

Chapter 6

Biological Resources—Wildlife

6.1 Environmental Setting

6.1.1 Introduction and Sources of Information

This chapter describes the wildlife resources in the project area. It includes regulatory, regional, and project settings to provide a context for analyzing the effects of the project. Information on existing conditions is derived from the following sources:

- *Baylands Ecosystem Species and Community Profiles: Life Histories and Environmental Requirements for Key Plants, Fish, and Wildlife* (Goals Project 2000);
- *Science Support for Wetland Restoration in the Napa-Sonoma Salt Ponds, San Francisco Bay Estuary, 2000 Progress Report* (Takekawa et al. 2000);
- *Napa Salt Ponds Biological Resources* (Lewis Environmental Services and Wetlands Research Associates 1992);
- *The Natural Resources of Napa Marsh; Coastal Wetland Series #19* (Madrone Associates 1977);
- *Status and Trends Report on Wildlife of the San Francisco Estuary* (U.S. Fish and Wildlife Service 1992);
- *Species List for the Napa River Salt Pond Restoration Project, Napa and Solano Counties, California (1-1-02-SP-0065)* (U.S. Fish and Wildlife Service 2001);
- *Rarefind2: California Natural Diversity Database* (California Department of Fish and Game 2001);
- *State of the Estuary* (Association of Bay Area Governments 1992); and
- *Draft Subsequent Environmental Impact Report, March 1986, Wastewater Reclamation and Disposal Facilities* (Landon, Wheeler, and Weinstein 1986);
- *Stanly Ranch Specific Plan Draft EIR* (Brady/LSA, August 1998); and

- Los Carneros Recycled Water Irrigation Pipeline Initial Study/Negative Declaration (Napa Sanitation District, January 11, 1995).

6.1.2 Regulatory Setting

Several state and federal agencies have regulatory authority or responsibility over project-related activities that affect biological resources. Table 6-1 summarizes project-related activities, the type of resource affected, and the government agency with regulatory authority over the activity.

Table 6-1. Summary of Regulatory Setting for Wildlife Resources

Project-Related Activity	Regulatory Authority
Alteration of stream channel, bed, or bank, including dredging or discharge of fill	DFG, permitting authority under Section 1601 (Lake or Streambed Alteration Agreement) of the California Fish and Game Code
Effects on species or the habitat of species listed or candidates for listing under ESA	USFWS and NMFS, formal consultation and permitting authority under Section 7 of ESA
Effects on species or the habitat of species listed or candidates for listing under CESA	DFG, consultation and permitting authority under Section 2081 of CESA
Effects on animals fully protected in California	DFG, permitting authority under California Fish and Game Code Sections 3511 [birds], 4700 [mammals], and 5050 [amphibians and reptiles], 5515 [fish]
Effects on birds of prey, their nests, and eggs	DFG, permitting authority under California Fish and Game Code Section 3503.5
Effects on other special-status species, including species of concern and CNPS-listed plants	DFG and USFWS, responsible agencies to review EIR

6.1.2.1 Federal

The regulatory setting for wildlife resources under the following is nearly the same as that described in Section 5.1.2.1 in Chapter 5, “Biological Resources—Vegetation”:

- ESA,
- CWA Section 404, and
- Executive Order 11990—Protection of Wetlands.

In addition, the federal regulatory requirements described below apply to wildlife resources.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC 661 *et seq.*) requires consultation with USFWS when the waters of any stream or other body of water are proposed, authorized, permitted, or licensed to be impounded, diverted, or otherwise controlled or modified under a federal permit or license. Most USFWS comments on applications for permits under Section 404 of the CWA or Section 10 of the RHA are conveyed to the Corps through the consultation process required by this coordination act.

USFWS provides advisory comments and recommends mitigation measures to avoid impacts on wetlands or modify activities that may directly affect wetlands. Mitigation recommended by USFWS may include restoring or creating habitat to avoid a net loss of wetland functions and values. Although consultation with USFWS is required, the Corps is not required to implement USFWS recommendations.

USFWS prepared a Planning Aid Report in 1997 and has prepared a Fish and Wildlife Coordination Act Report (CAR) that documents the habitat effects, including benefits, anticipated as a result of the proposed project and project options.

Migratory Bird Treaty Act and Executive Order 13186— Conservation of Migratory Birds

The MBTA (16 USC 703–711) prohibits the take of any migratory bird or any part, nest, or eggs of any such bird. Under the act, *take* is defined as pursuing, hunting, shooting, capturing, collecting, or killing, or attempting to do so. This act applies to all persons and agencies in the United States, including federal agencies. Construction of all project options would comply with provisions of the MBTA.

Executive Order 13186 (January 11, 2001) requires that any project with federal involvement address impacts of federal actions on migratory birds. The order is designed to assist federal agencies in their efforts to comply with the MBTA and does not constitute any legal authorization to take migratory birds. The order also requires federal agencies to work with USFWS to develop a memorandum of understanding (MOU). Protocols developed under the MOU must promote the conservation of migratory bird populations by

- avoiding and minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions;
- restoring and enhancing habitat of migratory birds, as practicable; and
- preventing or abating the pollution or detrimental alteration of the environment for the benefit of migratory birds, as practicable.

6.1.2.2 State

The regulatory setting for wildlife resources under the following is nearly the same as that described in Section 5.1.2.2 in Chapter 5, “Biological Resources—Vegetation”:

- CEQA,
- CESA,
- California State Wetlands Conservation Policy, ~~and~~
- RWQCBs-, and
- Fish and Game Code Section 1600 et seq.

In addition, the state regulatory requirements described below apply to wildlife resources.

California Fish and Game Code

Fully Protected Species

Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) identify fish and wildlife species for which DFG may not authorize take, except for scientific research; these species are collectively referred to as *fully protected* species. The four sections specify that

no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected [bird], [mammal], [reptile or amphibian], [or fish], and no such permits or licenses heretofore issued shall have any force or effect for any such purpose...

Sections 3503 and 3503.5

Section 3503 of the California Fish and Game Code specifies that

It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.

Section 3503.5 of the code specifies that

It is unlawful to take, possess, or destroy any birds in the orders 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.

~~Section 1600 et seq.~~

~~DFG has jurisdictional authority over wetland resources associated with rivers, streams, and lakes under California Fish and Game Code Sections 1600–1607. DFG has the authority to regulate all work under the jurisdiction of the State of~~

~~California that would substantially divert, obstruct, or change the natural flow of a river, stream, or lake; substantially change the bed, channel, or bank of a river, stream, or lake; or use material from a streambed. Activities of agencies that are project proponents are regulated under Section 1601. Activities of private individuals who are project proponents are regulated under Section 1603.~~

~~In practice, DFG marks its jurisdictional limit at the top of the stream or lake bank or the outer edge of the riparian vegetation, where present, and sometimes extends its jurisdiction to the edge of the 100-year floodplain. Because riparian habitats do not always support wetland hydrology or hydric soils, wetland boundaries, as defined by Section 404, sometimes include only portions of the riparian habitat adjacent to a river, stream, or lake. Therefore, jurisdictional boundaries under Section 1600 *et seq.* may encompass a greater area than that regulated under Section 404.~~

~~DFG enters into a lake or streambed alteration agreement with a project proponent and can impose conditions on the agreement to ensure that no net loss of wetland values or acreage will be incurred. The lake or streambed alteration agreement is not a permit, but rather a mutual agreement between DFG and the project proponent.~~

~~The project sponsors would prepare a lake or streambed alteration agreement for the proposed project.~~

6.1.2.3 Special-Status Species

Special-status wildlife species are legally protected under CESA and ESA or other regulations and are considered sufficiently rare by the scientific community to qualify for such listing. For the purpose of this report, the term *special-status wildlife* refers to species that

- are listed or proposed for listing as threatened or endangered under ESA (50 CFR 17.12 [listed plants], 50 CFR 17.11 [listed animals], and various notices in the *Federal Register* [proposed species]);
- are candidates for possible future listing as threatened or endangered under ESA (61 FR 40:7596–7613, February 28, 1996);
- are listed or proposed for listing as threatened or endangered under CESA (14 CCR 670.5);
- meet the definition of rare or endangered under CEQA (CEQA Guidelines, Section 15380) and for which certain impacts (e.g., removal of rookery habitat) could be considered significant under CEQA;
- are wildlife species of special concern (SSC) to DFG (Remsen 1978 [birds], Williams 1986 [mammals], Jennings and Hayes 1994 [amphibians and reptiles], and Moyle et al. 1995 [fish]);

- are wildlife species of concern (SC) to USFWS (this designation has no legal status; however, ~~NEPA~~ and CEQA requires that federal SCs be considered in environmental analyses);
- are animals fully protected in California (California Fish and Game Code, Sections 3511 [birds], 4700 [mammals], 5050 [reptiles and amphibians], and 5515 [fish]);
- are nesting raptors protected in California (California Fish and Game Code, Section 3503.5); and
- are mammals protected under the Marine Mammal Protection Act.

6.1.3 Regional Setting

The Napa River Unit is an integral part of the Bay-Delta estuary. It comprises approximately 1,600 square miles, drains more than 40% of the state, provides drinking water to 22 million people, and irrigates 4.5 million acres of farmland. The estuary provides habitat for a rich diversity of flora and fauna. Two-thirds of the state's salmon and nearly half the birds migrating along the Pacific Flyway pass through the Bay-Delta. A variety of unique endemic birds and small mammals, including the California clapper rail (*Rallus longirostris obsoletus*), California black rail (*Laterallus jamaicensis*), saltmarsh song sparrow (*Melospiza melodia*), and salt marsh harvest mouse (*Reithrodontomys raviventris*) also occur almost exclusively in this ecosystem.

