

4.7 BIOLOGICAL RESOURCES

This section analyzes potential impacts of the project on the existing biological resources found within the various proposed project areas. Discussion of these biological resources and analysis of potential environmental impacts are based on available studies of regional biological resources, recent biological surveys, previous environmental impact reports, field reconnaissance to corroborate results of previous surveys, and project-specific survey efforts. A comprehensive list of special status species potentially occurring in the project vicinities is provided in Table 4.7-1.

4.7.1 REGULATORY FRAMEWORK

FEDERAL ENDANGERED SPECIES ACT

Under the Federal Endangered Species Act (FESA), the Secretary of the Interior and the Secretary of Commerce jointly have the authority to list a species as threatened or endangered (16 USC 1533[c]). Pursuant to the requirements of FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally listed threatened or endangered species may be present in the project area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the agency is required to determine whether the project is likely to jeopardize the continued existence of any species proposed to be listed under FESA or result in the destruction or adverse modification of critical habitat proposed to be designated for such species (16 USC 1536[3], [4]). Therefore, project-related impacts to these species or their habitats would be considered “significant” in this EIR.

The U.S. Fish and Wildlife Service (USFWS) also publishes a list of candidates and other species of concern which receive “special attention” from federal agencies during environmental review, although they are not protected otherwise under FESA. The candidate species are those for which the USFWS or the National Marine Fisheries Service (NMFS) has sufficient biological information to support a proposal to list as endangered or threatened. Project impacts to such species would be considered significant in this EIR.

CALIFORNIA ENDANGERED SPECIES ACT

Under the California Endangered Species Act (CESA), the California Department of Fish and Game (CDFG) has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code 2070). The CDFG also maintains a list of “candidate species,” which are species that the CDFG has formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. The CDFG also maintains lists of “species of special concern” that serve as watch lists. Pursuant to the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species may be present in the project area and determine whether the project will have a potentially significant impact on such species. In addition, the

TABLE 4.7-1
SPECIAL STATUS SPECIES POTENTIALLY IN THE PROJECT VICINITY
 (A list of status codes is provided at the end of this table)

Species	Status USFWS or NMFS/ CDFG/ CNPS	General Habitat	Potential for Occurrence in the Project Vicinity	Associated PG&E Power Plant
Species that are Listed or Proposed for Listing				
Plants				
<i>Erysimum capitatum</i> ssp. <i>angustatum</i> Contra Costa wallflower	FE/CE/1B	Inland dunes along the San Joaquin River	Present. Populations exist adjacent to PG&E transmission tower.	Contra Costa, Pittsburg
<i>Lilaeopsis masonii</i> Mason's lilaepsis	FSC/CR/1B	Riparian scrub, freshwater and brackish marsh, within the tidal zone in muddy or silty soil, dunes	Present. Occurs at picnic area of Contra Costa plant.	Contra Costa, Pittsburg
<i>Cordylanthus mollis</i> ssp. <i>mollis</i> Soft bird's beak	FE/CR/1B	Coastal saltmarsh. Associated with saltgrass, pickleweed, and Mason's lilaepsis	Moderate. Plant occurs in tidal saltmarsh approximately one mile west on PG&E property.	Pittsburg, Contra Costa
<i>Oenothera deltooides</i> ssp. <i>howellii</i> Antioch dunes evening primrose	FE/CE/1B	Interior dunes associated with remnant river bluffs and sand dunes east of Antioch	Present	Contra Costa, Pittsburg
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i> Suisun thistle	FE/--/1B	Saltmarsh. Most often seen near small watercourses within saltmarsh, growing with bulrush, blackberry, and saltgrass.	Moderate to High.	Contra Costa, Pittsburg
<i>Aster lentus</i> Suisun marsh aster	FE/--/1B	Marshes and swamps, brackish and freshwater. Most often seen along sloughs with bulrush, blackberry, and cattail.	Present. Approximately 10 plants observed in 1990 on the Pittsburg Marina breakwater near New York Point.	Contra Costa, Pittsburg
<i>Dichanthelium lanuginosum</i> var. <i>thermale</i> Geysers panicum	FSC/CE/1B	Near hot springs and hydrothermally altered soils	Present. Largest colonies are in Geyser Canyon, near Units 5 and 6, and the Little Geysers, near Unit 18. Smaller populations occur between these two areas within the Big Sulphur Creek drainage.	Geysers
<i>Pentachaeta bellidiflora</i> White-rayed pentachaeta	FE/CE/1B	Valley-foothill grassland on open, dry, rocky slopes and grassy areas. Often found on serpentinite substrate.	Moderate	Potrero,
Birds				
<i>Empidonax Traillii</i> (nesting) Willow flycatcher	--/CE/--	Broad, open river valleys, large mountain meadows, with dense willow thickets necessary for nesting	High	Geysers
<i>Falco peregrinus anatum</i> American peregrine falcon	FE/CE/--	Open grasslands, cliffs	High	Geysers
<i>Strix occidentalis caurina</i> Northern spotted owl	FT/--/--	Dense, old growth, multi-layered mixed conifer, redwood and Douglas-fir habitats with permanent water and snags	Moderate	Geysers
<i>Laterallus jamaicensis coturniculus</i> California black rail	FSC/CT/--	Saline, brackish, and fresh emergent wetland in coastal and estuarine habitats supporting pickleweed, bulrush, and saltgrass	Moderate. Occurs less than 2 miles west at Avon-Port Chicago marsh.	Pittsburg

TABLE 4.7-1 (Continued)
SPECIAL STATUS SPECIES POTENTIALLY IN THE PROJECT VICINITY

Species	Status USFWS or NMFS/ CDFG/ CNPS	General Habitat	Potential for Occurrence in the Project Vicinity	Associated PG&E Power Plant
<u>Species that are Listed or Proposed for Listing (cont.)</u>				
Birds (cont.)				
<i>Rallus longirostris obsoletus</i> California clapper rail	FE/CE/--	Saltmarsh supporting pickleweed, bulrush, and coyote brush	Moderate to High	Pittsburg
<i>Sterna antillarum browni</i> California least tern	FE/CE/--	Feeds in estuaries, nests in adjacent barren or sparsely vegetated sites, usually a sandy or gravelly substrate	Present	Pittsburg
<i>Lanius ludovicianus</i> Loggerhead shrike	FE/CSC/--	Prefers open-canopied valley foothill hardwood, valley foothill riparian. Occurs rarely in urbanized areas, but often found in open cropland	High	Geysers, Pittsburg, Contra Costa
<i>Ardea herodias</i> (rookeries) Great blue heron	--/CR/--	Shallow estuaries and fresh and saline emergent wetlands. Nests colonially in secluded groves of tall trees near feeding areas	Moderate	Pittsburg
Fish				
<i>Oncorhynchus tshawytscha</i> Winter-run Chinook salmon	FE/SE/--	Cool, perennial, streams and estuaries of the Pacific Coast	Present (Pittsburg, Contra Costa). Low (Potrero).	Potrero, Pittsburg, Contra Costa
<i>Oncorhynchus tshawytscha</i> Spring-run Chinook salmon	FPE/SCE/--	Cool, perennial streams and estuaries of the Pacific Coast	Present (Pittsburg, Contra Costa). Low (Potrero).	Potrero, Pittsburg, Contra Costa
<i>Oncorhynchus tshawytscha</i> Central Valley fall-run/late fall-run Chinook salmon	FPT/--/--	Cool, perennial streams and estuaries of the Pacific Coast	Present (Pittsburg, Contra Costa). Low (Potrero).	Potrero, Pittsburg, Contra Costa
<i>Oncorhynchus kisutch</i> Central California Coho salmon	FT/SE*/-- (*south of SF Bay)	Cool, perennial streams and estuaries of Central California	Low. May be extinct from SF Bay (San Francisco Estuary Project, 1997).	Potrero, Pittsburg, Contra Costa
<i>Onchorhynchus mykiss</i> Central California Coast steelhead	FT/--/--	Cool, perennial, coastal streams and estuaries of Central California	Present (Geysers). Low (Potrero).	Potrero, Geysers
<i>Onchorhynchus mykiss</i> Central Valley steelhead	FT/--/--	Cool, perennial streams and estuaries of the Central Valley region of California	Present	Pittsburg, Contra Costa
<i>Hypomesus transpacificus</i> Delta smelt	FT/ST/--	Brackish and freshwater of large channels in the Sacramento-San Joaquin Delta region	Present	Pittsburg, Contra Costa
<i>Pogonichthys macrolepidotus</i> Sacramento splittail	FPT/CSC/--	Backwaters and pools of rivers, lakes in SF Bay-Delta and lower Sacramento River; tolerant of brackish waters	Present	Pittsburg, Contra Costa
Mammals				
<i>Reithrodontomys raviventris</i> Saltmarsh harvest mouse	FE/CE/--	Found only in saline emergent wetlands of San Francisco Bay and its tributaries. Primary habitat is pickleweed.	Moderate. Records exist for saltmarsh approximately 3 miles west.	Pittsburgh

TABLE 4.7-1 (Continued)
SPECIAL STATUS SPECIES POTENTIALLY IN THE PROJECT VICINITY

Species	Status USFWS or NMFS/ CDFG/ CNPS	General Habitat	Potential for Occurrence in the Project Vicinity	Associated PG&E Power Plant
<u>Species that are Listed or Proposed for Listing (cont.)</u>				
Mammals (cont.)				
<i>Taxidea taxus</i> American badger	--/CR/--	Open stages of most shrub, forest, and herbaceous habitats with friable soil	Moderate	Geysers
<u>Species of Special Concern</u>				
Plants				
<i>Grindelia hirsutula maritima</i> San Francisco gumplant	FSC/--/1B	Coastal scrub, coastal bluff scrub, valley-foothill grassland on sandy or serpentine slopes and sea bluffs	Moderate	Potrero,
<i>Blepharizonia plumosa</i> ssp. <i>plumosa</i> Big tarplant	--/--/1B	Valley-foothill grassland, usually seen on dry hills and plains	Low. Site does not provide suitable habitat.	Pittsburg, Contra Costa, Potrero
<i>Limosella subulata</i> Delta mudwort	--/--/2	Riparian scrub, freshwater, and brackish marsh, usually on mud banks. Often seen with Mason's lilaepsis.	Moderate. Several plants observed on the west end of Brown's Island, across New York Slough.	Pittsburg, Contra Costa
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	FSC/--/1B	Freshwater and brackish marshes. Associated with bulrush, cattail, coyotebrush.	High. Hundreds of plants observed at several locations on southwest side of Brown's Island, northeast of Pittsburg plant and on Chipps Island directly north and on Pittsburg Marina breakwater at New York Point.	Pittsburg
<i>Atriplex depressa</i> Brittlescale	--/--/1B	Alkali playas, valley-foothill grassland, vernal pools, especially adjacent to freshwater and saltmarsh	Low	Pittsburg, Contra Costa
<i>Atriplex joaquiniana</i> San Joaquin saltbush	FSC/--/1B	Alkali meadow, valley-foothill grassland. Most often seen in seasonal alkali wetlands or alkali sink scrub.	Low	Contra Costa, Pittsburg
<i>Atriplex cordulata</i> Heartscale	FSC/--/1B	Valley-foothill grassland and meadows, most often in alkaline flats with sandy soils	Low	Contra Costa, Pittsburg
<i>Grindelia hirsutula maritima</i> San Francisco gumplant	FSC/--/1B	Coastal scrub, coastal bluff scrub, valley-foothill grassland on sandy or serpentine slopes and sea bluffs	Moderate	Potrero,
<i>Eriogonum nervulosum</i> Snow Mountain buckwheat	FSC/--/1B	Openings in serpentine chaparral	Present. Four known localities along the Mayacmas ridgeline southeast of Unit 13 and generally south of Unit 16, Lake County.	Geysers

