOGRAPHIC AREA - 'GEYSERS'
-  GEOGRAPHIC AREA - 'SEBASTOPOL'
-  GEOGRAPHIC AREA - 'SANTA ROSA PLAIN/RUSSIAN RIVER'
-  GEOGRAPHIC AREA - 'WEST COUNTY'
-  GEOGRAPHIC AREA - 'SOUTH COUNTY'
-  SIGNIFICANT RIVER OR STREAM
-  AREA OF AGRICULTURAL IRRIGATION
-  TENTATIVE DAM & RESERVOIR SITE
-  TRANSMISSION & DISTRIBUTION PIPE
-  HIGHWAY OR ROADWAY
-  AREA OF INDIRECT IMPACTS



Scale: 1"=12000'

Source: Parsons Engineering Science
USGS Quad Maps

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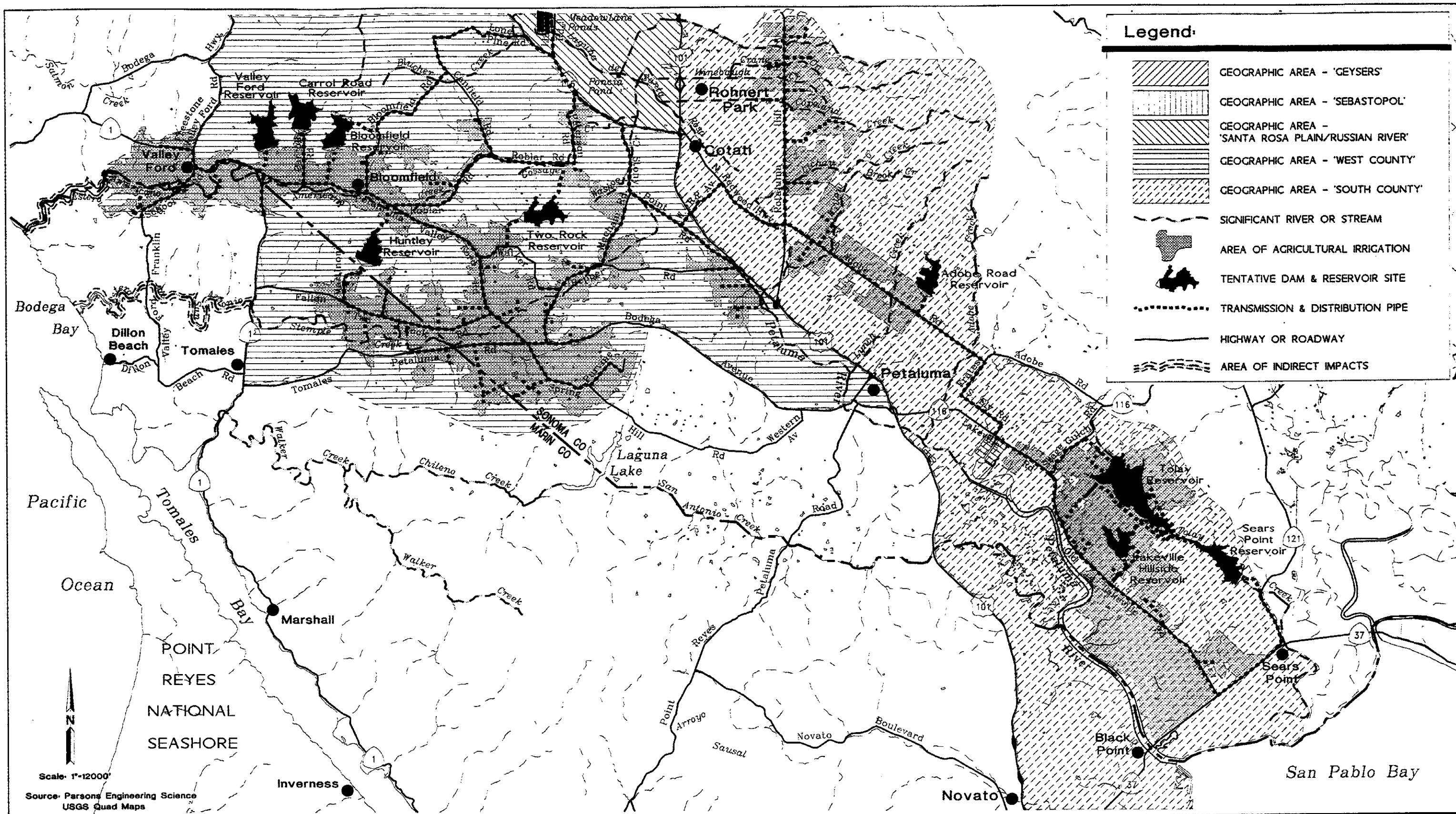
Santa Rosa

Subregional Long-Term
Wastewater Project

GEOGRAPHIC AREAS
AND AREA OF INDIRECT IMPACTS

Figure 4.8-1b

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Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
Species	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Abronia umbellata</i> ssp. <i>breviflora</i> Pink sand-verbena	--	--	1B	8	Coastal dunes	Vehicles and foot traffic.
<i>Agrostis blasdalei</i> var. <i>blasdalei</i> Blasdale's bent grass	--	--	1B	3,8	Coastal dunes, coastal bluff scrub, and coastal prairie, gravelly soils.	Agriculture and recreation.
<i>Agrostis blasdalei</i> var. <i>marinensis</i> Marin bent grass	SR	--	--	1	Coastal dunes and coastal prairie	Agriculture and recreation.
<i>Amsinckia lunaris</i> Bent-flowered fiddleneck	--	--	4	6,8	Open woods, grassland, and mixed chaparral.	Limited distribution.
<i>Antirrhinum virga</i> Tall snapdragon	--	--	4	6,8	Openings in chaparral, rocky areas, often on serpentine.	Limited distribution.
<i>Arabis blepharophylla</i> Coast rock cress	--	--	4	6,8	Rocky soils, outcrops; chaparral; broadleaved, upland forests; coastal prairie; and coastal scrub.	Limited distribution.
<i>Arctostaphylos bakeri</i> ssp. <i>bakeri</i> Baker's manzanita	SR	--	1B	1,3,8	Broadleaved, upland forests; and chaparral, often ultramafic [i.e., highly acidic soils]; and serpentine outcrops.	Road construction, non-native plants, dumping, and development.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Arctostaphylos bakeri</i> ssp. <i>sublaevis</i> The Cedars manzanita	--	--	1B	8	Serpentine outcrops, ridges, and chaparral.	Rare throughout its range.
<i>Arctostaphylos canescens</i> ssp. <i>sonomensis</i> Sonoma manzanita	--	--	1B	6,8	Ridges, slopes, chaparral, and forest.	Development.
<i>Arctostaphylos densiflora</i> Vine Hill manzanita	SE	--	1B	1,3,8	Found in association with chaparral (acid marine sand), and shale outcrops.	Fungal infection.
<i>Arctostaphylos hispidula</i> Howell's manzanita	--	--	4	3,8	Rocky, serpentine soils or sandstone; open sites; and forest.	Mining.
<i>Arctostaphylos stanfordiana</i> ssp. <i>decumbens</i> Rincon manzanita	--	--	1B	3	Found in association with chaparral, open areas.	Development, road construction, vehicles, and viticulture.
<i>Arctostaphylos stanfordiana</i> ssp. <i>raichei</i> Hopland manzanita	--	--	1B	8	Chaparral (often associated with serpentinite).	Urbanization.
<i>Arctostaphylos virgata</i> Marin manzanita	--	--	1B	8	Broadleaved, upland forests; closed-cone coniferous forests; north coast forests; chaparral; sandstone; and granitic outcrops.	Fire suppression.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Asclepias solanoana</i> Serpentine milkweed	--	--	4	8	Cismontane woodland, conifer forest, serpentine outcrops, and chaparral.	Grazing, vehicles, logging, mining, and geothermal development.
<i>Astragalus breweri</i> Brewer's milk-vetch	--	--	4	6,8	Cismontane woodland, open slopes, and grassy areas, sometimes on serpentine.	Development and road construction
<i>Astragalus clarianus</i> Clara Hunt's milk-vetch	ST	FPE	1B	2,3,5,8, 10	Cismontane woodland, valley-foothill grassland, and open grassy areas on thin soil.	Recreational development and non-native plants.
<i>Astragalus rattanii</i> var. <i>rattanii</i> Rattan's milk-vetch	--	--	4	8	Cismontane woodland, conifer forest, river banks, sandbars, and gravelly streambanks.	Limited distribution.
<i>Blennosperma nanum</i> var. <i>robustum</i> Point Reyes blennosperma	SR	--	1B	1,8,5	Coastal prairie, coastal scrub, grassy places in shrubs, and sandy soils.	Grazing.
<i>Calamagrostis ophitidis</i> Serpentine reed grass	--	--	4	8	Chaparral, meadows, and valley-foothill grassland on serpentine.	Limited distribution.
<i>Calandrinia breweri</i> Brewer's calandrinia	--	--	4	8	Sandy to loamy soils, disturbed places, burns, chaparral, and coastal scrub.	Limited distribution.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Calochortus raichei</i> The Cedars fairy-lantern	--	--	1B	8	Closed-cone coniferous forests, ultramafic chaparral, and open serpentine in woodlands.	Mining and road construction
<i>Calyptridium quadripetalum</i> Four-petaled pussypaws	--	--	4	6,8	Chaparral, and sandy or gravelly areas, generally on serpentine.	Limited distribution.
<i>Calystegia collina</i> ssp. <i>oxyphylla</i> Mount Saint Helena morning-glory	--	--	4	3,8	Chaparral and serpentine chaparral; open, grassy or rock; open oak/pine woods; serpentine.	Limited distribution.
<i>Cardamine pachystigma</i> var. <i>dissectifolia</i> Dissected-leaf toothwort	--	--	3	8	Chaparral and serpentine outcrops.	Lack of information and taxonomic uncertainty.
<i>Castilleja affinis</i> ssp. <i>neglecta</i> [<i>C. neglecta</i>] Tiburon Indian paintbrush	ST	FE	1B	1,2,5,8	Associated with valley-foothill grasslands on serpentine soils and open serpentine slopes.	Development, gravel mining, and grazing.
<i>Ceanothus confusus</i> Rincon Ridge ceanothus	--	--	1B	3,8	Serpentine and volcanic chaparral, closed-cone coniferous forest, and cismontane woodland on dry, shrubby slopes.	Development.
<i>Ceanothus divergens</i> Calistoga ceanothus	--	--	1B	3,8	Found in association with serpentine chaparral; and dry, rocky, volcanic slopes.	Development in the geysers geothermal area.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Ceanothus foliosus</i> var. <i>vineatus</i> Vine Hill ceanothus	--	--	1B	5,8	Chaparral and dry, rolling hills.	Rare throughout its range.
<i>Ceanothus gloriosus</i> var. <i>gloriosus</i> Point Reyes ceanothus	--	--	4	6,8	Coastal bluff scrub, closed-cone forest, coastal dunes, and coastal scrub/sandy.	Limited distribution.
<i>Ceanothus masonii</i> Mason's ceanothus	SR	--	1B	1,3,8	Chaparral and dry, rocky slopes on Bolinas Ridge.	Rare throughout its range.
<i>Ceanothus sonomensis</i> Sonoma ceanothus	--	--	1B	3,8	Chaparral, sandy soils, serpentine, volcanic soils; Hood Mountain Range.	Development.
<i>Chlorogalum pomeridianum</i> var. <i>minus</i> Dwarf soaproot	--	--	1B	8	Serpentine outcrops in chaparral.	Rare throughout its range.
<i>Chorizanthe cuspidata</i> var. <i>cuspidata</i> San Francisco Bay spineflower	--	--	1B	8	Sandy places, coastal dunes, coastal prairie, and coastal scrub; Merced Lake.	Rare throughout its range.
<i>Chorizanthe cuspidata</i> var. <i>villosa</i> Woolly-headed spineflower	--	--	1B	8	Sandy places, coastal dunes, coastal prairie, and coastal scrub.	Rare throughout its range.
<i>Chorizanthe valida</i> Sonoma spineflower	SE	FE	1B	1,2,3,5,8	Coastal prairie (sandy).	Rare throughout its range.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Cirsium andrewsii</i> Franciscan thistle	--	--	4	6,8	Broadleaved, upland forest; bluffs; ravines, and seeps.	Limited distribution.
<i>Cirsium hydrophilum</i> var. <i>vaseyi</i> Mount Tamalpais thistle	--	--	1B	8	Chaparral and broadleaved upland forests on serpentine soil, and serpentine seeps.	Road construction and non-native plant invasions.
<i>Clarkia concinna</i> ssp. <i>raichei</i> Raichei's red ribbons; Tomales clarkia	--	--	1B	8	Exposed sites. Known from only one occurrence near Tomales in Marin County.	Limited distribution.
<i>Clarkia imbricata</i> Vine Hill clarkia	SE	FPE	1B	1,2,3,5,8, 10	Meadows, valley-foothill grasslands, chaparral, clearings, and roadsides.	Development and road maintenance
<i>Collinsia corymbosa</i> Round-headed Chinese houses	--	--	1B	8	Coastal dunes.	Rare throughout its range.
<i>Cordylanthus tenuis</i> ssp. <i>brunneus</i> Serpentine bird's-beak	--	--	4	8	Closed-cone forest, chaparral, and cismontane woodland/serpentine.	Limited distribution.
<i>Cordylanthus tenuis</i> ssp. <i>capillaris</i> Pennell's bird's-beak	SR	FE	1B	1,2,3,5,8	Closed-cone coniferous forests, ultramafic chaparral, and serpentine chaparral.	Dumping, vehicles, road maintenance, and development.
<i>Cupressus goveniana</i> ssp. <i>pigmaea</i> Pygmy cypress	--	--	1B	8	Closed-cone pine/cypress forests and coastal terrace.	Development and vehicles.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Cypripedium californicum</i> California lady's-slipper	--	--	4	6,8	Serpentine seeps and streambanks, and mixed or coniferous forest.	Horticultural collecting and logging.
<i>Cypripedium montanum</i> Mountain lady's-slipper	--	--	4	6,8	Moist areas, dry slopes, and mixed or coniferous forest.	Logging.
<i>Delphinium bakeri</i> Baker's larkspur	SR	FC	1B	1,2,3,5,8	Coastal scrub. One population known from Salmon Creek Canyon.	Agriculture, grazing, and road maintenance.
<i>Delphinium luteum</i> Yellow larkspur	SR	FC	1B	1,2,3,5,8	Coastal scrub, moist sites, cliffs, coastal prairie, chaparral, and rock outcrops.	Development and grazing.
<i>Dichondra occidentalis</i> Western dichondra	--	--	4	6,8	Cismontane woodland, slopes, chaparral, coastal scrub, and headlands under shrubs.	Limited distribution.
<i>Dirca occidentalis</i> Western leatherwood	--	--	1B	6,8	Moist, rocky slopes in partial shade; chaparral; broadleaved, upland forest; and riparian woodland.	Rare throughout its range.
<i>Elymus californicus</i> California bottle-brush grass	--	--	4	6,8	North Coast coniferous forest.	Limited distribution.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Erigeron angustatus</i> Narrow-leafed daisy	--	--	1B	8	Serpentine chaparral.	Rare throughout its range.
<i>Erigeron biolettii</i> Streamside daisy	--	--	3	8	North Coast forest, broadleaved upland forest, slopes, rocks, and ledges along rivers.	Lack of information and taxonomic uncertainty.
<i>Erigeron serpentinus</i> Serpentine daisy	--	--	1B	8	Serpentine chaparral.	Rare throughout its range.
<i>Erigeron supplex</i> Supple daisy	--	--	1B	6,8	Coastal prairie and bluffs.	Coastal development.
<i>Eriogonum luteolum</i> var. <i>caninum</i> Tiburon buckwheat	--	--	3	8	Chaparral, coastal prairie, valley-foothill grasslands, and open serpentine.	Development and non-native plants.
<i>Eriogonum nervulosum</i> Snow Mountain buckwheat	--	--	1B	3,8	Found in association with serpentine chaparral, and serpentine outcrops.	Rare throughout its range.
<i>Eriogonum ternatum</i> Ternate buckwheat	--	--	4	8	Lower montane conifer forest and serpentine outcrops.	Limited distribution.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Erysimum franciscanum</i> San Francisco wallflower	--	--	4	8	Coastal scrub and coastal dune, serpentine outcrops, and valley-foothill grassland.	Limited distribution.
<i>Erythronium helenae</i> Saint Helena fawn lily	--	--	4	8	Chaparral, cismontane woodland, valley-foothill grassland, and dry woodlands on serpentine.	Horticultural collecting, road construction, and geothermal development.
<i>Fritillaria liliacea</i> Fragrant fritillary	--	--	1B	3,8	Coastal scrub, coastal prairie, and valley-foothill grasslands.	Grazing, agricultural and urban development.
<i>Grindelia hirsutula</i> var. <i>maritima</i> [<i>G. maritima</i>] San Francisco gumplant	--	--	1B	8	Coastal bluff scrub, coastal scrub, and valley-foothill grassland/sandy; and serpentinite.	Coastal development and non-native plants.
<i>Helianthella castanea</i> Diablo helianthella	--	--	1B	3,8	Broadleaved upland forest and chaparral; valley-foothill grassland; and open grassy areas.	Urbanization, grazing, and fire suppression.
<i>Hemizonia congesta</i> ssp. <i>leucocephala</i> Hayfield tarplant	--	--	3	6,8	Coastal scrub and valley-foothill grassland; serpentine.	Agriculture, urban development.
<i>Hesperevax sparsiflora</i> var. <i>brevifolia</i> Short-leafed evax	--	--	4	8	Sandy bluffs and flats, and coastal dunes.	Limited distribution.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Hesperolinon bicarpellatum</i> Two-carpellate western flax	--	--	1B	8	Serpentine chaparral.	Development and grazing.
<i>Hesperolinon congestum</i> Marin western flax	ST	FT	1B	1,2,3,5,8	Chaparral and valley-foothill grasslands in association with serpentine soils.	Development and foot traffic.
<i>Holocarpha macradenia</i> Santa Cruz tarplant	SE	FC	1B	1,2,5,8	Valley-foothill grasslands and coastal prairie (often clay).	Urbanization, agriculture, and non-native plants.
<i>Horkelia cuneata</i> ssp. <i>sericea</i> Kellogg's horkelia	--	--	1B	8	Closed-cone forest and coastal scrub.	Coastal development.
<i>Horkelia marinensis</i> Point Reyes horkelia	--	--	1B	3,6,8	Sandy coastal flats, coastal dunes, coastal prairie, and coastal scrub.	Rare throughout its range.
<i>Horkelia tenuiloba</i> Thin-lobed horkelia	--	--	1B	6,8	Sandy soils in open chaparral.	Rare throughout its range.
<i>Layia carnosa</i> Beach layia	SE	FE	1B	1,2,5,8	Coastal dunes.	Coastal development, off-vehicles, and non-native plants.
<i>Layia septentrionalis</i> Colusa layia	--	--	1B	3,8	Serpentine or sandy soils in chaparral, cismontane woodlands, and valley-foothill grasslands.	Development.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Lessingia arachnoidea</i> Crystal Springs lessingia	--	--	1B	8	Cismontane woodlands, coastal scrub, and valley-foothill grasslands.	Rare throughout its range.
<i>Lessingia hololeuca</i> Woolly-headed lessingia	--	--	3	8	Coastal scrub, lower montane coniferous forest, and valley-foothill grasslands, clay, serpentinite, fields, and roadside ditches.	Grazing.
<i>Lessingia micradenia</i> var. <i>micradenia</i> Tamalpais lessingia	--	--	1B	8	Chaparral; thin, gravelly soils of serpentinite outcrops; and roadcuts.	Rare throughout its range.
<i>Lilium rubescens</i> Redwood lily	--	--	4	6,8	Chaparral, lower montane coniferous forest, and sometimes serpentinite.	Urbanization, horticultural collection, and grazing.
<i>Linanthus acicularis</i> Bristly linanthus	--	--	4	8	Grassy areas in woodlands, coastal prairie, and chaparral.	Limited distribution.
<i>Linanthus grandiflorus</i> Large-flower linanthus	--	--	4	8	Coastal bluff and scrub, coastal prairie, valley-foothill grassland, open grassy flats, and cismontane woodland; generally in sandy soil.	Development.
<i>Lomatium repostum</i> Napa lomatium	--	--	4	6,8	Pine/oak woodland and chaparral, often on serpentinite.	Limited distribution.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Lupinus eximius</i> (<i>L. arboreus</i> var. <i>eximius</i>) San Mateo tree lupine	--	--	3	8	Chaparral and coastal scrub.	Lack of information, taxonomic uncertainty.
<i>Lupinus sericatus</i> Cobb mountain lupine	--	--	1B	6,8	Chaparral, cismontane woodland, montane coniferous forest, and open wooded slopes.	Geothermal development, logging, and road widening.
<i>Lupinus tidestromii</i> Tidestrom's lupine	SE	FE	1B	1,2,8	Coastal dunes.	Coastal development, trampling, and non-native plants.
<i>Lupinus tidestromii</i> var. <i>layneae</i> Point Reyes clover lupine	SE	FE	1B	1,2,5,8	Coastal dunes.	Coastal development, trampling, and non-native plants.
<i>Madia nutans</i> Nodding madia	--	--	4	6,8	Rocky soils, cismontane woodland, and chaparral.	Limited distribution.
<i>Micropus amphibolus</i> Mount Diablo cottonweed	--	--	4	6,8	Broadleaved, upland forest; cismontane woodland; valley-foothill grasslands; and bare, grassy or rocky slopes.	Limited distribution.
<i>Monardella undulata</i> Curly-leafed monardella	--	--	4	8	Chaparral, coastal dunes, coastal scrub, and lower montane coniferous forest.	Coastal development, sand mining, and non-native plants.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Monardella villosa</i> ssp. <i>globosa</i> Robust monardella	--	--	1B	8	Openings in oak woodland and chaparral.	Rare throughout its range.
<i>Monardella viridus</i> ssp. <i>viridus</i> Green monardella	--	--	4	6,8	Rocky soils, open woodland, chaparral, and serpentine.	Limited distribution.
<i>Orobanche valida</i> ssp. <i>howellii</i> Howell's broomrape	--	--	4	6,8	Chaparral, volcanic, and serpentine slopes. Generally parasitic on <i>Garrya</i> sp.	Limited distribution.
<i>Parvisedum leiocarpum</i> Lake County stonecrop	SE	--	1B	1,3,8	Valley-foothill grasslands, dry vernal pools, cismontane woodlands, and rocky depressions.	Trampling, grazing, and development.
<i>Penstemon newberryi</i> var. <i>sonomensis</i> Sonoma beardtongue	--	--	1B	6,8	Chaparral, outcrops, and talus.	Rare throughout its range.
<i>Pentachaeta bellidiflora</i> White-rayed pentachaeta	SE	PE	1B	1,2,7,8	Valley-foothill grasslands with serpentine soils; rocky areas.	Historical occurrences lost to development.
<i>Perideridia gairdneri</i> ssp. <i>gairdneri</i> Gairdner's yampah	--	--	4	8	Moist soil of flats, meadows, streamsides, grasslands, and pine groves.	Agriculture and urban development.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Phacelia insularis</i> var. <i>continentis</i> North Coast phacelia	--	--	1B	8	Sandy soils, bluffs, coastal dunes, coastal bluffs, and coastal scrub.	Foot traffic, non-native plants, and grazing.
<i>Piperia candida</i> White-flowered rein orchid	--	--	4	8	Open to shaded sites, generally coniferous forests, sometimes serpentinite.	Limited distribution.
<i>Pityopus californicus</i> California pinefoot	--	--	4	6,8	Mixed or coniferous forest.	Logging.
<i>Ribes victoris</i> Victor's gooseberry	--	--	4	8	Canyon forests; broadleaved, upland forest; and chaparral.	Limited distribution.
<i>Sidalcea hickmanii</i> ssp. <i>viridis</i> Marin checkerbloom	--	--	1B	6,8	Chaparral and serpentinite.	Development.
<i>Stebbinsoseris decipiens</i> [<i>Microseris decipiens</i>] Santa Cruz microseris	--	--	1B	8	Broadleaved, upland forests; chaparral; coastal prairie and scrub; and open, sandy, shale, or serpentine sites.	Grazing.
<i>Streptanthus batrachopus</i> Tamalpais jewel-flower	--	--	1B	8	Chaparral, closed-cone coniferous forests with serpentine soils, and serpentine barrens.	Rare throughout its range.
<i>Streptanthus brachiatus</i> ssp. <i>brachiatus</i> Socrates Mine jewel-flower	--	--	1B	3,8	Closed-cone coniferous forests and chaparral with serpentine soils.	Rare throughout its range.