The existing Bay-Delta estuary, however, is only a small remnant of a former vast aquatic ecosystem that once defined the bay, including a network of more than 80 islands and hundreds of miles of channels. Extensive land conversions during the Gold Rush of 1848 and in the more than 150 years since then have resulted in the loss of 85-90% of the Bay-Delta's historical wetlands. Hydraulic mining during the Gold Rush filled the rivers, bays, and marshes with more than 1 billion cubic yards of sediment. Subsequent reclamation of marshlands for agriculture and urban development has resulted in the loss of more than 750 square miles of tidal marsh. Construction of dams and diversion of water to cities and farms have also dramatically altered the hydrology and biology of the remaining wetlands. The existing level of contamination in the estuary today is also high enough to impair the health of the ecosystem (San Francisco Estuary Institute 2000a) and numerous introduced nonnative plants and animals now compete with the native flora and fauna for very limited resources.

6.1.4 Project Setting

The Napa River Unit borders the northern edge of San Pablo Bay and includes estuarine reaches of the Napa and Sonoma Rivers (see Figure 2-1). The area was historically all marsh and slough but was subsequently largely converted to commercial salt ponds. These ponds are still operative, but are no longer used to commercially produce salt. The 9,460-acre Napa River Unit consists of 7,190

acres of salt ponds and levees and 2,270 acres of fringing marsh, restored marsh, and sloughs. More than 150 wildlife species, including birds, mammals, reptiles, amphibians, and terrestrial invertebrates use the habitats of the Napa River Unit. The areas to the north and east of the Napa River Unit, within which the Sonoma Pipeline, Napa Pipeline, and CAC Pipeline are proposed for the Water Delivery Option, include many of the same wildlife species as the marsh plus wildlife species associated with the grassland, agricultural, and ruderal habitats that occur outside the marsh. The habitats in the Napa River Unit and nearby areas to the northwest and east and biological descriptions of the representative wildlife species that use them are presented below.

6.1.4.1 Habitats and Species

Wildlife habitats and species in the project area include open water, salt evaporation ponds, mudflats, levees, vegetated and unvegetated tidal marsh, disturbed marsh/leveed baylands, seasonal wetlands, windbreaks, human-made structures, and uplands.

The Napa River Unit includes mostly open water, salt ponds, mudflats, levees, and tidal marsh habitats. The study areas of the pipelines currently proposed for the Water Delivery Option span or parallel portions of the Hudeman Slough Mitigation and Enhancement Wetlands (HSMEW) (see Section 5.1.4, “Project Setting,” in Chapter 5), the Ringstrom Bay and Huichica Creek Units of the NSMWA, and portions of the City of American Canyon sphere of influence and include three habitat types: disturbed marsh/leveed baylands, seasonal wetlands, and upland.

Open Water

Open-water habitat is the habitat that contains water year-round, typically of depths more than 3 feet, and is rich in phytoplankton and zooplankton that provide food for birds, fish, and benthic invertebrates. San Pablo Bay, the Napa River, and the major sloughs in the project site contain open-water habitat.

San Francisco Bay, including San Pablo Bay and the Napa River Unit, is one of the most important staging areas and wintering areas for Pacific Flyway migratory waterfowl. Hundreds of thousands of birds use the San Francisco Bay area annually. Canvasback (*Aythya valisineria*), greater and lesser scaup (*Aythya affini*, *A. marila*), and ruddy duck (*Oxyura jamaicensis*) are the most abundant waterfowl in the project area. Between January 1999 and November 2000 more than 280,000 birds were recorded using the salt ponds. Canvasbacks are an important species in the area because a substantial portion of their population winters in San Francisco Bay. Approximately 25% of all canvasbacks in North America are found along the Pacific Flyway in January, and the majority of these are found in San Francisco Bay and its associated marshes and estuaries (Carter et al. 1990).

Salt Ponds

While no longer used to commercially make salt, the salt ponds still retain a gradient of salt concentrations representative of the former conditions in the ponds. At certain times of the year, these conditions favor establishment of large populations of invertebrates and phytoplankton that, in turn, support a rich diversity (80 species) of birds in some of the ponds with less saline conditions. The types of birds that use the ponds are correlated with the water depth, salinity, and sizes of the ponds. In shallow ponds, shorebirds including American avocet (*Recurvirostra americanus*), black-bellied plover (*Pluvialis squatarola*), black-necked stilt (*Himantopus mexicanus*), and willet (*Catoptrophorus semipalmatus*) and dabbling ducks predominate; in deeper ponds, diving ducks such as scaup, common goldeneye (*Bucephala clangula*), bufflehead (*B. albeola*), and ruddy duck are more prevalent. In ponds with low salinity (15–50 ppt), pelicans, terns, cormorants, egrets, and dabbling and diving ducks are common. In ponds with higher salinity (75–200 ppt), grebes, phalaropes, plovers, gulls, and diving ducks are common. Water depth and salinity also affect fish and invertebrate populations; these factors are discussed in Chapter 7, “Biological Resources—Aquatic Resources.”

Mudflats

The mudflats of San Francisco Bay, including San Pablo Bay and the Napa River Unit, are important foraging and resting habitats for many species of migratory and wintering shorebirds and waterfowl. The bay mudflats are composed of fine-grained silts and clays and are found along the bay/Napa River side of perimeter saltmarsh habitat that is outboard of the pond levees. They are exposed twice daily during low tide and extend from approximately 3 feet below ~~MSL~~ MTL to 1 foot above ~~MSL~~ MTL. Narrow bands of mudflat are also found at the same elevations along margins of subtidal channels in the tidal marshes. The mudflats are largely barren of vegetation, with limited benthic algae, but support a rich invertebrate fauna that provides food for both shorebirds and waterfowl. Shorebirds that typically use these mudflats include long-billed curlew (*Numenius americanus*), marbled godwit (*Limosa fedoa*), dunlin (*Calidris alpina*), least and western sandpiper (*Calidris minutilla*, *C. mauri*), and long-billed and short-billed dowitcher (*Limnodromus scolopaceus*, *L. griseus*) (Small 1994). A variety of dabbling ducks, diving ducks, and terns also roost on mudflats during low tide. Mudflats adjacent to tidal marshes are important foraging habitat for a number of special-status species including the California clapper rail, California black rail, and San Pablo song sparrow (*Melospiza melodia samuelis*).

Levees

Levees enclose all of the ponds in the project area. These human-made structures provide important upland nesting, refuge, and resting habitat for a diversity of birds, including American avocet, black-necked stilt, Caspian tern (*Hydroprogne*

caspia), gulls, and various waterfowl. The western burrowing owl (*Athene cunicularia hypugea*), a federal and state species of concern, occasionally uses levees in the upland transition region for nesting. The levees are also used by some reptiles, such as the western fence lizard (*Sceloporus occidentalis*), small mammals, and ground-feeding granivorous passerines such as the white-crowned sparrow (*Zonotrichia leucophrys*).

Tidal Marsh

Existing tidal marsh habitat is limited in the project area, occurring mostly south of SR 37. Tidal marsh habitat in the project area outside of Pond 2A is restricted to “fringe marsh” habitat (i.e., between the levees and slough channels), largely on accreted sediments. However, many acres of this habitat would be restored with implementation of the project. This habitat can be divided into three distinct zones based on the frequency and duration of tidal inundation:

- *Lower marsh* occupies the elevations between MTL and MHW (3.3–5.5 feet NAVD 88) and is inundated daily. This habitat is generally dominated by California cord grass ~~and bulrush~~.
- *Middle marsh* occupies the elevations between MHW and MHHW (5.5–6.0 feet NAVD 88) and is dominated by common pickleweed ~~and some bulrush~~. The marshplain is inundated frequently throughout each month, but for shorter periods than is lower marsh.
- *Upper (high transitional) marsh* occupies the elevations between MHHW and the highest tide level (>6.0 feet NAVD 88). This habitat is inundated infrequently and for short periods during higher high tides. It occurs primarily as a narrow strip along the bayside of the levees and supports plant species that are tolerant of saline conditions but not adapted to frequent, long-term inundation, ~~including saltgrass, alkali heath, fat hen, saltplant, and gumplant.~~

The tidal marsh community provides food, cover, and breeding habitat for numerous marsh-dependent wildlife species. The dense vegetation and large invertebrate populations typically associated with salt marshes provide ideal nesting and foraging conditions for a variety of bird species, including rails, egrets, herons, waterfowl, and shorebirds. In addition to being important habitat for wetland-associated wildlife, the salt marshes are also a crucial component of the San Pablo Bay ecosystem, providing nutrients and organic matter to the mudflats and open water of the bay. These in turn are important habitats for a variety of waterfowl, shorebirds, and other waterbirds as described above. Wildlife species characteristic of the marshlands in the project area include double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), American coot (*Fulica americana*), killdeer (*Charadrius vociferus*), northern harrier (*Circus cyaneus*), and San Pablo song sparrow. Other species that probably use the marshes include raccoon (*Procyon lotor*), mallard (*Anas platyrhynchos*), sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), and willet.