TABLE 4.7-1 (Continued)
SPECIAL STATUS SPECIES POTENTIALLY IN THE PROJECT VICINITY

Species	Status USFWS or NMFS/ CDFG/ CNPS	General Habitat	Potential for Occurrence in the Project Vicinity	Associated PG&E Power Plant
<u>Species of Special Concern (cont.)</u>				
Plants (cont.)				
<i>Lupinus sericatus</i> Cobb Mountain lupine	--/--/1B	Openings in ponderosa pine, mixed chaparral, mixed conifer forest	Present. Occurs in and near Unit 18, on roadcuts along Socrates Mine Road, old clearings or burns. Has been used in revegetation by PG&E.	Geysers
<i>Streptanthus brachiatus</i> ssp. <i>brachiatus</i> Socrates Mine jewelflower	FC/--/1B	Serpentine chaparral	Present. Known from the Socrates Mine, about 0.5 mi. west of Unit 18, and several localities further northwest.	Geysers
<i>Streptanthus morrisonii</i> ssp. <i>kruckebergii</i>	FSC/--/1B	Serpentine chaparral	Present. Known from the extensive serpentinite outcrops along the Mayacmas ridgeline, between Unit 13 and Unit 16 and continuing to the southeast.	Geysers
Birds				
<i>Pandion haliaetus</i> Osprey	--/CSC/--	Mixed conifer through ponderosa pine habitats adjacent to estuaries, lakes, rivers, moderate to large streams. Nests in top-killed conifers, snags, human structures with a clear approach to water.	Present	Geysers
<i>Circus cyaneus</i> Northern harrier	--/CSC/--	Meadows, grasslands, open rangelands. Uses tall grasses, moist or dry shrubs and edges of wetland/field border for nesting, cover and feeding	High. Species observed during surveys for Contra Costa Multipurpose Pipeline (ESA, 1997).	Pittsburg, Contra Costa, Geysers
<i>Aquila chrysaetos</i> Golden eagle	--/CSC/--	Rolling foothills, mountain areas with open slopes and cliffs, and rock outcrops	Moderate	Geysers
<i>Elanus caeruleus</i> White-tailed kite	--/CR/--	Substantial groves of dense, broad-leaved deciduous trees used for nesting and roosting. Open grasslands, meadows, and marshes used for foraging.	High. Species observed during surveys for Contra Costa Multipurpose Pipeline (ESA, 1997).	Pittsburg, Contra Costa, Geysers
<i>Falco mexicanus</i> Prairie falcon	--/CSC/--	Open terrain in perennial grasslands, savannahs, rangelands with canyons, cliffs, rock outcrops.	Moderate	Geysers
<i>Accipter striatus</i> Sharp-shinned hawk	--/CSC/--	Black oak, riparian deciduous, and mixed conifer habitats with little ground cover near water	Moderate	Geysers
<i>Accipter cooperii</i> Cooper's hawk	--/CSC/--	Dense stands of live oak, riparian deciduous, or other forest habitats with snags near water	Moderate	Geysers

TABLE 4.7-1 (Continued)
SPECIAL STATUS SPECIES POTENTIALLY IN THE PROJECT VICINITY

Species	Status USFWS or NMFS/ CDFG/ CNPS	General Habitat	Potential for Occurrence in the Project Vicinity	Associated PG&E Power Plant
<u>Species of Special Concern (cont.)</u>				
Birds (cont.)				
<i>Asio flammeus</i> Short-eared owl	--/CSC/--	Open areas with few trees, such as annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands	Moderate. No records at plant locations. Present on Grizzly Island.	Pittsburg
<i>Agelaius tricolor</i> Tricolored blackbird	FSC/CSC/--	Emergent wetland with tall, dense cattails or tules but also in thickets of willow, blackberry, wild rose, or tall herbs. Forages in grassland and cropland.	Moderate	Pittsburg
<i>Progne subis</i> (nesting) Purple martin	--/CSC/--	Old-growth, multi-layered, open forest and woodland with snags in breeding season. Forages over riparian areas, forest, and woodland.	Present	Geysers
<i>Dendroica petechia</i> Yellow warbler	--/CSC/--	Open to medium-density woodlands and forests with a heavy brush understory in breeding season. Uses riparian deciduous habitats in summer.	Present	Geysers
<i>Icteria virens</i> Yellow-breasted chat	--/CSC/--	Dense, brushy thickets and tangles near water, and thick understory in riparian woodland	Present	Geysers
<i>Geothlypis trichas sinuosa</i> Saltmarsh common yellowthroat	FSC/CSC/--	Freshwater and saltwater marshes. Requires tall grasses, tule patches, willows for nesting.	Moderate. Species is present at the naval weapons station to the west.	Pittsburg, Contra Costa
<i>Melospiza melodia maxillaris</i> Suisun song sparrow	FSC/--/--	Brackish water marshes surrounding Suisun Bay. Known to frequent scrub bordering sloughs.	Moderate. Species is present at the naval weapons station to the west.	Pittsburg, Contra Costa
<i>Phalacrocorax auritus</i> Double-crested cormorant	--/CSC/--	Fresh and salt water and estuaries. Uses offshore rocks, islands, wharves, jetties.	Moderate. Present.	Geysers
Fish				
<i>Spirinchus thaleichthys</i> Longfin smelt	--/CSC/--	Middle or bottom of water column in salt or brackish water portions of estuary. Emergent vegetation and sandy-gravel substrates in freshwater areas necessary for spawning	High	Pittsburg, Contra Costa
<i>Archiplites interruptus</i> Sacramento perch	FSC/CSC/--	Sloughs, slow-moving rivers and lakes of the Central Valley. Emergent vegetation necessary for nurseries.	High. Species occurs within a half mile.	Contra Costa, Pittsburg.

TABLE 4.7-1 (Continued)
SPECIAL STATUS SPECIES POTENTIALLY IN THE PROJECT VICINITY

Species	Status USFWS or NMFS/ CDFG/ CNPS	General Habitat	Potential for Occurrence in the Project Vicinity	Associated PG&E Power Plant
<u>Species of Special Concern (cont.)</u>				
Fish (cont.)				
<i>Acipenser medirostris</i> Green sturgeon	FSC/CSC/--	Estuaries, lower reaches of rivers; salt or brackish water along northern Pacific Coast south to Central California.	Present	Pittsburg, Contra Costa
Reptiles and Amphibians				
<i>Clemmys marmorata</i> Western pond turtle	FSC/CSC/--	Perennial streams or ponds with emergent vegetation and adjacent, unshaded banks	Present at Geysers. Moderate elsewhere.	Geysers, Pittsburg
<i>Rana boylei</i> Foothill yellow-legged frog	FSC/CSC/--	Shallow water in small to moderate drainages with cobble substrate	Present	Geysers
<i>Ambystoma californiense</i> California tiger salamander	FSC/CSC/--	Ponds and slow-moving streams adjacent to grassland with fossorial mammals	Moderate	Pittsburg, Contra Costa
Mammals				
<i>Perognathus inornatus inornatus</i> San Joaquin pocket mouse	FSC/--/--	Grasslands and blue oak savannahs with friable soil	Low. No suitable habitat exists on site.	Pittsburg, Contra Costa
<i>Myotis yumanensis</i> Yuma myotis	FSC/--/--	Open forests and woodland. Buildings, mines, caves, or crevices. Also abandoned swallow nests and under bridges.	High	Geysers
<i>Myotis evotis</i> Long-eared myotis	FSC/--/--	Brush, woodland, and forest habitats, roosting in buildings, crevices, spaces under bark, and snags	High	Geysers
<i>Myotis thysanodes</i> Fringed myotis	FSC/--/--	Roosts in buildings, caves, mines, or crevices. Valley-foothill hardwood and hardwood-conifer, using open habitats and early successional stages.	High	Geysers
<i>Myotis volans</i> Long-legged myotis	FSC/--/--	Roosts in rock crevices, buildings, under tree bark, in snags, mines, and caves. Woodland and forest habitats.	High	Geysers
<i>Antrozous pallidus</i> Pallid bat	--/CSC/--	Grasslands, shrublands, woodlands, and forests, roosting in caves, crevices, mines, hollow trees, and buildings	High	Geysers
<i>Plecotus townsendii townsendii</i> Pacific western big-eared bat	FSC/CSC/--	Caves, mines, tunnels, or buildings in all mesic habitats	Moderate	Geysers
<i>Eumops perotis californicus</i> Greater western mastiff bat	FSC/CSC/--	Crevices in cliff faces, high buildings, trees, and tunnels	Moderate	Geysers

TABLE 4.7-1 (Continued)
SPECIAL STATUS SPECIES POTENTIALLY IN THE PROJECT VICINITY

STATUS CODES:

FEDERAL:

- FE = Listed as Endangered by the Federal Government
- FT = Listed as Threatened by the Federal Government
- FPE = Proposed for listing as Endangered by the Federal Government
- FPT = Proposed for listing as Endangered by the Federal Government
- FC = Candidate for Federal listing (taxa for which the U.S. Fish and Wildlife Service or National Marine Fisheries Service has sufficient biological information to support a proposal to list as Endangered or Threatened)
- FSS = Former Category 2 candidates for Federal listing, now unofficially referred to as federal sensitive species

STATE:

- CE = Listed as Endangered by the State of California
- CT = Listed as Threatened by the State of California
- CR = Listed as Rare by the State of California
- CSC = Species of special concern

California Native Plant Society (CNPS):

- List 1A = Plants presumed extinct in California
- List 1B = Plants are rare and endangered in California
- List 2 = Plants endangered in California, but more common elsewhere
- List 3 = Plants about which more information needed
- List 4 = Plants of limited distribution (a watch list)

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SOURCE: Environmental Science Associates Inc., 1998; CNDDDB, 1998, USFWS, 1997.

Not included are the following CNPS List 4 species (Plants of Limited Distribution) that are known to occur in the Geysers: *Antirrhinum virga*, *Asclepias solanoana*, *Calyptidium quadripetalum*, *Cordylanthus tenuis ssp. brunneus*, possibly *Pityopus californicus*.

CDFG encourages informal consultation on any proposed project that may impact a candidate species. Project-related impacts to species on the CESA endangered and threatened lists would be considered significant in this EIR. Impacts to species of special concern would be considered significant under certain circumstances.

THE CLEAN WATER ACT

The regulations and policies of various federal agencies (e.g., the U.S. Army Corps of Engineers [Corps], U.S. Department of Agricultural Natural Resource Conservation Service [NRCS], U.S. Environmental Protection Agency [EPA], USFWS, and NMFS) mandate that the filling of wetlands be avoided unless it can be demonstrated that no practicable alternatives to filling such wetlands exist. The Corps has primary federal responsibility for administering regulations that concern waters and wetlands within the project site. In this regard, the Corps acts under one statutory authority, the Clean Water Act (Section 404), which governs specified activities in “waters of the United States,” including wetlands. The Corps requires that a permit be obtained if a project would place structures within navigable waters and/or alteration of waters of the United States below the ordinary high-water mark in nontidal waters.

The state's authority to regulate activities in wetlands and waters at the site resides primarily with the CDFG and the appropriate RWQCB. The CDFG provides comment on Corps permit actions under the Fish and Wildlife Coordination Act. CDFG is also authorized under the state Fish and Game Code, Sections 1600-1607 to develop mitigation measures and enter into a Streambed Alteration Agreement (SAA) with applicants that propose a project that would obstruct the flow or alter the bed, channel, or bank of a river or stream (including intermittent and ephemeral streams) in which there is a fish or wildlife resource. The appropriate RWQCB must certify that a Corps permit action meets state water quality objectives (Section 401, Clean Water Act).

The NPDES permits issued by the San Francisco Bay and Central Valley RWQCBs for the four Bay Area PG&E power plants required that studies be conducted to evaluate the potential adverse effects of the cooling water thermal discharge on the fish and invertebrate populations inhabiting the Bay-Delta Estuary (under Section 316(a) of the Clean Water Act), and to determine whether the location, design, construction, and capacity of the cooling water intake structures reflect the BTA for minimizing adverse environmental impacts, in compliance with Section 316(b) of the Clean Water Act.

CEQA GUIDELINES

CEQA Guidelines Section 15206 specifies that a project shall be deemed to be of statewide, regional, or areawide significance if it would substantially affect sensitive wildlife habitats including, but not limited to, riparian lands, wetlands, bays, estuaries, marshes, and habitats for rare and endangered species as defined by Fish and Game Code Section 903.

Although threatened and endangered species are protected by specific federal and state statutes, CEQA Guidelines Section 15380(b) provides that a species not listed on the federal or state list of protected species may be considered rare or endangered if the species can be shown to meet certain specified criteria. These criteria have been modeled after the definition in FESA and the section of the California Fish and Game Code dealing with rare or endangered plants or animals. This section was included in the Guidelines primarily to deal with situations in which a public agency is reviewing a project that may have a significant effect on, for example, a "candidate species" that has not yet been listed by the USFWS, NMFS, or CDFG. Thus, CEQA provides an agency with the ability to protect a species from a project's potential impacts until the respective government agencies have an opportunity to designate the species as protected, if warranted.