Notes and sources are at the end of the table.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
Species	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Streptanthus brachiatus</i> ssp. <i>hoffmanii</i> Freed's jewel-flower	--	--	1B	8	Serpentine barrens, chaparral, and open woodlands.	Rare throughout its range.
<i>Streptanthus glandulosus</i> var. <i>hoffmanii</i> [<i>S. glandulosus</i> ssp. <i>secundus</i>] Secund jewel-flower	--	--	1B	8	Chaparral, cismontane woodlands, serpentine and non-serpentine soils.	Rare throughout its range.
<i>Streptanthus morrisonii</i> ssp. <i>elatus</i> Three Peaks jewel-flower	--	--	1B	6,8	Serpentine barrens, chaparral, open woodlands, and cypress/knobcone pine woodlands.	Rare throughout its range.
<i>Streptanthus morrisonii</i> ssp. <i>hirtiflorus</i> Dorr's Cabin jewel-flower	--	FC	1B	2,5,8	Serpentine barrens, chaparral, open woodlands, and cypress/knobcone pine woodlands.	Limited distribution.
<i>Streptanthus morrisonii</i> ssp. <i>kruckebergii</i> Kruckeberg's jewel-flower	--	--	1B	8	Cismontane woodlands, serpentine barrens, chaparral, and cypress/knobcone pine woodlands.	Gold mining.
<i>Streptanthus morrisonii</i> ssp. <i>morrisonii</i> Morrison's jewel-flower	--	--	1B	8	Serpentine barrens, chaparral, and cypress/knobcone pine woodlands.	Rare throughout its range.
<i>Streptanthus niger</i> Tiburon jewel-flower	SE	FPE	1B	1,2,5,8	Valley-foothill grasslands with serpentine soils, and outcrops in grassland.	Road construction, foot traffic, and development on Tiburon Peninsula.
<i>Tracyina rostrata</i> Beaked tracyina	--	--	1B	8	Cismontane woodland, valley-foothill grasslands, and grassy slopes.	Rare throughout its range.
<i>Trifolium amoenum</i> Showy Indian clover	--	FPE	1B	2,3,5,8, 10	Valley-foothill grassland; heavy soils, disturbed soils.	Urbanization and agriculture.

Table 4.8-1

Special-Status Plant Species

PLANTS	STATUS				MANAGEMENT CONCERNS	
Species	State	Federal	CNPS	Source	Habitat	Potential Threats
<i>Triphysaria floribunda</i> [<i>Orthocarpus floribunda</i>] San Francisco owl's-clover	--	--	1B	8	Coastal prairie, valley-foothill grasslands; on serpentine slopes.	Grazing and trampling.
<i>Veratrum fimbriatum</i> Fringed false-hellebore	--	--	4	8	Meadows, coastal scrub, and North Coast forest (mesic).	Limited distribution.

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

- State status data taken from Endangered, Threatened, and Rare Plants of California and Listing Dates (CDFG, Revised January 1996) and Special Animals (CDFG, Revised January 1996).
SE = State listed Endangered
ST = State listed Threatened
SR = State listed Rare
SCE = State Candidate Endangered
SSC = Species of Special Concern
CFP = Listed as Fully Protected by the CDFG
- Federal status and probable distribution in Marin and Sonoma counties determined by correspondence with Laurie Simons-USFWS, 9 February 1994.
FE = Federally listed Endangered
FT = Federally listed Threatened
FPE = Federally Proposed Endangered
FC = Candidate: Taxa for which the USFWS has sufficient biological information to support a proposal to list as endangered or threatened.
- CNDDDB = California Natural Diversity Data Base, CDFG, 15 March 1995.
- Distribution of State Listed species and Species of Special Concern confirmed with California Statewide Wildlife Habitat Relationships System, CDFG April 1996.
- USFWS letter from Cay Goude, 16 February 1995.
- Species requested to be included by Caitlin Bean, CDFG Biologist, Region 3.
- USFWS letter from Joel Medlin, 22 June 1995.
- CNPS Inventory of Rare and Endangered Vascular Plants of California (CNPS, 1994).
- USFWS Plant Taxa for Listing as Endangered or Threatened Species; Notice of Review (Federal Register 58(188): 51144-51190, 30 September 1993).
- USFWS Plant Taxa for Listing as Endangered Species; Proposed Rule (Federal Register 60 (148): 39314-39326, 2 August 1995)

California Native Plant Society (CNPS) Listing Categories:

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

List 3 = Plants about which more information is needed - A Review List.

List 4 = Plants of limited distribution - A Watch List.

Habitat Sources:

CDFG Natural Heritage Program, Natural Diversity Data Base, 23 December 1993.

EIP Associates. December 1990 Santa Rosa Sub-Regional Water Reclamation System "Long-Term Wastewater System Draft Environmental Impact Report/Statement."

Holland, Robert F. 1986 Preliminary Descriptions of the Terrestrial Natural Communities of California, CDFG.

Note: In a series of recent federal register notices (50 CFR Part 17, Volume 61, Number 40, 7457-7463 and 7595-7613, February 28, 1996) the USFWS reclassified 96 candidate taxa of plants and animals. There is no longer a federal candidate category 2 status, there are now 182 plant and 89 animal taxa on a single candidate species list. The taxa on this list are considered by the USFWS as candidates for possible addition to the List of Endangered and Threatened Plants and Animals. As a consequence, the status of many taxa originally included in the analysis has changed, requiring that many taxa be removed from the list being considered in this EIR/EIS. See Biological Resources Technical Memorandum, Volume II for the original list and further clarification.

Table 4.8-2

Special-Status Animal Species

Species	STATUS				MANAGEMENT CONCERNS	
	State	Federal	Other	Source	Habitat	Potential Threats
REPTILES						
<i>Phrynosoma coronatum frontale</i> California horned lizard	SSC	--	--	1,4	Sandy open areas in riparian woodland, grassland, coastal scrub, mixed chaparral, and oak woodland.	Habitat loss and loss of native ant prey base.
BIRDS						
<i>Accipiter cooperii</i> Cooper's hawk	SSC	--	--	1,4	Prefers riparian habitat for nesting, primarily in the foothills and valleys.	Pesticide poisoning, and habitat loss and degradation.
<i>Accipiter striatus</i> Sharp-shinned hawk	SSC	--	--	1,4	Prefers broken woodlands of coniferous, deciduous, or mixed forests as nesting habitat.	Pesticide poisoning, and habitat loss and degradation.
<i>Agelaius tricolor</i> Tricolored blackbird	SSC	--	--	1,2,4,5	Nesting habitat primarily consists of freshwater marshes with dense stands of cattails or bulrushes; occasionally utilizes willows, thistles, mustard, blackberry thickets, and dense shrubs and grains for nesting as well.	Pesticide poisoning, and habitat loss and degradation.

Notes and sources are at the end of the table.

Table 4.8-2

Special-Status Animal Species

Species	STATUS				MANAGEMENT CONCERNS	
	State	Federal	Other	Source	Habitat	Potential Threats
<i>Amphispiza belli belli</i> Bell's sage sparrow	SSC	--	--	1,6	Chaparral in the inner Coast Range.	Habitat loss and degradation.
<i>Aquila chrysaetos</i> Golden eagle	SSC CFP	--	--	1,4	Nests primarily on cliffs or in tall trees; forages in open country, large portions of Area of Indirect Impacts may serve as foraging habitat.	Poisoning of prey species, and habitat loss and degradation.
<i>Asio flammeus</i> Short-eared owl	SSC	--	--	1,4	Inhabits swamplands, freshwater and saltwater marshes; nests in dense tule patches or stands of tall grasses.	Habitat destruction due to agricultural and urban development.
<i>Buteo regalis</i> Ferruginous hawk	SSC	--	--	1,2,4,5	Winter foraging habitat includes valley-foothill grassland, agricultural lands, and pastures; nests rarely in extreme northeastern California.	Habitat degradation and loss.
<i>Circus cyaneus</i> Northern harrier	SSC	--	--	1,4	Nests in coastal freshwater and saltwater marshes; forages in grasslands and marshes.	Habitat destruction due to agricultural and urban development.

Notes and sources are at the end of the table.

Table 4.8-2

Special-Status Animal Species

Species	STATUS				MANAGEMENT CONCERNS	
	State	Federal	Other	Source	Habitat	Potential Threats
<i>Dendroica petechia</i> Yellow warbler	SSC	--	--	1,4	Coastal and valley riparian forests and woodlands.	Habitat degradation and loss, and brood parasitism.
<i>Elanus leucurus</i> White-tailed kite	CFP	--	--	1,4	Grasslands, agricultural lands, meadows, and marshes for foraging. Nests and perches in dense topped trees.	Habitat destruction due to agricultural and urban development.
<i>Falco columbarius</i> Merlin	SSC			1	Foraging habitat includes brackish and freshwater marsh, salt ponds, grassland, oak woodland, and agricultural land.	
<i>Falco mexicanus</i> Prairie falcon	SSC			1	Foraging habitat includes freshwater marsh, grassland, and agricultural land.	Loss of foraging habitat, human disturbance at eyries, and shooting.
<i>Geothlypis trichas sinuosa</i> Salt marsh common yellowthroat	SSC	--	--	1,2,3,4, 5	Fresh and saltwater marshes; needs thick continuous cover down to the water surface for foraging.	Habitat degradation and loss.

Notes and sources are at the end of the table.

Table 4.8-2

Special-Status Animal Species

Species	STATUS				MANAGEMENT CONCERNS	
	State	Federal	Other	Source	Habitat	Potential Threats
<i>Icteria virens</i> Yellow-breasted chat	SSC	--	--	4	Inhabits dense riparian habitats.	Brood parasitism and habitat degradation and loss.
<i>Lanius ludovicianus</i> Loggerhead shrike	SSC	--	--	1	Foraging habitat includes annual grassland, cropland, and pasture.	Loss of habitat due to development and pesticide poisoning.
<i>Laterallus jamaicensis coturniculus</i> California black rail	ST	--	--	1,2,3,4, 5	Inhabits salt, brackish, and freshwater marshes bordering larger bays and rivers.	Habitat destruction and loss, introduced predators, and pesticide poisoning.
<i>Pandion haliaetus</i> Osprey	SSC	--	--	1,3,4	Nests in tall trees near freshwater lakes, reservoirs, large rivers, estuaries, and bays.	Pesticide poisoning, and habitat degradation and loss.
<i>Phalacrocorax auritus</i> Double-crested cormorant	SSC	--	--	1,3,4	Inhabits large freshwater lakes, reservoirs, rivers, bays, marshes, and the immediate sea coast.	Pesticide poisoning.
<i>Progne subis</i> Purple martin	SSC	--	--	1	Nests in large trees with cavities near open foraging areas.	Habitat loss and loss of nesting sites due to competition with introduced birds.

Notes and sources are at the end of the table.

Table 4.8-2

Special-Status Animal Species

Species	STATUS				MANAGEMENT CONCERNS	
	State	Federal	Other	Source	Habitat	Potential Threats
<i>Rallus longirostris obsoletus</i> California clapper rail	SE	FE	--	1,2,3,4, 5	Inhabits salt marshes composed primarily of pickleweed and cordgrass.	Habitat destruction and introduced predators.
<i>Speotyto cunicularia hypugea</i> Western burrowing owl	SSC	--	--	1,3,4	Valley-foothill grasslands.	Habitat destruction due to agricultural and urban development.
MAMMALS						
<i>Antrozous pallidus</i> Pallid bat	SSC	--	--	1,5	Inhabits open lowland areas below 6,000 feet.	Habitat loss, pesticide use, and roost-site disturbance.
<i>Bassariscus astutus</i> Ringtail	CFP	--	--	1,4	Inhabits riparian systems with moderately dense understories and rocky outcrops.	Habitat destruction due to agricultural and urban development.

Notes and sources are at the end of the table.

Table 4.8-2

Special-Status Animal Species

Species	STATUS				MANAGEMENT CONCERNS	
	State	Federal	Other	Source	Habitat	Potential Threats
<i>Eumops perotis californicus</i> Greater western mastiff-bat	SSC	--	--	1,2,4,5	Breeds in rugged, rocky canyons and forages in a variety of habitats.	Habitat loss, pesticide use, and roost-site disturbance.
<i>Plecotus townsendii townsendii</i> Pacific western big-eared bat	SSC	--	--	1,2,4,5	Inhabits oak and conifer woodlands, conifer and broadleaved forests, arid grasslands, deserts, and high mountain meadows.	Habitat loss, pesticide use, and human disturbance of maternity and night roosts.
<i>Reithrodontomys raviventris</i> Saltmarsh harvest mouse	SE CFP	FE	--	1,2,3,4, 5	Restricted to salt marshes of San Francisco Bay and its tributaries.	Habitat loss and degradation.

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

- State status data taken from Endangered and Threatened Animals of California (CDFG, Revised January 1996) and Special Animals (CDFG, Revised August 1994). ("Special Animals" is a broad term that refers to all the vertebrate and invertebrate taxa of concern to the Natural Diversity Data Base, regardless of their legal status or protection status).
 SE = State listed Endangered
 ST = State listed Threatened
 SCE = State Candidate Endangered
 SSC = Species of Special Concern
 CFP = Listed as Fully Protected by the CDFG
 * = CDFG is currently tracking this species
- Federal status and probable distribution in Marin and Sonoma counties determined by correspondence with Laurie Simons-USFWS, 9 February 1994.
 FE = Federally listed Endangered
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 FPE = Federally Proposed Endangered

FC = Federal Candidate: Taxa for which the USFWS has sufficient biological information to support a proposal to list as endangered or threatened.

3. CNDDDB = California Natural Diversity Data Base, CDFG, 15 March 1995.
4. Distribution of State Listed species and Species of Special Concern confirmed with California Statewide Wildlife Habitat Relationships System, CDFG April 1996.
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Habitat Sources:

CDFG Natural Heritage Program, Natural Diversity Data Base, 23 December 1993.

EIP Associates. December 1990 Santa Rosa Sub-Regional Water Reclamation System "Long-Term Wastewater System Draft Environmental Impact Report/Statement."

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- animals listed as “fully protected” in the Fish and Game Code of California (Sections 3511, 4700, 5050 and 5515) ; and
- plants listed in the California Native Plant Society’s *Inventory of Rare and Endangered Vascular Plants of California* (1994).

Special-status plant and animal species that were identified by regulatory agencies, private organizations, and other interested parties as potentially affected by implementation of the Project but deemed by Project biologists as being out of range or to have extremely low potential for occurrence within the Area of Indirect Impacts, are not presented in Table 4.8-1 and Table 4.8-2. These species are compiled in comprehensive potential special-status species lists for the Area of Indirect Impacts and are addressed in the *Biological Resources*, Special-Status Species Accounts, *Volume 2* (Harland Bartholomew & Associates, Inc. 1996b).

The terrestrial biological resources of Sonoma and Marin counties within the Area of Indirect Impacts are described below and are identified in association with the dominant plant communities and wildlife habitats. The acreage of each sensitive plant community and wildlife habitat identified within the Area of Indirect Impacts is presented in the Environmental Consequences (Impacts) and Recommended Mitigation section. The acreages of all plant communities and wildlife habitats are presented in the *Biological Resources, Volume 1-4* (Harland Bartholomew & Associates, Inc. 1996a-f).

Plant Communities

Plant communities are assemblages of plant species that occur together in the same area. Plant communities are defined by species composition and relative abundance. Due to the unique hydrogeological nature of the region, a singular classification system does not provide an adequate description of the regions’ plant communities. The plant community descriptions and nomenclature used in this analysis were based primarily on Holland (1986) and Shuford and Timossi (1989). The Holland system is not entirely applicable to all of the communities found in the Area of Indirect Impacts. The community descriptions of Shuford and Timossi (1989), which focus on the plant communities of Marin County, were therefore used to augment the Holland classification scheme. An “Agricultural Community” classification, which is not used by Holland or Shuford and Timossi, is included to describe four common and abundant community types in the Area of Indirect Impacts (i.e., cropland, orchard, vineyard, and pasture). An “Other Tree Communities and Associations” is also used in this section to describe non-native tree communities and associations, or monotypic associations of native trees, which are not addressed by Holland or Shuford and Timossi.

The plant communities are divided into five types: agricultural communities; grassland communities; shrub dominated communities; tree dominated communities; and other tree communities and associations. These plant communities are further differentiated into types (e.g., riparian woodland) and subtypes (e.g., willow riparian and mixed riparian).

Subtypes are only included when there are discernible or unique differences in their characteristics which warrant separate treatment in the impacts and mitigation analysis.

Agricultural Communities

Cropland

Croplands are located on flat to gently rolling terrain which is tilled prior to commencement of crop production (Zeiner 1988). Due to the artificially controlled growth and harvesting regime, croplands do not conform to normal seral stages (i.e., growth stage of habitat). These habitats may either be annual or perennial depending upon the crop-rotation system and geographic location. Crops grown in the Area of Indirect Impacts include hay, wheat, corn, potatoes, squash, and pumpkins and other truck crops. There are no special-status plant species associated with croplands.

Orchard

Orchards are generally found on valley floors which have rich, alluvial soils. They also may occur on rolling foothills and fairly steep slopes. Typical elevations for orchards range from sea level up to 3,000 feet above mean sea level (amsl) in areas that are normally frost-free. Orchards in California are dominated by a single tree species. Spacing between trees is uniform, and the understory is usually composed of low-growing grasses and other herbaceous plants (Schultze 1988). Typical orchards in the Area of Indirect Impacts include apple orchards and peach orchards. There are no special-status plant species specifically associated with orchards.

Pasture

Pastures are usually grown on flat to gently sloping land and may be irrigated in some manner. The length of a growing season for a particular pasture will depend upon the crop type and climatic influences. Pastures are maintained by man and are usually composed of a mix of perennial grasses and legumes that provide 100 percent ground cover. Old or poorly drained pastures may also have patches of weedy species (Zeiner 1988). This community is maintained to provide forage for a variety of livestock including cattle, sheep, and horses. In northern California, ryegrass (*Lolium* spp.), tall fescue (*Festuca arundinacea*), Dallisgrass (*Paspalum dilatatum*), Ladino clover (*Trifolium repens*), and trefoils (*Lotus* spp.) are preferred pasture plant species (George et al. 1980; Zeiner 1988). There are a few special-status plant species that can be associated with pastures. For example, in the Santa Rosa Plain, special-status species such as Sebastopol meadowfoam, Burke's goldfields, and Douglas' pogogyne are known to occur in seasonal wetlands in lightly grazed pastures (Betty Guggolz, California Native Plant Society, personal communication, December 2, 1995).

Vineyard

Vineyards are also generally found on alluvial soils of valley floors, but may also occur in the foothills at elevations up to 3,000 feet. Vineyards are typically composed of a single shrub species planted in rows and are usually supported on wood and wire trellises. Vines are normally intertwined in the rows, but there is open space between rows which may be planted with grasses or other herbaceous plants to prevent soil erosion. Vineyards are usually long-lived and may persist for over 40 years (Schultze 1988). There are no special-status plant species associated with vineyards.

Grassland Communities

Annual Grassland

Annual grasslands are virtually treeless areas dominated by non-native annual grasses. Annual grasslands occur from sea level to about 3,600 feet (Kie 1988). In California, annual grasslands occur throughout the Central Valley, Coast Range as far north as Mendocino County, and scattered locations in southern California.

Annual changes in rainfall and grazing have a profound effect on the species composition of annual grassland during a given year. Growth typically starts with the first fall rains. Slow growth is maintained throughout winter, followed by rapid growth in spring. During years of favorable rainfall and little or no grazing pressure, large amounts of standing dead plant material can be found during the summer months. A moderate level of livestock grazing may preserve botanical diversity and is considered beneficial (Kie 1988). In the absence of grazing, annual grasslands are often limited in diversity and dominated by tall, dense stands of invasive grasses such as ripgut brome (*Bromus diandrus*) or wild oats (*Avena* sp.), and scattered trees or clumps of trees.

Although the proportion and density of native plant species occurring within annual grassland is typically low, there are some special-status plant species which may be found in this community. These species include Brewer's milk-vetch, Clara Hunt's milk-vetch, Tiburon Indian paintbrush, and Vine Hill clarkia.

Coastal Prairie

Coastal prairie, also referred to as coastal terrace prairie (Holland 1986) and Festuca-Danthonia grassland (Shuford and Timossi 1989), occurs in sandy loams on marine terraces near the coast. Strong maritime influences produce frequent fog events resulting in reduced evapotranspiration and promoting the growth of perennial bunchgrasses (Shuford and Timossi 1989). Coastal prairies occur in the coastal portions of the region, such as the vicinity of the Estero Americano and Estero de San Antonio. Most stands are quite patchy and variable in composition, reflecting local differences in available soil moisture capacity (Holland 1986). A

higher proportion of native species is usually present in coastal prairies than in annual grasslands.

Coastal terrace prairie has been identified by the California Department of Fish and Game as a sensitive natural community (California Department of Fish and Game 1995). Special-status plant species found in this plant community include Blasdale's bent grass.

Native Grassland

Native grasslands are treeless areas dominated by perennial bunchgrass species. In northern California, relict perennial bunchgrasses such as purple needlegrass (*Nassella pulchra*) and wild blue rye (*Elymus glaucus*) occupy areas with greater precipitation and light grazing.

Annual, non-native grasses have replaced most of the native, perennial bunchgrasses that once dominated lower elevations throughout North America. One of the main factors that shifted the competitive advantage from native to non-native grasses appears to be the inability of native grasses to successfully compete under heavy grazing conditions (Barry 1972). Due to the historic use of grasslands, most stands of native grasses in the region now occur as small, isolated populations. The use of these grasslands for grazing has also limited the population and distribution of species endemic to this community, resulting in many species receiving protected status. Some of the special-status plant species associated with native grasslands include Colusa layia, woolly-headed lessingia, San Francisco wallflower, fragrant fritillary, and bristly linanthus. Valley needlegrass grassland and serpentine bunchgrass are types of native grassland that are considered sensitive natural communities by the California Department of Fish and Game (California Department of Fish and Game 1995).

Shrub Dominated Communities

Chaparral (Chamise Chaparral, Manzanita Chaparral, Mixed Chaparral, and Serpentine Chaparral)

Chaparral is composed of evergreen woody shrubs that form extensive low shrublands on the hills and lower mountain slopes of California (Hanes 1977, Holland 1986). Chaparral is found on nutrient-poor, rocky soils on dry inland hills (Shuford and Timossi 1989). Four types of chaparral communities occur in the region. These four communities include chamise chaparral, manzanita chaparral, mixed chaparral, and serpentine chaparral (Shuford and Timossi 1989). These community types also intergrade within the region. Species that grow in chaparral communities are hardy and are able to withstand severe environmental factors such as frequent fires, low water availability, and high magnesium, calcium, and iron concentrations in soils.

Chamise chaparral is the dominant type of chaparral throughout California (Hanes 1977). This community type is found on hot dry sites, usually on south- or west-facing slopes and ridges (Hanes 1977). Stanford manzanita and buck brush occasionally occur intermixed with the chamise. Special-status plants which may be associated with chamise chaparral include Brewer's calandrinia, Vine Hill ceanothus, Vine Hill clarkia, western dichondra, and thin-lobed horkelia.