Disturbed Marsh/Leveed Baylands

The marsh areas of the north bay region have often been leveed to create additional land, primarily for agriculture. These areas are considered disturbed marsh and continue to exist as several subhabitats, including reclaimed marsh, leveed seasonal marsh, and leveed permanent marsh. These vegetation communities provide habitat for invertebrates such as the blood worm and crayfish; fish such as the mosquitofish and carp; waterfowl, shorebirds, wading birds, and raptors; reptiles such as the western pond turtle (*Clemmys marmorata*), gopher snake (*Pituophis melanoleucus*), and garter snake; amphibians such as the Pacific treefrog (*Pseudacris regilla*) and bullfrog (*Rana catesbeiana*); and mammals such as the salt marsh harvest mouse, deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), Norway rat (*Rattus norvegicus*), black-tailed jackrabbit (*Lepus californicus*), opossum (*Didelphis virginiana marsupialis*), skunk, coyote (*Canis latrans*), California vole (*Microtus californicus*), ornate shrew (*Sorex ornatus*), and gray fox (*Urocyon cinereoargenteus*).

Seasonal Wetlands

Seasonal wetlands function as wetlands during the rainy season and uplands during the dry season. They typically form in shallow depressions throughout the area. Seasonal wetlands are frequently found along road and railroad corridors where adjacent swales and drainage ditches are created to aid in controlling stormwater runoff. Invertebrate species such as brine shrimp, seed shrimp, copepods, and water fleas are adapted to the parched-to-flood hydrologic regime exhibited by seasonal wetlands. During the dry season, the seasonal wetlands essentially function as uplands for vertebrates.

Numerous species are commonly found in wetlands and ponds along the Sonoma Pipeline route. These include greater scaup duck, ruddy duck, Canada goose (*Branta canadensis*), mallard, gadwall (*Anas strepera*), northern pintail (*Anas acuta*), green-winged teal (*Anas crecca*), northern shoveler (*Anas clypeata*), cinnamon teal (*Anas cyanoptera*), American avocet, black-necked stilt, long and short-billed dowitchers, greater yellowlegs (*Tringa melanoleuca*), godwit, long-billed curlew, and killdeer.

Western and least sandpipers (*Calidris mauri*, *C. minutilla*) are observed during the fall and winter. Bufflehead, eared grebe (*Podiceps nigricollis*), pied-billed grebe (*Podilymbus podiceps*), double-crested cormorant, and ring-necked ducks are often observed in deeper ponds, particularly in the winter months.

The American coot can be found in substantial numbers at the HSMEW (Kirven Associates 1996). Black rails can be found in the Petaluma Marsh. There is potential habitat for clapper and black rails along both proposed pipelines. Virginia rails occur at Ringstrom Bay and Huichica Creek.

The HSMEW also provides sightings of American and lesser goldfinches (*Carduelis tristis*, *C. psaltria*); barn, cliff, and violet-green swallows (*Hirundo rustica*, *Petrochelidon pyrrhonota*, *Tachycineta thalassina*); black and Say's phoebes (*Sayornis nigricans*, *S. saya*); common yellowthroat (*Geothlypis trichas*); house finch (*Carpodacus mexicanus*); loggerhead shrike (*Lanius ludovicianus*); marsh wren (*Cistothorus palustris*); northern mockingbird (*Mimus polyglottos*); savannah and song sparrows (*Passerculus sandwichensis*, *Melospiza melodia*); western kingbird (*Tyrannus verticalis*); western meadowlark (*Sturnella neglecta*); American pipit (*Anthus rubescens*); ring-necked pheasant (*Phasianus colchicus*); mourning dove (*Zenaida macroura*); horned lark (*Eremophila alpestris*); and Brewer's, red-winged, and tri-colored blackbirds (*Euphagus cyanocephalus*, *Agelaius phoeniceus*, *A. tricolor*) (Kirven Associates 1996).

Possible reptile and amphibian inhabitants in the HSMEW grassland include western fence lizard, southern alligator lizard (*Elgaria multicarinatus*), gopher snake, common kingsnake (*Lampropeltis getulus*), and common garter snake. Reptile and amphibian species present in the grasslands along the Napa Pipeline alignment include western fence lizard, western skink (*Eumeces skiltonianus*), southern alligator lizard, common kingsnake, common garter snake, gopher snake, western toad (*Bufo boreas*), and sometimes the northwestern pond turtle (*Clemmys marmorata marmorata*) (Envicom Corp. 1994).

Windbreaks and Human-Made Structures

Windbreaks are linear or grouped plantings of trees that were intended to provide protection from high winds. Although they are not a naturally occurring habitat, they provide additional habitat diversity in the project area that is used for nesting and shelter by a variety of resident and migrating birds. They are composed of eucalyptus trees on Pond 5 and between Ponds 2 and 6, and provide nesting habitat for double-crested cormorant and herons (Madrone Associates 1977). These trees may also provide nesting habitat and foraging perches for different raptors including red-shouldered hawk (*Buteo lineatus*), American kestrel (*Falco sparverius*), white-tailed kite (*Elanus leucurus*), and great horned owl (*Buteo virginianus*). Human-made structures such as pump houses and outbuildings found in the project area may also offer protection to nesting barn owl (*Tyto alba*), swallows (*Hirundinidae*), black phoebe, and roosting bats.

Upland

Grassland/Agricultural/Ruderal

Most of the upland habitat within the north bay region has been converted to agriculture, including oat hay, pastureland, and more recently, vineyards. These areas support a mixture of native and nonnative vegetation in the form of annual grasses, herbs, and wildflowers, along with oat hay and grapevines. A variety of wildlife can be found within grassland and agricultural uplands. Reptile species include the gopher snake, common kingsnake, garter snake, rattlesnake, western pond turtle, western skink, southern alligator lizard, and western fence lizard.

Amphibian species include western toad, Pacific treefrog, and bullfrog. Birds may include California quail (*Callipepla californica*), killdeer, Brewer's blackbird, red-winged blackbird, cattle egret (*Bubulcus ibis*), turkey vulture (*Cathartes aura*), red-tailed hawk, pheasant, dove, crow, raven, house finch, and western meadowlark. Trees, especially in the form of eucalyptus windrows, provide valuable habitat for raptors. Mammals may include black-tailed jackrabbit, cottontail, pocket gopher, deer mouse, house mouse, California vole, California ground squirrel (*Spermophilus beecheyi*), and mule deer (*Odocoileus hemionus*), as well as the following predators: coyote, fox, bobcat (*Lynx rufus*), raccoon, opossum, and skunk.

Raptors appearing during surveys within the HSMEW include the American kestrel, white-tailed kite, northern harrier, barn owl, short-eared owl, and red-tailed hawk (Kirven Associates 1996). In the winter it is not unusual to observe burrowing owl, juvenile golden eagles (*Aquila chrysaetos*), prairie and peregrine falcons (*Falco mexicanus*, *F. peregrinus*), and merlins (*F. columbarius*) in this same area.

Grasslands along the Napa Pipeline alignment serve as habitat for burrowing owl, turkey vulture, northern harrier, American kestrel, white-tailed kite, prairie falcon, horned lark, western meadowlark, and numerous songbirds (Envicom Corp. 1994).

Mammal species observed at the HSMEW include the California vole, western harvest mouse, house mouse, opossum, raccoon, coyote, black-tailed jackrabbit, and mule deer (Kirven Associates 1996). Mammal species with habitat in the grasslands along the Napa Pipeline alignment include brush rabbit, black-tailed jackrabbit, California ground squirrel, Botta's pocket gopher (*Thomomys bottae*), western harvest mouse, California vole, long-tailed weasel (*Mustela frenata*), coyote, and mule deer (Envicom Corp. 1994). Similar common wildlife are found in the upland/grassland habitat adjacent to the CAC pipeline.

6.1.4.2 Special-Status Wildlife

Numerous special-status wildlife species have been documented to occur, or have the potential to occur, in the project area and in suitable habitat types in the vicinity of the project area. These species are listed in Table 6-2 along with their listing status, geographic distribution, habitat requirements, and potential to be affected by the project. Biological information on those species for which there is a potential for adverse impact from the proposed project alternatives is presented below.

6.1.4.3 Aquatic Invertebrates

Information on the status and biology of special-status aquatic invertebrates known to occur, or with potential to occur, in the project area is presented in Chapter 7, "Biological Resources—Aquatic Resources."

Table 6-2. Special-Status Wildlife Species with Potential to Occur in the Project Area and Vicinity

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Invertebrates							
Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	T/--		Central Valley, central and south Coast Ranges from Tehama County to Santa Barbara County; isolated populations also in Riverside County	Common in vernal pools; also found in sandstone rock outcrop pools	Habitat loss to agricultural and urban development	Moderate—one CNDDDB record from Napa County Airport in 2000	No
California freshwater shrimp <i>Syncaris pacifica</i>	E/E		Coastal lowland streams in Napa, Marin, and Sonoma Counties	Streams	Introduced predators, summer dam construction, instream gravel mining	None	No
Vernal pool tadpole shrimp <i>Lepidurus packardii</i>	E/--		Shasta County south to Merced County	Vernal pools and ephemeral stock ponds	Habitat loss to agricultural and urban development	Low	No
Monarch butterfly (wintering sites) <i>Danaus plexippus</i>	--/--		Throughout California	Overwinters in coastal Monterey pine, Monterey cypress, and eucalyptus groves in California	Habitat loss and alteration	Moderate—roosting habitat only	No
Callippe silverspot butterfly <i>Speyeria callippe callippe</i>	E/--		San Bruno Mountain, San Mateo County; and a single location in Alameda County	Open hillsides where wild pansy (<i>Viola pendunculata</i>) grows; larvae feed on Johnny jump-up plants, whereas adults feed on native mints and nonnative thistles	Habitat loss and alteration	Low	No
Myrtle's silverspot butterfly <i>Satyrrium auretorum fumosum</i>	E/--		Historically known from San Mateo County north to the mouth of the Russian River in Sonoma County. No butterflies have been observed recently at the known population sites near Pacifica and San Mateo in San Mateo County	Inhabits coastal terrace prairie, coastal bluff scrub, and associated nonnative grassland habitats where the larval foodplant, <i>Viola</i> sp. occurs	Habitat loss and alteration	Low	No