OTHER STATUTES, CODES, AND POLICIES AFFORDING LIMITED SPECIES PROTECTION

The federal Migratory Bird Treaty Act (16 USC, Section 703, Supp. I, 1989) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs. Birds of prey are protected in California under the state Fish and Game Code, Section 3503.5, which states that it is "unlawful to take, possess, or destroy any birds in the order Falconiformes or Strigiformes (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant

thereto.” Construction disturbance during the breeding season could result in the incidental loss of fertile eggs or nestlings, or otherwise lead to nest abandonment. Disturbance that causes nest abandonment and/or loss of reproductive effort is considered “taking” by the CDFG. Any loss of fertile eggs, nesting raptors, or any activities resulting in nest abandonment would constitute a significant impact. This approach would apply to red-tailed hawks, American kestrels, owls, and other birds of prey.

The federal Bald Eagle Protection Act prohibits persons within the United States (or places subject to U.S. jurisdiction) from “possessing, selling, purchasing, offering to sell, transporting, exporting or importing any bald eagle or any golden eagle, alive or dead, or any part, nest, or egg thereof.”

Vascular plants listed as rare or endangered by the California Native Plant Society (CNPS) (Skinner and Pavlik, 1995), but which have no designated status or protection under federal or state endangered species legislation, are defined as follows:

- List 1A Plants Believed Extinct.
- List 1B Plants Rare, Threatened, or Endangered in California and elsewhere.
- List 2 Plants Rare, Threatened, or Endangered in California, but more numerous elsewhere.
- List 3 Plants About Which We Need More Information - A Review List.
- List 4 Plants of Limited Distribution - A Watch List.

In general, plants appearing on CNPS List 1 or 2 are considered to meet CEQA’s Section 15380 criteria, and effects to these species are considered significant.

LOCAL PLANS AND POLICIES

CEQA Guidelines specify that a project will normally have a significant impact on the environment if it would physically impact communities or species protected by adopted environmental plans and goals of the community(ies) where it is located. Relevant local standards are summarized below.

Potrero Power Plant

San Francisco City and County General Plan (City and County of San Francisco, 1973)

Objective 3: Maintain and improve the quality of the Bay, ocean, and shoreline areas.

Objective 8: Ensure the protection of plant and animal life in the City.

Policy 1: Cooperate with and otherwise support the California Department of Fish and Game and its animal protection programs.

Policy 2: Protect the habitats of known plant and animal species that require a relatively natural environment.

Policy 3: Protect rare and endangered species.

Policy 13: Preserve and protect significant natural resource areas.

Pittsburg and Contra Costa Power Plants

Contra Costa County General Plan (Contra Costa County, 1996)

Goal 8-D: To protect ecologically significant lands, wetlands, plant, and wildlife habitats.

Goal 8-E: To protect rare, threatened, and endangered species of fish, wildlife and plants, significant plant communities, and other resources which stand out as unique because of their scarcity, scientific value, aesthetic quality, or cultural significance. Attempts to achieve a significant net increase in wetland values and functions within the County over the life of the General Plan. The definition of rare, threatened, and endangered includes those definitions provided by the Federal Endangered Species Act, the California Endangered Species Act, the California Native Plant Protection Act, and the California Environmental Quality Act.

Goal 8-F: To encourage the preservation and restoration of the natural characteristics of the San Francisco Bay-Delta Estuary and adjacent lands, and recognize the role of Bay vegetation and water area in maintaining favorable climate, air and water quality, and fisheries and migratory waterfowl.

Geysers Power Plant

Lake County General Plan, Plant and Animal Resources Section (Lake County, 1981)

Policy 1.2: The County should consider the environmentally sensitive areas ... as areas of natural significance and limit the encroachment of development into these areas when possible.

Policy 1.4: When planning any development or alteration of a site with identified wildlife or plant life habitat, considerations should be given to ways of protecting the habitat.

Sonoma County General Plan (Sonoma County, 1989)

Goal RC-5: Promote and maintain the County's diverse plant and animal communities and protect biotic resources from development activities.

Goal RC-6: Identify and protect rare and endangered plants and animals.

Goal RC-8: Encourage effective management of freshwater fishery resources and balance competing agricultural, development, and mining needs with the protection of the stream environment.

Objective RC-8.1: Identify sources of sediment and erosion and minimize their impacts on local water courses.

Objective RC-8.2: Manage riparian corridors along streams to provide protection for fish habitat.

4.7.2 REGIONAL SETTING

POTRERO, CONTRA COSTA, AND PITTSBURG POWER PLANTS

These three power plants are located adjacent to San Francisco Bay (Potrero) and the Sacramento-San Joaquin Delta (Pittsburg and Contra Costa) within the regional area known as the Bay-Delta Estuary, the largest estuarine ecosystem in California. The historic natural environment of the Bay Area has been significantly altered in the last 150 years. Most of the shoreline and surrounding upland areas have converted to urban or agricultural uses. The remaining areas of natural vegetation are scattered and only rarely found as large continuous blocks. This loss of habitat has been accompanied by the elimination of many wildlife species and the reduction in numbers of many other species in the Bay Area.

The following sections summarize the plant and wildlife species typically found in San Francisco Bay habitats.

Terrestrial Habitats

Although the terrestrial habitats around San Francisco Bay are now predominantly urbanized, open space areas supporting both native and introduced vegetation and wildlife still exist in city, county, regional, and state parks as well as along portions of the Bay shoreline. The urban areas, many of them heavily landscaped, support a limited variety of birds and mammals, such as pigeons, starlings, house sparrows, mourning doves, Norwegian rats, and house mice.

Larger open space areas contain grassland, scrub, and woodland habitats that support a greater variety of plants and wildlife. Grassland and scrub habitats attract reptiles and amphibians such as western fence lizard (*Sceloporus occidentalis*) and Pacific slender salamander (*Batrachoseps attenuatus*), which feed on invertebrates found within and underneath fallen logs and on debris within the community. California quail (*Callipepla californica*), mourning dove (*Zenaidura macroura*), savanna sparrow (*Passerculus sandwichensis*), western kingbird (*Tyrannus verticalis*), and meadowlarks (*Sturnella neglecta*) are a few seed-eaters that nest in grasslands. Insect-eaters such as scrub jays (*Aphelocoma coerulescens*), barn swallows (*Hirundo rustica*), mockingbirds (*Mimus polyglottus*), *Myotis* bat species, and pallid bats (*Antrozous pallidus*) use the habitat for foraging.

The scrub component of this association supports several important food plants including sage, California blackberry, poison oak, and various grass species, which in turn support a variety of wildlife. Mammals such as California vole (*Microtus californicus*), Botta's pocket gopher (*Thomomys bottae*), western harvest mouse (*Reithrodontomys megalotis*), deer mouse

(*Peromyscus maniculatus*), broad-footed mole (*Scapanus latimanus*), California ground squirrel (*Spermophilus beecheyi*), badger (*Taxidea taxus*), and black-tailed jackrabbit (*Lepus californicus*) forage and breed within this community. Small rodents attract raptors (birds of prey) including red-tailed hawks (*Buteo jamaicensis*), black-shouldered kite (*Elanus caeruleus*), red-shouldered hawk (*Buteo lineatus*), barn owl (*Tyto alba*), northern harrier (*Circus cyaneus*), turkey vulture (*Cathartes aura*), rough-legged hawk (*Buteo lagopus*), American kestrel (*Falco sparverius*), and merlin (*Falco columbarius*).

Tidal Wetlands

Less than 5 percent of the original tidal wetlands of the region now remains (Josselyn, 1983). Tidal action is a major influence on these wetlands, determining the distribution of plant and animal life. These areas contain highly productive, herbaceous and woody, salt-tolerant, water-adapted plants (hydrophytes) that form a dense cover up to 3 feet in height. The distribution of these species is determined by the land elevation relative to the tidal flows. Dominant plant species in tidal saltmarshes are pickleweed (*Salicornia virginica*) and Pacific cordgrass (*Spartina foliosa*), which frequently form monotypic stands. Other characteristic species include brassbuttons (*Cotula coronopifolia*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), alkali heath (*Frankenia grandiflora*), gumweed (*Grindelia stricta* var. *angustifolia*), salt grass (*Distichlis spicata*), California sea-lavender (*Limonium californicum*), Pursh's seablite (*Suaeda depressa*), Douglas baccharis (*Baccharis douglasii*), and fat hen (*Atriplex triangularis*).

Tidal saltmarsh and associated coyote bush (*Baccharis pilularis*) scrub provide cover for western harvest mouse (*Reithrodontomys megalotis*) and California vole (*Microtus californicus*), with drier upland areas occupied by deer mouse (*Peromyscus maniculatus*), raccoon (*Procyon lotor*), and striped skunk (*Mephitis mephitis*). Two federally listed endangered animal species, the saltmarsh harvest mouse (*Reithrodontomys raviventris*) and the California clapper rail (*Rallus longirostris obsoletus*), as well as the state-listed threatened California black rail (*Rallus longirostris levipes*), inhabit these tidal marshes.

Mudflats

Mudflats, or intertidal flats, separate tidal marshes from the open waters of the Bay. Mudflats do not support vascular plants but contain substantial surface and subsurface algal growths and diverse invertebrate fauna consisting of worms, mollusks, and arthropods. Species composition fluctuates with season, freshwater influence, tides, wave action, and a number of other biotic and abiotic factors. These organisms provide an important food source for large numbers of shorebirds. San Francisco Bay remains one of the most important stopovers on the Pacific Flyway for migrating shorebirds. Dominant species in a recent survey (San Francisco Estuary Project, 1997) included American avocet (*Recurvirostra americana*), willet (*Catoptrophorus semipalmatus*), black-bellied plover (*Pluvialis squatarola*), and marbled godwit (*Limosa fedoa*).

Open Water

The open water habitat of the Bay is used by harbor seals (*Phoca vitulina*) and piscivorous birds such as double-crested cormorant (*Phalacrocorax auritus*), western grebe (*Aechmophorus occidentalis*), common loon (*Gavia immer*), and Forster's tern (*Sterna forsteri*), as well as the federally listed endangered California least tern (*Sterna antillarum browni*) and California brown pelican (*Pelecanus occidentalis californicus*).

The Bay-Delta Estuary provides habitat for a wide variety of resident and migratory fish and invertebrates. Approximately 100 fish species are known to occur within San Francisco Bay (Moyle, 1976). Many of these aquatic species support commercial or recreational fisheries within the Bay-Delta and adjacent nearshore Pacific coastal waters. The composition and geographic distribution of aquatic species within the Bay-Delta Estuary are influenced by a variety of environmental factors, such as salinity gradients. Salinity within the estuary reflects the balance of saltwater intrusion from Pacific coastal waters through the Golden Gate into San Francisco Bay and freshwater inflow from the Sacramento and San Joaquin River systems. The aquatic community in the general vicinity of the Potrero Power Plant is typical of that expected from a marine environment, whereas the aquatic community further upstream in the vicinity of the Pittsburg and Contra Costa Power Plants is typical of freshwater or low-salinity habitats.

GEYSERS POWER PLANT

These units are located in the Geysers Known Geothermal Resource Area (KGRA) of the Mayacmas Mountains, approximately 27 miles northeast of Healdsburg, California. Twelve units of the plant are situated in Sonoma County and two units are in Lake County. This region has a Mediterranean climate. Compared to the coast of California, the Geysers area has colder winters and hotter summers, with rainfall typically concentrated during the winter and early spring months. Big Sulphur Creek, a tributary to the Russian River, is the primary watershed drainage in the project area. Squaw Creek and Little Sulphur Creek are the major tributaries to Big Sulphur Creek, located in the vicinity of the Geysers plant. The two Lake County units are within the Putah Creek watershed, which drains into Lake Berryessa, Napa County.

Other than geothermal development over the past 30 years, the Geysers KGRA is only lightly developed, primarily due to the large leaseholds required for steam field operation. Natural habitats for native flora and fauna are extensive, and resident and migratory wildlife are largely undisturbed.