Manzanita chaparral is found on deeper soils and at higher elevations than chamise chaparral. Manzanita chaparral often forms thick, almost impenetrable stands (Hanes 1977). Special-status plant species associated with manzanita chaparral include Sonoma manzanita, Rincon manzanita, and Marin manzanita.

Mixed chaparral occurs on mesic (moist soil) sites and usually grades into mixed evergreen forest on moist, shady slopes or in drainages (Shuford and Timossi 1989). Mixed chaparral consists of an almost even mix of interior live oak (*Quercus wislizenii* var. *wislizenii*), manzanita, chamise, and buck brush (Shuford and Timossi 1989). Special-status plant species associated with mixed chaparral include bent-flowered fiddleneck, Sonoma ceanothus, western leatherwood, nodding madia, and robust monardella.

Serpentine chaparral is an open, low type of chaparral associated with serpentine soils (Hanes 1977). The dominant shrubs in this community include chamise, toyon (*Heteromeles arbutifolia*), and leather oak. Tree species associated with this community include scrub oak and gray pine. Serpentine soils have very low levels of important nutrients such as calcium, phosphorus, and nitrogen, and high levels of magnesium, chromium, and nickel (Shuford and Timossi 1989; Kozloff and Beidleman 1994). Consequently, plant species occurring on these soils are usually dwarfed due to the poor growing conditions.

Serpentine chaparral is irregularly and locally distributed within the chaparral zone of the region. The impoverished soil that results from the breakdown of minerals present in serpentinite supports a variety of unique plant species (i.e., serpentine endemics) that contribute a significant portion of California's plant diversity. Examples of special-status plant species in the region that are limited primarily to serpentine soils are bent-flowered fiddleneck, Hopland manzanita, serpentine milkweed, serpentine reed grass, dwarf soaproot, serpentine bird's beak, Baker's manzanita, and The Cedars manzanita.

Northern Coastal Scrub

Northern coastal scrub is characterized by low to moderate-sized, semi-woody shrubs (one to six feet in height) with mesophytic leaves and shallow root systems (Harrison et al. 1971, Bakker 1971). Southern and western exposures with shallow, rocky soils support a relatively dense canopy with a well-developed understory of herbs and grasses. Species composition changes between mesic and

xeric sites and from north to south along the coast. In the Area of Indirect Impacts two types of northern coastal scrub are recognized: low-growing patches of bush lupine (*Lupinus succulentus*) near the ocean, and areas of coyote brush (*Baccharis pilularis*) in less exposed sites.

Several special-status plant species are associated with northern coastal scrub including San Francisco spineflower, woolly-headed spineflower, yellow larkspur, and coast rock cress. Coast rock cress is most often found on rocky outcrops in northern coastal scrub habitat (Betty Guggolz, CNPS, personal communication, December 2, 1995).

Tree Dominated Communities

Oak Woodland (Coast Live Oak/Interior Live Oak, Oak-Bay-Madrone)

Several species of tree oaks (*Quercus* spp.) occur in California, seven of which are found in the Area of Indirect Impacts. These seven oak species include coast live oak (*Quercus agrifolia* var. *agrifolia*), canyon live oak (*Q. chrysolepis*), blue oak (*Q. douglasii*), Oregon oak (*Q. garryana* var. *garryana*), California black oak (*Q. kelloggii*), valley oak (*Q. lobata*), and interior live oak (*Q. wislizenii*). A predominance of deciduous oaks, open canopies, and grassy ground cover beneath and among the trees characterizes the oak woodlands in the Area of Indirect Impacts (Shuford and Timossi 1989).

Although various classifications have been devised to describe the oak woodland communities of California (e.g., Holland 1986; Griffin 1977, Pavlik et al. 1991), none of these classifications accurately describes the dominant oak woodland community type found within the Area of Indirect Impacts. The most common oak woodland community type occurring in the Area of Indirect Impacts consists of a mixture of coast live oak and interior live oak. Coast live oak is usually the dominant tree among these two species and this community is therefore identified as "coast live oak/interior live oak". This community intergrades with the oak-bay-madrone woodland community. The other species of tree oaks within the Area of Indirect Impacts occur as scattered, individual trees or as small stands of trees, consisting of one or more oak species.

In addition to the tree oak species listed above, two species of shrub oaks occur within the Area of Indirect Impacts (i.e., scrub oak [*Quercus dumosa*] and leather oak [*Quercus durata*]). These shrub oak species occur as a component of the chaparral community within the geysers reserve and at higher elevations along Pine Flat Road in Sonoma County.

Oak-bay-madrone woodland is a type of mixed evergreen forest dominated by closed-canopy stands of coast live oak, California bay (*Umbellularia californica*), and California madrone (*Arbutus menziesii*) (Shuford and Timossi 1989). Oak-bay-madrone woodland is a tall, dense community with few shrubs or low-

growing herbs (Pavlik et al. 1991). Oak-bay-madrone woodland generally occurs in moist, cool areas, but may also occur on drier sites (Shuford and Timossi 1989).

Special-status plant species associated with the oak woodlands within the Area of Indirect Impacts include bent-flowered fiddleneck, western dichondra, Diablo helianthella, Napa lomatium, robust monardella, and green monardella.

Redwood Forest

Redwood forest, also described as upland redwood forest is dominated by redwood (*Sequoia sempervirens*) (Holland 1986). Redwood forests grow on shallow, well-drained soils and very deep, alluvial floodplain soils in the Coast Range of California from San Luis Obispo County north to southwestern Oregon (McMinn and Maino 1981, Zinke 1977). Natural stands of redwood forest occur in Sonoma and Marin counties, and are present in scattered locations within the Area of Indirect Impacts (e.g., Sebastopol Agricultural Irrigation area). Individual redwood trees are a popular horticultural tree and are commonly planted along roadsides and in parks and yards (e.g., Carroll Road storage reservoir site). Special-status plant species that may occur within the redwood forest plant community include fringed false-hellebore, California pinefoot, and California bottle-brush grass.

Riparian Woodland (Willow Riparian, Mixed Riparian, and Non-wooded Riparian)

Riparian woodlands are complex habitats associated with perennial and intermittent creeks and streams. Riparian woodlands generally have closed canopies dominated by broadleaved, winter deciduous trees. The composition of species in riparian woodland communities is highly variable and dependent on geographic location, elevation, substrate, and amount of flow in the watercourse. Riparian woodland is a widespread community type scattered throughout the Central Valley of California, lower foothills of the Cascades, Sierra Nevada, and Coast Range, though it has been estimated that 95 percent of riparian woodlands have been eliminated in California (Grenfell 1988). Riparian woodlands occur on well-aerated, sandy, alluvial soils.

Willow riparian and mixed riparian are two types of riparian woodlands that occur in the Area of Indirect Impacts. Willow riparian is dominated by red willow (*Salix laevigata*) and arroyo willow (*S. lasiolepis*), whereas mixed riparian woodland is dominated by red alder (*Alnus rubra*) and big leaf maple (*Acer macrophyllum*). Evergreen hardwoods such as California bay and coast live oak commonly occur along the edges of riparian corridors where they gradually intergrade into adjacent grasslands. Further inland, red alder is replaced by white

alder (*Alnus rhombifolia*), Fremont's cottonwood (*Populus fremontii* ssp. *fremontii*), and valley oak.

The number of layers of understory vegetation depends on the age of the woodland, climate, and surrounding land uses. The density and diversity of the understory is often influenced by cattle grazing. Riparian woodlands that have been carefully managed or fenced from cattle support a significantly higher number of native species than those areas where cattle are allowed free access.

Riparian corridors that are mostly devoid of shrubs and trees (due to cattle grazing) are classified as non-wooded riparian habitats. These corridors occur mostly along intermittent watercourses. In the absence of cattle grazing, it is likely that these corridors will support at least some level of riparian community development.

Other Tree Communities and Associations

This section includes descriptions of other tree communities and associations of native and non-native trees that occur in scattered locations within the major vegetation community types (e.g. grasslands, riparian woodlands, and wetland communities) in the Area of Indirect Impacts. The tree species involved include eucalyptus (*Eucalyptus globulus*), Monterey pine (*Pinus radiata*), and Lombardy poplar (*Populus nigra*) non-native species; Monterey cypress (*Cypress macrocarpa*), a native species that is not indigenous to Sonoma or Marin counties; and California buckeye (*Aesculus californica*), a native species that occurs as individuals or in small groups.

California Buckeye (Buckeye)

California buckeye is a native California species that occurs on canyon slopes and in the low dry hills of the Sierra Nevada and Coast Range of California (McMinn and Maino 1981). Populations of California buckeye in Sonoma County occur in small, scattered populations in canyons and on hillsides in association with major community types such as grasslands, oak woodlands, and mixed hardwood forests. The species also occurs as an associate with coast live oak in narrow canyons along drainages.

Eucalyptus

The eucalyptus community is an example of a non-native, exotic plant community that has become naturalized in many locations in the Area of Indirect Impacts. Eucalyptus was introduced to California as an ornamental species and to provide lumber and windbreaks (Ornduff 1974). Monotypic (single species) stands of eucalyptus are common in the Area of Indirect Impacts, especially where the trees were planted in groves to serve as windbreaks. The groves are usually even aged with an open understory due to the allelopathic effects (inhibits growth of nearby

plants) of this genus. The most common species in this community is blue gum, which reaches heights up to 120 feet and trunk diameters of over five feet. Eucalyptus trees tend to replace natural riparian habitat when planted along creeks or natural drainages in the region.

Lombardy Poplar (Poplar)

The Lombardy poplar is not native to California. Although similar to the native cottonwood or poplar (*Populus fremontii* ssp. *fremontii*), Lombardy poplars have a columnar shape as compared to the open, spreading form of the native cottonwood. In the Area of Indirect Impacts, Lombardy poplars are planted in rows in scattered locations as a windbreak along property lines and hedgerows. They have also become established in scattered locations along drainages.

Monterey Cypress (Cypress)

The Monterey cypress is a native California species that has been widely planted outside its natural range on the Monterey Peninsula (Bartel 1993). This species is planted as hedges, windbreaks, and park trees (McMinn and Maino 1981).

Monterey Pine

The Monterey pine is a native California species that occurs in Santa Cruz and Monterey counties along California's central coast. This species has also been widely planted throughout coastal California. In the Area of Indirect Impacts, Monterey pines have been planted as hedge rows and wind breaks. These stands do not represent a distinct plant community type because they have been planted and are not indigenous to Sonoma County, however, the planted Monterey pines occur in large enough numbers to warrant mapping within the Project area.

Wildlife Habitats

The plant communities described above generally correlate with wildlife habitats within the Area of Indirect Impacts (see Plant Community/California Wildlife Habitat Relationships Habitat Type comparison presented in Table 4.8-3).

The wildlife habitats present within the Area of Indirect Impacts were described and mapped using the California Department of Fish And Game's California Wildlife Habitat Relationships System (CWHR) and the classification scheme developed by Mayer and Laudenslayer (1988). Wildlife habitat provides cover, food, and water necessary to meet the biological requirements of one or more individuals of an animal species (Bailey 1982). It is necessary to differentiate wildlife habitats from plant communities in order to assess more accurately how changes in habitats (e.g., change in seral stage within a particular habitat type or change from one habitat type to another) impact abundance, distribution, diversity, and interactions between species. Essential habitat elements which relate to the reproduction, foraging, and cover requirements of each wildlife species are

central to the Wildlife Habitat Relationship analysis. The wildlife habitats identified within the Area of Indirect Impacts are described below in terms of the assemblage of wildlife species that they support. The vegetative component of these wildlife habitats is addressed under the corresponding plant communities described above.

Table 4.8-3

Plant Community/Wildlife Habitat Relationship System Habitat Type Comparison

Plant Community	Corresponding CWHR Habitat¹
Cropland	Cropland
Orchard	Orchard/Vineyard
Pasture	Pasture
Vineyard	Orchard/Vineyard
Annual Grassland	Annual Grassland
Coastal Prairie	N/A
Native Grassland	N/A
Chaparral	Mixed Chaparral
Northern Coastal Scrub	Coastal Scrub
Coastal Live Oak/Interior Live Oak Woodland	Coastal Oak Woodland
Oak-Bay Madrone Woodland	Montane Hardwood/Montane Hardwood-Conifer ²
Redwood	Redwood
Willow Riparian	Valley Foothill Riparian
Mixed Riparian	Valley Foothill Riparian
Non-wooded Riparian	N/A
Buckeye	N/A
Eucalyptus	Eucalyptus
Poplar	Urban
Cypress	Urban
Monterey Pine	Urban

Source: "A Guide to Wildlife Habitats of California", 1988

Notes:

- 1 California Wildlife Habitat Relationship System. Habitats are grouped according to vegetative dominance or unique characteristics to which wildlife are thought to respond (Mayer and Laudenslayer 1988).
- 2 Montane hardwood-conifer habitats relate to oak-bay-madrone woodlands which are composed of at least one-third Douglas-fir.

Cropland

Although cropland generally provides low to moderate habitat value for wildlife, low-growing row crops and fallow fields may provide important foraging habitat for resident open-country hawk species such as American kestrel, and red-tailed hawk. Ferruginous hawk (*Buteo regalis*), rough-legged hawk (*Buteo lagopus*),

and prairie falcon (*Falco mexicanus*) also forage in fallow fields during the fall and winter months. Migratory waterfowl species such as Canada goose (*Branta canadensis*) may seasonally depend on croplands for foraging habitat.

Croplands are found in association with a variety of habitat types such as orchard-vineyard, pasture, annual grassland, valley foothill riparian, mixed chaparral, and fresh emergent wetland.

Orchard-Vineyard

Animal species which may use orchard or vineyard communities for cover, foraging, or breeding habitat include widespread species such as, western scrub jay (*Aphelocoma californica*), American crow (*Corvus brachyrhynchos*), Brewer's blackbird (*Euphagus cyanocephalus*), mourning dove (*Zenaida macroura*), northern mockingbird (*Mimus polyglottus*), and California ground squirrel (*Spermophilus beecheyi*). No special-status animal species are associated with this man-made, cultivated habitat.

Orchards and vineyards may be associated with cropland, pasture, and urban wildlife habitats. They are also found near native habitats such as valley foothill riparian and mixed chaparral.

Pasture

Pastures may be utilized by a wide variety of wildlife species. However, the use of this habitat is dependent upon the geographic region and availability of adjacent habitat types. Waterfowl, ring-necked pheasant (*Phasianus colchicus*), California quail, (*Callipepla californica*) and other ground-nesting birds will nest in pastures if adequate vegetation is present at the start of the nesting season. Pastures that are flood-irrigated provide feeding and roosting sites for wetland-associated birds such as shorebirds, waterfowl, and some raptors. In addition, deer will graze in pastures if sufficient escape cover is available. Although there are no special-status animal species that are associated with pastures, overwintering ferruginous hawks and other special-status raptors often use pastures as foraging habitat.

Pastures are frequently associated with several other wildlife habitat types including cropland, annual grassland, and orchard-vineyard.

Annual Grassland

Relatively undisturbed annual grasslands provide nesting habitat for bird species such as western meadowlark (*Sturnella neglecta*) and horned lark (*Eremophila alpestris*), as well as the western burrowing owl (*Speotyto cunicularia hypugea*). This habitat produces large numbers of seeds that are shed and become available to bird species such as American pipit (*Anthus rubescens*), lark sparrow

(*Chondestes grammacus*), and savanna sparrow (*Passerculus sandwichensis*). Mammals that also forage on seeds and are found in this habitat include deer mouse (*Peromyscus maniculatus*), California vole (*Microtus californicus*), California ground squirrel, and Botta's pocket gopher (*Thomomys bottae*). These rodents also become the prey base for various resident raptors, such as golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), white-tailed kite (*Elanus leucurus*), and northern harrier (*Circus cyaneus*), that utilize wide, open grasslands as foraging habitat. Prairie falcons also forage in this habitat during the winter months. In addition, coyote (*Canis latrans*), Pacific gopher snake (*Pituophis melanoleucus catenifer*), western yellow-bellied racer (*Coluber constrictor mormon*), and western rattlesnake (*Crotalus viridis*) feed on seed-eaters in this community. Due to its extensive distribution, annual grassland intergrades with all of the different habitat types discussed in this section.

Under certain soil conditions, shallow depressions in annual grassland may fill with water during the rainy-season forming seasonal wetlands such as vernal pools. Vernal pools support a unique wildlife assemblage and plant community especially adapted to the annual cycle of seasonal inundation and desiccation. This seasonally dynamic community supports many endemic special-status animal and plant species and provides seasonal foraging habitat for shorebirds and waterfowl. Special-status species that are associated with vernal pools and other seasonal wetlands are discussed under Aquatic Biological Resources, Section 4.9.

Mixed Chaparral

Mixed chaparral provides important cover, foraging, and breeding habitat for many wildlife species. Characteristic bird species that utilize this habitat include wrentit (*Chamaea fasciata*), bushtit (*Psaltiriparus minimus*), California quail, orange-crowned warbler (*Vermivora celata*), spotted towhee (*Pipilo maculatus*), California thrasher (*Toxostoma redivivum*), western scrub jay, and northern mockingbird. During the winter months, chaparral also provides suitable foraging habitat for Cooper's hawk (*Accipiter cooperii*) and sharp-shinned hawk (*Accipiter striatus*).

Chaparral also offers valuable foraging habitat and cover for wild pig (*Sus scrofa*), black-tailed deer (*Odocoileus nemionus*), bobcat (*Felis rufus*), coyote (*Canis latrans*), brush rabbit (*Sylvilagus bachmani*), black-tailed jackrabbit (*Lepus californicus*), and California kangaroo rat (*Dipodomys californicus*). Due to the relatively dry nature of the chaparral community, few if any amphibian species inhabit this community. However, chaparral does provide suitable shelter, basking sites, and foraging habitat for reptiles like the western rattlesnake, common kingsnake (*Lampropeltis getulus*), Pacific gopher snake, striped racer (*Masticophis lateralis*), and western fence lizard. Some of the special-status animal species that may be found in association with chaparral habitats in the

region include California horned lizard, ringtail (*Bassariscus astutus*), peregrine falcon (*Falco peregrinus*), and Bell's sage sparrow (*Amphispiza belli*).

Mixed chaparral is found in association with coastal scrub, blue oak-gray pine woodland, coastal oak woodland, and annual grassland.

Coastal Scrub

Coastal scrub provides habitat for many bird species including California thrasher, bushtit, California quail, Swainson's thrush (*Catharus ustulatus*), Wilson's warbler (*Wilsonia pusilla*), and wrentit (*Chamaea fasciata*). White-crowned sparrow (*Zonotrichia leucophrys*), song sparrow (*Melospiza melodia*), Anna's hummingbird (*Calypte anna*), and Allen's hummingbird (*Selasphorus sasin*) may nest in the thick coastal scrub near the seashore. Birds that utilize coastal scrub as a foraging habitat include northern harrier, red-tailed hawk, common raven (*Corvus corax*), and turkey vulture (*Cathartes aura*). Mammals known to occur in coastal scrub include cottontail, black-tailed deer, striped skunk, coyote, bobcat, and the introduced red fox (*Vulpes vulpes*). Common amphibian and reptile species found in this community include western fence lizard, southern alligator lizard (*Elgaria multicarinatus*), western yellow-bellied racer, Pacific gopher snake, and western skink. Myrtle's silverspot butterfly is a special-status animal species associated with coastal scrub wildlife habitat.

At lower elevations, coastal scrub may be associated with annual grassland, perennial grassland, cropland, and pasture. At higher elevations, coastal scrub transitions into coastal oak woodland, montane hardwood, and mixed chaparral.

Coastal Oak Woodland

The wildlife habitat associated with coastal oak woodland is diverse. Oak acorns are an essential food resource for many wildlife species including western gray squirrel (*Sciurus griseus*), California ground squirrel, black-tailed deer (*Odocoileus hemionus*), wild pig (*Sus scrofa*), deer mouse, dusky-footed woodrat (*Neotoma fuscipes*), acorn woodpecker (*Melanerpes formicivorus*), band-tailed pigeon (*Columba fasciata*), northern flicker (*Colaptes auratus*), and western scrub jay. The abundant insect life found in the bark and foliage of oaks provide food for bird species such as white-breasted nuthatch (*Sitta carolinensis*), bushtit (*Psaltirparus minimus*), plain titmouse (*Parus inornatus*), and ash-throated flycatcher (*Myiarchus cinerascens*). Avian predators that nest and forage in the coast oak woodland habitat include great horned owl (*Bubo virginianus*), western screech-owl (*Otus kennicotti*), red-tailed hawk, and red-shouldered hawk (*Buteo lineatus*).

Oak trees and other hardwoods in this community provide shelter, shade, and breeding habitat for many wildlife species, including raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), cottontail (*Sylvilagus audubonii*), and gray fox

(*Urocyon cinereoargenteus*). A variety of woodpecker species are primary-cavity nesters in oak trees, while house wren (*Troglodytes aedon*), western bluebird (*Sialia mexicana*), and American kestrel (*Falco sparverius*) are secondary-cavity nesters (i.e., utilizing abandoned woodpecker cavities).

Typical amphibian and reptile species that utilize this habitat include ensatina (*Ensatina eschscholtzi*), western skink (*Eumeces skiltonianus*), California slender salamander (*Batrachoseps attenuatus*), arboreal salamander (*Aneides lugubris*), sharp-tailed snake (*Contia tenuis*), ringneck snake (*Diadophis punctatus*), Pacific tree frog (*Pseudacris regilla*), western terrestrial garter snake (*Thamnophis elegans*), western fence lizard (*Sceloporus occidentalis*), and northern alligator lizard (*Elgaria coeruleus*).

Cooper's hawk, white-tailed kite, golden eagle, and northwestern pond turtle are special-status wildlife species that may be found in association with oak woodlands.

Montane Hardwood

Montane hardwood habitat provides resources for many species of forest birds and mammals. Bark and leaf-gleaning insectivores (e.g., white-breasted nuthatch and chestnut-backed chickadee [*Parus rufescens*]) are common residents of montane hardwood habitat, as are birds and mammals that feed primarily on the abundant acorn crops (e.g., wild turkey [*Meleagris gallopavo*], band-tailed pigeon, western scrub jay, acorn woodpecker, western gray squirrel, and black-tailed deer). Sharp-tailed snake, ensatina, and western fence lizard are reptile and amphibian species found in montane hardwood habitat. Many of these species are prey for mammalian and avian predators such as ringtail (*Bassariscus astutus*), gray fox, Cooper's hawk, and red-shouldered hawk. Mature trees and snags provide habitat for cavity-nesting birds (e.g., northern flicker) and mammals (e.g., raccoon) while raptors such as red-tailed hawk and golden eagle often nest near the tops of large conifers.

This habitat often transitions with valley foothill conifer habitat at lower elevations. At middle elevations, montane hardwood habitat interfaces with mixed chaparral. Common associated habitats include valley foothill riparian, annual grassland, and mixed chaparral.

Montane Hardwood-Conifer

Montane hardwood conifer woodlands typically occur on coarse, well-drained mesic soils, often in mountainous terrain with narrow valleys (Mayer and Laudenslayer 1988). This particular habitat type is well-represented in regions with cool, wet winters and warm, dry summers.

Montane hardwood conifer woodlands occur throughout California, and are somewhat continuous from Santa Cruz County north through the outer coast range into Oregon (Cheatham and Haller 1975). Elevations range from 1,000 to 4,000 feet in the north and 2,000 to 5,800 feet in the south (Mayer and Laudenslayer 1988).

Montane hardwood conifer woodlands include at least one-third conifers and one-third broad-leaved-hardwoods (Anderson et al. 1976). The habitat often occurs in a mosaic-like pattern with small pure stands of conifers interspersed with small stands of broad-leaved trees (Sawyer 1980). Montane hardwood conifer habitat represents a transition between hardwood-dominated habitats and conifer-dominated habitats and provides a high degree of vegetational diversity. Typical conifer species include Douglas-fir, incense cedar, Ponderosa pine, and gray pine, while typical hardwood species include Oregon oak, California black oak, California bay-laurel, Pacific madrone, coast live oak, and canyon live oak (Mayer and Laudenslayer 1988). These species will vary depending upon the elevation and geographical area.