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Opler's longhorn moth <i>Adela opleri</i>	SC/--		Marin County and Oakland area on the inner Coast Ranges south to Santa Clara County. One record from Santa Cruz County	Serpentine substrates that support the host plant, cream cups (<i>Platystemon californicus</i>)	Habitat loss and alteration	Low	No
Fish—see “Biological Resources—Aquatic Resources” chapter							
Amphibians							
California red-legged frog <i>Rana aurora draytoni</i>	T/SSC		Found along the coast and coastal mountain ranges of California from Marin County to San Diego County; Sierra Nevada (middle elevations [above 1,000 feet] from Butte County to Fresno County)	Permanent and semipermanent aquatic habitats, such as creeks and coldwater ponds, with emergent and submergent vegetation and riparian species along the edges; may estivate in rodent burrows or cracks during dry periods	Loss and degradation of habitat from development, livestock grazing, and recreational activity; introduction of exotic predators	Moderate—designated critical habitat west of study area	No
Reptiles							
Northwestern pond turtle <i>Clemmys marmorata marmorata</i>	SC/SSC		In California, range extends from Oregon border of Del Norte and Siskiyou Counties south along coast to San Francisco Bay, inland through Sacramento Valley, and on the western slope of Sierra Nevada; range overlaps with that of southwestern pond turtle through the Delta and Central Valley to Tulare County	Woodlands, grasslands, and open forests; occupies ponds, marshes, rivers, streams, and irrigation canals with muddy or rocky bottoms and with watercress, cattails, water lilies, or other aquatic vegetation	Loss and alteration of aquatic and wetland habitats, habitat fragmentation	Low	No

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Birds							
White-faced ibis (rookery site) <i>Plegadis chihi</i>	SC/SSC		Both resident and winter populations on the Salton Sea and in isolated areas in Imperial, San Diego, Ventura, and Fresno Counties; breeds at Honey Lake (Lassen County), at Mendota Wildlife Management Area (Fresno County), and near Woodland (Yolo County)	Prefers freshwater marshes with tules, cattails, and rushes, but may nest in trees and forage in flooded agricultural fields, especially flooded rice fields	Has declined in California and stopped breeding regularly, probably from destruction of extensive marshes required for nesting	None	No
Double-crested cormorant (nesting colony) <i>Phalacrocorax auritus</i>	--/SSC		Winters along the entire California coast and inland over the Coast Ranges into the Central Valley from Tehama County to Fresno County; a permanent resident along the coast from Monterey County, and the islands off San Francisco; also breeds in the San Francisco Bay area and in Yolo and Sacramento Counties	Rocky coastlines, beaches, inland ponds, and lakes; needs open water for foraging, and nests in riparian forests or on protected islands, usually in snags	Loss of coastal and riparian breeding sites, human disturbance	High	No
American bittern <i>Botaurus lentiginosus</i>	SC/--		Breeds throughout length of the state, west of the Sierra Nevada, and in suitable habitat in southern portion of its range	Freshwater marshes, and occasionally salt marsh	Population has declined from draining of marshes, human disturbance, and pesticides (Arbib 1979); overgrazing of emergent vegetation also is detrimental	Moderate	No
Great egret (rookery) <i>Ardea alba</i>	—/—		Breeds the entire length of the state, withdrawing from northeastern portions in winter	Coastal salt and freshwater marshes and lagoons, mudflats, river and lake margins	Intrusions of humans into nesting colonies often cause parents to desert nests; many former nesting colonies have been abandoned. Wetland drainage has markedly reduced available habitat	High	No

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Snowy egret (rookery) <i>Egretta thula</i>	—/—		Occurs over most of the state, less commonly in the northern portions	Coastal lagoons, saltwater marshes, bays, estuaries, freshwater marshes, lakes, rivers, and streams.	At Salton Sea, numbers of nesting individuals have declined, apparently from competition with cattle egrets for nest sites. Probably similar to the great egret: highly sensitive to human intrusions into nesting colonies, and to pesticides	High	No
Black crowned night heron (rookery) <i>Nycticorax nycticorax</i>	—/—		Breeds over the length of the state	Saltwater and freshwater marshes	Corvidae and other predators eat eggs. Numbers have been reduced from drainage of marshes and swamps, and cutting of trees, but this species is more adaptable and persistent than most other ardeids	High	No
Great blue heron (rookery) <i>Ardea herodias</i>	—/—		Breeds the entire length of the state. Does not breed in eastern portion of state except Salton Sea and Colorado River area	Saltwater and freshwater marshes, estuaries, mudflats, freshwater lakes, and rivers	Sensitive to human disturbance near nests, and probably to pesticides and herbicides in nesting and foraging areas. Populations in California increased between 1970 and 1978	High—two documented rookeries in study area	No
White-tailed kite <i>Elanus leucurus</i>	--/FP		Lowland areas west of Sierra Nevada from head of Sacramento Valley south, including coastal valleys and foothills to western San Diego County at the Mexico border	Low foothills or valley areas with valley or live oaks, riparian areas, and marshes near open grasslands for foraging	Loss of grassland and wetland habitats to agriculture and urban development	High	No
Ferruginous hawk <i>Buteo regalis</i>	SC/SSC		Does not nest in California; winter visitor along the coast from Sonoma County to San Diego County, eastward to the Sierra Nevada foothills and southeastern deserts, the Inyo-White Mountains, the plains east of the Cascade Range, and Siskiyou County	Open terrain in plains and foothills where ground squirrels and other prey are available	Young may be preyed upon by golden eagles and great horned owls. Competes with the numerous avian and mammal species that prey upon small mammals.	Low—winter foraging only	No

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Northern harrier <i>Circus cyaneus</i>	--/SSC		Throughout lowland California; has been recorded in fall at high elevations	Grasslands, meadows, marshes, and seasonal and agricultural wetlands providing tall cover	Loss of habitat to agricultural and urban development	High	Yes
Merlin <i>Falco columbarius</i>	--/SSC		Does not nest in California; rare but widespread winter visitor to the Central Valley and coastal areas	Forages along coastlines, open grasslands, savannas, and woodlands; often forages near lakes and other wetlands	Unclear; possibly chemical contamination and illegal take of young	High—winter migrant only	No
Black rail <i>Laterallus jamaicensis coturniculus</i>	SC/T		Permanent resident in the San Francisco Bay area and eastward through the Delta into Sacramento and San Joaquin Counties; small populations in Marin, Santa Cruz, San Luis Obispo, Orange, Riverside, and Imperial Counties	Tidal salt marshes associated with heavy growth of pickleweed; also occurs in brackish marshes or freshwater marshes at low elevations	Loss of wetland habitat	High	Yes
California clapper rail <i>Rallus longirostris obsoletus</i>	E/E		Marshes around the San Francisco Bay area and east to Suisun Marsh	Restricted to salt marshes and tidal sloughs; usually associated with heavy growth of pickleweed; feeds on mollusks removed from the mud in sloughs	Loss of wetland habitat and predation by nonnative predators, shooting	High	Yes
Western snowy plover (coastal populations) <i>Charadrius alexandrinus nivosus</i> (nesting)	T/SSC (Coastal)		Population defined as those birds that nest adjacent to or near tidal waters, including all nests along the mainland coast, peninsulas, offshore islands, and adjacent bays and estuaries. Twenty breeding sites are known in California from Del Norte to San Diego County	Coastal beaches above the normal high-tide limit in flat, open areas with sandy or saline substrates; vegetation and driftwood are usually sparse or absent	Human disturbance on nesting beaches, feral animal and nonnative predator disturbance, loss of habitat	High	Yes

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Long-billed curlew <i>Numenius americanus</i>	--/SSC		Nests in northeastern California in Modoc, Siskiyou, and Lassen Counties. Winters along the coast and in interior valleys west of Sierra Nevada	Nests in high-elevation grasslands adjacent to lakes or marshes. During migration and in winter, frequents coastal beaches and mudflats and interior grasslands and agricultural fields	Breeding range has retracted considerably in the last 80 years, but western populations have not decreased as much as those in eastern U.S.	High—foraging only	No
Caspian tern (nesting colony) <i>Sterna caspia</i>	—/—		Nesting colonies are located at south San Francisco Bay, San Diego Bay, and several lakes in Modoc and Lassen Counties; small colonies recently reported on Humboldt Bay, San Pablo Bay, and Elkhorn Slough (Monterey County)	Nests in dense colonies on sandy estuarine shores, on levees in salt ponds, and on islands in alkali and freshwater lakes	Nest predation	Moderate—historical breeder in area, current summer migrant only	Yes
Short-eared owl <i>Asio flammeus</i>	--/SSC		Permanent resident along the coast from Del Norte County to Monterey County although very rare in summer north of San Francisco Bay, in the Sierra Nevada north of Nevada County, in the plains east of the Cascades, and in Mono County; small, isolated populations	Freshwater and salt marshes, lowland meadows, and irrigated alfalfa fields; needs dense tules or tall grass for nesting and daytime roosts	Predators include great horned owls, golden eagles, snowy owls, and peregrine falcons. Small, predatory mammals and large reptiles may prey upon young and eggs. Competitors include northern harriers, gulls, barn owls, and other large owls	High—foraging only	No
Western burrowing owl <i>Athene cunicularia hypugea</i>	SC/SSC		Lowlands throughout California, including the Central Valley, northeastern plateau, southeastern deserts, and coastal areas; rare along south coast	Level, open, dry, heavily grazed or low-stature grassland or desert vegetation with available burrows	Loss of habitat, human disturbance at nesting burrows	Low—documented from Tubbs Island	No