The Mayacmas Mountains support a complex mosaic of vegetation types arranged in response to soil type, slope, elevation, precipitation, and exposure. Several of the most abundant vegetation types are described below. Since many of the descriptions and mapping in the Geysers were developed in the late 1970s and 1980s, mapping units were as per Holland (1986) or Cheatham and Haller (1975). In the paragraphs that follow, the equivalent vegetation series according to the more recent nomenclature developed by Sawyer and Keeler-Wolf (1995) are also mentioned.

Typical wildlife species known or expected to occur within these vegetation series according to the California Department of Fish and Game (CDFG)'s Wildlife Habitat Relationships (WHR) System (Mayer and Laudenslayer, 1988) are also discussed.

Non-native Annual Grassland

Non-native annual grassland consists of a dense to sparse cover of annual grasses associated with a variety of broadleaf herbs and perennial grasses. The most abundant species are generally non-native annual grasses in the genera *Bromus*, *Avena*, *Lolium*, and *Vulpia*. Common broadleaf species are quite variable, but often include the genera *Erodium*, *Centaurea*, *Lupinus*, *Lepidium*, *Castilleja*, and *Eschscholzia*. In addition to considerable site-to-site variation that is largely based on soils and management practices, there is also much year-to-year variation in species composition in response to the timing and amount of precipitation. The non-native annual grassland natural community is equivalent to the California annual grassland series in Sawyer and Keeler-Wolf (1995).

Annual grasslands are utilized by a wide variety of wildlife. Reptile species typically found in this area include western fence lizard, common garter snake, and western rattlesnake. Mammals within this habitat include black-tailed jackrabbit, California ground squirrel, western harvest mouse, California vole, and coyote. The principal game species in the project area are deer, California quail, and mourning dove. The state-protected mountain lion (*Felis concolor*) is also found in and adjacent to this habitat (Mayer and Laudenslayer, 1988). Common birds known to breed in this habitat include the California horned lark, a species of special concern in California (CSC). Typical foraging birds include the turkey vulture, northern harrier, American kestrel, black-shouldered kite, and prairie falcon (a CSC).

Non-native grassland is common at lower elevations in the Geysers, especially on the south-facing slopes in the Big Sulphur Creek drainage on clay soils.

Northern Mixed Chaparral

Often referred to in environmental documents simply as mixed chaparral, this natural community consists of a dense, closed-canopy stand of shrubs belonging to several genera—oaks (*Quercus*), chamise (*Adenostoma*), ceanothus (*Ceanothus*), toyon (*Heteromeles*), mountain-mahogany (*Cercocarpus*), poison-oak (*Toxicodendron*), and manzanita (*Arctostaphylos*). At the Geysers, this community is typically found on rocky soils and exposed sites, often on ridgelines. It may occur on either north-facing or south-facing slopes at low elevations, usually in less exposed sites than chamise chaparral. This natural community is equivalent to several series in Sawyer and Keeler-Wolf (1995): scrub oak–birchleaf mountain mahogany series, scrub oak–chamise series, mixed scrub oak series, and interior live oak–scrub oak series.

Chaparral habitat contains wildlife species that are attracted to the edges of other communities, such as grassland or oak forest, for foraging and nesting. These types of species include mountain quail, in the higher elevations, and California quail, California thrasher, mourning dove, and rufous-sided towhee, all of which forage among the leaf litter for invertebrates. Avian

species that use the canopy of the chaparral for catching insects include ash-throated flycatcher and wren-tit. Besides insects, flowers of the manzanita and ceanothus attract nectar drinkers such as Anna's hummingbird. If cliffs are nearby, prairie falcons will use chaparral for foraging grounds, as will sharp-shinned hawks. Mammals use this habitat for protection and foraging grounds, feeding off new shoots of plants. Such mammals include brush rabbits, gophers, and deer mice. Small mammals attract predators such as long-tailed weasel, grey fox, red fox, and bobcat.

Northern mixed chaparral is found extensively in the Mayacmas Mountains, on ridges both east and west of Big Sulphur Creek, as well as on the slopes of Cobb Mountain on the Lake County side of the ridgeline. Northern mixed chaparral occurs near Geysers Units 7, 8, 9, 10, 11 and 17.

Chamise Chaparral

This natural community is strongly dominated by a single shrub species, chamise (*Adenostoma fasciculatum*). It typically occurs on very rocky sites with little soil development, often on south-facing slopes. It also may be associated with areas that experience frequent fire. This natural community is described as the chamise series in Sawyer and Keeler-Wolf (1995).

Birds that nest and forage in this habitat include California quail, brown towhee, and Oregon junco. Chamise chaparral does not offer much foraging or cover habitat for larger mammals. However, smaller mammals such as brush rabbits and woodrats use this habitat for cover and foraging. Reptiles that would be attracted to this habitat include western fence lizard, horned lizard, alligator lizard, and western rattlesnake.

Chamise chaparral is found on south-facing slopes in the Big Sulphur Creek drainage and in Lake County, near Units 7, 8, 9, 10 and 16.

Serpentine Chaparral

This natural community is closely associated with outcroppings of serpentinite, a metamorphic rock with infertile soils resulting from high proportions of magnesium and low proportions of calcium, nitrogen, potassium, and phosphorus. The plants found in serpentine chaparral are adapted to these unusual mineral conditions. Serpentine chaparral usually consists of a relatively open canopy of leather oak (*Quercus durata*), yerba santa (*Eriodictyon californicum*), and toyon (*Heteromeles arbutifolia*), with occasional gray pine (*Pinus sabiniana*) or Sargent cypress (*Cupressus macnabiana*). The serpentine chaparral community is equivalent to Sawyer and Keeler-Wolf's (1995) leather oak series.

Wildlife species found in this habitat are similar to the mixed chaparral and chamise chaparral series discussed above.

Serpentine chaparral is not closely associated with any of the power plant sites, but is found on the Mayacmas ridgeline in several areas, most extensively between Unit 13 and Unit 16.

Oak Savanna and Woodland

Oak savanna and woodland are found on deep, well-developed soils at the lower elevations at the Geysers. In drier sites, they are associated with ephemeral drainages; in less exposed or higher-rainfall sites, it covers larger expanses of the hillsides, and tree density becomes greater. Oak savanna and woodland consist of varying densities of oaks, including blue oak (*Quercus douglasii*), valley oak (*Q. lobata*), Oregon oak (*Q. garryana*), black oak (*Q. kelloggii*), and interior live oak (*Q. wislizenii*). The understory is variable, but tends to increase with increasing tree cover. Typical species include buckeye (*Aesculus californica*), madrone (*Arbutus menziesii*), poison-oak, and hoary manzanita (*Arctostaphylos canescens*). Equivalent series in Sawyer and Keeler-Wolf (1995) are: blue oak series, valley oak series, and Oregon oak series.

This habitat supports many edge species, that is, species that use two habitats adjacent to each other for different purposes. Often these species will nest or hide in one habitat and forage in another. Mammals such as fox squirrel and deer feed off acorns and new leaf shoots, while others such as red fox, bobcat, and short-tailed weasels, feed off small mammals and ground-dwelling birds. Amphibians and reptiles occurring underneath leaf litter and fallen logs include California slender salamander, ringneck snake, common kingsnake, and gopher snake. Purple martin (*Progne subis*), a special status species, is known to nest in this habitat at the Geysers.

Oak savanna and woodland are found at the Geysers at lower elevations (near Units 3, 4, 5, and 6), and primarily in the Big Sulphur Creek watershed.

Mixed Evergreen Forest

This natural community consists of a generally closed-canopy forest of medium-height trees. Typical species include Douglas-fir (*Pseudotsuga menziesii*), canyon live oak (*Quercus chrysolepis*), California nutmeg (*Torreya californica*), California bay (*Umbellularia californica*), bigleaf maple (*Acer macrophyllum*), and madrone. Shrubby understory species include scrub oak (*Quercus berberidifolia*=*Q. dumosa*) and poison oak. This natural community is equivalent to several series in Sawyer and Keeler-Wolf (1995): Douglas-fir series, mixed oak series, and mixed conifer series.

Avian species in this habitat include evening grosbeak, Clark's nutcracker, northern flicker, yellow-rumped warbler, ruby-crowned kinglet, woodpeckers, Steller's jay and Bewick's wren. Mammals in this habitat include Douglas' squirrel and short-tailed weasel, both occurring in the upper branches of conifers and hunting for nuts and birds eggs, respectively. Ground dwellers include mule deer, which move through a variety of habitats feeding on twigs and needles during the winter. Striped skunk and spotted skunk also occur in this and other habitats, feeding on insect larvae and competing with black bear for berries and other fruits. Special status species for in this habitat include long-eared owl, Coopers hawk, and sharp-shinned hawk. Mixed evergreen forest occurs on north slopes and canyon bottoms throughout the project area.

Knobcone Pine Forest

Knobcone pine (*Pinus attenuata*) forms single-species, even-age stands. It is a fire-associated type, since heat from wildfires kills the stand but releases seeds from the closed cones. Knobcone pine forest is often found on sites with some serpentinite influence, but is not exclusive to serpentine soils. The knobcone pine forest community is equivalent to the Knobcone pine series in Sawyer and Keeler-Wolf (1995).

Numerous game species, including tree squirrels and band-tailed pigeons, as well as non-game species, utilize this habitat for feeding and cover. Few species other than great horned owls and red-tailed hawks breed in knobcone pine forests. In the project area, this habitat is patchy in distribution on dry, rocky soils.

Riparian

This natural community is associated with more or less permanent water in the major drainages within the Geysers area. Plant species found in this type include white alder (*Alnus rhombifolia*), cottonwood (*Populus fremontii*), willows (*Salix laevigata*, *S. lasiandra*), grape (*Vitis californica*), and certain herbaceous genera such as horsetails (*Equisetum arvense*), rushes (*Juncus* spp.), and sedges (*Carex* spp.).

Riparian habitat attracts bird species that hover while catching insects, such as warbling vireo and black phoebe. The American crow is found in this habitat, as well as others, feeding on insects, fruits, carrion, amphibians, and reptiles. Predators such as sharp-shinned hawks and red-shouldered hawks nest in the high canopy and feed on the smaller birds and amphibians. Omnivores such as raccoon and striped skunk forage on invertebrate species, plant parts, amphibians, and fruits. Special status species potentially found in this habitat are yellow-breasted chat (*Icteria virens*), purple martin (*Pogon subis*), western pond turtle (*Clemmys marmorata*), foothill yellow-legged frog (*Rana boylei*), and California tiger salamander (*Ambystoma californiense*) (ESA, 1994).

Well-developed riparian vegetation is found primarily along Big Sulphur Creek within the developed portion of the Geysers. Along ephemeral drainages, mixed evergreen forest comprises the riparian forest.

Ponderosa Pine Forest

Coast Range ponderosa pine forest is found at the higher elevations of the Mayacmas Mountains, on well-developed neutral soils. The dominant tree species is ponderosa pine (*Pinus ponderosa*), but other species may be present, including black oak (*Quercus kelloggii*), Douglas-fir, and other representatives of mixed evergreen forest.

Ponderosa pine habitat sometimes serves as a migratory route and feeding ground for deer. Two bird species of special concern, the sharp-shinned hawk (*Accipiter striatus*) and purple martin (*Progne subis*), also use this habitat on occasion (ESA, 1994).

An example of ponderosa pine forest may be found within the Unit 18 leasehold, but is more extensive on the higher slopes of Cobb Mountain.

4.7.3 LOCAL SETTING

POTRERO POWER PLANT

The Potrero plant is located within the City of San Francisco, along the shoreline of Central San Francisco Bay. The Potrero Power Plant is located south of Central Basin and north of Warm Water Cove within the industrialized part of San Francisco, which generally contains very limited terrestrial biological resources.

The power plant withdraws water from the western edge of San Francisco Bay for once-through cooling. After passing through the cooling water system, the water is discharged back into San Francisco Bay. Aquatic habitats in the vicinity of the intake and discharge structures are characteristic of a marine inshore environment. The area is typically shallow, having a mud and sand bottom, with scattered hard substrate (e.g., rock, concrete, pilings, etc.) occurring both within intertidal and subtidal areas.

Vegetation

The power plant lacks any substantial on-site vegetation. The perimeter of the Potrero Power Plant adjacent to the shoreline contains a narrow band of weedy species such as wild fennel (*Foeniculum vulgare*). No special status plant species were observed at either site.