Normally, conifers form the upper canopy, while hardwoods comprise the lower canopy. There is usually minimal understory associated with the denser stands of montane hardwood conifer habitat. However, annual grassland, valley foothill riparian, and mixed chaparral may intergrade with this habitat depending upon the conditions.

Montane hardwood conifer woodlands provide foraging and breeding habitat for a variety of wildlife species. Wildlife species associated with montane hardwood habitat are also associated with montane hardwood conifer habitat. However, bird species such as northern pygmy owl (*Glaucidium gnoma*), brown creeper (*Certhia americana*), pileated woodpecker (*Dryocopus pileatus*), and Hutton's vireo (*Vireo huttoni*) are more likely to be found in montane hardwood conifer habitat.

Redwood

Redwood forest is known to provide cover, food, and breeding habitat for at least 193 species of wildlife. Bird species typically found in this habitat type include pileated woodpecker, northern pygmy-owl, Allen's hummingbird, Pacific-slope flycatcher (*Empidonax difficilis*), brown creeper, winter wren (*Troglodytes troglodytes*), Wilson's warbler, and dark-eyed junco (*Junco hyemalis*). Other animals inhabiting the various seral stages of redwood forest include striped skunk, western gray squirrel, ringtail, Oregon salamander (*E. e. oregonensis*), black salamander (*Aneides flavipunctatus*), Pacific giant salamander (*Dicamptodon ensatus*), California slender salamander, and Coast garter snake (*Thamnophis elegans terrestris*). Foothill yellow-legged frog is a special-status animal species found in drainages associated with redwood forest habitats and is discussed in Section 4.9, Aquatic Biological Resources.

Valley Foothill Riparian

Riparian woodland can support more species (i.e., more than 250 species) than any other terrestrial habitat type in the Area of Indirect Impacts (Grenfell 1988). Riparian woodland provides abundant food, cover, and breeding sites for wildlife in close proximity to water. These factors and the structural diversity of riparian woodland are largely responsible for the high productivity of this habitat type. Bird species that are characteristic of this habitat include California quail, mourning dove, Nuttall's woodpecker (*Picoides nuttallii*), black phoebe (*Sayornis nigricans*), western wood-pewee (*Contopus sordidulus*), California towhee (*Pipilo crissalis*), and song sparrow. A number of these species nest or roost in riparian woodland and feed in adjacent habitat types, such as annual grassland and agricultural fields. Riparian woodlands also provide important feeding, resting, and nesting habitat for neotropical migrant songbirds such as warblers, vireos, grosbeaks, and flycatchers.

Mammals found within riparian woodland habitat may include opossum, raccoon, deer mouse, broad-footed mole (*Scapanus latimanus*), striped skunk, gray fox, and ringtail. Amphibians and reptiles that are likely to occur in this community include California newt (*Taricha torosa*), western toad (*Bufo boreas*), Pacific tree frog, common king snake, western aquatic garter snake, and western skink.

Riparian woodlands also provide nesting and foraging habitat for a variety of special-status wildlife species including Cooper's hawk, yellow warbler, white-tailed kite, and yellow-breasted chat. Although there are historical nesting records for long-eared owl along the Russian River in Sonoma County, this species is currently only a rare fall and winter visitor to riparian habitat within the County (Burridge 1995).

In addition to providing high value wildlife habitat, riparian corridors provide local movement corridors between fragmented habitat patches, and necessary habitat for migrant wildlife species such as neotropical migrant songbirds. Due to the value and scarcity of riparian woodlands, on both a state and region-wide scale, they are considered a sensitive habitat type and monitored closely by the California Department of Fish and Game.

The valley foothill riparian habitat is found in association with riverine, grassland, (annual and perennial), coastal oak woodland, and agricultural habitats. The transition to a non-riparian habitat is usually abrupt, especially in agricultural areas. At higher elevations valley foothill riparian habitat intergrades with montane riparian habitat.

Eucalyptus

The lack of plant species diversity within the eucalyptus wildlife habitat results in a corresponding limited wildlife species diversity. Wildlife species that inhabit

this habitat type are generalists that utilize a wide variety of habitat types. Bird species that utilize this habitat as nesting or roosting habitat include red-tailed hawk, red-shouldered hawk, great horned owl, American crow, house finch (*Carpodacus mexicanus*), European starling (*Sturnus vulgaris*), Anna's hummingbird, turkey vulture, blue jays, and house sparrow (*Passer domesticus*). Mammals which may occur in eucalyptus groves include opossum (*Didelphis virginiana*), raccoon, house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), and striped skunk. Western fence lizard, Pacific slender salamander, Pacific gopher snake, and southern alligator lizard are common reptile and amphibian species found in this habitat.

There are no special-status animal species that are associated with eucalyptus wildlife habitat. However, monarch butterflies may form colonial roosts in large, wind-protected groves of eucalyptus trees during migration.

Urban

A distinguishing characteristic of urban habitats is the mixture of native and exotic plant species. Exotic plant species may provide valuable habitat elements such as cover for nesting and roosting, as well as food sources such as nuts or berries.

Native and introduced animal species that are tolerant of human activities often thrive in urban habitats. These species include western fence lizard, northern mockingbird, barn swallow (*Hirundo rustica*), raccoon, striped skunk, European starling, house sparrow, house finch, house mouse, Norway rat, and opossum. Special-status species that nest in less disturbed urban habitats include white-tailed kite, Cooper's hawk, and western burrowing owl.

Regional Resource Planning Efforts

The complexity and variability of the topography, geology, and climate in Sonoma and northern Marin counties have contributed to the occurrence of a great diversity of terrestrial biological resources that support a wide variety of plant and animal species. Several large-scale planning efforts which address the protection of this diversity have been undertaken within the Area of Indirect Impacts. A summary of these efforts and applicable guidelines for natural resources protection within the Area of Indirect Impacts is presented in Table 4.8-4.

Table 4.8-4

Summary of Regional Resource Planning Efforts

Jurisdiction	Program Name	Public/Private	Resource Protection Guidelines
California State Coastal Conservancy	Sonoma County Coastal Wetlands Enhancement Plan (March 1987)	Public	Identify, enhance, and protect wetland resources. Reduce erosion and sedimentation Implement the policies of the Sonoma County local coastal program.
California State Coastal Conservancy	San Francisco Bay Joint Venture	Public	Operates under the framework of the North American Waterfowl Management Plan. Protect, restore, and enhance wetlands. Promote cooperative management agreements.
City of Rohnert Park	General Plan (March 14, 1989)	Public	Recognizes the importance of broad matrix of resources of the Laguna de Santa Rosa, and supports the protection, enhancement, and preservation of the Laguna's wetlands and habitat for migratory waterfowl, fish, native plant communities, and endangered plants (Resolution #89-40).
City of Santa Rosa, Sonoma County, Sonoma County Water Agency	Santa Rosa Creek Master Plan (September 21, 1993)	Public	Conserve and restore natural habitats.
Laguna de Santa Rosa Foundation/Coordinated Resources Management Plan	Goals Set for the Laguna de Santa Rosa (Laguna Views, April 1995)	Private	Coordinate resource management. Preserve, restore and enhance native habitats. Accomplish recovery of native species. Assist landowners in conserving and enhancing natural resources. Support the long-term viability of agriculture. Improve integrated floodplain management.

Table 4.8-4

Summary of Regional Resource Planning Efforts

Jurisdiction	Program Name	Public/Private	Resource Protection Guidelines
Marin County Agricultural Land Trust	Mission Statement	Private	No net loss of agricultural land should occur in Marin County.
Marin County and Southern Sonoma Resource Conservation Districts	Stemple Creek/Estero de San Antonio Watershed Enhancement Plan (July 1994)	Public	Assist agricultural producers with practices that promote the conservation and enhancement of natural resources. Encourage environmentally-sound management of rangeland. Investigate the impact of the proposed West County Alternative on agriculture and natural resources. Conserve and enhance existing natural habitats. Restore the riparian corridor.
National Audubon Society (Western Region)	Mayacama Audubon Preserve	Private	Establishment of a preserve for existing resources through acquisition of conservation easements.
San Francisco Bay Conservation and Development Commission	San Francisco Bay Plan (1969)	Public	Protect San Francisco Bay from needless and gradual destruction. BCDC is authorized to issue or deny permits for any filling and dredging in the Bay.
San Francisco Bay Conservation and Development Commission	Guidelines for Enhancement and Restoration of Diked Historic Baylands (February 1983)	Public	Enhance and restore wetlands to create conditions that will be most beneficial to fish and wildlife while avoiding environmental losses and unsuccessful projects.

Table 4.8-4

Summary of Regional Resource Planning Efforts

Jurisdiction	Program Name	Public/Private	Resource Protection Guidelines
San Francisco Bay Conservation and Development Commission, Counties of Marin, Sonoma, Napa, and Solano; Cities of San Rafael, Novato, American Canyon, and Vallejo	North Bay Wetlands Protection Program (Draft due December 1995)	Public	Protect, enhance, and restore North Bay wetlands (allowing uses that are consistent with wetland functions and values, such as agriculture).
San Francisco Bay Estuary Project	Comprehensive Conservation and Management Plan (1993)	Public and Private	Protect and manage existing wetlands. Restore and enhance the ecological productivity and habitat values of wetlands. Expedite a significant increase in the quality and quantity of wetlands. Educate the public about the values of wetland resources
San Francisco Bay Estuary Project	Status and Trends Report on Wetlands and Related Habitats in the San Francisco Estuary (1991)	Public and Private	Protect and manage existing wetlands. Restore and enhance the ecological productivity and habitat values of wetlands. Expedite a significant increase in the quality and quantity of wetlands. Educate the public about the values of wetland resources
San Francisco Bay Regional Water Quality Control Board	Wetlands Ecosystem Goals Project	Public	Develop conceptual options showing optimal mosaic of wetlands and wetland types that the San Francisco Bay-Delta Estuary needs to restore using GIS. Provide a template to guide future wetland restoration projects.

Table 4.8-4

Summary of Regional Resource Planning Efforts

Jurisdiction	Program Name	Public/Private	Resource Protection Guidelines
Santa Rosa Plain Vernal Pool Task Force	Final Santa Rosa Plain Vernal Pool Ecosystem Preservation Plan (June 30, 1995)	Private and Public	<p>Characterize and preserve the full range of diversity of the Santa Rosa Plain vernal pool ecosystem and associated biological resources.</p> <p>Establish goals, policies, and implementation measures for preservation of vernal pool systems and associated biological resources within the vernal pool ecosystem.</p> <p>Help ensure coordinated, effective and timely resolution of conflicts between landowner, agency, and conservation interests.</p> <p>Provide a comprehensive framework for use in linking plant and animal conservation programs with local land use programs.</p> <p>Provide a framework for meeting the requirements of existing federal and state regulatory compliance, including Clean Water Act and federal and state endangered species compliance.</p>
Save San Francisco Bay Association	Partnership for San Pablo Baylands	Private	<p>Educate public on the importance of the San Pablo Baylands.</p> <p>Develop a Baylands Stewardship Plan which would enhance wetland resources and ensure viable agricultural production.</p>

Table 4.8-4

Summary of Regional Resource Planning Efforts

Jurisdiction	Program Name	Public/Private	Resource Protection Guidelines
Sierra Club, Redwood Chapter (Sonoma Group)	Policy on Sonoma County Wastewater Issues	Private	<p>A wastewater system must maximize reclamation and re-use of wastewater as a resource to benefit organic agriculture, and to enhance and promote natural resources and wildlife.</p> <p>All area wastewater reclamation projects must be scaled and diverse enough to allow for redundancy in case of failure. No single system should be selected that could jeopardize people or natural resources in the event of a failure or shutdown. There needs to be adequate contingency plans in place for the initiation of a system to allow for effective shutdown of any one unit or system that becomes non-compliant for any reason.</p>
Sonoma County	Laguna de Santa Rosa Environmental Analysis and Management Plan (May 1977)	Public	Enhance riparian habitat and preserve biotic resources, promote long-term diversity in plant and animal populations.

Table 4.8-4

Summary of Regional Resource Planning Efforts

Jurisdiction	Program Name	Public/Private	Resource Protection Guidelines
Sonoma County Agricultural Preservation and Open Space District	Acquisition Plan Adopted on December 15, 1992 (Revised November 15, 1994)	Public	The Acquisition Plan (in part shall): Evaluate and prioritize within the District's annual Action Plan special areas of interest according to the following criteria (including in part): 1) protection of crucial natural resource areas 2) protection of resources or scenic lands threatened by development or other adverse land use change.
Sonoma County Land Trust	Project Selection Guidelines	Private	Protect open space and natural diversity. Provide permanent protection of land and its resources.
Sonoma County, California State Coastal Conservancy	Russian River Estuary Study (1992-1993 Summary Report); Russian River Estuary Study: Limnological and Biological Aspects of an Estuary Management Plan, 1992-1993 (1993)	Public	Continue implementation of biological monitoring plan: 1) fish and macroinvertebrate sampling 2) test for entrapment of salmonid smoltssmoult 3) continue behavioral observations of pinniped activity 4) mysid shrimp and juvenile fish sampling
Sonoma County, City of Santa Rosa, City of Sebastopol, City of Rohnert Park	Subregional Wastewater Management Plan for the Santa Rosa Plain (1992)	Public	Preserve and enhance fish and wildlife. Protect wildlife and waterfowl from toxic or other deleterious substances.

Table 4.8-4

Summary of Regional Resource Planning Efforts

Jurisdiction	Program Name	Public/Private	Resource Protection Guidelines
U.S. Environmental Protection Agency	North Bay Initiative	Public	Forum for sharing information about wetlands-related planning efforts in the North Bay.
Western Marin County	Marin Coastal Watershed Enhancement Project (November, 1995)	Private	Goals (in part) are to: 1) continue to provide technical assistance and educational information on ranch planning, nutrient budgeting, and wildlife considerations for landowners; 2) assess each watershed to identify and prioritize problems and projects to improve fish habitat; and 3) provide funding to implement critical water quality and conservation projects

Source: Harland Bartholomew & Associates, Inc., 1996

Geographic Area Terrestrial Biological Resources

The Area of Indirect Impacts in Sonoma and Marin counties can be divided into five relatively distinct geographic areas (i.e., Santa Rosa Plain/Russian River, West County, South County, Sebastopol, and geysers) based primarily on watersheds and their associated aquatic and terrestrial biological resources. A brief discussion of the local environment in each geographic area including important local terrestrial biological resources (unique habitats and special-status species) and local resource planning efforts is provided below. Refer to Figures 4.8-1a, 1b, and 1c for a map of each area.

Santa Rosa Plain/Russian River

The Santa Rosa Plain is a flat valley with low gradient watersheds that generally drain in a west-southwest direction into the Laguna de Santa Rosa (CH2M Hill 1995). This area historically supported stands of valley oak woodlands and savannahs interspersed with grasslands. The relatively flat terrain combined with clayey soils and fairly high rainfall contributed to the once widespread occurrence of seasonally inundated areas which are referred to as seasonal wetlands and vernal pools. Human activities, however, have led to a sharp decrease in the abundance and quality of both the oak woodlands and vernal pools. Dairy farming, planting of orchards and vineyards, and conversion of grasslands to pasture have altered the natural vegetation and surrounding landscape (CH2M Hill 1995). These agricultural practices, in conjunction with commercial and residential development, have led to severely fragmented remnants of valley oak woodlands, seasonal wetlands, and vernal pools.

Vernal pools and associated seasonal wetlands are important aquatic plant communities in California. The Santa Rosa Plain contains the best remaining examples of vernal pools and associated seasonal wetlands in the Area of Indirect Impacts. Although these vernal pools are in a semi-natural state, they comprise a unique habitat feature of this geographic area. Other prominent habitat features in this area include the Laguna de Santa Rosa and Russian River. Each of these resources are described in greater detail in the Aquatic Biological Resources, Section 4.9.

West County

The topography of the West County geographic area varies from rolling hills to steep, incised valleys. The area has a strong maritime influence which contributes to the growth of coastal prairie. The gently sloping, wind swept hills of the area also support annual grasslands, while pockets of oak woodland and oak-bay-madrone woodland are found in the steeper valleys. The numerous perennial and intermittent streams of the area contain stands of willow riparian or mixed riparian woodland. Occasionally, narrow seasonal wetlands occur along the banks of these streams and drainages. Many of the valleys and low lying areas also support

seasonal wetlands, freshwater marshes, and vernal pools. Patches of northern coastal scrub are found on the drier hillsides with shallow rocky soils. The West County geographic area also supports a large agricultural community, with the majority of the area being devoted to pasture (for cattle and other livestock) and cropland (primarily oat hay). The predominant exotic plant community is eucalyptus.

The Estero Americano (a component of the Americano Creek watershed) and Estero de San Antonio (a component of the Stemple Creek watershed) comprise unique habitat features of the West County geographic area. Both of the esteros are located within the Gulf of the Farallones National Marine Sanctuary (Sanctuary), with Americano Creek and Stemple Creek emptying into the Sanctuary at the upper ends of the esteros. The aquatic biological resources of the esteros are described in Aquatic Biological Resources, Section 4.9. The esteros are located in the heart of the Pacific Flyway and the mudflats and open water of the esteros provide seasonally important foraging habitat for migratory waterfowl and shorebirds, and resident long-legged wading birds (Connors and Maron 1989, Madrone and Associates 1977). The eelgrass beds located near the mouths of the esteros provide critically important seasonal foraging habitat for migratory brant (*Branta bernicla*), which forage almost exclusively on eelgrass (eelgrass beds are discussed further in Aquatic Biological Resources [Section 4.9]). The Sanctuary is an area of essential foraging habitat for migratory waterfowl, loons, grebes, pelicans, and terns, as well as for resident nesting seabirds such as cormorants, gulls, murres, guillemots, auklets, and puffins (U.S. Fish and Wildlife Service 1981). The importance of the Sanctuary is highlighted by its inclusion as part of the International Biosphere Reserve Network.

The coastline is another unique habitat feature of the West County area and includes coastal bluffs, coastal dunes, coastal scrub, and coastal salt marsh. Special-status plant species associated with these coastal plant communities include pink sand-verbena, Thurber's reedgrass, swamp harebell, Point Reyes bentgrass, Point Reyes bird's-beak, and Point Reyes blennosperma. Golden eagle, double-crested cormorant, western snowy plover, and osprey are special-status animal species that are found in the West County area.

South County (Including Bay Flats)

The South County geographic area supports a large agricultural industry including vineyards, irrigated cropland, and pasture for sheep, cattle, and horses. The northern portion of this area consists of pasture and vineyards on rolling terrain.

Due to the relative inaccessibility to cattle, steeper hillsides within this area support sensitive plant communities including native grasses. Freshwater seeps are also common on many of the hillsides in the area. Riparian and oak woodlands are distributed in areas with well-developed soils along drainages.

Eucalyptus trees are common along fence lines. Although the floodplain of the Petaluma River formerly supported extensive tidal marshes, this area was diked, reclaimed, and is now dominated by cropland and pasture interspersed with seasonal wetlands (including vernal pools) (Association of Bay Area Governments 1991). The remaining tidal marshes are primarily associated with the east side of the Petaluma River.

The Baylands area along northern San Pablo Bay formerly consisted of salt or freshwater marsh wetlands, and are part of the tidal marshes on the north shore of San Pablo Bay. Most of the Baylands area has been drained for agriculture and many of the tidal areas are now surrounded by levees. Channels, agricultural fields, and levees provide the substrate for most of the plant communities found in this area. The channels surround the perimeter of many of the agricultural fields in the Baylands area and are used primarily to convey stormwater during periods of high seasonal runoff. The channels vary from deep (typically up to 10 feet) to shallow and may or may not have emergent vegetation. Seasonally dry areas are found within many of the channels, while standing water may be present within the deeper sections of the channels year-round. Although the Baylands area currently supports primarily crop and pasture land (composed of annual grasses), historic wetlands, farmed wetlands, and wetland pastures are also present (refer to Jurisdictional Wetlands Resources, Section 4.10). The channels and their banks in the southern portion of the Baylands area primarily support salt-tolerant vegetation due to the relatively high salinity of the water. This vegetation typically includes alkali bulrush, alkali heath, pickleweed, and salt grass. The agricultural fields in the Baylands area are primarily composed of common oat, with a few other species present including bird's-foot trefoil, field bindweed, and Italian ryegrass. Stands of eucalyptus and golden wattle (*Acacia longifolia*) surround many of the agricultural fields. Italian ryegrass, ripgut grass, slender wild oat, and wild radish are the major constituents of the levee plant community, with a few scattered coyote brush shrubs also present (Marcus and Velms 1989).

Important habitat features associated with the South County geographic area include the Petaluma Marsh, Cunningham Marsh, Petaluma River, and San Pablo Bay. Three state wildlife areas are located within the vicinity of the South County geographic area and include San Pablo Bay Wildlife Area in Sonoma and Marin counties; Napa-Sonoma Marshes Wildlife Area in Solano, Napa, and Sonoma counties; and the Petaluma Marsh Wildlife Area in Sonoma County. The wildlife areas provide foraging habitat and cover for migratory waterfowl; and cover, breeding, and foraging habitat for resident water birds and other wildlife including special-status species. Special-status species associated with the unique habitat features in the South County geographic area are represented by animals such as San Pablo vole, San Pablo song sparrow, California black rail, California clapper rail, and salt marsh harvest mouse. Examples of special-status plants found in this area

include alkali milk-vetch, Marin western flax, Sonoma spineflower, Marin knotweed, and soft bird's-beak.

Sebastopol

The Sebastopol geographic area is characterized primarily by agricultural plant communities. Orchards consist primarily of apple, crabapple, and peach. Squash and other row crops are also grown in this area. Unirrigated areas are used as pasture and consist of annual grasslands, seasonal wetlands, drainages, and riparian communities. Pitkin Marsh and portions of the Laguna de Santa Rosa are important habitat features found in the Sebastopol geographic area. Special-status plant species known only or primarily from Pitkin Marsh include white sedge, Pitkin Marsh Indian paintbrush, Pitkin Marsh lily, and California beaked-rush. Special-status animal species found in the Sebastopol geographic area include yellow warbler and Cooper's hawk.

Geysers

The geysers geographic area is located at about 1,600 feet in the Mayacamas Mountains of northern Sonoma County. The area is composed of annual and native grasslands, chaparral, and riparian woodland communities. Existing roads and water pipelines built to support the geothermal well fields criss-cross the area.

Serpentine outcroppings are a unique habitat feature of the geysers geographic area. Special-status plant species associated with this habitat feature include serpentine milkweed, serpentine reed grass, serpentine bird's-beak, tall snapdragon, *Calistoga ceanothus*, Geysers dichanthelium, Socrates Mine jewel-flower, Freed's jewel-flower, Kruckeberg's jewel-flower, and Three Peaks jewel-flower. Special-status animal species known from the vicinity of the geysers geographic area include golden eagle, peregrine falcon, prairie falcon, purple martin, Cooper's hawk, sharp-shinned hawk, California horned lizard, Bell's sage sparrow, and ringtail (Williamson et al. 1982).

Regulatory Framework

Federal Endangered Species Act

The Federal Endangered Species Act of 1973 (Act) recognized that many species of fish, wildlife, and plants are in danger of or threatened with extinction and established a national policy that all federal agencies should work toward conservation of these species. The Secretary of the Interior and the Secretary of Commerce are designated in the Act as responsible for identifying endangered and threatened species and their critical habitats, carrying out programs for the conservation of these species, and rendering opinions regarding the impact of proposed federal actions on endangered species. The Act also outlines what

constitutes unlawful taking, importation, sale, and possession of endangered species and specifies civil and criminal penalties for unlawful activities.