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Vaux's swift <i>Chaetura vauxi</i>	--/SSC		Coastal belt from Del Norte County south to Santa Cruz County and in mid-elevation forests of the Sierra Nevada and Cascade Range	Nests in hollow, burned-out tree trunks in large conifers	Sometimes heavily parasitized by lice, which can cause considerable mortality	High—foraging only	No
Willow flycatcher <i>Empidonax traillii</i>	SC/E		Summers along the western Sierra Nevada from El Dorado to Madera County, in the Cascade and northern Sierra Nevada in Trinity, Shasta, Tehama, Butte, and Plumas Counties, and along the eastern Sierra Nevada from Lassen to Inyo County	Riparian areas and large wet meadows with abundant willows. Usually found in riparian habitats during migration	Frequently parasitized by brown-headed cowbird. Formerly bred commonly in willow thickets throughout most of lowland and montane California, but numbers have declined drastically in recent decades because of cowbird parasitism and habitat destruction. Heavy grazing of willows by livestock apparently reduces numbers	Moderate	No
Salt marsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	SC/SSC		Found only in the San Francisco Bay area in Marin, Napa, Sonoma, Solano, San Francisco, San Mateo, Santa Clara, and Alameda Counties	Freshwater marshes in summer and salt or brackish marshes in fall and winter; requires tall grasses, tules, and willow thickets for nesting and cover	Loss of marsh breeding habitat	High	Yes
San Pablo song sparrow <i>Melospiza melodia samuelis</i>	SC/SSC		Found in San Pablo Bay area	Uses tidal sloughs in pickleweed marshes; requires tall bushes (usually grindelia) along sloughs for cover, nesting, and songposts; forages over mudbanks and in the pickleweed	Loss of marsh breeding habitat	High	Yes

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Tricolored blackbird <i>Agelaius tricolor</i>	SC/SSC		Largely endemic to California; permanent residents in the Central Valley from Butte County to Kern County; at scattered coastal locations from Marin County south to San Diego County; breeds at scattered locations in Lake, Sonoma, and Solano Counties; rare nester in Siskiyou, Modoc, and Lassen Counties	Nests in dense colonies in emergent marsh vegetation, such as tules and cattails, or upland; probably requires water at or near the nesting colony; requires large foraging areas, including marshes, pastures, agricultural wetlands, dairies, and feedlots, where insect prey is abundant	Loss of wetland and upland breeding habitats from conversion to agriculture and urban development and to water development projects, pesticides contamination, human disturbance of nesting colonies	Moderate— foraging only	Yes
California horned lark <i>Eremophila alpestris</i>	SSC		Found throughout California, but less common in mountain regions and on the North Coast	Common in a variety of open habitats with sparse vegetation. Found from grasslands along the coast and deserts near sea level to alpine dwarf-shrub habitat above treeline. Migrates to lower elevations in the winter and from out of state.	Loss of habitat	High	Yes

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Mammals							
Pale Townsend's (=western) big-eared bat <i>Corynorhinus townsendii pallescens</i>	SC/SSC		Klamath Mountains, Cascades, Sierra Nevada, Central Valley, Transverse and Peninsular Ranges, Great Basin, and the Mojave and Sonora Deserts	Mesic habitats; gleans insects from brush or trees and feeds along habitat edges	This species is extremely sensitive to disturbance of roosting sites. A single visit may result in abandonment of the roost. All known nursery colonies in limestone caves in California apparently have been abandoned. Numbers reportedly have declined steeply in California	Moderate— foraging only	No
Pacific Townsend's (=western) big-eared bat <i>Corynorhinus townsendii townsendii</i>	SC/SSC		Coastal regions from Del Norte County south to Santa Barbara County	Roosts in caves, tunnels, mines, and dark attics of abandoned buildings. Very sensitive to disturbances and may abandon a roost after one on-site visit	This species is extremely sensitive to disturbance of roosting sites. A single visit may result in abandonment of the roost. All known nursery colonies in limestone caves in California apparently have been abandoned. Numbers reportedly have declined steeply in California	Moderate— foraging only	No
Yuma myotis <i>Myotis yumanensis</i>	SC/--		Common and widespread throughout most of California except the Colorado and Mojave deserts	Found in a wide variety of habitats from sea level to 11,000 feet, but uncommon above 8,000 feet. Optimal habitat is open forests and woodlands near water bodies	Sensitive to human disturbance of roosts, loss of habitat, and pesticides	Moderate— foraging only	No

Table 6-2. Continued

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/State						
Pallid bat <i>Antrozous pallidus</i>	--/SSC		Occurs throughout California except the high Sierra from Shasta to Kern County and the northwest coast, primarily at lower and middle elevations	Occurs in a variety of habitats from desert to coniferous forest. Most closely associated with oak, yellow pine, redwood, and giant sequoia habitats in northern California and oak woodland, grassland, and desert scrub in southern California. Relies heavily on trees for roosts	Very sensitive to disturbance of roosting sites. Such sites are essential for metabolic economy and juvenile growth and as night roosts to consume prey	Moderate— foraging only	No
Greater western mastiff bat <i>Eumops perotis californicus</i>	SC/SSC		Occurs along the western Sierra primarily at low to middle elevations and widely distributed throughout the southern coast ranges. Recent surveys have detected the species north to the Oregon border	Found in a wide variety of habitats from desert scrub to montane conifer. Roosts and breeds in deep, narrow rock crevices, but may also use crevices in trees, buildings, and tunnels	Sensitive to human disturbance of roosts, loss of habitat, and pesticides	Moderate— foraging and possible roosting in buildings	No
Suisun ornate shrew <i>Sorex ornatus sinuosus</i>	SC/SSC		Restricted to tidal marshes of the northern shores of San Pablo and Suisun Bays, both in Solano County	Tidal, salt, and brackish marshes containing pickleweed, grindelia, bulrushes, or cattails; requires driftwood or other objects for nesting cover	Loss of habitat, limited range and restricted habitat	Moderate—most recent CNDDDB record in the area is from 1983	Yes
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	E/E		San Francisco, San Pablo, and Suisun Bays	Salt marshes with a dense plant cover of pickleweed and fat hen; adjacent to an upland site	Habitat loss to urban development and salt production	High	Yes

Common and Scientific Name	Status ^a		California Distribution	Habitats	Reason for Decline	Likelihood of Occurrence in Study Area	Potential for Adverse Project Effect
	Federal/	State					
^a Status explanation: Federal: FE = Federally listed as endangered FS = U.S. Forest Service sensitive species FT = Federally listed as threatened SC = Species of concern -- = No listing State: FP = State fully protected SE = State-listed as endangered SSC = Species of special concern ST = State-listed as threatened -- = No listing							

6.1.4.4 Terrestrial Invertebrates

Little is known about the terrestrial invertebrates in the Napa River Unit. No special-status invertebrates have documented occurrences in the project area. However, suitable roosting habitat for the migrating monarch butterfly (*Danaus plexippus*) is found in the eucalyptus trees on-site. However, this habitat should not be affected by proposed restoration actions for any of the alternatives.

6.1.4.5 Fish

Information on the status and biology of special-status fish known to occur, or with potential to occur, in the project area is presented in Chapter 7, “Biological Resources—Aquatic Resources.”

6.1.4.6 Amphibians and Reptiles

Little is known about the amphibians and reptiles that occur, or could occur, in the Napa River Unit. The brackish and saline waters on-site are generally unsuitable for the red-legged frog (*Rana aurora draytoni*). The western pond turtle is not likely to occur in the project area for the same reason (Lewis Environmental Services and Wetland Research Associates 1992), although they could potentially be washed into the area during flood events (Wyckoff pers. comm.).

6.1.4.7 Birds

Caspian Tern (Nesting Colony)

Caspian tern is a migrant and summer visitor that forages primarily over the salt ponds in the project area. This species is known to nest on salt pond levees and islands in the San Francisco Bay area (Goals Project 2000). Historically, breeding colonies of Caspian terns have been recorded in the project area. However, this species is currently only a summer migrant to the area.

Northern Harrier

Northern harrier is a state species of special concern. It winters in and forages over marsh and grassland near the project area. Northern harriers are known to breed in the project area (Swanson pers. comm.).

California Black Rail

The California black rail is a state-listed threatened species and a federal species of concern. This species prefers pickleweed-dominated marsh habitat but also

occurs in freshwater and brackish marshes (Evens et al. 1991). Preferred breeding habitat includes areas of mature, higher-elevation marshes dominated by *Scirpus* and pickleweed. The species' reliance on tidally influenced, vegetated, elevated saltmarsh habitat makes it a valuable indicator species of mature, upper tidal marsh habitat (Goals Project 2000). California black rail occurs at a number of sites in the San Francisco Bay area, perhaps more concentrated in the northern part of the bay. The species will nest in higher areas of freshwater marshes, wet meadows, and salt marshes (Eddleman et al. 1994). Surveys conducted in 1976 (Manolis 1977) and 1988 (Evens et al. 1988) indicate that California black rails occur in the Napa River Unit. Indices of rail abundance (rails per census station) ranged from 0.11 in the area to the east of the intake channel along San Pablo Bay to 2.09 at the north mouth of South Slough. The area in and adjacent to the Napa River Unit has the highest relative density of black rails as well as the largest contiguous population in the San Francisco Bay area (Lewis Environmental Services and Wetland Research Associates 1992).