Wildlife

Wildlife species on the power plant property are expected to be limited to house mice, Norwegian rats, and feral cats. The intertidal and pelagic zones adjacent to the plant contain numerous shorebirds and waterfowl typically found in San Francisco Bay.

Aquatic Resources

During cooling water intake studies conducted at the power plant in 1978-79 (PG&E, 1980), 53 species of fish were sampled at Potrero Power Plant. Northern anchovy was the most abundant species observed. Other species collected included Pacific herring, midshipman, surf perch, surf smelt, and white croaker. The dominant larval and juvenile fish entrained were Pacific herring and several species of gobies. Entrained invertebrates included copepods, barnacle larvae, amphipods, and other zooplankton. A similar assemblage of fish and invertebrates was observed in the local area adjacent to the power plant during investigations of the thermal discharge plume conducted during 1989-90 (Tenera, 1991). Observations during these studies demonstrated extensive spawning activity in the vicinity of the power plant by both Pacific herring and northern anchovy.

Pacific herring (*Clupea harengus*) supports the Bay's largest remaining commercial fishery (San Francisco Estuary Project, 1997). Herring in San Francisco Bay spawn primarily during the months of December through March. Eggs are deposited on a variety of substrates, including eel grass, seaweed, rocks, pilings, and sandy beaches. Large numbers of larvae have been observed in the vicinity of Hunters Point (Wang, 1986) and Candlestick Point (Watters, 1998). Because of their commercial importance, Pacific herring populations and spawning success are closely monitored by the CDFG.

San Francisco Bay also serves as a major migratory corridor for several species listed, or proposed to be listed, for protection under the state and federal Endangered Species Acts, including winter-run, spring-run, and fall-run/late fall-run Chinook salmon, coho salmon, and steelhead. Both salmon and steelhead were rare in fisheries collections conducted at the power plant (PG&E, 1980; Tenera, 1991). Other fish species identified or proposed for protection under the Endangered Species Acts, including Delta smelt and Sacramento splittail, do not inhabit San Francisco Bay in the vicinity of the power plant.

Benthic invertebrates expected to occur in the vicinity of the power plant include the Japanese littleneck clam (*Tapes japonica*), mussels (*Mytilus edulis*, *Musculista senhousia*) and, further south, native oyster (*Ostrea lurida*) (U.S. Geological Survey, 1986). Clams along the south shore of Candlestick Point have been determined to be large enough to support a sport fishery if water quality parameters meet public health standards. Mud flats along the Candlestick Point shoreline support a variety of arthropods (e.g., crabs, shrimp) and annelids (worms) that comprise an important food source for fish and shorebirds.

Based upon results of environmental studies conducted at the Potrero Power Plant, the San Francisco Bay Regional Water Quality Control Board (RWQCB) found in 1994 (Order 94-057 and Order 94-056, respectively) that the existing cooling water intake methods represent the best available technology for minimizing adverse environmental impacts. The RWQCB, in adopting NPDES permit Nos. CA0005649 and CA0005657, also specified effluent limitations on the thermal discharge from the plants under Section 316(a) of the Clean Water Act. The National Pollution Discharge Elimination System (NPDES) permits limit discharge temperatures during periods of routine operations and when thermal demusseling treatment occurs.

CONTRA COSTA AND PITTSBURG POWER PLANTS

The Contra Costa Power Plant is located on the south bank of the lower San Joaquin River, which is approximately 3,600 feet wide and generally less than 20 feet deep, except in the main channel which runs adjacent to the northern bank of the river. The nearshore area of the Contra Costa Power Plant is characterized by pilings, riprap, and bulkheads with intermittent shallow-water areas vegetated by tules and other emergent vegetation. Bottom substrate consists mainly of unconsolidated mixed and interbedded alluvial sediments (clays, silts, sands, and gravel). Maintenance dredging routinely occurs within the ship channel. The shoreline adjacent to the Contra Costa Power Plant has been developed for industrial uses, which include paper and

chemical production and the manufacturing of gypsum wallboard. Several large marinas are also located along the shore to the east of the power plant.

The Pittsburg Power Plant is located on the Bay-Delta Estuary at the nominal division point of the San Francisco Bay system on the west and the Sacramento-San Joaquin Delta on the east. The plant is located on the south shore of Suisun Bay immediately west of the confluence of the Sacramento and San Joaquin Rivers. The Pittsburg Power Plant is approximately five miles downstream of the Contra Costa Power Plant. At the plant site, Suisun Bay is approximately 4,000 feet wide and has a maximum depth of approximately 70 feet within the dredged ship canal, although the majority of Suisun Bay is characterized by relatively shallow water (less than 20 feet deep). Bottom substrate consists mainly of unconsolidated mixed and interbedded alluvial sediments (i.e., clays, silts, sand, and gravel). The shoreline to the west of the power plant site is vegetated by tules and other shallow-water emergent wetland vegetation. Marinas and industrial facilities are located along the shoreline to the east of the power plant site.

Terrestrial conditions at both sites are typical of highly developed industrial areas that contain limited habitat value for upland and aquatic species. High-quality saltmarsh, estuarine, and freshwater marsh habitats are present adjacent to the Pittsburg plant site, providing excellent habitat opportunities for a variety of common and special status plants and wildlife. Upland plant and wildlife habitat is considerably poorer in and near the Contra Costa Power Plant. These areas are described below.

Vegetation

Northern coastal saltmarsh occurs immediately south of the Pittsburg Power Plant and at the Montezuma Habitat Enhancement Site, an off-site enhancement area undergoing restoration under the Draft Multiple Species Habitat Conservation Plan (HCP) for Pittsburg and Contra Costa Power Plants (PG&E, 1997). The Pittsburg Unit 7 cooling water canal extends approximately one mile into the saltmarsh. The northern coastal saltmarsh assemblage intergrades with coastal brackish marsh closer to the Sacramento River, and occurs to a limited extent in a 5- to 10-foot-wide shoreline band where the Pittsburg plant meets Suisun Bay. This assemblage is absent from the Contra Costa plant shoreline. Special status plant species identified in tidal wetland habitat west of the Pittsburg plant include Suisun Marsh aster (*Aster lentus*), soft bird's beak (*Cordylanthus mollis* ssp. *mollis*), Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), and Mason's lilaeopsis (*Lilaeopsis masonii*). These species also potentially occur in tidal marsh areas at the Montezuma Habitat Enhancement Site. Tidal wetlands near the Contra Costa Power Plant occur in only a narrow shoreline band that does not provide habitat for special status plants.

Southwest of the Pittsburg plant toward the City of Pittsburg, saltmarsh vegetation intergrades with freshwater plant assemblages where freshwater inputs affect community structure. Low-quality freshwater emergent wetlands, with small stands of cattail (*Typha* sp.) and bulrush (*Scirpus* sp.), also occur within the boundaries of the Pittsburg Power Plant at the central spill containment basin and the drainage channel adjoining the Sacramento Northern Railroad. No major freshwater drainages enter this brackish marsh; however, several small drainages support

freshwater emergent wetlands in the form of Great Valley willow scrub and coastal freshwater marsh. This habitat is generally considered one of the most productive habitats for wildlife in that it offers water, food, and cover. Primary vegetation species in these areas include cattails (*Typha* sp.), mixed sedges (*Carex* sp.), rush (*Juncus* sp.), and arroyo willow (*Salix lasiolepus*). Based on project-specific field surveys, no special status plants are expected to occur in freshwater drainages at or near the Contra Costa or Pittsburg plants.

Non-native annual grassland, described under The Geysers heading, above, occurs in a narrow band and isolated patches between marshlands and upland development west of the Pittsburg plant, and does not occur near the Contra Costa plant. This community is composed of a dense to sparse cover of annual grasses and scattered patches of shrubs, often associated with numerous species of annual and perennial forbs. Based on project-specific field surveys, no special status plant species are expected to occur in this habitat at the Contra Costa or Pittsburg plants.

Terrestrial Wildlife

Wildlife species using the industrialized portions of the Contra Costa and Pittsburg plants are similar to those described for the Potrero plant and are limited to a handful of common human-tolerant and introduced species. These include Norway rat, rock dove (*Columba livia*), feral cat, raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), opossum (*Didelphis virginiana*), house mouse (*Mus musculus*), killdeer (*Charadrius vociferus*), American crow (*Corvus brachyrhynchos*), red-winged blackbird (*Agelaius phoeniceus*), and black phoebe (*Sayornis nigricans*). Special status wildlife species are not expected to use these areas, with the exception of the isolated Pittsburg Unit 7 cooling water canal, which provides nesting habitat for the federal and state endangered California least tern (*Sterna antillarum browni*).

Many species that are endemic to tidal wetland habitats are expected to occur west of the Pittsburg plant. Among these are special status species such as California clapper rail (*Rallus longirostris obsoletus*), saltmarsh harvest mouse (*Reithrodontomys raviventris*), California black rail (*LaTenerallus jamaicensis*), and saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*), with California least tern occurring in sparsely vegetated upland areas. Populations of all of these species have suffered from declines in the quality, as well as the quantity, of the remaining habitat. Good quality saltmarsh habitat occurs in the tidal saltmarsh west of the Pittsburg Power Plant, but no habitat for these species is provided at the Contra Costa plant.

Modifications to the Pittsburg plant freshwater drainages and drainages to the west have severely reduced the vegetative structure of freshwater marshes and their overall value for wildlife. Habitat for the western pond turtle (*Clemmys marmorata*), a CSC, occurs in less-disturbed freshwater marshes southwest of the Pittsburg plant (PG&E, 1997). Several special status species using freshwater marsh areas southwest of the Pittsburg Power Plant include tricolor blackbird (*Agelaius tricolor*), Suisun song sparrow (*Melospiza melodia mazillaris*), and saltmarsh common yellowthroat (PG&E, 1997). Freshwater marsh habitat was not detected in or near the Contra Costa plant.

Among the diving birds, only double-crested cormorant (*Phalacrocorax auritus*) breeds in the vicinity. Both pied-billed grebe (*Podilymbus podiceps*) and western grebe (*Aechmophorus occidentalis*) winter in the area. American white pelicans (*Pelicanus erythrorhynchos*) migrate through the area, and in recent years have stayed through the summer. Brown pelicans (*Pelicanus occidentalis*) are present during the non-breeding season and are most common in fall.

Aquatic Resources

The area of the lower Delta, from which the Contra Costa Power Plant withdraws cooling water, is characteristic of the estuarine transition zone that separates the upstream, freshwater Delta from the downstream saltwater Bay. Salinity in the area generally ranges from approximately 0 to 7 parts per thousand (ppt), depending on tides and freshwater inflow (PG&E, 1981b), which represents freshwater to brackish salinity conditions favorable for many estuarian species. The area adjacent to the plant contains several types of aquatic habitat, including shallow channel, shoal areas, and the main river channel. Together these habitats support a large and diverse biotic community that includes several commercially and recreationally important species of fish.

The aquatic community inhabiting Suisun Bay in the vicinity of the Pittsburg Power Plant is typical of low-salinity estuarine habitat. Tidal hydraulics and flows from both the Sacramento and San Joaquin River systems have a major influence on water quality conditions (e.g., salinity) and current patterns in the area. Depending on freshwater inflow and tidal conditions, salinities within Suisun Bay vary from approximately 0 to 8 ppt (PG&E, 1981a), which represents freshwater to brackish salinity conditions favorable for many estuarian species.

Species composition and abundance in the vicinity of the two power plants are essentially identical. The shallow-water areas are inhabited by large numbers of small invertebrates such as mysid shrimp and amphipods, which are an important food supply for young-of-the-year striped bass and many other fish that utilize the area in the vicinity of the power plant as a nursery, rearing, and foraging area. Species of fish in the area include striped bass (*Morone saxatilis*), Sacramento squawfish (*Ptychocheilus grandis*), gobies, silversides, starry flounder, Sacramento splittail (*Pogonichthys lucius*), carp, and catfish. The area also provides habitat for Delta smelt (*Hypomesus transpacificus*), longfin smelt (*Spirinchus thaleichthys*), Chinook salmon (*Oncorhynchus tshawytscha*), and green sturgeon (*Acipenser medirostris*). The area in the vicinity of the power plants provides nursery habitat for a variety of fish species, including the early lifestages of striped bass, longfin and Delta smelt, Chinook salmon, and splittail. The area also serves as habitat for subadult and adult lifestages for many resident and migrating fish species, including Chinook salmon, striped bass, sturgeon, steelhead trout (*O. mykiss*), and American shad.