Biological assessments are required under Section 7(c) of the Act if listed species or critical habitat may be present in the area affected by any major construction activity as defined in Part 404.02. Under Section 7(a)(3) of the Act every federal agency is required to consult with the United States Fish and Wildlife Service or National Marine Fisheries Service on a proposed action if the agency has reason to believe that an endangered or threatened species may be present in an area affected by the proposed action and that implementation of the action will likely affect the species.

National Environmental Policy Act

Pursuant to the U.S. Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, the significance of an impact on the quality of the human environment is determined by considering the context in which it will occur and the intensity of the action (40 CFR, Part 1508, Section 1508.27). “Context” refers to the affected region and the locality in which the action would occur; significance, therefore, will vary depending on the setting of the proposed action. “Intensity” refers to the severity of the impact. In determining the intensity of an impact to wildlife, the following factors should be considered:

Unique Characteristics: An action which affects unique characteristics of the geographic area, such as ecologically critical areas, could be considered to have a significant impact on the human environment.

Threatened/Endangered Species: An action which adversely affects an endangered or threatened species or its habitat could be considered to have a significant impact on the human environment.

National Oceanic and Atmospheric Administration

The National Oceanic and Atmospheric Administration (NOAA) has regulatory authority over the Gulf of the Farallones National Marine Sanctuary. This sanctuary was designated under Section 302(a) of Title III of the Marine Protection, Research and Sanctuaries Act of 1972. The sanctuary encompasses an area of the waters adjacent to the coast of California north and south of the Point Reyes Headlands, between Bodega Head and Rocky Point and the Farallon Islands (including Noonday Rocks).

California Environmental Quality Act

CEQA Guidelines - Article 5, Section 15065

Article 5, Section 15065 of the CEQA Guidelines requires that a lead agency make mandatory findings of significance in an EIR if:

“The Project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.”

CEQA Guidelines - Section 15380

Rare or endangered species are defined in the CEQA Guidelines (Section 15380) as follows:

- (a) “Species” as used in this section means a species or subspecies of animal or plant or variety of plant.
- (b) A species of animal or plant is:
 - (1) “Endangered” when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, disease, or other factors; or
 - (2) “Rare” when either:
 - (A) Although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or
 - (B) The species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered “threatened” as that term is used in the Federal Endangered Species Act.
- (c) A species of animal or plant shall be presumed to be rare or endangered as it is listed in:
 - (1) Sections 670.2 or 670.5, Title 14, California Administrative Code; or
 - (2) Title 50, Code of Federal Regulations Sections 17.11 or 17.12 pursuant to the Federal Endangered Species Act as rare, threatened, or endangered.

- (d) A species not included in any listing identified in subsection (c) shall nevertheless be considered to be rare or endangered if the species can be shown to meet the criteria in subsection (b).

CEQA Guidelines - Appendix G

Appendix G of the State CEQA Guidelines lists several impacts that are “normally” considered significant. The three impacts relating to biological resources are listed below:

1. Substantially affect a rare or endangered species of animal or plant or the habitat of the species;
2. Interfere substantially with the movement of any resident or migratory fish or wildlife species; and
3. Substantially diminish habitat for fish, wildlife, or plants.

California Endangered Species Act

The California Endangered Species Act (Fish and Game Code Sections 2050-2098) established a State policy to conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat. The Fish and Game Commission is charged with establishing a list of endangered and threatened species. State agencies must consult with the Department of Fish and Game to determine if a proposed Project is likely to jeopardize the continued existence of any endangered or threatened species.

Section 2081 of the Fish and Game Code allows the “take” of a species listed as threatened or endangered by the California Endangered Species Act. Take is defined as any act that involves direct mortality or other actions that may result in adverse impacts when attempting to take individuals of a listed species. Under Section 2081, the state Department of Fish and Game may issue a memorandum of understanding to authorize take for scientific, educational or management purposes only. Private development that may adversely affect a listed species is prohibited from any take of a species unless the sponsor obtains a Management Authorization for the development Project pursuant to Section 2081. The applicant must agree to strict measures and standards for the management of the species and sign a Memorandum of Understanding to carry out these measures.

California Fish and Game Code

Native Plant Protection Policy

The goals of the California Native Plant Protection Policy are as follows:

The intent of the Legislature and the purpose of this chapter is to preserve, protect, and enhance endangered or rare plants of this state (Section 1900). For purposes of this Chapter, a 'native plant' means a plant that grows in a wild uncultivated state which is normally found native to the plant life of this state (Section 1901).

The commission may adopt regulations governing the taking, possession, propagation, transportation, exportation, importation, or sale of any endangered or rare native plants. Such regulations may include, but shall not be limited to, requirements for persons who perform any of the foregoing activities to maintain written records and to obtain permits which may be issued by the department (Section 1907).

No person shall import into this state, or take, possess, or sell within this state, except as incident to the possession or sale of the real property on which the plant is growing, any native plant, or any part or product thereof, that the commission determines to be an endangered native plant or a rare native plant, except as otherwise provided in this chapter (Section 1908).

All state departments and agencies shall, in consultation with the department, utilize their authority in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered or rare native plants. Such programs include, but are not limited to, the identification, delineation, and protection of habitat critical to the continued survival of endangered or rare native plants (Section 1911).

Biological Resource Goals, Objectives, and Policies

Table 4.8-5 identifies goals, objectives, and policies which provide guidance for development in relation to biological resources (terrestrial, aquatic and wetlands) in the Project area. The table also indicates which criteria in the Terrestrial Biological Resources, Aquatic Biological Resources, and Jurisdictional Wetlands Resources Sections are responsive to each set of policies.

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Sonoma County General Plan	Land Use Element	Goal LU-9 Objective LU-9.1	Accomplish development on lands with important biotic resources and scenic features in a manner which preserves or enhances these features	4.8.1-7 4.9.1-9 4.10.1
Sonoma County General Plan	Resource Conservation Element	Goal RC-5 Objective RC-5.1	Promote and maintain the County's diverse plant and animal communities and protect biotic resources from development activities, including areas with important wildlife habitats and woodland resources	4.8.1-7 4.9.1-9 4.10.1
Sonoma County General Plan	Resource Conservation Element	Objective RC-5.3	Recognize and preserve the Laguna de Santa Rosa and the San Pablo Bay area as biotic resource areas of particular significance to Sonoma County's environment	4.8.1-7 4.9.4,5,7,8 4.10.1
Sonoma County General Plan	Resource Conservation Element	Goal RC-6 Objective RC-6.1 Objective RC-6.2	Identify and protect rare and endangered species and their environment and require that any development on lands containing rare and endangered species be done in a manner which protects the resource or mitigates adverse impacts	4.8.1 4.9.1 4.10.1
Sonoma County General Plan	Resource Conservation Element	Goal RC-7	Protect and conserve the quality of ocean, marine, and estuarine environments for environmental values	4.9.6
Sonoma County General Plan	Resource Conservation Element	Goal RC-8 Objective RC-8.1	Encourage effective management of freshwater fishery resources, balance competing needs with protection of the stream environment and manage riparian corridors along streams to provide protection for fish habitat.	4.9.5,7,8,9

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Sonoma County General Plan	Open Space Element	Goal OS-4 Objective OS-4.1 Objective OS-4.2	Identify critical habitat areas and assure that the quality of these natural resources is maintained and not adversely affected by development activities	4.8.1-7 4.9.1-9 4.10.1
Sonoma County General Plan	Open Space Element	Policy OS-4e	Require a minimum setback of 50 feet from the edge of any wetlands which are within a critical habitat area	4.10.1
Sonoma County General Plan	Open Space Element	Goal OS-5 Objective OS-5.1	Provide protective measures for riparian corridors along selected streams which balance other needs with preservation of riparian values	4.8.1-7 4.9.1-9
Sonoma County General Plan	Open Space Element	Policy OS-5c Policy OS-5e	Establish streamside conservation areas for designated riparian corridors as follows: Urban: 50 feet Russian River: 200 feet Flatland: 100 feet Upland: 50 feet Allow grazing and similar agricultural production activities not involving structures within any streamside conservation area: except that agricultural cultivation shall be no closer than: Russian River corridors: 100 feet from top of bank Flatland corridors: 50 feet from top of bank Upland corridors: 25 feet from top of bank	4.8.1-7

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Sonoma County General Plan	Open Space Element	Policy OS-5h	Roadway and utility construction should seek to minimize and mitigate, where feasible, damage to riparian areas, and minimize vegetation removal for necessary stream crossings	4.8.1-7 4.9.1-9
Marin Countywide Plan	Environmental Quality Element	Policy EQ-2.1 Policy EQ-2.2 Policy EQ-2.3	Riparian systems, streams and their woodland habitat should be protected as essential environmental resources and a Stream Conservation Area (SCA) should be designated along all natural watercourses shown as blue line streams or dashed blue lines on the most recent appropriate USGS quad sheets, or along all watercourses supporting riparian vegetation for a length of 100 feet or more. These should be subject to stream and creekside protection policies and in the Inland Rural Corridor, the zone should extend 50 feet landward from the edge of the riparian vegetation	4.8.1-7 4.9.1-9
Marin Countywide Plan	Environmental Quality Element	Policy EQ-2.43c	No overall net losses shall occur in wetlands acreage, functions and values	4.10.1
Marin Countywide Plan	Environmental Quality Element	Policy EQ-2.59	Agricultural activities should minimize removal of natural vegetation and avoid removal of wetland vegetation, where possible	4.8.1-7 4.9.4 4.10.1

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Marin Countywide Plan	Environmental Quality Element	Policy EQ-2.85	Consider the impact of proposed development on species and habitat diversity	4.8.1-7 4.9.1-9 4.10.1
Marin Countywide Plan	Environmental Quality Element	Policy EQ-2.86	Development shall be restricted or modified in areas which contain special status and migratory species of the Pacific Flyway and/or significant natural areas, wetlands, riparian habitats, and freshwater habitats, to ensure the continued health and survival of these species and areas	4.8.1-7 4.9.1-9 4.10.1
Marin Countywide Plan	Environmental Quality Element	Policy EQ-3.4	No operation shall cause irreversible damage or more than minimum reversible change to natural biological processes	4.8.1-7 4.9.1-9 4.10.1
Marin Countywide Plan	Environmental Quality Element	Policy EQ-3.6	Diversity and abundance of wildlife and marine life shall be maintained, and vegetation and animal habitats shall be preserved wherever possible	4.8.1-7 4.9.1-9 4.10.1
Marin Countywide Plan	Environmental Quality Element	Policy EQ-3.14	Protect large trees, trees with historical importance, and oak woodland habitat, and prevent the untimely removal of trees through implementation of a tree preservation ordinance	4.8.5
Marin Countywide Plan	Environmental Quality Element	Policy EQ-3.20	Along creeks, development must retain natural vegetation	4.8.5
Marin Countywide Plan	Environmental Quality Element	Policy EQ-3.26	Development shall be situated so that wetlands are protected and preserved to the maximum extent feasible	JW1

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Santa Rosa General Plan	Element	Goal OSC-1	Preserve and restore the natural network of creeks and creek habitats	4.8.1-7 4.9.1-9
Santa Rosa General Plan	Element	Goal OSC-2	Identify and preserve vernal pool wetlands and restore modified pools	4.10.1
Santa Rosa General Plan	Element	Goal OSC-3	Conserve significant trees and vegetation in Santa Rosa, including creek corridors and hillsides, in rural and agricultural areas, and in urban areas	4.8.5
Santa Rosa General Plan	Element	Goal OSC-4	Conserve the habitats and movement corridors required by wildlife	4.8.1,6
Santa Rosa General Plan	Element	Goal LUR-3	Conserve biotic values of the City's hillsides, ridgelines, outlying valleys, and drainage courses	4.8.1-7 4.9.1-9
Petaluma General Plan	Community Character Element	Objective (l) Policy 18	Preserve heritage and landmark trees and major groves.	4.8.5
Petaluma General Plan	Petaluma River Element	Goal 2 Objective (i) Objective (j)	Preserve and protect the Petaluma River and streams in their natural state as open spaces, natural resources and habitats	4.8.1-7 4.9.1-9
Petaluma General Plan	Open Space, Conservation and Energy Element	Objective (m) Objective (o)	Protect water resources important to the area's ecology, including the Petaluma Marsh	4.9.1-9 4.10.1
Petaluma General Plan	Open Space, Conservation and Energy Element	Objective (n)	Enhance the wildlife habitat and maintain wildlife travel corridors along waterways	4.8.1,6

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Petaluma General Plan	Open Space, Conservation and Energy Element	Objective (q) Objective (r)	Stabilize banks of waterways and establish a continuous strip of native vegetation	4.8.4,5,6
Petaluma General Plan	Open Space, Conservation and Energy Element	Objective (s)	Manage waterways in the Petaluma Planning Referral Area to ensure compatibility between wildlife, plant restoration, and agriculture	4.8.1-7 4.9.1-9
Sebastopol General Plan	Conservation, Parks, and Open Space Element	Goal 1 Program 4.1 Program 6	Preserve and protect environmentally sensitive areas and areas with important biotic resources such as wetlands, upland habitat, endangered plant and other biotic resources	4.8.1-7 4.9.1-5, 7-9 4.10.1
Sebastopol General Plan	Conservation, Parks, and Open Space Element	Goal 2 Goal 3	Protect, maintain, and restore wetlands	4.10.1
Sebastopol General Plan	Conservation, Parks, and Open Space Element	Goal 5 Program 13	Conserve, protect, and enhance trees and native vegetation	4.8.5
Sebastopol General Plan	Conservation, Parks, and Open Space Element	Goal 14 Program 44 Program 44.2	Protect and enhance existing sensitive habitats in the Laguna, and provide buffer areas to avoid or minimize potential adverse ecological effects and for farm management	4.8.1-7 4.9.1-5, 7-9
Windsor General Plan	Environmental Resources Element	Policy D1.1	Significant biological and ecological resources in the Windsor Planning Area should be protected, including wetlands; rare, threatened and endangered species and their habitats; vernal pools; heritage trees; and oak and riparian woodlands	4.8.1-7 4.9.1 4.10.1

Table 4.8-5

General Plan Goals, Objectives, and Policies - Biological Resources

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria ¹
Windsor General Plan	Environmental Resources Element	Policy D1.3	Development Projects which would fill wetlands or vernal pools shall be required to conform with applicable state and federal regulations	4.10.1
Windsor General Plan	Environmental Resources Element	Policy D.1.6	Preserve oak woodlands and significant stands of oaks and heritage trees, and require proper measures to assure their long-term survival	4.8.5

Source: Harland Bartholomew and Associates, Inc., 1995

Notes:

- 1 Criteria are described as follows:
Terrestrial Biological criteria in Table 4.8-9
Aquatic Biological criteria in Table 4.9-7
Jurisdictional Wetlands criteria in Table 4.10-2

EVALUATION CRITERIA WITH POINTS OF SIGNIFICANCE

Table 4.8-6 summarizes both the evaluation criteria and point of significance used to address potential impacts to terrestrial biological resources.

The California Fish and Game Code, NEPA, CEQA, the Federal Endangered Species Act, and the California Endangered Species Act were used as supporting documentation in developing the evaluation criteria and points of significance. In addition, pertinent policies and data bases from the California Department of Fish and Game, United States Fish and Wildlife Service, and the National Oceanic and Atmospheric Administration were also considered. Policies adopted by local private organization such as the Sierra Club - Sonoma Chapter, Marin and Sonoma Resource Conservation Leagues, Sonoma Land Trust, and the Marin Land Trust were also evaluated.

Table 4.8-6

Evaluation Criteria and Point of Significance - Terrestrial Biological Resources

Evaluation Criteria	As Measured By	Point of Significance	Justification
1. Will the Project cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species ¹ ?	a. Number of individuals of a plant or wildlife species that would be lost b. Acres of occupied or designated critical habitat	a. Greater than 0 individuals b. Greater than 0 acres	FESA, CESA (Sections 2062 and 2067), CEQA (Article 5, Section 15065), and California Native Plant Protection Act (CDFG Code Sections 1900-1913)
2. Will the Project cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Number of plant species or populations that would experience a loss of individuals	Greater than 15 percent of known occurrences or populations in Sonoma and Marin counties	California Native Plant Protection Act (CDFG Code Sections 1900-1913), CEQA (Article 5, Section 15065)
3. Will the Project cause loss of active raptor nest sites?	Number of active nesting sites	Greater than 0 active nest sites	CEQA (Article 5, Section 15065), CDFG Wildlife Habitat Relationships model - (Version 5.2), Fish and Game Code - (Section 3503.5)
4. Will the Project cause permanent loss of sensitive terrestrial wildlife habitat ² ?	Acres of sensitive terrestrial wildlife habitat	Greater than 25 percent of each habitat type	CEQA (Article 5, Section 15065), CDFG Wildlife Habitat Relationships model - (Version 5.2)
5. Will the Project cause permanent loss of sensitive native terrestrial plant communities?	Acres of sensitive native terrestrial plant community lost	Greater than 0 acres	CEQA (Article 5, Section 15065), California Native Plant Protection Act (Fish and Game Code, Sections 1900-1913), CDFG Interim Wildlife/Hardwood Management Guidelines (February 1, 1989), CDFG (CNDDDB 1994, 1995), Sonoma County Tree Ordinance 4014 (June 13, 1989)

Table 4.8-6

Evaluation Criteria and Point of Significance - Terrestrial Biological Resources

Evaluation Criteria	As Measured By	Point of Significance	Justification
6. Will the Project substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Number of corridors substantially blocked or disrupted	Greater than 0 corridors	CEQA (Appendix G)
7. Will the Project may result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ) ³	EQ greater than 10	Menzie et al. 1993

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

CDFG California Department of Fish and Game
 CEQA California Environmental Quality Act
 CESA California Endangered Species Act
 CNDDDB California Natural Diversity Data Base
 CNPS California Native Plant Society
 FESA Federal Endangered Species Act
 USFWS United States Fish and Wildlife Service

1. Endangered, threatened, or rare is defined here as:
 - federally listed endangered, threatened, or proposed plant or wildlife species
 - state listed endangered, threatened, or proposed plant or wildlife species or rare plant species
 - federal candidates for listing
 - CNPS List 1B plant species
2. Sensitive terrestrial wildlife are defined here as:
 - wildlife designated as "species of special concern" by the California Department of Fish and Game
 - wildlife listed as "fully protected" in California
3. Ecological quotient is the ratio of the exposure concentration or exposure rate to the appropriate benchmark value (i.e., reference values for potential effects on site organisms).

METHODOLOGY

The following section provides a brief discussion of the survey and analytical methodologies utilized in assessing terrestrial biological resource impacts within the Area of Directs Impacts and Area of Indirect Impacts.

Terrestrial biological resources potentially impacted by Project alternatives were identified through literature review, California Natural Diversity Data Base (CNDDDB) record searches, consultation with natural resource experts, and field surveys. The CNDDDB contains occurrence records for special-status plant and animal species, as well as sensitive natural vegetation communities. CNDDDB record searches were conducted in 1994 and 1995 for each 7.5 minute USGS quadrangle that contains portions of the Area of Indirect Impacts. In addition, resource agency representatives (California Department of Fish and Game, United States Fish and Wildlife Services, National Marine Fisheries Service) and local natural resources experts (e.g., Milo Baker Chapter of the California

Native Plant Society, and the Madrone Chapter of the National Audubon Society) were consulted to provide available occurrence data not provided by the CNDDDB.

Field surveys were conducted at each Project alternative component site in order to describe, inventory, and map the existing terrestrial biological resources. The results of CNDDDB record searches, field observations, and field mapping of terrestrial biological resources were entered into a Geographic Information System (GIS) data base as separate layers (e.g., wetlands, vegetation communities, wildlife habitats, and special-status species occurrences). The GIS database was queried to determine the acreage and location of vegetation communities, wetlands, wildlife habitats, and number and location of special-status species occurrences within the construction zone boundary of each component site. The data were then used to evaluate impacts by comparison to the impact evaluation criteria in Table 4.8-6. For a more thorough discussion of analytical methods refer to the *Biological Resources Technical Memorandum, Volume 1* (Harland Bartholomew & Associates, Inc. 1996a). Survey methodologies specific to terrestrial biological resources are briefly summarized below.

Pipeline Routes, Pump Stations, and Downstream Studies

Single reconnaissance-level pedestrian surveys for terrestrial biological resources were conducted along all pipeline routes, at pump station sites, and along streams located downstream of the storage reservoir sites. All surveys of the pipeline routes were conducted within road right-of-ways, while the surveys of downstream drainages were only conducted on accessible parcels. Each of the above surveys was conducted from June through October, 1995.

The pipeline routes were again assessed, in late February 1996, from a vehicle to determine plant communities and wildlife habitats that were present within the pipeline construction zone. All plant communities and wildlife habitat types (except for annual grassland, cropland, pasture, and urban) located within 30 feet of the road were mapped as a point occurrence. Annual grassland, community point occurrences was not mapped because of the disturbed nature of this community within road right-of-ways and limited nature of potential impacts. This point occurrence referred to an approximate width and extent (perpendicular extension from road) of each of the vegetative communities observed.

When possible, private property associated with cross-country pipelines was assessed from an off-site location in a public right-of-way. The geysers steamfield distribution line routes were assessed on foot because there were no adjacent roads.

Storage Reservoir Sites

Terrestrial biological resource surveys were conducted at each proposed storage reservoir site. Surveys were conducted within the area encompassed by the construction zone boundary.

Plant Surveys

Special-status plant surveys were conducted by botanists, utilizing a four-visit approach at each of the reservoir sites. The four visits occurred during the early spring (late February to mid-March 1995), mid-spring (May 1995), summer (June 1994 and 1995), and late summer/early fall (mid-September 1994 and mid-August 1995). Botanical surveys during each of the four visits were conducted in accordance with the "Guidelines Assessing Effects of Proposed Developments on Rare and Endangered Plants and Plant Communities" (Skinner and Pavlik 1994). Botanists walked meandering transects to allow for 100 percent visual coverage of each reservoir site. The botanists, while concentrating on special-status plant species, also developed a complete plant inventory for each reservoir site. Refer to the *Biological Resources Technical Memorandum, Volume 3*, Appendix A for complete plant inventories (Sycamore Environmental Consultants, Inc. 1996).

Plant Community Mapping

Plant communities within the reservoir construction zones were mapped using 1994 aerial photographs at a scale of 1"=500'. The mapped aerial photographs were ground-truthed to verify plant community identification and boundaries.

California Wildlife Habitat Relationships Mapping

The California Wildlife Habitat Relationships System was used as a primary tool for the impact evaluation on terrestrial biological resources. The Wildlife Habitat Relationships System was developed by a consortium of state agencies and private organizations and is maintained by the California Department of Fish and Game. The system includes comprehensive information for California wildlife that describes and models, habitat relationships and requirements, geographic distribution, life history, and responses to habitat changes of wildlife species in the system. Currently, the system has models for 646 species of regularly occurring resident and migratory terrestrial and aquatic amphibians, reptiles, birds, and mammals in California. Only regularly occurring species are included in the Wildlife Habitat Relationship System since they are the species that typically receive management emphasis by resource professionals in California.

Wildlife habitat mapping consisted of field inventories for wildlife habitats and wildlife habitat elements on all storage sites. Botanists utilized the point-center vegetation sampling method for identifying the habitat type and determining the seral stage and percent cover. The point-center method involved dropping a thin dowel perpendicular to the ground at one-meter intervals along a 50 meter transect and characterizing any vegetation or habitat component touched by the dowel. At least two randomly-placed transects were sampled in each 40 acres of representative habitat. Wildlife biologists also recorded habitat elements present near the transect. Habitat elements are specific physical and biological attributes

of the surrounding landscape (e.g., ponds and rock formations) which are essential to the life history of a wildlife species.