California Clapper Rail

The California clapper rail is both federally listed and state-listed as endangered. It is considered nonmigratory and occurs primarily in emergent salt marsh and brackish tidal marsh habitats with extensive areas of pickleweed, cord grass, saltgrass, alkali heath, jaumea, and rush. The network of tidal sloughs in the project area, being rich in tidal invertebrates, provides important foraging habitat (DeGroot 1927, Harvey 1988, Collins et al. 1994) and escape routes from predators (Zemba and Massey 1983; Foerster et al. 1990). Rail density appears to be positively correlated with channel density. Clapper rail nests are generally located along tidal channels in pickleweed-dominated marshes (Collins and Evens 1992). Gill (1979) surveyed the Napa River Unit for clapper rails and identified Dutchman Slough, Napa Slough, and Devil's Slough as having resident breeding populations. Gill estimated 1.0 rails/hectare (ha) at the Napa River Unit, compared to 1.4/ha in San Francisco Bay. Gill suggests that the Napa River Unit is a stronghold for the bay's clapper rail population. (Lewis Environmental Services and Wetland Research Associates 1992.)

Western Snowy Plover

The western snowy plover is federally listed as threatened and state-listed as a species of special concern. In 1975, Gill (reported in Page and Stenzel 1981) found three snowy plover nests on the internal levee of Pond 6. However, no plover nests were observed there in 1978 (Page and Stenzel 1981) or in 1989 (Carter et al. 1990). Nests and plovers have also been observed on levees and mudflats throughout the region, and there is a potential that they could again nest in the project area. Snowy plovers were observed in the project area in April 2002 at Pond 7 (Wyckoff pers. comm.). This species forages along the tidal flats and salt ponds. Roosting occurs along the levees of dry or partly dry salt ponds and sandy tidal flats. Nesting occurs on the ground on barren or sparsely vegetated salt pond levees and edges and along lagoon margins. Snowy plovers

move among the breeding, foraging, and roosting sites during all seasons (Goals Project 2000). Part of the San Francisco Bay population of snowy plovers is resident and part is migratory.

Salt Marsh Common Yellowthroat

The salt marsh common yellowthroat is a state and federal species of concern. It is believed to be a resident of coastal saltmarsh habitats from San Francisco Bay south to San Diego (Sibley 1952 in Goals Project 2000). In the bay region, approximately 60% of salt marsh common yellowthroats breed in brackish marsh, 20% in riparian woodland, 10% in freshwater marsh, 5% in salt marsh, and 5% in upland vegetation (Hobson et al. 1986; Shuford 1993). These birds are insectivorous, gleaning insects from low herbaceous vegetation, bushes, and small trees in the marshes and from the surface of the mud along associated channels (Goals Project 2000). In the San Francisco Bay area, salt marsh common yellowthroats winter in *Salicornia* marshes on the Skaggs Island complex and breed in adjacent brackish marshes (Foster 1977; Whisler pers. comm.).

Surveys by Hobson et al. (1986) and Foster (1977) indicate that the Napa River Unit has some of the highest breeding densities of salt marsh common yellowthroats in the Bay Area. The majority of the salt marsh common yellowthroat territories were in brackish marsh habitat. Territories included vegetation characterized by dense mixtures of salt-tolerant plants intermixed with freshwater plants.

San Pablo Song Sparrow

San Pablo song sparrow is a state and federal species of concern that is restricted to the salt marshes of San Pablo Bay (Grinnell and Miller 1944, Goals Project 2000). These birds generally inhabit regions of the salt marshes characterized by mixed salicornia/spartina vegetation along channels and numerous grindelia subshrub bushes that provide nesting sites and song perches (Goals Project 2000). San Pablo song sparrow is omnivorous, subsisting primarily on detritus-feeding insects, other invertebrates from intertidal mud, the maturing heads of grindelia flowers, and the fleshy fruits and tiny seeds of salicornia (Goals Project 2000). Records of occurrence for this species have been documented throughout the San Pablo Bay area, primarily in marsh vegetation along agricultural ditches and tidal channels (Goals Project 2000).

California Horned Lark

The California horned lark is a subspecies that is restricted to the coastal and coast range grasslands from southern Humboldt County south to San Diego as well as the San Joaquin Valley (Behle 1942, Grinnell and Miller 1944). It was considered a state species of special concern (Remsen 1978), but currently is not

in the current draft list of California Bird Species of Special Concern (CDFG and PRBO 2001). The horned lark forages on insects, spiders, snails, and grass and forb seeds. It breeds from March through July in grass-lined, cup-shaped nests in depressions on the ground.

American White Pelican

The American white pelican is a state species of special concern as a breeding species (Remsen 1978, CDFG and PRBO 2001). Nesting colonies are currently confined to the Klamath Basin in California (Shuford in prep.). Flocks of pelicans congregate at a few locations in the Bay Area during the non-breeding season (June through December) (Goals 2000), including the Napa Marshes (Carter et al. 1990 cited in Lewis Environmental Services and Wetland Research Associates 1992, Sterling pers. comm.). Pelicans prey upon fish in the tidal sloughs and Napa River, but will frequently roost in salt evaporation ponds and on dikes in the project area.

Double-Crested Cormorant

The double-crested cormorant was considered a state species of special concern (Remsen 1978), but currently is not in the current draft list of California Bird Species of Special Concern (CDFG and PRBO 2001). Populations had declined but have been recovering since the 1970s (Goals 2000). Double-crested cormorants build large, stick nest structures on powerline towers and on dead eucalyptus trees adjacent to tidal sloughs, the Napa River and salt ponds in the Napa Marshes region (Berner et al. 2003, Carter et al. 1990 cited in Lewis Environmental Services and Wetland Research Associates 1992, Sterling pers. comm.). They prey on fish and shrimp in ponds, tidal sloughs, open bay, lakes, reservoirs, and rivers throughout the Bay Area and in the nearshore of the Pacific Ocean.

Forster's Tern

The Forster's Tern breeds on coastal and inland wetlands, lakes and reservoirs throughout much of California. It forages for fish in marshes, ponds, tidal sloughs and rivers. This species nests in dirt scrapes alone or in colonies on bare islands and dikes at sites scattered throughout San Francisco/San Pablo Bay region (Goals 2000). Colonies of up to several hundred birds have been documented in the Napa Marsh region (Carter et al. 1990 cited in Lewis Environmental Services and Wetland Research Associates 1992, Goals 2000, Berner et al. 2003). The status and distribution of these colonies were unknown as of 1999 (Goals 2000). This tern's breeding season begins in April and lasts until August (Goals 2000).

6.1.4.8 Mammals

Suisun Ornate Shrew

The Suisun ornate shrew is a federal and state species of concern. It occurs only in the San Pablo and Suisun Bay areas and typically occupies saltwater and freshwater marshes, salt and fresh; low, dense vegetation adjacent to rivers, lakes, and streams; grassy hillsides; and chaparral slopes. It inhabits the dense, low-lying cover of salicornia and nests in wood, shrubs, and burrows. It feeds on insects, slugs, snails, centipedes, and occasionally on amphibians. Because of its restricted range, the Suisun ornate shrew is highly susceptible to habitat fragmentation.

Salt Marsh Harvest Mouse

The salt marsh harvest mouse is federally listed as threatened and state-listed as endangered. It is also fully protected under Section 4700 of the California Fish and Game Code.

There are two subspecies of salt marsh harvest mouse: the northern subspecies (*Reithrodontomys raviventris halicoetes*) in the San Pablo Bay area and the Napa River Unit and the southern subspecies (*R. r. raviventris*) in the San Francisco Bay area. The two subspecies exhibit subtle differences in biology and habitat use. *R. r. halicoetes* can tolerate fairly large fluctuations in marsh salinity where the average salinity is low (<22 ppt). In contrast, *R. r. raviventris* occurs in marshes where the salinity is high and more stable (27.0–31.2 ppt). The breeding season for *R. r. halicoetes* is May–November. This is shorter than the breeding season for *R. r. raviventris*, which is approximately March–November. (Shellhammer et al. 1982; Fisler 1965.)

Optimal habitat for the species consists of saline emergent wetland with thick, perennial plant cover consisting predominantly of pickleweed in association with fat hen and alkali heath (Goals Project 2000, Fisler 1965). To be suitable, salt marsh must have an upper border of peripheral halophytes (salt-tolerant plants) that offers refuge (escape habitat) during high tides or floods (Shellhammer et al. 1982). However, salt marsh harvest mice have been captured in less-than-optimal habitat, such as hypersaline areas and areas with 50% bare ground (Zetterquist 1978; Shellhammer et al. 1982), and will move into grasslands and bordering marshes in spring and summer months when maximum cover is present (Fisler 1965; Shellhammer et al. 1982).

The species' habitat use may also be affected by other rodent species. For example, in one study, salt marsh harvest mouse was found to use lower quality pickleweed habitat when California voles (*Microtus californicus*) were present in high numbers and to move to higher quality habitat when the vole population diminished (Geissel et al. 1988). Dispersal distances and the minimum patch size of suitable habitat needed to support populations of salt marsh harvest mouse are not well known. In one study, salt marsh harvest mice had a mean home range of

0.53 acre (2,133 square meters) (Bias and Morrison 1999). Salt marsh harvest mice have been observed crossing barriers such as narrow canals (up to 7 feet [2 meters] wide) and levee roads (up to 13 feet [4 meters] wide) and have been reported to swim sloughs up to 23 feet (7 meters) wide (Bias and Morrison 1999; Geissel et al. 1988). Geissel et al. (1988) also reported individuals traveling distances of 280 feet (85 meters) or more.