Several of the fish species that inhabit Suisun Bay support commercial or recreational fisheries (e.g., Chinook salmon, sturgeon, striped bass). Special status fish species in the area include winter-run, spring-run, and fall/late fall-run Chinook salmon, Central California steelhead trout, Sacramento splittail, Delta smelt, longfin smelt, and green sturgeon. Suisun Bay is included

within critical habitat identified for winter-run Chinook salmon and Delta smelt. Table 4.7-1 summarizes the listing status of each of the above species.

Invertebrates occurring locally include several species of Bay shrimp (e.g., *Crangon franciscorum*, *Crangon nigracada*, and *Palaemon macrodactylus*), clams (*Corbicula* sp.), amphipods (*Corophium* sp.), small introduced crabs (e.g., *Rhithropanopeus harrisi*), and a variety of species of estuarine zooplankton such as calanoid copepods (*Eurytemora affinis*) and the opossum (mysid) shrimp (*Neomysis mercedis*). A variety of other bivalves, polychaete worms, and gastropods also inhabit the estuarine portion of the Bay-Delta system.

As a result of the abundance of fish and invertebrates in the area and the potential take of species of special concern, potential impacts resulting from cooling water system operations have been identified as an issue of concern to both state and federal agencies.

Cooling Water Studies

Given the environmentally sensitive nature of Suisun Bay and the lower San Joaquin River, potential impacts resulting from operation of the Pittsburg and Contra Costa Power Plant cooling water systems have received considerable attention. Intensive fisheries studies within Suisun Bay and the lower San Joaquin River began with investigations by CDFG in the 1960s. PG&E conducted an intensive fisheries survey during the early 1970s at the Pittsburg and Contra Costa plants (PG&E, 1973a; PG&E, 1973b) as part of an evaluation of the potential effects of the power plant thermal discharge on the aquatic resources. Extensive studies of entrainment (marine organisms passing through intake screens) and impingement (marine organisms colliding with or being pinned to intake screens) were conducted at both power plants in 1978-79 to evaluate impacts of the cooling water intake structures (PG&E, 1981a; PG&E, 1981b). Further field studies were conducted during 1991-92 to investigate potential thermal effects of the cooling water discharges from both plants on fish and invertebrates inhabiting the receiving waters (PG&E, 1992). Additional studies have been performed as part of NPDES monitoring and in support of the draft Habitat Conservation Plan (HCP) (PG&E, 1997). These investigations are briefly summarized below.

Entrainment and Impingement - 316(b) Best Technology Available

An intensive study of the entrainment and impingement of fish as a result of operation of the Pittsburg and Contra Costa cooling water systems was conducted in 1978-79 (PG&E, 1981a; PG&E, 1981b) in response to requirements of Section 316(b) of the Clean Water Act. Section 316(b) requires that the “location, design, construction, and capacity of cooling water intake structures reflect the best technology available (BTA) for minimizing adverse environmental impacts.”

The 316(b) entrainment and impingement studies were performed as part of requirements for the NPDES permitting process, administered by the San Francisco Bay RWQCB for the Pittsburg Power Plant and Central Valley RWQCB for the Contra Costa Power Plant. Although a wide variety of fish and invertebrates were found to be susceptible to entrainment and impingement as

a direct result of cooling water system operations, striped bass were identified as the primary species of concern. Because striped bass early lifestages (eggs and larvae) occur during the spring in high numbers within the vicinity of both power plants, and the early lifestages are not effectively excluded from the cooling water systems by the existing intake screens, large numbers of young striped bass were found to be entrained at both power plants (PG&E, 1981a; PG&E, 1981b). Entrainment losses for striped bass were found to primarily occur during the spring (approximately May-June). Striped bass entrainment was also found to vary in direct proportion to the volumes of cooling water diverted by the power plants. Survival studies were also conducted during 1978-79 (and subsequent years) to determine the survival of striped bass larvae entrained into the once-through cooling water system of Pittsburg Power Plant Units 1-6 and Contra Costa Power Plant Units 1-7. Survival of entrained striped bass larvae was found to be approximately 80 percent when cooling water discharge temperatures were less than 86 °F. As discharge temperatures exceeded 86 degrees Fahrenheit (°F), the mortality of entrained striped bass larvae increased quickly, reaching 100 percent mortality at discharge temperatures exceeding approximately 93 °F. Because of the closed-cycle cooling system, no larval fish are expected to survive entrainment into the Pittsburg Unit 7 cooling system.

Based upon results of the 1978-79 entrainment and impingement studies, analyses of cooling water system operational features that influence entrainment and impingement mortality, and the seasonal and geographic distribution of striped bass, a range of engineering alternatives were evaluated to identify appropriate modifications to cooling water system operations. These structural and operational modifications were designed to reduce the losses of striped bass and other fish species as part of an engineering assessment of the best technology available for the Pittsburg and Contra Costa cooling water intake structures. Results of the engineering assessment were documented in a technical report provided to the San Francisco Bay and Central Valley RWQCBs (Tenera, 1982; Tenera, 1985). The proposed Resource Management Program (RMP) and improved intake structures, in addition to a striped bass stocking program, were adopted by the Regional Boards as BTA in 1986 for both power plants and included as provisions to the NPDES permits. PG&E completed the installation of improvements to the intake structures at both the Pittsburg and Contra Costa Power Plants, such as installation of variable-speed circulating water-pump drives on selected units, in compliance with the requirements specified in the NPDES permits adopted by the Central Valley and San Francisco Bay RWQCBs. NPDES permits issued in 1990 and 1994 continue to define BTA as improved intake structures and implementation of the RMP.

The Pittsburg and Contra Costa plants are in close proximity, approximately five miles apart; as a result, the assessment of engineering technologies considered joint operations of the two power plants as one element of an RMP designed to reduce entrainment losses of striped bass. The technology assessment also recommended modification to the cooling water systems at Pittsburg Power Plant Units 1-6 and Contra Costa Units 6 and 7 (which have once-through cooling water systems) to include variable-speed circulating water-pump controls. These variable speed drives (VSD) were designed to reduce the volume of cooling water provided to a unit during periods when the unit load is low. The RMP specified modifications to power plant unit commitment and dispatch and to cooling water system operations during the spring period, when striped bass

larvae are susceptible to entrainment. Operational changes included preferential commitment and dispatch of Pittsburg Unit 7, which is equipped with a closed-cycle cooling water system. The system at Pittsburg Unit 7 requires that substantially less water be withdrawn from the Bay-Delta system, and thereby fewer fish and other aquatic organisms are lost as a result of entrainment and impingement.

Modifying dispatch procedures to reduce the frequency of discharge temperatures that exceed 86 °F during the spring period, when striped bass entrainment was occurring, was also identified as an element of the RMP. By reducing the frequency of 86°F or greater discharge temperatures, the mortality of larval and early juvenile striped bass and other entrained organisms is reduced. Coordinated operation between the Pittsburg and Contra Costa Power Plants was also identified as an operational component of the RMP. Coordinated operations between the Pittsburg and Contra Costa plants, in combination with striped bass real-time entrainment monitoring, provided the opportunity to preferentially commit and dispatch units at the power plant where striped bass densities were lowest, thus reducing the numbers of fish susceptible to entrainment.

Results of biological monitoring demonstrated that the geographic distribution of larval striped bass varied within and among years, partially in response to variation in such factors as freshwater outflow from the Sacramento and San Joaquin River systems, which contributed to differential susceptibility of striped bass larvae to entrainment between the Pittsburg and Contra Costa Power Plants. The original RMP operational plan for the two power plants included an intensive biological monitoring program designed to detect the seasonal period when striped bass larvae were in the area of the cooling water systems and susceptible to entrainment. Results of daily biological monitoring during the spring were used to determine when the RMP was to be initiated each year. Biological monitoring at both the Pittsburg and Contra Costa plants was also implemented during the spring larval striped bass entrainment period to provide daily information on larval striped bass densities for use in preferentially operating units between the two power plants.

In recent years, monitoring of larval striped bass entrainment at the Pittsburg and Contra Costa power plants as part of RMP has been suspended. The U.S. Fish and Wildlife Service listed delta smelt as a threatened species under the Federal Endangered Species Act. Delta smelt have also been listed as a threatened species under the California Endangered Species Act. Since there is a potential to collect delta smelt as part of fisheries sampling conducted at the power plants as part of the RMP, resulting in incidental take of a protected species, no entrainment sampling has been performed at the power plants since 1994. In the absence of actual entrainment monitoring, the start date for the entrainment period has been established as May 1 in compliance with terms and conditions outlined in the NPDES permits. An incidental take permit for biological sampling is required before additional entrainment monitoring in support of the RMP could be conducted at the two power plants.

Preferential operation of units at the Pittsburg and Contra Costa Power Plants, as outlined in the RMP and incorporated in the NPDES permits for both power plants, stipulates that during the striped bass entrainment period (approximately May 1 to mid-July, unless modified by results of biological monitoring):

- PG&E shall maximize the commitment of, dispatching of, and power production from Pittsburg Unit 7, as required to meet system demand, in place of and before the dispatching and power production above minimum load at any other unit at Pittsburg or Contra Costa Power Plants, except under a series of specific operating conditions as identified in the NPDES permits;
- PG&E shall minimize the commitment and dispatch of all units at the Pittsburg Power Plant, except for the preferential operation of Pittsburg Unit 7 and of all units at the Contra Costa Power Plant to minimize cooling water flows, unless commitment and dispatching of these units is necessary to meet system demand, to meet power pool commitments, and/or to maintain system reliability according to prudent utility operating practices, including equipment and personnel safety;
- All committed units at Pittsburg and Contra Costa Power Plants must be dispatched to the level at which the unit discharge temperatures equal 86 °F before the discharge temperature for any similar unit is allowed to exceed 86 °F, unless the unit is located at a plant that has fish densities below the density threshold, as determined by the Threshold Monitoring Program outlined in the NPDES permit monitoring requirements; and
- PG&E shall use the variable-speed circulating water-pump drives (VSD) whenever the units operate at reduced loads, in accordance with design parameters. Reduced load is defined as less than 95 percent of maximum load for the existing variable-speed pumps. PG&E shall shut off circulating water pumps for uncommitted units as soon as possible, except as required according to prudent operating practices to ensure personnel and equipment safety.

In addition to preferential unit operation as part of the RMP, the NPDES permits also specify: frequency of intake, traveling screen rotation and cleaning, maintenance and debris removal to maintain bar-rack velocity as close as practical to design levels, operation of the fish pumps associated with the Contra Costa Units 1-5 cooling water system, and scheduling for planned unit overhauls.

Recommendations for modifying the Pittsburg and Contra Costa cooling water systems (e.g., VSDs), in combination with changes to the commitment and dispatching of individual units based on the seasonal timing, geographic distribution, and unit-specific discharge temperatures, were reviewed by state and federal agencies including CDFG, National Marine Fisheries Service (NMFS), the U.S. Fish and Wildlife Service (USFWS), and the San Francisco and Central Valley RWQCB. The recommended RMP was subsequently adopted by the San Francisco Bay and Central Valley RWQCBs and participating resource agencies as a joint program for the Pittsburg and Contra Costa Power Plants as the best technology available in 1986. The operational conditions identified through this process, as well as the specific changes identified for the cooling water systems at the two power plants, are incorporated as provisions of the current NPDES permits for both power plants. Requirements for achieving BTA are specified in NPDES permit CA0004880 (Order 95-225) for the Pittsburg Power Plant and permit CA0004863 (Order 95-234) for the Contra Costa Power Plant.