The Wildlife Habitat Relationship analysis predicts wildlife species occurrences within given habitat types. Habitat types are rated for their potential (low, moderate, or high) to provide reproductive, cover, and feeding requirements for each wildlife species (Mayer and Laudenslayer 1988). Based on the model's output, habitat was evaluated for its potential to support special-status wildlife species that were deemed likely to occur within the construction zone of the reservoir sites. Wildlife habitat types that were rated high for reproduction, cover, or feeding for a particular special-status wildlife species were evaluated in the impact analysis. Refer to the *Biological Resources Technical Memorandum, Volume 1* for a more detailed description of the Wildlife Habitat Relationship system and habitat types (Harland Bartholomew & Associates, Inc. 1996a).

Wildlife Surveys

Riparian bird surveys were conducted on all reservoir sites where access was permitted, in the spring of 1994 and 1995 (i.e., mid-April to mid-June). Biologists walked meandering transects along all riparian corridors within a given reservoir site in order to obtain one hundred percent visual coverage. Binoculars were used for visual identification, and auditory identification of songs and calls was also used to identify all bird species encountered. All species identified during the riparian bird surveys were recorded on standardized field forms.

Burrowing owl habitat assessments were conducted concurrently with other focused surveys, such as riparian bird surveys and sampling transects. The burrowing owl habitat assessments consisted of searching for the presence of ground squirrel colonies and suitable nearby foraging habitat (i.e., primarily short to medium height grassland, pasture, or fallow agricultural fields).

In addition, biologists also recorded the wildlife species observed incidentally during other focused surveys on standardized field forms. The results of all focused wildlife surveys conducted on storage reservoir sites are summarized and presented in the *Biological Resources Technical Memorandum, Volume 1* (Harland Bartholomew & Associates, Inc. 1996a).

Agricultural Irrigation Areas

Surveys to assess the terrestrial biological resources located within the agricultural irrigation areas were conducted from August through October 1995. A general approach to these surveys was established through consultation with the California Department of Fish and Game, U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers. Because access to private property was not always granted, on-site surveys of some parcels located within agricultural irrigation areas could not be conducted. These parcels

were assessed from adjacent public right-of-ways when possible. Due to the vast acreage associated with each of the agricultural irrigation areas, multiple visits to each area did not occur. A more detailed description of each specific survey effort is provided below.

Plant Surveys

Plant surveys were conducted on all agricultural irrigation areas that were accessible. All observations of special-status plant species were recorded and mapped.

Plant Community Mapping

Plant communities within the agricultural irrigation areas were identified and mapped (see storage reservoir methodology for further details concerning accessible areas). The plant communities of inaccessible areas were mapped on aerial photographs (1"=500', 1990) and ground-truthed from adjacent public rights-of-way.

Wildlife Surveys

No focused wildlife surveys were conducted at the proposed agricultural irrigation areas. However, observations of special-status species were recorded and mapped on areas that were accessible. All observed wildlife species and wildlife species sign were recorded on standardized field forms.

California Wildlife Habitat Relationships Mapping

Wildlife habitats (Mayer and Laudenslayer 1988) within the agricultural irrigation areas were identified and mapped (see storage reservoir methodology for further details concerning accessible areas). Visible habitat elements were recorded on standardized field forms. The wildlife habitats of inaccessible areas were mapped on aerial photographs (1"=500', 1990) and ground-truthed from adjacent public rights-of-way.

Ecological Risk Assessment

An ecological risk assessment of representative sites under the various Project alternatives was undertaken to evaluate potential adverse effects to ecological resources as a result of the increased discharge of treated wastewater. The primary objective of the ecological risk assessment was to identify and characterize the potential risks posed to environmental receptors (i.e., individual species) as a result of the alternative wastewater releases. The assessment was also used for the overall characterization of the various areas potentially affected and as the basis for evaluating each of the discharge alternatives under consideration.

Two main routes of exposure were identified for evaluation of ecological risk to terrestrial and aquatic organisms due to the implementation of the Project: direct contact with the media (surface soil, water, and sediment) and indirect exposure by dietary intake. Specific ecological receptors were selected to evaluate potential effects on aquatic biota and wildlife exposure through food ingestion. Key ecological receptors (i.e., target species), representative of various trophic levels were evaluated, including mallard duck, red-tailed hawk, and great blue heron.

In the evaluation of potential effects on terrestrial wildlife, benchmarks were based on toxicological data for individual test species. These screening benchmarks identify soil concentrations which have a low potential for effects on biota, based on toxicological data for several test species. Benchmarks for evaluation of potential effects of chemicals on terrestrial vegetation and soil invertebrates were obtained from various sources including screening reference values developed by the Oak Ridge National Laboratory.

The assessment of ecological risk was based on the calculation of the ecological quotients (EQs). The quotient is calculated as the ratio between exposure concentration for a given chemical substance and an applicable benchmark value that identifies possible adverse effect levels on ecological receptors. The characterization of potential effects on receptor organisms was based on the following guidelines (EPA 1989; Watkins and Stelljes 1993; Menzie et al., 1993) These are standard accepted parameters for risk assessment evaluation, and provide a protective level of significance:

- Adverse effects are not expected for EQ values equal to, or less than, 1;
- A low potential for environmental effects is indicated by an EQ value between 1 and 10;
- A significant potential for adverse effects is indicated by an EQ value greater than 10; and
- EQs in excess of 100 identify a very high probability for potential adverse effects on ecological receptors and biological communities.

Six major pathways were identified for the potential exposure of aquatic organisms and wildlife to the reclaimed water: 1) direct exposure to the reclaimed water in Santa Rosa Creek and the Laguna de Santa Rosa (including fish consumption by the great blue heron); 2) exposure of organisms associated with the Russian River (including fish consumption by the harbor seal); 3) exposure of rooted vegetation, benthic organisms, and waterfowl to sediments in the Laguna de Santa Rosa and the Russian River; 4) exposure of aquatic and terrestrial vegetation by reclaimed water application to irrigation fields; and 6) potential releases from reclaimed water pipelines along the transfer route to the geysers injection area. Exposure through river discharge was estimated at 1 percent, 5 percent, 10 percent, and 20 percent discharge rates. Detail on the risk assessment

methodology and results is presented in the *Ecological Risk Assessment* (Parsons Engineering Science, Inc. 1996).

ENVIRONMENTAL CONSEQUENCES (IMPACTS) AND RECOMMENDED MITIGATION

No Action (No Project) Alternative

Table 4.8-7

Terrestrial Biological Resources Impacts by Component - No Action Alternative

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
8.1.1. Will the No Action Alternative cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals b. Greater than 0 acres	None	C	==
8.1.2. Will the No Action Alternative cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 percent of known occurrences or populations in Sonoma County	None	C	==
8.1.3. Will the No Action Alternative cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	C	==
8.1.4. Will the No Action Alternative permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25 percent of each habitat type in Sonoma County	None	C	==
8.1.5. Will the No Action Alternative cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None	C	==
8.1.6. Will the No Action Alternative substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	C	==

Table 4.8-7

Terrestrial Biological Resources Impacts by Component - No Action Alternative

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
8.1.7. Will the No Action Alternative result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ) greater than 10	EQ less than 8.02	O&M	○

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
C Construction
O&M Operation and Maintenance

2. Level of Significance:
○ Less than significant impact; no mitigation proposed
== No impact

Impact: 8.1.1-6. Will the No Action Alternative impact terrestrial biological resources based on evaluation criteria 1 through 6?

Analysis: *No Impact; Alternative 1.*

The No Action Alternative involves no construction and therefore no construction impacts will result.

Mitigation: No mitigation is needed.

Impact: 8.1.7. Will the No Action Alternative result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?

Analysis: *Less than Significant; Alternative 1.*

Continued discharge of reclaimed water to the Russian River through the Laguna will result in low risks to terrestrial wildlife from ingestion of aquatic organisms (EQ is between 0.0 and 0.38) or ingesting fish from the Laguna (EQ less than 8.02). These risks are less than the point of significance (EQ greater than 10), therefore this impact is less than significant. Impacts to harbor seals in the Russian River is included in the Aquatic Biological Resources section.

Mitigation: No mitigation is proposed.

Headworks Expansion Component

Impact: 8.2.1-7. Will the headworks expansion component impact terrestrial biological resources based on evaluation criteria 1 through 7?

Analysis: *No Impact; All Alternatives.*

The headworks expansion will not require additional land and as a consequence no new surface impacts are expected to occur. There will be no impact to terrestrial biological resources associated with the headworks expansion.

Alternative 1 does not have a headworks expansion component.

Mitigation: No mitigation is needed.

Urban Irrigation Component

Impact: 8.3.1-7. Will the urban irrigation component impact terrestrial biological resources based on evaluation criteria 1 through 7?

Analysis: *No Impact; All Alternatives.*

The rate of application of irrigation water and the irrigated acreage at the urban irrigation sites will remain the same. The only change will be associated with the source of the irrigation water. Currently, these sites are supplied with water from wells and city water. The Project will provide for the use of reclaimed water. Since both the rate of application and the area irrigated will not change as a result of this Project, there will be no impacts to terrestrial biological resources.

Alternatives 1, 4, and 5 do not have an urban irrigation component.

Mitigation: No mitigation is needed.

Pipeline Component

Table 4.8-8

Terrestrial Biological Resources Impacts by Component - Pipelines

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
8.4.1. Will the pipeline component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals b. Greater than 0 acres	None	C	==
8.4.2. Will the pipeline component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 percent of known occurrences or populations in Sonoma County	None	C	==
8.4.3. Will the pipeline component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	C	==
8.4.4. Will the pipeline component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25 percent of each habitat type in Sonoma County	None	C	==
8.4.5. Will the pipeline component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None	C	==
8.4.6. Will the pipeline component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	C	==
8.4.7. Will the pipeline component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ) greater than 10	None	O&M	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:	1. Type of Impact:	2. Level of Significance:
	C Construction	○ Less than significant impact; no mitigation proposed
	O&M Operation and Maintenance	== No impact

Impact: 8.4.1- 3, 6 - 7. Will the pipeline component impact terrestrial wildlife or plant species, wildlife habitats, or plant communities based on evaluation criteria 1, 2, 3, 6, 7?

Analysis: *No Impact; All Alternatives.*

This analysis addresses potential impacts associated with all pipelines, except those that occur within agricultural irrigation areas, and the geysers steamfield area. Impacts to most sensitive resources will be avoided through implementation of Measure 2.2.5. adopted as part of the Project. Measure 2.2.5 provides programs to avoid environmentally sensitive areas along pipelines and establishes procedures for avoidance of construction impacts to special-status terrestrial wildlife and plant species. Preconstruction surveys will be conducted for sensitive biological resources prior to final Project design. Project siting and design will reflect avoidance of identified resources with an associated exclusionary buffer.

Habitat assessments were conducted within the proposed pipeline corridors to determine the feasibility of avoiding sensitive biological resources. Special-status plant and wildlife species were observed during these assessments. Two Rincon manzanita shrubs (California Native Plant Society List 1B) one population of serpentine bird's beak (California Native Plant Society List 4) and one population of Mt. St. Helena morning glory (California Native Plant Society List 4) were found along a pipeline segment associated with Alternative 4. Hayfield tarplant (California Native Plant Society List 3) was observed along a pipeline segment associated with Alternative 3. All of these resources will be avoided through pipeline realignment. Maps which show special-status species occurrences along pipeline routes can be found in *Biological Resources Technical Memorandum, Volume 4* (Harland Bartholomew & Associates, Inc. 1996c-g). Results of these assessments, intensive literature review, and coordination with the U.S. Fish and Wildlife Service and State Department of Fish and Game indicate that after implementation of Measure 2.2.5, pipelines:

- will not be constructed on occupied habitat of endangered, threatened or rare terrestrial wildlife or plant species (criterion #1);
- will not be constructed on occupied habitat of state proposed or listed terrestrial wildlife or plant species, or California Native Plant Society List 1B, 2, 3, or 4 terrestrial plant species (criterion #2);
- will not impact nesting raptors (criterion #3);

- will not block major terrestrial wildlife migration or travel corridors (criterion #7); and
- will not create a potential ecological risk to terrestrial organisms (criterion #8).

Alternatives 1 and 5B do not have a pipeline component.

Mitigation: No mitigation is needed.

Impact: 8.4.4. Will the pipeline component cause a permanent loss of sensitive terrestrial wildlife habitat?

Analysis: *No Impact; All Alternatives.*

Sensitive wildlife habitats are defined as habitats that provide high suitability for foraging and breeding for state species of special concern and California fully protected species, and important resting, foraging, and breeding habitat for migratory songbirds and other wildlife. Sensitive wildlife habitats that were identified within the pipeline corridors include coastal oak woodland, montane hardwood, and valley foothill riparian (Table 4.8-9).

Table 4.8-9

Sensitive Wildlife Habitats in Pipeline Corridors to Be Avoided
(acres)

Alternative	Coastal Oak Woodland	Montane Hardwood	Valley Foothill Riparian
Tolay Extended	1.72	0.34	5.16
Adobe Road/Lakeville	1.72	0.34	5.16
Tolay Confined	1.72	0.34	5.18
Sears Point/Lakeville	1.72	0.34	5.19
Two Rock	1.72	0.34	8.08
Bloomfield	1.72	0.34	8.12
Carroll Road	1.72	0.34	8.08
Valley Ford	1.72	0.34	8.08
Huntley	1.72	0.34	8.08
Geysers Recharge	0.00	0.00	0.93
Russian River Discharge	1.38	6.50	1.62

Source: Harland Bartholomew & Associates, Inc. 1996

All of these habitats are also considered sensitive plant communities except annual grassland and will be avoided through implementation of Measure 2.2.5, Avoid Sensitive Biological Resources, adopted as part of the Project.

Within the 30-foot construction zone associated with the pipeline construction, it is estimated that no more than 100 acres of annual grassland will be temporarily lost due to pipeline construction of any alternative. This is much less than the point of significance (i.e., 25 percent loss of each habitat type in Sonoma and Marin counties). In addition, Measure 2.2.8, adopted as part of the Project, will result in the revegetation of pipeline construction scars with native grasses resulting in no permanent loss of annual grassland. Therefore this is a less than significant impact.

Alternatives 1 and 5B do not have a pipeline component.

Mitigation: No mitigation is needed.

Impact: 8.4.5. Will the pipeline component cause a permanent loss of sensitive native terrestrial plant communities?

Analysis: *No Impact; All Alternatives.*

Results of surveys within the pipeline corridors indicate that many of the pipeline locations support sensitive plant communities (see Table 4.8-10). The point location of these communities is in *Biological Resources Technical Memorandum, Volume 4E* (Harland Bartholomew & Associates, Inc. 1996g). All of these habitats will be avoided through Measure 2.2.5. Avoid Sensitive Biological Resources, adopted as part of the Project.

Alternatives 1 and 5B do not have a pipeline component.

Mitigation: No mitigation is needed.

Table 4.8-10

Sensitive Plant Communities in Pipeline Corridors to Be Avoided
(acres)

Alternative	Mixed Riparian	Willow Riparian	Oak Woodland	Oak-Bay- Madrone Woodland
Tolay Extended	4.82	0.35	1.72	0.34
Adobe Road/Lakeville	4.82	0.35	1.72	0.34
Tolay Confined	4.82	0.38	1.72	0.34
Sears Point/Lakeville	4.82	0.39	1.72	0.34
Two Rock	4.46	3.67	1.72	0.34
Bloomfield	4.46	3.72	1.72	0.34
Carroll Road	4.46	3.67	1.72	0.34
Valley Ford	4.46	3.67	1.72	0.34
Huntley	4.46	3.67	1.72	0.34
Geysers Recharge	0.45	0.50	0.00	0.00
Russian River Discharge	1.45	1.21	1.38	6.54

Source: Harland Bartholomew & Associates, Inc. 1996

Storage Reservoir Component

Table 4.8-11

Terrestrial Biological Resources Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
8.5.1. Will the storage reservoir component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals b. Greater than 0 acres	None	C, P	==

Table 4.8-11

Terrestrial Biological Resources Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact¹	Level of Significance²
8.5.2. Will the storage reservoir component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 % of known occurrences in populations in Sonoma and Marin counties			
• Two Rock		10%	P	○
• Huntley		5%	P	○
• All other reservoirs		None	P	==
8.5.3. Will the storage reservoir component cause loss of active raptor nest sites?	Greater than 0 acres of suitable nesting habitat ³	Greater than 0 acres	C, P	⊙
8.5.4. Will the storage reservoir component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25% of each habitat type in Marin and Sonoma counties ³			
• Tolay Extended		3%	P	○
• Adobe Road		15%	P	○
• Tolay Confined		3%	P	○
• Lakeville Hillside		3%	P	○
• Sears Point		14%	P	○
• Two Rock		4%	P	○
• Bloomfield		2%	P	○
• Carroll Road		4%	P	○
• Valley Ford		4%	P	○
• Huntley		2%	P	○
8.5.5. Will the storage reservoir component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres ⁴			
• Tolay Extended		32	P	⊙
• Adobe Road		77	P	⊙
• Tolay Confined		32	P	⊙

Table 4.8-11

Terrestrial Biological Resources Impacts by Component - Storage Reservoirs

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
• Lakeville Hillside		12	P	⊙
• Sears Point		60	P	⊙
• Two Rock		75	P	⊙
• Bloomfield		11	P	⊙
• Carroll Road		18	P	⊙
• Valley Ford		10	P	⊙
• Huntley		7	P	⊙
8.5.6. Will the storage reservoir component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	C, P	==
8.5.7. Will the storage reservoir component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Ecological Quotient (EQ) greater than 10	EQ less than 2.28	O&M	○

Source: Harland Bartholomew & Associates, Inc., 1996

- Notes:
- | | |
|-------------------------------|---|
| 1. Type of Impact: | 2. Level of Significance: |
| C Construction | ⊙ Significant impact before mitigation; less than significant impact after mitigation |
| O&M Operation and Maintenance | ○ Less than significant impact; no mitigation proposed |
| P Permanent | == No impact |
| -- Not Applicable | |
3. The most adverse impact on a population is represented here. See discussion of impact for percent affected per species.
4. The total impact of all sensitive plant communities is represented here. See discussion of impact for acreage affected per species.

Impact: **8.5.1. Will the storage reservoir component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?**

Analysis: *No Impact; All Alternatives.*

Results of intensive special-status terrestrial wildlife and plant surveys indicate that none of the storage reservoir sites currently support endangered threatened, or rare terrestrial wildlife or plant species (See Aquatic Biological Resources section for discussion of amphibians). The proposed storage reservoirs and associated facilities (including dams,

access roads, pump stations, electrical distribution lines and diversion channels) will not result in the loss of individuals or populations or occupied habitat of the designated species. In addition, results of intensive literature review and coordination with the U.S. Fish and Wildlife Service indicate that habitats within the construction zone boundary of storage reservoir sites have not been designated as critical habitat for any federally-proposed or listed species by the U.S. Fish and Wildlife Service.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is needed.

Impact: 8.5.2. Will the storage reservoir component cause a loss of populations of CNPS Lists 2, 3, or 4 terrestrial plant species?

Analysis: *Less than Significant; Alternatives 3A and 3E.*

Construction of the Huntley storage reservoir component will result in the loss of two populations of hayfield tarplant (Table 4.8-12). One of the populations is found near the center of the reservoir site and another population exists near the freshwater pond on the southeastern boundary of the site. These occurrences are presented on maps in *Biological Resources Technical Memorandum, Volume 4C* (Harland Bartholomew & Associates, Inc. 1996e). These populations consist of scattered individual plants occupying an area of less than 10,000 square feet, in an area that has been exposed to moderate to heavy grazing. Review of the records of the U.C. Berkeley Herbarium determined that twenty populations or occurrences of hayfield tarplant have been identified in Sonoma and Marin counties (eight in Marin County and ten in Sonoma County). An additional 15 populations were identified during surveys undertaken in support of this document (five in Marin County and 12 in Sonoma County). Therefore, there is a total of 37 known and historical records of hayfield tarplant in Sonoma and Marin counties. The two populations identified within the construction boundary zone on the Huntley storage reservoir site represent approximately five percent of the known populations of this species.

A loss of 15 percent or less of the known and historic records of hayfield tarplant in the region of the Project will not cause a substantial range contraction, result in the hayfield tarplant becoming threatened with extinction, or substantially diminish the habitat of hayfield tarplant (see CEQA Section 15065).

Construction of the Two Rock storage reservoir component will result in the loss of one population of bristly linanthus (Table 4.8-12). The location of this occurrence is presented on Map C-1 in *Biological Resources Technical Memorandum, Volume 4C* (Harland Bartholomew &

Associates, Inc. 1996e). Review of the records of the U.C. Berkeley Herbarium determined that nine populations or occurrences of bristly linanthus have been identified in Sonoma and Marin counties. One population was identified during surveys undertaken in support of this document. Therefore, there is a total of ten known and historical records of hayfield tarplant in Sonoma and Marin counties. The population at the Two Rock reservoir site represents approximately ten percent of the known populations of this species. A loss of 15 percent or less of the known and historic records of bristly linanthus in the region of the Project will not cause a substantial range contraction, and will not result in the bristly linanthus becoming threatened with extinction, or substantially diminish the habitat of bristly linanthus (see CEQA Section 15065).

Table 4.8-12

CNPS List 2, 3, or 4 Plants Impacted by Storage Reservoirs

Plant Species	Number of Populations	Percent of known populations
Bristly linanthus		
Two Rock	1	10%
All other reservoir sites	0	0%
Hayfield Tarplant		
Huntley	2	5%
All other reservoir sites	0	0%

Source: Harland Bartholomew & Associates, Inc. 1996

No Impact; Alternatives 2, 3B, 3C, and 3D.

Results of special-status plant surveys within the construction zone boundaries of the storage reservoir sites indicate that none of these sites currently support populations of CNPS List 2, 3, or 4 plant species. None of the storage reservoir components will therefore impact these species.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is proposed.

Impact: 8.5.3. Will the storage reservoir component cause loss of active raptor nest sites?

Analysis: *Significant; Alternatives 2 and 3.*

Focused surveys for raptor nest sites (i.e., hawks and owls) were not conducted on the storage reservoir sites, however, suitable nesting habitat was identified on all reservoir sites. Noise and visual disturbance associated with construction activities occurring during the nesting season may disrupt nesting raptors leading to nest abandonment and nest failure. Construction activities will destroy active nest sites. Grading and inundation of the reservoir sites during the nesting season will flood nest sites or disrupt nesting behaviors leading to nest failure.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.4.5. Active Raptor Nest Location and Monitoring Program

Alternatives 1, 4, and 5. No mitigation is needed.

After

Mitigation: *Less than Significant; Alternatives 2 and 3.*

Potential active raptor nest sites within 0.25 miles of the construction zone will be identified during preconstruction surveys. Construction activities within 0.25 miles of active raptor nests and initial inundation of reservoir sites will be scheduled to occur outside of the nesting season (April-July). Therefore impacts to nesting raptors will be avoided.

Impact: 8.5.4. Will the storage reservoir component cause permanent loss of sensitive terrestrial wildlife habitat?

Analysis: *Less than Significant; Alternatives 2 and 3.*

The storage reservoir component will result in the loss of annual grassland, coastal scrub, coastal oak woodland, montane hardwood, and valley foothill riparian wildlife habitats (Table 4.8-13) (the habitat types are classified according to the Wildlife Habitat Relationship system, see Table 4.8-14). Maps A-1 through A-7 of *Biological Resources, Volume 4A* illustrate the wildlife habitats mapped for each reservoir site (Harland Bartholomew & Associates, Inc. 1996g). These are valuable wildlife habitats, providing cover, breeding, and foraging habitat for a variety of wildlife species, including state species of special concern and California fully protected species.

Valley foothill riparian habitat is especially important for resting, foraging, and nesting neotropical migrant songbirds (birds that breed in North America and migrate to Mexico, Central and South America to spend the winter) Table 4.8-14 provides a list of potential sensitive species found in these habitats and those observed during field surveys for this Project.