Habitat destruction is the greatest threat to salt marsh harvest mouse (U.S. Fish and Wildlife Service 1984). Approximately 85-90% of the Bay Area's tidal marshes have been lost to filling, flooding, or commercial conversion over the past 150 years (Goals Project 2000). In addition to habitat reduction, the salt marsh harvest mouse is threatened by flood control, mosquito abatement, marsh subsidence, changes in salinity, plowing, mowing, burning, and artificial flushing. All these conditions have adversely affected habitat quality by changing the composition of plant communities and/or reducing the vegetation required for cover (Shellhammer et al. 1982).

Salt marsh harvest mouse habitat in and near the project site includes the upper (high) marsh south of SR 37 and South Slough west of Pond 2A, including the accreted marsh on the inside bend of Ponds 2 and 2A. The most recently trapped area in the project site was the area along South Slough. Five salt marsh harvest mice, the northern subspecies (*R. r. halicoetes*), were captured in 2,385 trap nights from June 3 to June 5 in 1983 (Shellhammer 1983). Numerous trappings from the early 1970s and 1980s indicated relatively good populations south of SR 37. Captures on Fly Bay, the land between Pond 7 and Pond 8, also confirmed presence of this species. Overall, the narrow strips of tidal marsh surrounding the levees provide suitable habitat for this species. (Lewis Environmental Services and Wetland Research Associates 1992.)

6.2 Environmental Impacts and Mitigation Measures

6.2.1 Methodology and Significance Criteria

6.2.1.1 Analytical Methods

Impacts on wildlife were assessed by comparing the quantity and quality of aquatic and marsh habitats predicted to develop over time under the project options with aquatic and marsh habitat conditions under the No-Project Alternative. Wildlife species that occur or have potential to occur at the project site were presumed to be indirectly affected if the quantity or quality of habitats with which they are typically associated would be affected. Direct impacts on individual species were assessed qualitatively based on the likely sensitivity or susceptibility of the species to disruption as a result of activities that may be associated with construction (e.g., noise associated with equipment operation).

A major assumption is that conditions predicted to result with implementation of each habitat restoration option would occur within 50 years of project implementation. Predictions of future conditions are based largely on predicted rates of sediment accumulation and colonization of plants and effects of wave action on plant colonization. The actual rate at which nontidal and tidal wetland habitats would evolve and their distribution on the project site could be slower or faster because of uncertainties regarding the actual function and interaction of these parameters in tidal systems.

6.2.1.2 Impact Mechanisms

The following types of activities associated with project implementation could result in loss of or disturbance to aquatic and marsh-dependent habitats and associated species:

- operating equipment and conducting other construction activities, including construction of intakes and outfalls, grading down of levees in limited areas, levee maintenance, fill placement, excavation of channel breaches, and refurbishing or replacement of siphons (see Chapter 2, “Site Description, Options, and Alternatives”);
- reintroducing tidal flow to currently nontidal lands; and
- performing management and maintenance activities necessary to maintain target habitats (e.g., activities associated with control of noxious weeds and invasive invertebrates), maintaining operation and integrity of infrastructure (e.g., water drainage and control structures), and controlling mosquito populations.

6.2.1.3 Thresholds of Significance

Criteria based on the State CEQA Guidelines were used to determine the significance of wildlife impacts. The project would have a significant impact on wildlife resources if it would

- result in a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by DFG or USFWS, with habitat modifications specifically considered significant if they would
 - substantially decrease the acreage or quality of intertidal and subtidal aquatic habitats,
 - substantially decrease the acreage or quality of tidal or nontidal wetlands,
 - substantially decrease the acreage or quality of waterfowl breeding or wintering habitat,

- substantially decrease the acreage or quality of migrant and wintering shorebird habitat, or
- result in the permanent loss of occupied special-status species habitat or the direct mortality of individuals of special-status species;
- result in a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by DFG or USFWS; or
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

The project would have a beneficial impact if it would result in a substantial increase in the quantity or quality of subtidal and intertidal aquatic and marshland habitat for wintering waterfowl, migrant and wintering shorebirds, or special-status species.

6.2.2 No-Project Alternative

6.2.2.1 Impact W-1: Long-Term Decline in Habitat Value and Function

Site conditions are expected to continue to deteriorate as salinity in the ponds closed to tidal influence continues to increase. DFG would manage the site to reduce day-to-day salinity, if possible, by adding water from the north and south, but there would be a net annual increase in the total salt load. The ponds would dry out more frequently as siphons become inoperable as a result of increased salinity gradients. Increasing the total salt load in the ponds would adversely affect resident and migrating wildlife by reducing habitat quality. This impact is considered significant. However, this alternative would result in no project being implemented; therefore, no mitigation is required.

6.2.2.2 Impact W-2: Temporary Disturbance of Wildlife

Noise, vibration, and visual disturbances associated with emergency levee repairs could adversely affect wildlife near the repair sites. For example, the federally listed and state-listed California clapper rail and California black rail could be affected during their breeding seasons. Disturbances could cause individuals to abandon their nests or young, resulting in a reduction of the breeding success of these species. This impact is considered significant. However, this alternative would result in no project being implemented; therefore, no mitigation is required.

6.2.3 Salinity Reduction Option 1A: Napa River and Napa Slough Discharge

6.2.3.1 Impact W-3: Construction-Related Disturbance and Mortality of Special-Status Species

Disturbances associated with construction or replacement of the intakes and outfalls and other improvements necessary to reduce salinity levels in the ponds could adversely affect birds nesting at and adjacent to construction sites. As indicated in Table 6-2, either special-status bird species have been observed to nest or suitable nesting habitat exists at and adjacent to the project site. These birds include California clapper rail, California black rail, snowy plover, northern harrier, Caspian tern, saltmarsh common yellowthroat, and San Pablo song sparrow. Construction disturbances, including noise and vibration, could cause individuals to abandon their nests or reduce the ability of adults to properly care for their eggs, thereby adversely affecting breeding success. Nesting birds located more than 150 feet from construction sites are unlikely to be adversely affected by construction because this distance should provide an adequate buffer from noise, vibration, and visual disturbances. Because potential nesting sites for these birds are located throughout the project area, construction activities could result in a substantial adverse direct effect on these species. Therefore, this impact is considered significant.

Similarly, construction of the salinity reduction facilities could result in the direct mortality of these bird species; nests with eggs or young birds could be crushed by construction equipment operating in the tidal marsh and on levees. Therefore, this impact is considered significant.

Implementation of Mitigation Measure W-1 would reduce this impact to a less-than-significant level.

Mitigation Measure W-1: Avoid Construction Activities near Nesting Habitats during Breeding Season

The project sponsors will avoid construction activities during the nesting period of the California clapper rail, California black rail, snowy plover, northern harrier, Caspian tern, saltmarsh common yellowthroat, and San Pablo song sparrow to the extent feasible. If construction activities must occur during nesting periods, the project proponents will conduct appropriate clearance surveys in the construction area as needed and determined by USFWS and DFG. Surveys will be conducted up to a distance at which birds are unlikely to be affected by project construction. This distance could vary according to terrain and type of construction activity, but is often 150 feet from the maximum limit of each construction site. If nests are located an adequate distance from the limits of construction, construction may proceed. If nest sites are located in areas that would be disturbed by construction, the project sponsors will consult with USFWS and/or DFG to determine what additional mitigation measures could be

implemented to avoid or reduce mortality (e.g., establishing buffers around active nest sites or sequencing construction to avoid potential impacts on these species during their breeding season) while allowing construction to proceed. These measures would reduce construction-related effects on nesting bird species to a less-than-significant level.

6.2.3.2 Impact W-4: Construction-Related Disturbance and Mortality of Salt Marsh Harvest Mouse and Suisun Ornate Shrew

Constructing pond intakes and outfalls, repairing levees, refurbishing or replacing siphons, and making other improvements necessary to reduce salinity levels in the ponds could adversely affect the salt marsh harvest mouse and the Suisun ornate shrew. Construction activities resulting in noise, vibration, and visual disturbances could cause individuals to abandon their burrows, foraging areas, and protective shelter. This disturbance could cause the species to become more susceptible to mortality from predation, physiological stress, or starvation. Similarly, operating construction equipment within the tidal marsh habitat could result in direct mortality. This impact is considered significant. Implementation of Mitigation Measures W-2 and W-3 would reduce this impact to a less-than-significant level.

Mitigation Measure W-2: Avoid Construction Activities near Occupied Suisun Ornate Shrew Habitat or Remove Shrews

Before constructing facilities within tidal marsh habitat, the project sponsors will conduct clearance surveys for the Suisun ornate shrew in the construction area as needed and determined by USFWS and DFG. If surveys indicate the presence of shrews, the project sponsors will consult with USFWS to identify appropriate methods for avoiding construction-related effects on the shrew. These methods may include installing exclusion fencing or trapping and relocating individuals.

Mitigation Measure W-3: Avoid Construction Activities near Occupied Salt Marsh Harvest Mouse Habitat

To the extent feasible, the project sponsors will avoid construction activities in or near marsh habitat suitable for the salt marsh harvest mouse. If construction activities must occur in this habitat, the project sponsors will consult with USFWS to determine appropriate methods for avoiding construction-related mortality of salt marsh harvest mice. These methods may include installing exclusion fencing or trapping and relocating individuals.