As part of evaluating the performance of the RMP and intake structure modifications in reducing striped bass entrainment losses, a computerized model (SIMBAS) has been developed by PG&E, and adopted by the Regional Boards and resource agencies, for use in estimating the annual

percentage reduction in entrainment loss compared to an historic base period. Performance each year is evaluated based on hourly monitoring data on cooling water volume for each of the Contra Costa and Pittsburg units, hourly monitoring data on discharge water temperatures, and the measured or assumed density of striped bass susceptible to entrainment during the seasonal period when the RMP is in effect. Since entrainment monitoring has not been performed since 1994, larval striped bass densities are established using historical striped bass density data from previous entrainment monitoring at the power plant. The striped bass densities selected for use in the SIMBAS model in calculating RMP performance, and the reduction in striped bass losses, is based on Sacramento and San Joaquin river outflows during the spring entrainment period. Using data from the current year on circulating water pump operations and discharge temperatures and historical larval striped bass densities, an estimate of striped bass losses is calculated for the current year and compared with the resulting calculated loss based on the assumed striped bass density distribution and historical operations at both power plants during three base years (1976, 1978, 1979). The resulting estimates of equivalent striped bass losses in the current year, and the average of the three historical base years, is then used to calculate the percentage reduction in striped bass losses achieved through implementation of the RMP, operation of the VSDs, and other management actions designed to reduce fisheries losses. The resulting calculation of percentage reduction in striped bass entrainment losses provides a measure of performance of the RMP, in compliance with requirements specified in the NPDES permits. For example, increased operation of the Pittsburg and Contra Costa units that resulted in increased cooling water volumes and an increase in the frequency of discharge temperatures exceeding 86 °F during the entrainment period would be reflected as a decrease in the percentage reduction of striped bass losses. The original BTA performance criteria was a 79 percent reduction in striped bass losses, calculated using SIMBAS, compared to the 1976, 1978, and 1979 operational base period. Specific numeric performance criteria for striped bass percentage reduction achieved by the BTA program were removed from the Pittsburg and Contra Costa power plant NPDES permits in 1995.

Results of the RMP performance calculations are documented in annual NPDES compliance reports submitted to the Central Valley and San Francisco Bay RWQCBs, and provided to the CDFG, USFWS, and NMFS for purposes of monitoring and evaluating annual performance. Target reduction thresholds for cooling water volumes diverted at the Pittsburg and Contra Costa Power Plants are also specified in the draft HCP (PG&E 1997). Provisions of the HCP stipulate that if electrical energy demands require the units to be taken out of VSD mode, and target performance thresholds are not met during the period February 1 through July 31, mitigation compensation will be required. The mitigation compensation provides funding for aquatic habitat restoration. Therefore, the performance criteria established and monitored through the NPDES Compliance Monitoring Program, and performance criteria established through the HCP provide the necessary information for evaluating operational performance of the Pittsburg and Contra Costa Power Plants in reducing fisheries losses under current and future operating conditions.

Thermal Effects Assessment - 316(a)

Section 316(a) of the Clean Water Act requires compliance with state water quality standards for the discharge of thermal effluent. The Regional Boards may, in accordance with Section 316(a) and other regulations (40 Code of Federal Regulations [CFR] 122), grant an exception to state Thermal Plan standards.

NPDES permits adopted by the San Francisco Bay and Central Valley RWQCBs required that PG&E perform a study to assess the effects of water temperatures on striped bass and other aquatic organisms within the area of influence of the Pittsburg and Contra Costa Power Plant thermal discharges. The field studies were required to provide the necessary technical information for the Regional Boards to determine whether a 316(a) exception for the discharges would be appropriate. Field studies were conducted during 1991-92 at both power plants. Both the Pittsburg and Contra Costa Power Plants followed routine operating procedures, including implementation of the RMP as specified in the NPDES permits, during the period of these field data collection activities and investigations. Detailed monitoring was performed to document cooling water system operations, discharge temperatures, the location and dynamics of the discharge plumes, and biological studies on the location, species composition, and seasonal distribution of fish and macroinvertebrates inhabiting the discharge receiving waters. In addition, the studies provided an assessment of the potential for adverse impacts (e.g., direct thermal mortality, migration blockage, etc.) resulting from cooling water system operations. Results of these investigations were documented by PG&E (1992) and were provided to the RWQCBs and resource agencies, in compliance with the requirements and schedule specified in the NPDES permits.

Results of the thermal effects assessment demonstrated that the receiving waters for both power plants support diverse fish communities, including striped bass. The power plant receiving waters also support an active recreational fishery for striped bass and other species. The study indicated that an assemblage of warmwater fish species appear to be attracted to the Contra Costa Units 6 and 7 discharge canal. No adverse effects on abundance or species composition in the vicinity of the thermal discharges from either power plant were detected. Furthermore, the studies provided no evidence that the thermal discharges were contributing to direct mortality. In fact, fish collected from both the discharge receiving waters and reference sites were considered to be in good condition. Analysis of receiving water temperatures did not show a thermal blockage to migration for Chinook salmon, striped bass, or American shad. Species listed for protection or proposed for listing under State of California and Federal Endangered Species Acts (CESA and FESA)—including Delta smelt, Sacramento splittail, and juvenile Chinook salmon within the size range designated for winter-run salmon—were collected at both the Pittsburg and Contra Costa Power Plant receiving water sites and reference locations. These studies provided no evidence of adverse effects attributable to the power plant discharges.

Results of the thermal assessment study were documented (PG&E, 1992) and provided to CDFG, NMFS, USFWS, and the San Francisco and Central Valley RWQCBs. The information developed through the study was subsequently used by the Regional Boards to adopt discharge temperature criteria included in the NPDES permits for both the Pittsburg and Contra Costa

Power Plants. These discharge temperature limits are included in NPDES permits CA0004880 and CA0004863 for the Pittsburg and Contra Costa plants, respectively.

Endangered Species Act Habitat Conservation Plan

Studies conducted at the Pittsburg and Contra Costa Power Plants (PG&E, 1981a; PG&E, 1981b; PG&E, 1992; PG&E, 1997) demonstrated that various fish species listed or proposed for listing under the state and federal Endangered Species Acts are susceptible to entrainment and/or impingement losses or are exposed to the thermal discharge as a result of operation of the Pittsburg and Contra Costa cooling water systems. Juvenile winter-run Chinook salmon, spring-run Chinook salmon, fall-run/late fall-run Chinook salmon, splittail, steelhead, green sturgeon, longfin and Delta smelt are vulnerable to cooling-water system effects. CESA and FESA prohibit the unlawful incidental take of protected species. The RMP implemented as part of the BTA program for reducing striped bass losses does not eliminate the potential for incidental take of Delta smelt, winter-run Chinook salmon, steelhead, or other special status species.

To address the impacts of cooling water system operations and maintenance activities at the Pittsburg and Contra Costa Power Plants on special status species (in addition to birds, mammals, and plants also listed under the Endangered Species Act), PG&E has developed a Multispecies Habitat Conservation Plan (HCP) in connection with seeking incidental take authorization under CESA and FESA. PG&E has received incidental take authorization under CESA pursuant to a Memorandum of Understanding, between PG&E and the California Department of Fish and Game (CDFG), executed December 1997 (the CESA MOU), which outlines the obligations and responsibilities of the parties over a term of 15 years. Under the CESA MOU, PG&E has agreed to implement the requirements of the HCP upon issuance of incidental take permits by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) under Section 10 of the FESA (the Section 10 Permits). The HCP referenced in the CESA MOU, dated November 14, 1997, has been approved by the CDFG.

In order to obtain take authorization under FESA, PG&E has submitted an application to USFWS and NMFS for Section 10 Permits. The HCP and draft Implementing Agreements between PG&E and the federal agencies were included in this application. In response to comments from the USFWS and NMFS, PG&E has slightly revised the HCP incorporated in the CESA MOU. The revised draft HCP (dated April 22, 1998) and associated permit application documents have been reviewed and deemed completed by USFWS and NMFS staff in June 1998. Based on PG&E's discussion with USFWS and NMFS, the federal agencies intend to adhere to a timeline under which the availability of the draft HCP and draft Environmental Assessment for the Section 10 Permits will be noticed in the Federal Register in July 1998. This will initiate a formal 30-day public review and comment period. Comments received during the formal review period will be addressed in a final HCP. According to the staff timeline, the Section 10 Permits will be issued by October 1998.

The CESA MOU provides that upon the issuance of the Section 10 Permits, the HCP previously approved by the CDFG and incorporated in the CESA MOU may be amended by PG&E and the CDFG to ensure that it is consistent with the HCP ultimately approved by the federal agencies.

The following minimization and mitigation elements are incorporated in the current state HCP and draft federal HCP:

- Minimization of circulating water flows would be achieved by operating the circulating water pumps at the power plant intakes using the variable speed drive (VSD) mode from February 1 through July 31 each year;
- Target reduction thresholds for circulating water-pump operations at the Pittsburg and Contra Costa Power Plants are established and, if load demands require the units be taken out of VSD mode and target thresholds are exceeded during the February 1 to July 31 period, mitigation compensation is required. The mitigation compensation provides funding to an endowment fund dedicated to aquatic habitat restoration;
- A conservation easement for a 139-acre site, maintained in perpetuity, at the Montezuma enhancement site located in Solano County adjacent to the Sacramento River and Marshall cut;
- Inclusion of various measures designed to protect species within the Montezuma enhancement area;
- Employee training for all PG&E personnel working within the HCP area based upon a program reviewed and approved by USFWS, NMFS, and CDFG; and
- Monitoring requirements at the Pittsburg and Contra Costa Power Plants and the Montezuma Habitat Enhancement Site, an off-site enhancement area undergoing restoration (and habitat creation) for aquatic and terrestrial species.
- Provisions for the conveyance of a perpetual conservation easement of the Montezuma Enhancement Site to CDFG after the habitat restoration work at the Montezuma Habitat Enhancement Site has been completed.

The HCP includes other requirements designed to reduce losses of species of special concern as a result of cooling water system operations and maintenance activities at the Pittsburg and Contra Costa plants, in addition to restoration and enhancement of sensitive species habitat at the Montezuma enhancement site.

GEYSERS POWER PLANT

Vegetation

Vegetation at and near the various Geysers units, although diverse, follows the typical pattern for this area - south-facing slopes are dominated by oak savanna and woodland, whereas rocky south-facing slopes usually contain some type of chaparral. Mixed evergreen forests are found on most north-facing slopes. Riparian vegetation is present along most of the major water courses, such as Big Sulphur Creek and Squaw Creek. Other important habitat types found at the Geysers include serpentine chaparral and serpentine barrens (found primarily near Units 16 and 17), which support several special status plants, including jewelflower (*Streptanthus morrisonii*)

and Snow Mountain buckwheat (*Eriogonum nervulosum*). Meadows such as Birdsong Meadow near Unit 13 are rare in the Mayacmas Mountains but provide important wildlife foraging habitat (PG&E, 1979). The Geysers panicum (*Dichanthelium lanuginosum* var. *thermale*) grows in thermally altered soils around hot springs, especially in the Little Geysers area. Populations of this species have been monitored by PG&E since 1982 (PG&E, 1990). Several other special status plant species occurring in the area are listed in Table 4.7-1.

Wildlife

Due to the limited amount of development within the Geysers-Calistoga KGRA, local wildlife species are generally able to move freely throughout the area. Therefore, for the purpose of this report, any species known to occur within the vicinity of one power plant unit (e.g., ESA, 1994; BioSystems, 1992; PG&E, 1987a; PG&E, 1987b; PG&E et al., 1986) is also expected to be present at or near the other units unless noted otherwise.

The diverse habitats in the Geysers area support a healthy assemblage of wildlife, including a variety of special status species. The most common mammals encountered in the project area include black-tailed hare (*Lepus californicus*), black-tailed deer (*Odocoileus hemionus*), brush rabbits (*Sylvilagus bachmani*), western gray squirrel (*Sciurus griseus*), and raccoon (*Procyon lotor*). The ringtail cat (*Bassaricus astutus*), a CDFG fully protected animal, has been known to occur in the area as well.

The project area provides high-quality breeding and foraging habitat for many bird species, including raptors (PG&E, 1982a). Both California quail (*Callipepla californica*) and mountain quail (*Oreortyx pictus*) occur throughout most of the project area, as well as acorn woodpecker (*Melanerpes formicivorus*), black phoebe (*Sayornis nigricans*), violet-green swallow (*Tachycineta thalassina*), Steller's jay (*Cyanocitta stelleri*), and numerous others. Common raptors of the area include turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). Special status bird species known to utilize the region include the federally endangered peregrine falcon (*Falco peregrinus*), which was last spotted during the mid-1980s (PG&E, 1987a), and the following species of special concern: purple martin (*Progne subis*), loggerhead shrike (*Lanius ludovicianus*), yellow warbler (*Dendroica petechia*), tricolored blackbird (*Agelaius tricolor*), osprey (*Pandion haliaetus*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*Accipiter cooperii*), golden eagle (*Aquila chrysaetos*), and prairie falcon (*Falco mexicanus*).