This impact is determined by comparison of mapped habitat on each storage reservoir site with the total mapped habitat for Sonoma and Marin Counties per California Department of Forestry's California Vegetation map (CalVeg) or total mapped habitat within the reservoir and agricultural irrigation areas. See *Biological Resources, Volume 1* for more information on California vegetation mapping (Harland Bartholomew & Associates, Inc. 1996a). For each habitat type the impacted acreage in each reservoir site is less than the point of significance, 25% of the Marin and Sonoma acreage. In fact, the total of all habitat types affected on each reservoir is also less than 25% of the Marin/Sonoma acreage. Therefore, impacts on terrestrial wildlife habitats are less than significant at all reservoir sites.

Coastal oak woodland, montane hardwood, and valley foothill riparian are valuable not just as wildlife habitat as evaluated under this criterion, but also as sensitive plant communities under criterion 5. Under criterion 5, impacts to these habitats will be mitigated through measure 2.3.11, Sensitive Resource Conservation Program.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is proposed.

Table 4.8-13

Sensitive Wildlife Habitat Impacted by Storage Reservoirs

Community	Acres	Percent of habitat type in Sonoma & Marin Counties (%)
Annual Grassland		
Tolay Extended	413	3
Adobe Road	271	2
Tolay Confined	343	2
Lakeville Hillside	178	1
Sears Point	397	2
Two Rock	264	2
Bloomfield	320	2

Table 4.8-13

Sensitive Wildlife Habitat Impacted by Storage Reservoirs

Community	Acres	Percent of habitat type in Sonoma & Marin Counties (%)
Carroll Road	276	2
Valley Ford	362	2
Huntley	283	2
Coastal Scrub		
Bloomfield	5	< 1
Carroll Road	3	< 1
Other reservoirs	0	0
Coastal Oak Woodland		
Adobe Road	15.2	< 1
Sears Point	5	< 1
Other Reservoirs	0	0
Montane Hardwood		
Two Rock	58	< 1
Bloomfield	1	< 1
Valley Ford	1	< 1
Other reservoirs	0	0
Valley Foothill Riparian		
Tolay Extended	8	3
Adobe Road	61	15
Tolay Confined	8	3
Lakeville Hillside	11	3
Sears Point	59	14
Two Rock	16	4
Bloomfield	10	2
Carroll Road	18	4
Valley Ford	9	2
Huntley	5	1

Source: Harland Bartholomew & Associates, Inc. 1996

Percentages of impacted habitat were calculated based on the following data:

Annual Grassland - (16,844 acres) acreage mapped by Harland Bartholomew & Associates

Coastal Scrub - (73,361 acres) acreage from Cal Veg data

Coastal Oak Woodland - (28,356 acres) acreage from Cal Veg data

Montane Hardwood - (20,367 acres) acreage from Cal Veg data

Valley Foothill Riparian - (407 acres) acreage mapped by Harland Bartholomew & Associates, Inc. (because riparian habitat is not mapped in Cal Veg, this number represents a minimum acreage of this habitat type)

Table 4.8-14

Special-Status Wildlife Species Associated with Wildlife Habitat Relationship
System Habitat Types
(High Suitability Only)

Wildlife Species	Observed During Surveys	Annual Grassland	Coastal Scrub	Coastal Oak Woodland	Montane Hardwood	Valley Foothill Riparian
Pallid bat ¹	No	F		F		
Ringtail ¹	No					F, R
White-tailed kite ²	Yes	F		R		R
Northern harrier ¹	Yes	F, R				
Ferruginous hawk ¹	No	F				
Golden eagle ¹	Yes	F		R	R	
Prairie falcon ¹	Yes	F				
Long-billed curlew ¹	No	F				
Tricolored blackbird ¹	Yes	F				
Sharp-shinned hawk ¹	Yes		F	F	F, R	F
Cooper's hawk ¹	Yes		F	F, R	F, R	F, R
Merlin ¹	Yes					F
Burrowing owl ¹	Yes	F, R				
Yellow warbler ¹	No			F		F, R
Yellow-breasted chat ¹	No			F		F

Source: Harland Bartholomew & Associates, 1996

Notes:

F = high suitability for foraging

R = high suitability for reproduction

¹ Species of special concern, California Department of Fish and Game

² Fully protected,

Impact: 8.5.5. Will the storage reservoir component cause the permanent loss of sensitive native terrestrial plant communities?

Analysis: *Significant; Alternatives 2 and 3.*

Storage reservoirs and associated facilities will result in the loss of oak woodland at Adobe Road, Sears Point, Two Rock, Bloomfield, Valley Ford; riparian woodland at all reservoir sites; and native grassland at Tolay Extended, Tolay Confined, Lakeville Hillside, Two Rock, Carroll Road, Huntley (see Table 4.8-15).

Each of the plant communities discussed above has undergone tremendous reduction in distribution and acreage over the past 100 years and is considered sensitive by the California Department of Fish and Game. Any loss of these communities is a significant impact.

Table 4.8-15

Sensitive Native Plant Communities at Reservoir Sites (acres)

Reservoir	Oak Woodland	Riparian Woodland	Native Grassland
Tolay Extended	0	7	25
Adobe Road	17	60	0
Tolay Confined	0	7	24
Lakeville Hillside	0	11	0.6
Sears Point	6.2	59	0
Two Rock	58	16	1
Bloomfield	0.6	10	0
Carroll Road	0	17	1
Valley Ford	1	9	0
Huntley	0	5	2

Source: Harland Bartholomew & Associates, Inc., 1996

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a storage reservoir component.

Mitigation: *Alternatives 2 and 3.*

2.3.11. Sensitive Resource Conservation Program

Alternatives 1, 4 and 5. No mitigation is needed.

After

Mitigation: *Less than Significant; Alternatives 2 and 3.*

Loss of sensitive native plant communities will be compensated through creation of new habitats, or restoration and preservation of existing habitat. Monitoring will ensure no net loss of habitat acreage or function.

Impact: 8.5.6. Will the storage reservoir component substantially block or disrupt major terrestrial wildlife migration or travel corridors?

Analysis: *No Impact; All Alternatives.*

Results of literature reviews and discussions with California Department of Fish and Game (Fred Bottie, Biologist, California Department of Fish and Game Region 3, Yountville, personal communication, September 1995) indicate that no major terrestrial wildlife migration or travel corridors are located within the construction zone boundary of any storage reservoir site. Construction of the storage reservoirs and associated facilities will not block or disrupt major terrestrial wildlife migration or travel corridors.

Alternatives 1, 4, and 5 do not have a storage reservoir component.

Mitigation: No mitigation is needed.

Impact: 8.5.7. Will the storage reservoir component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?

Analysis: *Less than Significant; Alternatives 2 and 3.*

Based on the ecological risk assessment, no significant risk was identified for direct exposure of terrestrial organisms to organic chemicals and metals found at detectable levels in the reclaimed water or in the sediment. All ecological quotient (EQ) values for sediment or reclaimed water were below the significance threshold of 10. The risk to vegetation from the sediment, has an EQ less than 2.28, and so the impacts are considered to be less than significant. The EQ values for bioaccumulation of metals in the diet, as measured by food ingestion in the mallard, were well below significance levels, EQ less than 0.01, and therefore the impact of bioaccumulation is also less than significant.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have a reservoir component.

Mitigation: No mitigation is proposed.

Pump Station Component

This analysis addresses potential impacts associated with all pump stations, except those which occur within storage reservoir construction zones. The storage reservoir pump station impacts are addressed in the storage reservoir impact analysis, because they are within the construction zone for the reservoirs.

Table 4.8-16

Terrestrial Biological Resources Impacts by Component - Pump Stations

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
8.6.1. Will the pump station component cause loss of individuals or occupied habitat of endangered, threatened, or rare, terrestrial wildlife or plant species?	Greater than 0 individuals and Greater than 0 acres	None	P	==
8.6.2. Will the pump station component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15% of known occurrences or populations in Sonoma County	None	P	==
8.6.3. Will the pump station component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	P	==
8.6.4. Will the pump station component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25% of each habitat type in Sonoma County	Less than 1%	C	○
8.6.5. Will the pump station component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None	P	==
8.6.6. Will the pump station component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	P	==
8.6.7. Will the pump station component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ Greater than 10	None	P	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
P Permanent
C Construction

2. Level of Significance codes:
== No impact
○ Less than significant impact; no mitigation proposed

Impact: 8.6.1-3, 6-7. Will the pump station component impact terrestrial wildlife or plant species based on evaluation criteria 1, 2, 3, 6, and 7?

Analysis: *No Impact; All Alternatives.*

Measure 2.2.5, Avoid Sensitive Biological Resources, adopted as part of the Project, provides measures to avoid environmentally sensitive areas near pump stations and electrical systems and establishes procedures for avoidance of construction impacts to wildlife or plant species and occupied habitats. Preconstruction surveys will be conducted for sensitive biological resources prior to final Project design. Project siting and design will reflect avoidance of identified resources with an associated exclusionary buffer. Construction within a 0.25 mile buffer of raptor nests will be timed to occur prior to or after the nesting season.

Results of habitat assessments, literature review, and coordination with the U.S. Fish and Wildlife Service and the state Department of Fish and Game indicate that after implementation of Measure 2.2.5., the pump station component:

- Will not be constructed on occupied habitat for endangered, threatened, or rare, proposed, or federal candidate terrestrial wildlife or plant species (criterion #1);
- Will not be constructed in habitat that supports CNPS List 2, 3, or, 4 terrestrial plant species (criterion #2);
- Will not impact nesting raptors (criterion #3);
- Will not block major terrestrial wildlife migration or travel corridors (criterion #7); and
- Will not create a potential ecological risk to terrestrial organisms (criterion #8).

Alternatives 1, 4 and 5 do not have a storage reservoir component.

Mitigation: No additional mitigation is needed.

Impact: 8.6.4. Will the pump station component cause permanent loss of sensitive terrestrial wildlife habitat?

Analysis: *Less than Significant; Alternatives 2, 3, and 4.*

Results of the habitat assessments indicate that there are sensitive wildlife habitats present (i.e. coastal oak woodland, valley foothill riparian habitat, and annual grassland) within the current pump station construction zones. With the exception of annual grassland and coastal scrub habitat, all other sensitive

wildlife habitat identified are also considered sensitive plant communities. With implementation of Measure 2.2.5, adopted as part of the Project, all sensitive plant communities will be avoided in the construction of pump stations.

Surveys indicate that there will be less than nine acres of annual grassland habitat impacted by any alternative. Of that, no greater than one acre will be lost permanently. The remaining acreage will be temporarily impacted through construction activities. The construction scars will be restored to their original form through implementation of Measure 2.2.8 Revegetate Temporarily Disturbed Sites, adopted as part of the Project. The total permanent loss of annual grassland is much less than the point of significance threshold of 25% of any habitat type in Sonoma and Marin counties and this impact is less than significant.

No Impact; Alternatives 1 and 5.

These alternatives do not have a pump station component.

Mitigation: No additional mitigation is proposed.

Impact: 8.6.5. Will the pump station component cause permanent loss of sensitive native terrestrial plant communities?

Analysis: *No Impact; All Alternatives.*

Habitat assessments were conducted to identify sensitive vegetative communities potentially affected by the proposed pump station locations. Two proposed pump stations (G3 and G4), are located in the vicinity of well-developed stands of oak-bay-madrone woodland. Each of these pump stations will have an approximate construction zone boundary of one acre, resulting in the combined loss of at least two acres of oak-bay-madrone woodland.

Measure 2.2.5, adopted as part of the Project, provides measures to avoid sensitive plant communities near pump stations and electrical systems and establishes procedures for avoidance of construction impacts to wildlife or plant species and occupied habitats. Project siting and design will reflect avoidance of identified resources with an associated exclusionary buffer.

Because exclusionary buffers for sensitive biological resources will be incorporated into the final Project design there will be no impacts to sensitive native terrestrial plant communities.

Alternatives 1 and 5 do not have a pump station component.

Mitigation: No additional mitigation is needed.

Agricultural Irrigation Component

Table 4.8-17

Terrestrial Biological Resources Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
8.7.1. Will the agricultural irrigation component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals b. Greater than 0 acres	None Temporary impacts due to accidental ponding or runoff only	C, P O&M	== ○
8.7.2. Will the agricultural irrigation component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15% of known occurrences or populations in Sonoma and Marin counties	None Temporary impacts due to accidental ponding or runoff only.	C, P O&M	== ○
8.7.3. Will the agricultural irrigation component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	C, P, O&M	==
8.7.4. Will the agricultural irrigation component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25% of each habitat type in Sonoma and Marin counties	19% to 22% loss	C, P, O&M	○
8.7.5. Will the agricultural irrigation component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None Temporary impacts due to accidental ponding or runoff only	C, P, O&M	== ○
8.7.6. Will the agricultural irrigation component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	C, P	==

Table 4.8-17

Terrestrial Biological Resources Impacts by Component - Agricultural Irrigation

Evaluation Criteria	Point of Significance	Impact	Type of Impact¹	Level of Significance²
8.7.7. Will the agricultural irrigation component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ Greater than 10	EQ between 0.00 and 0.01	O&M, O&M-CP	○

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:	1. Type of Impact:	2. Level of Significance codes:
O&M	Operation and Maintenance	○ Less than significant impact; no mitigation proposed
O&M-CP	Contingency Plan	== No impact
P	Permanent	

Impact: **8.7.1. and 8.7.2 Will the agricultural irrigation component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species; loss of individuals of CNPS List 1B, 2, 3, or 4 terrestrial plant species?**

Analysis: ***Construction, Permanent***
No Impact; All Alternatives.

Results of habitat assessments for special-status plant and wildlife species within proposed agricultural irrigation areas indicate that all of the agricultural areas currently support habitat for these species see *Biological Resources Technical Memorandum Volumes 1, 2, and 4D* for detailed methodology and survey results with maps (Harland Bartholomew & Associates, Inc. 1996a, b, f). In addition, over the life of the Project, there is an opportunity for future protection of species that do not currently have special-status, but do occupy these lands. Therefore, there is potential for special-status species to occur on agricultural sites when they receive irrigation waters. Measures adopted as part of the Project will ensure that all impacts to special-status species are avoided.

Measure 2.2.2 and Measure 2.2.5 will result in avoidance of impacts to these resources. In Measure 2.2.2, the City will compile a resource map for every irrigation parcel immediately prior to irrigation design and layout. Irrigation design (Measure 2.2.5) will reflect exclusionary buffers for both irrigation application and pipeline construction. Exclusionary buffers will be established around any identified sensitive plant species

habitat, the riparian corridor of all linear waterways, and occupied burrows or nest sites of sensitive ground-dwelling wildlife species. Thus, agricultural irrigation will not result in the loss of individuals, populations or occupied habitat, and therefore there is no impact.

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Operation and Maintenance

Less than Significant; Alternative 2 and 3.

Irrigation runoff and ponding may occur due to faulty operation or pipeline leakage. Measures adopted as part of the Project (Measure 2.2.1) are designed to avoid runoff and ponding. Measure 2.2.2 (Irrigation Site Resource Maps) and Measure 2.2.5 (Avoid Sensitive Biological Resources) are also designed to avoid the potential effects of runoff and ponding by providing for identification and buffering of special-status terrestrial plant and wildlife species and occupied habitats. Therefore, any potential impacts to the designated species and occupied habitats will be less than significant.

Winter irrigation will occur in areas previously evaluated for normal summer irrigation. Results of habitat assessments for sensitive plant communities and wildlife habitats within agricultural irrigation areas indicate that some of the agricultural irrigation areas contain sensitive plant communities and habitats that support sensitive wildlife (see Agricultural Irrigation Impact Analysis). However, Measure 2.2.2, Irrigation Site Resource Maps, ensures that the results of previous biological surveys are verified and that additional special-status species surveys will be conducted on those parcels that were not previously surveyed.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: No additional mitigation is proposed.

Impact: 8.7.3. Will the agricultural irrigation component cause loss of active raptor nest sites?

Analysis: *No Impact; All Alternatives.*

Raptor nesting behavior and nesting success could be affected by the physical, noise and visual disturbances associated with the construction of pipelines, cultivation practices and the aerial application of irrigation water. Active raptor nest sites may be present on all irrigation sites but all impacts will be avoided through the implementation of measures adopted as part of the Project.

In Measure 2.2.2, the City will compile a resource map for every irrigation parcel immediately prior to irrigation design and layout. Irrigation design (Measure 2.2.5) will reflect exclusionary buffers for both irrigation application, new cultivation, and pipeline construction for active raptor nests.

Irrigation runoff and ponding may occur due to faulty operation or pipeline leakage. However, due to the low volumes of water involved, the transitory nature of potential effects, and the implementation Measure 2.2.1- Irrigation Conservation and Management Programs, Measure 2.2.2 - Irrigation Site Resource Maps, and Measure 2.2.5 - Avoid Sensitive Biological Resources including active raptor nest sites potential impacts to raptor nest sites will be avoided. Therefore, there will be no impact.

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Mitigation: No additional mitigation is needed.

Impact: 8.7.4. Will the agricultural irrigation component cause permanent loss of sensitive terrestrial wildlife habitat?

Analysis: *Less than Significant; Alternatives 2 and 3.*

Assessments of sensitive wildlife habitat were conducted on each agricultural subcomponent. See discussion on pipeline impact 8.6.6 for definition of sensitive wildlife habitat. Results of the surveys are presented in Tables 4.8-18, 19, and 20.

Table 4.8-18

Sensitive Terrestrial Wildlife Habitats
South County Agricultural Irrigation (Alternative 2)
(acres)

Habitat	Adobe Road	East of Rohnert Park	Lakeville	North Petaluma Valley	Bay Flats	Total South County
Annual Grassland	1,162	1,214	2,152	381	--	5,591
Coastal Oak Woodland	1	61	12	95	682	80
Valley Foothill Riparian	1	33	1	4	--	39
Montane Hardwood	--	43	--	--	--	43

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

Numbers under "Acres" heading indicate the total acreage mapped for that particular agricultural area.

Table 4.8-19

Sensitive Terrestrial Wildlife Habitats -
Sebastopol Agricultural Irrigation (Alternative 2 and 3) (acres)

Habitat	Sebastopol (Acres)
Annual Grassland	371
Coastal Oak Woodland	35
Valley Foothill Riparian	92
Redwood	14
Montane Hardwood	11

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

Numbers under "Acres" heading indicate the total acreage mapped for that particular agricultural area.

Table 4.8-20

Sensitive Terrestrial Wildlife Habitats - West County Agricultural Irrigation
(Alternative 3)
(acres)

Habitat	Americano	Miscellaneous	Stemple	Total West County
Annual Grassland	3,203	220	4,392	7,815
Valley Foothill Riparian	9	2	13	24
Coastal Oak Woodland	--	<1	<1	<1
Montane Hardwood	--	--	8	8
Coastal Scrub	4	--	--	4

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:

Numbers under "Acres" heading indicate the total acreage mapped for that particular agricultural area.

All of the habitats in Tables 4.8-18, 19, and 20 are protected under Measure 2.2.5, Avoid Sensitive Biological Resources adopted as part of the Project, as sensitive plant communities, with the exception of annual grasslands and coastal scrub. Thus valley foothill riparian, coastal oak

woodland, and montane hardwood communities will not be included in irrigation areas, but will be avoided. The potential conversion of annual grassland and coastal scrub to cropland will result in decreased value and capability of this habitat to support sensitive terrestrial wildlife species. The potential loss of coastal scrub represents less than 0.01% and is less than significant.

Because the exact boundaries of agricultural irrigation for Alternatives 2 and 3 have not been defined, potential annual grassland conversion to cropland has been estimated upon the following assumptions:

- Conversion to irrigated pasture or silage (forage) will not substantially diminish sensitive wildlife use;
- Predicted cropping patterns and acreage are based on the high technological cropping scenarios developed in Cropping Scenarios For the West County and South County Reclamation Alternatives (1996). High technological cropping scenarios result in the largest acreage of land conversions for this Project; and
- With the exception of Sebastopol (utilizing the most conservative approach) all agricultural production is assumed to occur on annual grasslands. It is assumed in this analysis, as it is for the cropping analysis, that Sebastopol irrigation will include 1,600 acres of existing orchards and vineyards.

The results of this analysis are presented in Table 4.8-21. For all alternatives the maximum loss of annual grassland is less than the 25% point of significance Therefore this impact is less than significant.

Table 4.8-21

Maximum Predicted Acreage of Annual Grassland Converted to Other Agricultural Uses

Alternative	Maximum Annual Grassland Available for Conversion (Acres)	Maximum Irrigable Acreage Required for Alternatives 2 and 3 (Acres)	Predicted Conversion to Irrigated Pasture (Acres)	Predicted Conversion to Forage, Hay Silage (Acres)	Existing Cropland Assumed Irrigated within Scenario (Acres)	Predicted Conversion of Annual Grassland to Cultivated Crops (Acres)	Percentage of Annual Grassland Converted to Cultivated Crops
West County	7,815	6,800	1,000	2,300		3,500	21%
West County with Sebastopol	8,186	6,800	750	1,300	1,600	3,150	19%
South County	5,591	4,200	300	800		3,100	18%
South County with Sebastopol	5,960	5,100	200	400	1,600	2,900	17%

Source: Harland Bartholomew & Associates, Inc., 1996

Percentages of habitat impacted were calculated based on the following data:

Annual Grassland - (16,884 acres) acreage mapped in Sonoma and Marin Counties during this study by Harland Bartholomew & Associates, Inc

Irrigation runoff and ponding may occur due to faulty operation or pipeline leakage. However, due to the low volumes of water involved, the transitory nature of potential effects, and the small acreages of sensitive wildlife habitat potentially affected by runoff or ponding, the 25 percent threshold for loss of sensitive wildlife habitat will not be exceeded. In addition, implementation of Measure 2.2.1 - Irrigation Conservation and Management Programs, Measure 2.2.2 - Irrigation Site Resource Maps, and Measure 2.2.5 - Avoid Sensitive Biological Resources will ensure that potential impacts will be minimized and there will be no permanent loss of sensitive terrestrial wildlife habitats. Therefore, this impact is considered less than significant.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: No additional mitigation is proposed.

Impact: 8.7.5. Will the agricultural irrigation component cause permanent loss of sensitive native terrestrial plant communities?

Analysis: ***Construction; Permanent***

No Impact; All Alternatives.

Measures adopted by the City as part of the Project (Measure 2.2.2 and Measure 2.2.5) will compile a resource map for every potential irrigation parcel, ensure that biological surveys are verified; and protect sensitive areas within agricultural irrigation areas by establishing buffers for all sensitive biological resources located on all parcels brought into agricultural production with reclaimed water. Therefore, agricultural irrigation will not result in the permanent loss of any sensitive native terrestrial plant community.

The Adobe Road agricultural irrigation area contains mixed riparian woodland, coast live oak woodland, and willow-dominated riparian woodland. The bay flats agricultural irrigation area contains some small patches of native grassland. The East of Rohnert Park agricultural irrigation area contains coast live oak woodland, oak-bay-madrone woodland, mixed riparian woodland, willow-dominated riparian woodland, and native grassland. The Lakeville agricultural irrigation area contains oak woodland, mixed riparian woodland, willow-dominated riparian woodland, and native grassland. The North Petaluma Valley agricultural irrigation area contains coast live oak woodland and mixed riparian and willow-dominated riparian woodland. The Americano agricultural irrigation area contains native grassland, willow-dominated riparian woodland, and less than 0.5 acres of mixed riparian woodland. The Stemple agricultural irrigation area contains both mixed riparian

woodland and willow-dominated riparian woodland. The Miscellaneous agricultural irrigation area contains both mixed riparian woodland and willow-dominated woodland. The Sebastopol agricultural irrigation area contains coastal oak woodland, mixed riparian woodland (over 100 acres), and willow-dominated riparian woodland. See *Biological Resources Technical Memorandum, Volume 4D* for mapping results (Harland Bartholomew & Associates, Inc. 1996g)

All of these communities will be avoided through Measures 2.2.2 and 2.2.5, therefore there is no impact.

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Operation and Maintenance

Less than Significant; Alternatives 2 and 3.

Irrigation runoff and ponding may occur due to faulty operation or pipeline leakage. Measure 2.2.1 is designed to avoid runoff and ponding. Measure 2.2.2 (Irrigation Site Resource Maps) and Measure 2.2.5 (Avoid Sensitive Biological Resources) are also designed to avoid the potential effects of runoff and ponding by providing for identification and buffering of sensitive biological resources, including sensitive native terrestrial plant communities. However, due to the low volumes of water involved, the transitory nature of potential effects, and the small acreages of sensitive native plant communities potentially affected by runoff or ponding, the impact will be considered less than significant.

No Impact; Alternatives 1, 4 and 5.

These alternatives do not have an agricultural irrigation component.

Mitigation: No additional mitigation is proposed.

Impact: 8.7.6. Will the agricultural irrigation component substantially block or disrupt major terrestrial wildlife migration or travel corridors?

Analysis: *No Impact; All Alternatives.*

Results of literature reviews and discussions with the California Department of Fish and Game (Fred Bottie, Biologist, Region 3, Yountville, personal communication, September 1995) indicate that no major terrestrial wildlife migration or travel corridors are located within the agricultural irrigation areas. Application of reclaimed water at the agricultural irrigation areas will not block or disrupt major terrestrial wildlife migration or travel corridors, therefore there is no impact.

Alternatives 1, 4, and 5 do not have an agricultural irrigation component.

Mitigation: No mitigation is needed.

Impact: **8.7.7. Will the agricultural irrigation component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?**

Analysis: *Less than Significant; Alternatives 2 and 3.*

Ecological quotients (EQ) were calculated for the exposure of vegetation and soil organisms to undiluted effluent applied directly to agricultural fields. The EQ for risk to vegetation and soil organisms from exposure to soils irrigated with undiluted effluent range from 0.00 to 0.01. All EQ values are below the significance threshold of 10, and therefore the impact is less than significant. The same analysis applies to winter irrigation under the Contingency Plan.

No Impact; Alternatives 1, 4, and 5.

These alternatives do not have an agricultural irrigation plan.

Mitigation: No mitigation is proposed.

Geysers Steamfield Component

Table 4.8-22

Terrestrial Biological Resources Impacts by Component - Geysers Steamfield

Evaluation Criteria	Point of Significance	Impact	Type of Impact	Level of Significance
8.8.1. Will the geysers steamfield component cause loss of individuals or occupied habitat of endangered, threatened, or rare, terrestrial wildlife or plant species?	a. Greater than 0 individuals and b. Greater than 0 acres	None	P	==
8.8.2. Will the geysers steamfield component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 percent of known occurrences or populations in Sonoma and Marin counties	None	P	==
8.8.3. Will the geysers steamfield component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	P	==

Table 4.8-22

Terrestrial Biological Resources Impacts by Component - Geysers Steamfield

Evaluation Criteria	Point of Significance	Impact	Type of Impact	Level of Significance
8.8.4. Will the geysers steamfield component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25 percent of each habitat type in Sonoma and Marin counties	Less than 1%	P	○
8.8.5. Will the geysers steamfield component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres	None	P	==
8.8.6. Will the geysers steamfield component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	P	==
8.8.7. Will the geysers steamfield component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ Greater than 10	None	--	==

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:	1. Type of Impact:	2. Level of Significance:
--	Not Applicable	○ Less than significant impact; no mitigation proposed
P	Permanent	= No impact

Impact: 8.8.1-3, 5, 6, and 7. Will the geysers steamfield component impact terrestrial wildlife or plant species based on evaluation criteria 1-3, 5, 6, and 7?

Analysis: *No Impact; All Alternatives.*

Results of terrestrial habitat assessments, intensive literature review, and coordination with the U.S. Fish and Wildlife Service and the state Department of Fish and Game indicate that the geysers storage tank locations, pipelines, and access roads will be sited and constructed in areas which:

- do not support rare, threatened, or endangered terrestrial wildlife or plant species, or habitat therefore (criterion #1);

- do not support the California Native Plant Society List 2, 3, or, 4 terrestrial plant species (criterion #2);
- will not impact nesting raptors (or timing of the Project will not affect) nesting raptors (criterion #3);
- do not support sensitive plant communities (criterion #5);
- will not block major terrestrial wildlife migration or travel corridors (criterion #6); and
- will not create a potential ecological risk to terrestrial organisms via reclaimed water transfer by pipeline to the geysers steamfield area (criterion #8).

Measure 2.2.5, adopted as part of the Project, to avoid sensitive biological resources along pipelines, pump stations, and electrical systems and establishes procedures for avoidance of construction impacts to terrestrial wildlife or plant species and occupied habitats. Preconstruction surveys will be conducted for sensitive biological resources prior to final Project design. Project siting and design will reflect avoidance of identified resources with an associated exclusionary buffer. Active raptor nests will be avoided or the construction will occur outside the nesting season. Therefore, there is no impact.

Mitigation: No mitigation is needed.

Impact: 8.8.4. Will the geysers steamfield component cause permanent loss of sensitive terrestrial wildlife habitat?

Analysis: *Less than Significant; Alternative 4.*

Re-sizing of the current injection well locations will not result in the loss of any sensitive terrestrial wildlife habitat. Construction of pipelines could result in the temporary loss of sensitive wildlife habitats. All sensitive wildlife habitats are also considered sensitive vegetation communities except mixed chaparral and annual grasslands. Measure 2.2.5 avoids environmentally sensitive vegetative communities along pipelines, pump stations, and electrical systems and establishes procedures for avoidance and minimization of construction impacts to special-status species and habitats. Preconstruction surveys will be conducted for sensitive biological resources prior to final Project design. Project siting and design will reflect avoidance of identified resources with an associated exclusionary buffer. In addition implementation of Measure 2.2.8 will result in the revegetation of pipeline construction scars with native grasses.

Pipelines will be constructed along existing roadways and pipeline alignments. New alignments will be above ground with minimal ground disturbance. Loss of annual grassland and mixed chaparral habitats will be less than one acre.

The designated construction zone for the storage tanks will be designed to allow a minimum 100-foot exclusionary buffer for all sensitive biological resources (including sensitive terrestrial wildlife habitat). Construction of the geysers storage tanks will result in the loss of annual grassland or mixed chaparral. The estimated total acreage of habitat that will be permanently or temporarily lost is less than one acre, based on the size of the storage tanks (each tank is 80 feet in diameter and both tanks combined will occupy an area of approximately 0.25 acres) and assuming a 100-foot construction buffer around these tanks.

Because exclusionary buffers for sensitive biological resources will be incorporated into the final Project design, the permanent loss of sensitive terrestrial wildlife habitats will be minimized. The percent loss of annual grassland and mixed chaparral terrestrial wildlife habitat is minimal (less than three acres) and is substantially less than a 25 percent loss of each habitat type. As a result, the impact will be less than significant.

No Impact; Alternatives 1, 2, 3, and 5.

These alternatives do not have a geysers steamfield component.

Mitigation: No mitigation is proposed.

Discharge Component

Table 4.8-23

Terrestrial Biological Resources Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact ¹	Level of Significance ²
8.9.1. Will the discharge component cause loss of individuals or occupied habitat of endangered, threatened, or rare terrestrial wildlife or plant species?	a. Greater than 0 individuals b. Greater than 0 acres	None	P, O&M	==

Table 4.8-23

Terrestrial Biological Resources Impacts by Component - Discharge

Evaluation Criteria	Point of Significance	Impact	Type of Impact¹	Level of Significance²
8.9.2. Will the discharge component cause loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Greater than 15 percent of known occurrences or populations in Sonoma and Marin counties	None	P, O&M	==
8.9.3. Will the discharge component cause loss of active raptor nest sites?	Greater than 0 active nest sites	None	P, O&M	==
8.9.4. Will the discharge component cause permanent loss of sensitive terrestrial wildlife habitat?	Greater than 25 percent of each habitat type in Sonoma County			
• Russian River		Less than 1%	P	○
• Laguna		None	P, O&M	==
8.9.5. Will the discharge component cause permanent loss of sensitive native terrestrial plant communities?	Greater than 0 acres			
Russian River		.25 acre	P	⊙
Laguna		None	P, O&M	==
8.9.6. Will the discharge component substantially block or disrupt major terrestrial wildlife migration or travel corridors?	Greater than 0 corridors	None	P, O&M	==
8.9.7. Will the discharge component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	EQ greater than 10	EQ less than 8.02	O&M	○

Source: Harland Bartholomew & Associates, Inc., 1996

Notes: 1. Type of Impact:
O&M Operation and Maintenance

P Permanent

2. Level of Significance:
⊙ Significant impact before mitigation; less than significant impact after mitigation
○ Less than significant impact; no mitigation proposed
== No impact

Impact: 8.9.1-3, 6. Will the discharge component impact terrestrial wildlife or plant species based on evaluation criteria 1 through 3, and 6?

Analysis: *No Impact; All Alternatives.*

Results of terrestrial habitat assessments, literature review, and coordination with the U.S. Fish and Wildlife Service and the state Department of Fish and Game indicate that the discharge locations:

- do not support endangered, threatened, or rare terrestrial wildlife or plant species or their habitat (criterion #1);
- do not support the California Native Plant Society List 2, 3, or, 4 terrestrial plant species (criterion #2);
- will not impact nesting raptors (criterion #3); and
- will not block major terrestrial wildlife migration or travel corridors (criterion #6).

Measure 2.2.5 avoids sensitive biological resources and establishes procedures for avoidance of construction impacts to terrestrial wildlife or plant species and occupied habitats. Preconstruction surveys will be conducted for sensitive biological resources prior to final Project design. The designated construction zone for the outfall structure will be designed to allow a minimum 30-foot exclusionary buffer for all sensitive plant species and a minimum 100-foot exclusionary buffer for all other sensitive biological resources. Therefore, no impact to terrestrial wildlife or plant species will occur.

During dry winters, discharge to the Russian River may be restricted by low Russian River flows. During these periodic events, wastewater will be provided to farmers outside the normal irrigation season. Water will only be provided to areas currently under evaluation as a component of Alternatives 2 and 3. Other potential contingency measures may be employed but will have no impact. Emergency conservation will involve voluntary conservation measures and result in no impact to terrestrial resources. Similarly, emergency storage and Russian River discharge will utilize existing facilities and not cause any additional impacts to terrestrial resources.

Mitigation: No mitigation is needed.

Impact: 8.9.4. Will the discharge component permanent loss of sensitive terrestrial wildlife habitat?

Analysis: *Less than Significant; Alternative 5A.*

No special-status terrestrial wildlife species were observed at the site for the discharge outfall structure, but the area supports a well-developed valley foothill riparian woodland directly adjacent to the Russian River. The approximate construction zone boundary associated with this outfall structure is 100 feet by 100 feet (0.25 acres), subsequently, the potential loss of valley foothill riparian habitat will not be greater than 0.25 acres.

The loss of 0.25 acres of valley foothill riparian habitat represents less than a 25 percent loss of this habitat in the region, therefore the impact is less than significant. The loss of this resource is mitigated under Impact 8.9.5.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

Discharge at the Laguna involves no construction.

Mitigation: No mitigation is proposed.

Impact: 8.9.5. Will the discharge component cause permanent loss of sensitive native terrestrial plant communities?

Analysis: *Significant; Alternative 5A.*

A well-developed mixed riparian woodland occurs along the Russian River, at the location for the discharge outfall structure. The approximate construction zone boundary associated with this outfall structure is 100 feet by 100 feet (0.25 acres), subsequently, the potential loss of riparian woodland will not be greater than 0.25 acres.

Partial avoidance of riparian woodland at the outfall structure location may be possible through implementation of Measure 2.2.5 (Avoid Sensitive Biological Resources). Since complete avoidance of riparian habitat loss will not be possible, the impact will be significant.

No Impact; Alternatives 1, 2, 3, 4, and 5B.

Discharge at the Laguna involves no construction.

Mitigation: *Alternative 5A.*

2.3.11 Sensitive Resource Conservation Program

Alternatives 1, 2, 3, 4, and 5B. No mitigation is needed.

After

Mitigation: *Less than Significant after Mitigation; Alternative 5A.*

Loss of riparian habitat will be mitigated by creating new riparian habitat (1 acre created:each acre lost), restoring (1.5 acres restored:each acre lost) or preserving (two acres preserved:each acre lost) riparian habitat of equal function and value.

Impact: 8.9.7. Will the discharge component result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?

Analysis: *Less than Significant; All Alternatives.*

Potential ecological risks were evaluated for a design discharge rate of 20 percent (i.e., highest design discharge rate). In relation to terrestrial biological resources, two transfer pathways were considered for the potential exposure of Russian River and Laguna de Santa Rosa organisms to effluent constituents: water ingestion by wildlife species and exposure by fish consumption by fish-eating birds and mammals (see 4.9-10, Aquatic Biological Resources impacts analysis for discharge for further discussion). EQ for terrestrial exposure to the Russian River discharge ranges from 0.0 to 0.75. EQs for terrestrial exposure to Laguna discharge (in the Laguna) range from 0.0 to 8.02. See Ecological Risk Assessment Report (Parsons Engineering Science, Inc., 1996a) for more details. Ecological quotient values are less than the threshold value of 10 and so the impacts are less than significant.

Mitigation: No mitigation is proposed.

CUMULATIVE IMPACTS

There are six impacts -- either less than significant or significant -- identified in the Terrestrial Biological Resources section:

Impact: 8.2C. Will the Project plus cumulative projects cause loss of individuals of CNPS list 2, 3, or 4 terrestrial plant species?

Analysis: Alternatives 3A and 3E.

The loss of two populations of hayfield tarplant at the Huntley storage site represents 5percent of the known populations in Sonoma and Marin counties and the loss of one population of bristly linanthus represents 10 percent of the known populations in Sonoma and Marin counties. Both are less than the 15 percent point of significance and therefore are considered less than significant.

Loss of four additional populations of hayfield tarplant or one additional population of bristly linanthus from cumulative projects will result in a significant effect. Though it is unknown if the implementation of the projects identified on the cumulative project list will result in the loss of

four additional populations of these species, it is probable. Both are associated with valley foothill grasslands. Valley foothill grasslands are a common habitat in the region and the site of many projects on the cumulative project lists. Therefore cumulative projects are considered to have a significant effect on both species

Mitigation: 2.4.15. Sensitive Plant Relocation Program. Seeds of hayfield tarplant or bristly linanthus populations shall be collected and reestablished in mitigation sites developed as a result of the Sensitive Resource Conservation Plan.

Impact: **8.3C. Will the Project plus cumulative projects cause loss of active raptor nest sites?**

Analysis: Alternative 2 and 3.

Construction and inundation of storage sites may lead to destruction of raptor nests or nest failure, a significant impact. Raptor (hawks, owls, falcons, eagles and vultures) populations have suffered substantial decline over the past century. Many of these species are listed as fully protected or species of special concern by the California Department of Fish and Game and all impacts are considered significant. Project impacts will be fully mitigated through avoidance either through establishment of protective buffers around the nest or modification of construction timing to avoid the nesting season.

Because all impacts from the Project to nesting raptors will be avoided, there are no additive effects to the cumulative projects. No additional mitigation is proposed.

Impact: **8.4C. Will the Project plus cumulative projects cause permanent loss of sensitive terrestrial wildlife habitat?**

Analysis: Alternatives 2, 3, 4, and 5A.

The Project will result in less than significant impacts to sensitive wildlife habitat for all alternatives. Losses exceeding 25 percent of existing habitat in the region (Sonoma and Marin counties) are considered significant for this type impact. Pipelines for all alternatives except Laguna Discharge; all reservoir sites; pump stations for all alternatives except Laguna Discharge; geysers steamfield; and the Russian River discharge outfall will result in a loss of sensitive wildlife habitats (annual grassland, coastal scrub, coastal oak woodland, montane hardwood, valley foothill riparian). Most of these habitats are also considered sensitive plant communities, and all impacts on sensitive plant communities are significant and will be fully mitigated. However, two wildlife habitat types, annual grassland and coastal scrub, are not sensitive plant communities, so loss of these habitats is not fully mitigated.

Losses of annual grassland and coastal scrub occur from pump stations (less than eight acres) and from conversion of habitat to crop production which is less suitable for wildlife habitat. The largest loss of annual grassland will occur with implementation of Alternative 3D (21 percent of the estimated 16,884 acres in Sonoma and Marin counties). The largest loss of coastal scrub will occur with implementation of Alternative 3C (less than 0.01 percent of the estimated 249,820 acres in Sonoma and Marin counties). Mitigation for losses to coastal scrub and annual grassland are not proposed.

Many of the projects identified on the cumulative project list will result in small incremental (but unknown) losses to both annual grassland and coastal scrub. The projects most likely to result in large losses to these habitats are reclamation projects. Additional agricultural irrigation with reclaimed water is planned for Petaluma (2,075 acres), Windsor (745 acres), the Airport (unknown), Camp Meeker (unknown), Forestville (unknown), Graton (unknown), Occidental (unknown), and the Russian River Sanitation District (200-400 acres). Habitat types potentially affected by the cumulative projects are unknown but assumed to be similar to those of the Project. Implementation of these projects in conjunction with the Project will not result in greater than 25 percent loss of coastal scrub (62,455 acres) in the region. Implementation of any of these projects in conjunction with the Project may result in significant losses to the region's annual grassland. Total cumulative loss to the annual grassland of all cumulative projects potentially exceeds 40 percent. This is a significant cumulative impact.

Mitigation: No feasible mitigation has been identified.

Impact: 8.5C. Will the Project plus cumulative projects cause permanent loss of sensitive native terrestrial plant communities?

Analysis: Alternatives 2, 3, and 5A.

Any loss of sensitive native terrestrial plant communities is considered significant in this analysis. All reservoir sites are associated with some loss of sensitive plant communities (oak woodland, riparian woodland, and native grassland). All losses to sensitive native plant communities acreage and functions will be fully mitigated through habitat creation, restoration and preservation.

Though cumulative projects may result in the loss of these communities, there will be no net loss for the Project and therefore the effects of the Project are not additive. No change in significance or mitigation of the Project is proposed.

Impact: 8.7C. Will the Project plus cumulative projects result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?

Analysis: Alternatives 1, 2, 3, and 5.

Exposure at Storage Sites and Irrigation Systems

There are less than significant impacts (EQ less than or equal to 10) associated with the operation of storage sites and irrigation systems (EQ ranging from 0.00 to 0.01).

The list of cumulative projects includes new storage sites for the City of Healdsburg, the City of Petaluma, the Sonoma County Airport, and the City of Santa Rosa for Gallo properties near Cotati (an interim project). Additional acreage to receive wastewater for irrigation is planned for the Petaluma, Windsor, Airport, Camp Meeker, Forestville, Graton and Occidental Treatment Plants and the Russian River Sanitation District. Because the ecological risk assessment at storage reservoirs and agricultural irrigation sites assumed 100 percent exposure to reclaimed water, nearby cumulative projects could not supply additional exposure for terrestrial species. No significant cumulative impacts are identified.

Exposure in the Russian River or the Laguna

Less than significant ecological risk to terrestrial wildlife and plants will occur due to alternatives 2, 3, 4, and 5A scenario result in EQs ranging below 1 (cumulative EQ less than 0.75). Though potential future discharge systems are planned for the Russian River (see Water Quality Section), future dischargers must adhere to a regulatory limit of zero acute and chronic toxicity in their discharge. Adherence to these standards will ensure that water quality of the Russian River will not decrease 13 fold, resulting in EQs greater than 10. Therefore the additive effect of the Project to the cumulative projects is less than significant. No mitigation is proposed.

Discharge for alternatives 1 and 5B via the Laguna de Santa Rosa will result in EQs ranging from 0.00 to 8.02 (great blue heron). Additional discharge from cumulative projects may occur in the Laguna, both in wastewater discharge and stormwater run-off events. It is possible the future water quality of the Laguna may produce significant ecological risk for the great blue heron. This cumulative impact is considered significant. A large portion of the cumulative EQ for the great blue heron is associated with aluminum (EQ=3.2).

Mitigation: 2.4.16. Ecological Risk Monitoring and Source Control Program. A monitoring plan shall be undertaken to collect additional toxicity data (Kelley Ponds, Russian River) over a two-year period. The data shall be used in an ecological risk assessment to determine if the existing system, the Project, and cumulative project discharges will result in an EQ exceeding 10 for great blue heron in the Laguna. If it is determined that the EQ for great blue heron exceeds 10, then the City shall undertake a program to identify the source and reduce the cumulative EQ for aluminum to less than 3.2.

Aluminum in effluent is derived primarily from the addition of alum sulfate to wastewater during treatment to enhance solids removal and disinfection. Options for reducing aluminum in effluent include substituting ferric chloride or an organic polymer during treatment and identifying primary sources (aside from treatment) and implementing a control program.

SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION MEASURES

Table 4.8-24

Summary of Significant Impacts and Mitigation Measures-Terrestrial Biological Resources

Impact	Level of Significance	Mitigation Measure
Storage Reservoir		
8.5.3. Storage reservoir component may cause loss of active raptor nest sites.	Alt 2 - ☉ Alt 3 - ☉	2.4.5. Active Raptor Nest Location and Monitoring Program
8.5.5. Storage reservoir component may cause loss of sensitive native terrestrial plant communities.	Alt 2 - ☉ Alt 3 - ☉	2.3.11. Sensitive Resource Conservation Program
Discharge		
8.9.5. Discharge component may cause permanent loss of sensitive native terrestrial plant communities.	Alt 5A - ☉	2.3.11. Sensitive Resource Conservation Program
Cumulative Impacts		
8.2C. Will the Project plus cumulative projects cause a loss of individuals of CNPS List 2, 3, or 4 terrestrial plant species?	Alt 3A - ☉ Alt 3E - ☉	2.4.15. Sensitive Plant Relocation Program
8.4C. Will the Project plus cumulative projects cause a permanent loss of sensitive terrestrial wildlife habitat?	Alt 2 - ● Alt 3 - ●	No feasible mitigation has been identified.
8.7C. Will the Project plus cumulative projects result in ecological risk to terrestrial plant and wildlife populations (i.e., acute or chronic toxicity and bioaccumulation)?	Alt 1 - ● Alt 5B - ☉	2.4.16. Ecological Risk Monitoring and Source Control Program.

Source: Harland Bartholomew & Associates, Inc., 1996

Notes:	1. Type of Impact: ● Significant impact before and after mitigation	2. Level of Significance: ☉ Significant impact before mitigation; less than significant impact after mitigation
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SUMMARY OF IMPACTS BY ALTERNATIVE

Table 4.8-25

Summary of Impacts by Alternative -Terrestrial Biological Resources

Component	Alt 1	Alt 2A	Alt 2B	Alt 2C	Alt 2D	Alt 3A	Alt 3B	Alt 3C	Alt 3D	Alt 3E	Alt 4	Alt 5A	Alt 5B
No Project Alternative	○	--	--	--	--	--	--	--	--	--	--	--	--
Headworks Expansion	--	==	==	==	==	==	==	==	==	==	==	==	==
Urban Irrigation	--	==	==	==	==	==	==	==	==	==	--	--	--
Pipelines	--	==	==	==	==	==	==	==	==	==	==	==	--
Storage Reservoirs	--	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	--	--	--
Pump Stations	--	○	○	○	○	○	○	○	○	○	○	--	--
Agricultural Irrigation	--	○	○	○	○	○	○	○	○	○	--	--	--
Geysers Steamfield	--	--	--	--	--	--	--	--	--	--	○	--	--
Discharge	--	○	○	○	○	○	○	○	○	○	○	⊙	○
Cumulative	●	●	●	●	●	●	●	●	●	●	==	==	⊙

Source: Harland Bartholomew & Associates, Inc., 1996

- | | | | |
|----|--|----|--|
| -- | Not applicable | == | No impact |
| ○ | Less than significant impact; no mitigation proposed | ● | Significant impact before and after mitigation |
| | | ⊙ | Significant impact; less than significant after mitigation |

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