Common reptiles known to occur in the project area and vicinity include western fence lizard (*Scalopus occidentalis*), common garter snake (*Thamnophis sirtalis*), and western rattlesnake (*Crotalus viridis*). The western pond turtle (*Clemmys marmorata*), a species of special concern, occurs within the project area.

Aquatic Resources

The project area extends into two separate watersheds. The Sonoma County units are located within the Big Sulphur Creek drainage, a tributary to the Russian River. Squaw Creek and Little

Sulphur Creek are the major tributaries to Big Sulphur Creek, located in the vicinity of the Geysers plant. Squaw Creek and Little Sulphur Creek are relatively high-gradient streams with high sediment transport potentials, while Big Sulphur Creek and the Russian River are more typical of low-gradient channels where much of the sediment load is deposited. The two Lake County units are within the Putah Creek watershed, which drains into Lake Berryessa, Napa County. The primary tributaries to Putah Creek in the vicinity of Units 13 and 16 are Anderson and Bear Canyon Creeks.

Extensive studies and monitoring programs of fish populations, water quality, and aquatic habitat have been conducted in both drainages (Podlech et al., 1996; Sandbach et al., 1996; Sanford and Seppeler, 1990; McMillan, 1985). Fish species occurring in Squaw Creek include California roach (*Hesperoleucus symmetricus*), Sacramento sucker (*Catostomus occidentalis*), Pacific lamprey (*Lampetra tridentata*), riffle sculpin (*Cottus gulosus*), and Sacramento squawfish (*Ptychocheilus grandis*). The most abundant fish species in Squaw Creek is the anadromous steelhead trout (*Oncorhynchus mykiss*), the Central California Coast Evolutionarily Significant Unit (ESU) of which is listed as threatened. Non-migratory rainbow trout (*O. mykiss*) are believed to co-inhabit the watershed with steelhead trout. Anderson and Bear Canyon Creeks contain rainbow trout, California roach, Sacramento sucker, and riffle sculpins. Steelhead trout do not occur in this land-locked drainage.

Amphibian surveys conducted along Big Sulphur Creek (PG&E et al., 1986) and the Putah Creek drainage (BioSystems, 1992) revealed the presence of red-bellied newts (*Taricha rivularis*), rough-skinned newts (*T. granulosa*), and Pacific giant salamanders (*Dicamptodon ensatus*). The foothill yellow-legged frog (*Rana boylei*), a species of special concern, is also known to occur in the project area.

Benthic macroinvertebrates, which consist primarily of aquatic insects and are the major food source for freshwater vertebrates, are abundant in both drainages. Dominant taxa include genera of mayflies (*Baetis sp.*), caddisflies (*Cheumatopsyche sp.*, *Hydropsyche sp.*), midges (family Chironomidae), water pennies (*Optioservus sp.*), and stoneflies (*Amphinemura sp.*). Neither drainage is known to support any special status macroinvertebrates.

4.7.4 SIGNIFICANCE CRITERIA

For the purposes of this EIR, significant environmental effects on biological resources include:

- substantial interference with the movement of any resident or migratory fish or wildlife species;
- substantial reduction of habitat for fish, wildlife, or plants (including locally designated species); or
- impacts to a rare or endangered species of animal or plant (including species of special concern) or its habitat.

Furthermore, CEQA Guidelines Sections 15206 and 15380, described in 4.7.1 Regulatory Framework, were used to determine impact significance.

Impacts are generally considered less than significant if the habitats and species affected are common and widespread in the region and the state.

For the purposes of this EIR, three principal components are considered:

- Magnitude of the impact (e.g., substantial/not substantial)
- Uniqueness of the affected resource (rarity)
- Susceptibility of the affected resource to disturbance (sensitivity)

The evaluation of significance must consider the interrelationship of these three components. For example, a relatively small-magnitude impact (e.g., disturbing a nest) to a state or federally listed species would be considered significant because the species is at low population levels and is presumed to be susceptible to disturbance. Conversely, a common habitat such as mixed chaparral is not necessarily rare or sensitive to disturbance. Therefore, a much larger magnitude of impact (e.g., removal of extensive vegetation) would be required for it to be considered a significant impact.

4.7.5 IMPACTS AND MITIGATION MEASURES

Impact 4.7-1: Divestiture could result in an overall loss of important species or habitat if future owners were unaware of the presence and sensitivity of such biological resources. (Significant)

Through its Technical and Ecological Services office, PG&E currently has access to in-house biological and regulatory experts familiar with individual sites and the unique context of environmental protection at different power plants. Important species and habitat at the plants could be threatened in the future—by changes in maintenance practices, for example, or non-power-production activities such as new staging or equipment storage areas—if the new owners were not fully aware of the presence and sensitivity of such biological resources.

Mitigation Measures Proposed as Part of Project

Mitigation Measure 4.7-1: Provide future plant owners with informational materials and training documents in PG&E's possession concerning jurisdictional wetlands and special status species and habitats in the vicinity of the power plants to be divested.

<i>Monitoring Action:</i>	PG&E will provide the CPUC mitigation monitor with disclosure form(s) signed by the new owner listing documents received.
<i>Responsibility:</i>	CPUC
<i>Timing:</i>	At least three business days prior to transfer of title of the plant(s).

Mitigation Measures Identified in This Report

None required.

Level of Significance After Mitigation: Less than Significant

Impact 4.7-2: If the Section 10 Permits are not issued to PG&E prior to the close of the sale or to the new owner at closing, divestiture may delay the issuance of such permits. The delay caused by divestiture may result in impacts to protected species. (Significant)

Winter-run, spring-run, and fall/late fall-run Chinook salmon, Delta smelt, steelhead trout, Sacramento splittail, longfin smelt, and green sturgeon have all been identified as special status species present in the vicinity of the Pittsburg and Contra Costa Power Plants, and potentially impacted from cooling water system operations. Increases in electrical generation would usually result in increases in the volumes of water diverted for cooling water system operations and/or increases in cooling water discharge temperature. Existing constraints imposed on system operations at the Pittsburg and Contra Costa plants contained within the NPDES permits, in addition to commitments contained within the HCP, are designed to protect special status species over a range of operating conditions, including those likely to occur in the future if increased electrical generation were to occur.

PG&E has taken steps to ensure that the new owner will be the holder of the CESA MOU and the Section 10 Permits at the closing of the sale of the Pittsburg and Contra Costa Power Plants. The CESA MOU includes provision for transfer of the CESA MOU to the new owner. NMFS and USFWS have agreed to work with PG&E and the new owner to reissue the Section 10 Permits to the new owner on an expedited basis. In addition, the draft Implementing Agreement outlines the process proposed by NMFS legal counsel for the reissuance of the Section 10 Permits and transfer of the draft Implementing agreement and HCP to the new owner. Section 13 currently provides that upon the new owner satisfying specified conditions, the federal agencies will use their best efforts to issue new permits within 60 days of receipt of a complete application for permit reissuance. USFWS has proposed revisions to the language drafted by NMFS, and therefore the language of Section 13 is still subject to change. Nevertheless, USFWS legal counsel has indicated to PG&E that a reissuance of the Section 10 Permits to the new owner can be accomplished within a 60-day period. Accordingly, if the Section 10 Permits are issued prior to or at closing, the new owner will be subject to the restrictions of such permits and the CESA MOU upon the closing of the sale to the same extent PG&E would have been.

There remains a small possibility that the federal agencies will not be in a position to issue the Section 10 Permits prior to closing due to unanticipated events that require reexamination of PG&E's permit application and related documents. The USFWS and NMFS are responsible for protecting special status species through the HCP process and issuance of incidental take permits. The HCP process is designed to ensure that the effects of the authorized incidental take will be minimized and mitigated. Upon transfer of the plants to a new owner, it is assumed that the federal agencies will continue to work diligently to complete the HCP process, finalize the Section 10 Permits for issuance to the new owner, and supervise the implementation of the HCP requirements. The fact that the new owner, rather than PG&E, was the permit applicant would not increase the delays unless the new owner did not continue PG&E's efforts to complete the

permitting process quickly or if the new owner seeks to make substantial changes to its permit applications. If absent divestiture PG&E would have received and complied with the Section 10 Permits earlier than the new owner receives and commences compliance with such permits, the delay caused by divestiture could cause a potential impact to protected species.

To address this potential delay if the Section 10 Permits are not issued prior to closing, PG&E is currently proposing, as a condition of closing the sale, that the new owner will resubmit PG&E's pending applications for the Section 10 Permits, including resubmitting the then-current draft Implementing Agreement and HCP, and will seek to obtain such permits on substantially the same terms and conditions as were contained in PG&E's permit applications.

Mitigation Measures Proposed as Part of Project

As a condition of closing the sale, the new owner will be required to obtain the reissuance of the Section 10 Permits issued to PG&E, and accept the permittee's obligations under the CESA MOU, the HCP and the Implementing Agreements. If the permits have not been issued to PG&E, the new owner will be required to resubmit and accept any obligations under, PG&E's pending applications for the Section 10 Permits, including the resubmittal of the then-current draft Implementing Agreement and HCP, and will seek to obtain such permits on substantially the same terms and conditions as were contained in PG&E's permit applications.

Monitoring Action: If the permits have been issued to PG&E, the CPUC will receive a copy of the letter to the permitting agencies *requesting* reissuance of the permit. If permits have not been issued, the new owners will provide CPUC a copy of the new owner's resubmission to the permitting agencies of PG&E's applications for the Section 10 Permits, along with the resubmission of the then-current draft of the Implementing Agreement and HCP, making only the changes necessary to reflect the new identity of the applicant.

Responsibility: CPUC

Timing: The appropriate letter should be provided to the CPUC at least forty days before the title transfer.

Mitigation Measures Identified in This Report

Mitigation Measure 4.7-2: If the Section 10 permits are not held by the new owner at closing (but have been issued to PG&E), the new owner of the Pittsburg and Contra Costa Power Plants will send a letter to the permitting agencies committing to the obligations listed in the preceding mitigation measure and state its intent to operate in the interim in accordance with their provisions. The letter will also state acceptance of the authority of the permitting agencies to enforce compliance with those obligations, and provide notification of these commitments to the plant managers.

Monitoring Action: The new owner will submit to the CPUC a copy of the documentation provided to the permitting agencies committing it to the measures stated above, and verification that copies were delivered to plant managers

Responsibility: CPUC

Timing: Documents should be provided to the CPUC at least forty days before the title transfer and the Section 10 Permits should be provided to CPUC when obtained.

Level of Significance after Mitigation: If the Section 10 Permits are not issued to the new owner prior to or at closing, the project may result in an unauthorized taking of listed species. The new owner's commitment to obtain the permits and to comply with the Operational Constraints during the interim period before they are issued will reduce this impact to Less than Significant.

Impact 4.7-3: Divestiture may result in impacts to locally designated species of concern and other aquatic organisms. (Less than Significant)

Locally designated aquatic species include Pacific herring and northern anchovy at the Potrero Power Plant, and striped bass at the Pittsburg and Contra Costa Power Plants. In addition, a variety of other fish and invertebrates at all three power plant sites have been identified as important species based on trophic interactions and their role within the Bay-Delta aquatic ecosystems. Many of these species would be susceptible to increased rates of entrainment and/or impingement mortality in the event that cooling water volumes were to increase in response to increased electrical generation as a result of divestiture. As noted previously, the cooling water volumes and discharge temperature limits for each of the power plants have been specified in the NPDES permits, which would be transferred to the new owners. These operating limits and criteria are particularly relevant to the Pittsburg and Contra Costa plants, where the RMP is identified as an integral part of the NPDES permits for both power plants, which were specifically designed to reduce entrainment losses of larval striped bass. Substantial changes in impacts to locally designated species are not anticipated based on (1) compliance by the new owners with the currently established NPDES permit requirements; (2) the sale of the Pittsburg and Contra Costa Power Plants as a unit to a single owner to allow coordinated operations as specified in the RMP; and (3) proposed additional regulatory constraints on operations associated with the HCP and state take authorization and federal take permits. Minor changes to the patterns and magnitude of cooling water system operations and discharge temperatures may occur with the proposed project; however, these would be limited by current permit conditions. Therefore, potential impacts to commercially or recreationally important species or other species important to the trophic dynamics and aquatic ecosystem of the Bay-Delta system are considered to be less than significant.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in This Report

None required.

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