6.2.3.3 Impact W-5: Exposure of Wildlife to Contaminants during Construction

The soils of the Napa River Unit were established as a result of accretion of sediments from San Pablo Bay and the Napa River. Existing sediment contaminant loads largely reflect the influence of past and present agricultural activities, mining and industrial uses, and urban development. Contaminants known to be present in the waters and sediments of the Napa River and San Pablo Bay include heavy metals (lead, copper, aluminum, mercury, nickel, vanadium, chromium, silver, zinc), PAHs, PCBs, chlorinated hydrocarbon pesticides, and tributyltin (TBT) (Tompson et al. 2000, Hornberger et al. 1999). These concentrations are not as high in the project area, as illustrated in Table 4-6 in Chapter 4. However, the sediments of both the Napa River and San Pablo Bay exceed sediment quality criteria for arsenic, chromium, copper, mercury, nickel, and total DDTs. The Napa River also exceeds sediment quality criteria for total chlordanes, and San Pablo Bay sediments exceed the criteria for total PAHs. The former Mare Island Naval Shipyard is also a potential point source of TBT, a highly toxic endocrine-disrupting chemical used as an antifoulant in ship paints.

Excavation for the intakes, outfalls, borrow ditches, and levee repairs and blasting proposed for the salinity reduction options could result in temporary remobilization of contaminated sediments. Remobilization could increase exposure of fish and wildlife to bioavailable contaminants. The effects of these contaminants on wildlife have not been fully quantified, and these effects could result in an ~~unsubstantial~~ adverse effect on the natural marsh community or special-status species; therefore, this impact is considered significant. Implementation of Mitigation Measure WQ-1, “Obtain RWQCB Authorization under Waste Discharge Requirements or NPDES Stormwater Permit for General Construction Activity and Implement Best Management Practices,” would reduce this impact to a less-than-significant level. This measure is described in Chapter 4, “Water Quality.”

6.2.4 Salinity Reduction Option 1B: Napa River and Napa Slough Discharge and Breach of Pond 3

Impacts under Salinity Reduction Option 1B (Impacts W-3, W-4, and W-5) are nearly the same as those under Salinity Reduction Option 1A. Impacts on tidal marsh habitat would be slightly less than described under Salinity Reduction Option 1A because water intakes would not be constructed to connect Dutchman Slough and South Slough to Pond 3. Constructing these intakes would require operating equipment and excavation of tidal marsh.

6.2.5 Salinity Reduction Option 1C: Napa River and Napa Slough Discharge with Breaches of Ponds 3 and 4/5

Impacts under Salinity Reduction Option 1C (Impacts W-3, W-4, and W-5) are nearly the same as those under Salinity Reduction Option 1A, except that there would be less construction than under even Salinity Reduction Option 1B.

6.2.6 Water Delivery Option

6.2.6.1 Impact W-3: Construction-Related Disturbance and Mortality of Special-Status Species

Water Delivery Project Component (Sonoma Pipeline)

Special-status species potentially affected by construction of the Sonoma Pipeline are listed in Table 6-3. Impacts on these species would occur only during construction. Impacts may include disturbance from project noise, harassment from construction activity and the presence of humans and equipment, and temporary modification of habitat during construction. Construction activities could also cause direct mortality of ground-dwelling special-status species by inadvertently striking them with construction equipment. This impact is considered significant. Implementation of Mitigation Measures W-4 through W-7 would reduce this impact to a less-than-significant level.

Table 6-3. Wildlife Species Potentially Affected by the Sonoma Pipeline

Species	Potential Location	Potential Impact	Mitigation Measures
Northwestern pond turtle <i>Clemmys marmorata marmorata</i>	Huichica Creek and the Huichica Creek Unit of the NSMWA	Noise disturbance, construction activity harassment, temporary modification of habitat, direct mortality	W-4, W-5, W-6, and W-7
California red-legged frog <i>Rana aurora draytoni</i>	Unknown, moderate likelihood of occurrence	Noise disturbance, construction activity harassment, temporary modification of habitat, direct mortality	W-4, W-5, W-6, and W-7
California clapper rail <i>Rallus longirostris obsoletus</i>	Napa, Hudeman, and Mud Sloughs; Flybay, and Edgerley and Coon Islands	Noise disturbance, construction activity harassment, temporary modification of habitat	W-4, W-5, and W-6
Saltmarsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	Napa and Hudeman, Sloughs; Flybay, and Coon Island	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Western snowy plover (coastal populations) <i>Charadrius alexandrinus nivosus</i> (nesting)	Flybay	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Black rail <i>Laterallus jamaicensis coturniculus</i>	Flybay and Coon Island	Noise disturbance, construction activity harassment, temporary modification of habitat	W-4, W-5, W-6, and W-7
Double-crested cormorant (nesting colony) <i>Phalacrocorax auritus</i>	Pond 7 and Buchli Station Road	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
American bittern <i>Botaurus lentiginosus</i>	Unknown, moderate likelihood of occurrence	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Great egret (rookery) <i>Ardea alba</i>	Unknown, high likelihood of occurrence	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Snowy egret (rookery) <i>Egretta thula</i>	Unknown, high likelihood of occurrence	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Black-crowned night heron (rookery) <i>Nycticorax nycticorax</i>	NSMWA along Skaggs Island Road	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Great blue heron (rookery) <i>Ardea herodias</i>	Buchli Station Road	Noise disturbance, construction activity harassment	W-4, W-5, and W-6

Table 6-3. Continued.

Species	Potential Location	Potential Impact	Mitigation Measures
White-tailed kite <i>Elanus leucurus</i>	Huichica Creek Unit—NSMWA, high likelihood of occurrence	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Northern harrier <i>Circus cyaneus</i>	Lands adjacent to and north of Pond 7	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Merlin <i>Falco columbarius</i>	Unknown, high likelihood of occurrence during the winter	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Western burrowing owl <i>Athene cunicularia hypugea</i>	Huichica Creek Unit—NSMWA, moderate likelihood of occurrence	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Suisun song sparrow <i>Melospiza melodia maxillaries</i>	Unknown, moderate likelihood of occurrence	Noise disturbance, construction activity harassment, temporary modification of habitat	W-4, W-5, W-6, and W-7
Tricolored blackbird <i>Agelaius tricolor</i>	Pond surrounded by vineyards—Huichica Creek Unit—NSMWA	Noise disturbance, construction activity harassment	W-4, W-5, and W-6
Salt marsh harvest mouse <i>Reithrodontomys raviventris</i>	Flybay, Edgerley, and Coon Islands	Noise disturbance, construction activity harassment, temporary modification of habitat, direct mortality	W-4, W-5, W-6, and W-7

Mitigation Measure W-4: Complete Focused Surveys for Special-Status Wildlife Species before Construction

Before final plans are completed for pipeline design and construction, SCWA will conduct focused biological surveys along the segments of the Sonoma and Napa Pipelines, particularly around Schell Slough, in the HSMEW area, in the Huichica Creek Unit to determine the precise location sensitive wildlife species and associated habitat. The survey(s) will be conducted by a qualified biologist(s) having the necessary permits from state and/or federal resources agencies, and will be completed during the appropriate survey season. If necessary, and as appropriate, consultation on affected special-status species will be initiated with USFWS and/or DFG. Should sensitive wildlife species be found to exist in or near (i.e., within 100 feet) of the construction corridor, the impact avoidance/reduction measures identified in Mitigation Measure V-2, “Conduct Preconstruction Surveys and Implement Impact Avoidance, Minimization, and Mitigation Measures,” described in Chapter 5, “Biological Resources—Vegetation,” will be implemented as applicable to habitat for

sensitive wildlife species. In addition, the following measures will be implemented:

- At least 72 hours before vegetation clearing occurs, a preconstruction survey will be conducted by a qualified biologist to check for any active nests in or near the construction corridor. Should an active nest(s) be present, construction activities in the area of concern will be rescheduled or modified to avoid adverse impacts to the avian species occupying the nest.
- A qualified biologist will be present to monitor construction activities in and near areas known to be occupied by sensitive wildlife species, and will have the authority to install or require wildlife protection measures such as fencing (i.e., for nonavian species), noise buffers or noise level limitations during avian breeding seasons, and temporarily halting or redirecting construction activities to avoid direct impacts on sensitive species. The on-site biologist will have the required USFWS permit(s), or immediate access to a permitted biologist, should the handling of listed species be necessary.

Mitigation Measure W-5: Educate Construction Crews regarding Special-Status Wildlife Species

A qualified biologist will train construction crews on the sensitive wildlife resources and exclusion zones within the proposed construction alignment.

Mitigation Measure W-6: Use Trenchless Construction Techniques for Special-Status Wildlife Species Protection

An SCWA or sanitation district contractor will use impact avoidance or reduction measures such as jack-and-bore or other trenchless techniques to reduce the need for surface construction within identified sensitive locales, and the reconfiguration, limitation, or other control of areas proposed to be graded.

Mitigation Measure W-7: Restore Habitat Modified by Construction

An SCWA or sanitation district contractor will restore habitat to preconstruction conditions in consultation with USFWS and DFG and will provide on-site mitigation of modifications to sensitive species habitat, if necessary. Exact mitigation will be determined through consultation with USFWS or DFG.

Water Delivery Project Component (Napa Pipeline)

The Napa Pipeline would have the potential for impacts on several special-status species and/or their habitat as Segment 1 of the pipeline is constructed through the Stanly Ranch. Table 6-4 lists the special-status species potentially affected by the Napa Pipeline. Impacts would occur only during construction and would be temporary in nature. Impacts may include disturbance from project noise, harassment from construction activity and the presence of humans and equipment, and temporary modification of habitat during construction. Construction activities could also cause direct mortality of ground-dwelling special-status species by inadvertently striking them with construction equipment. This impact is considered significant. Implementation of Mitigation

Measures W-4 through W-7 would reduce this impact to a less-than-significant level.

Table 6-4. Napa Pipeline Potentially Affected Species

Species <i>Scientific Name</i>	Potential Location	Potential Impact	Mitigation Measures
Salt marsh harvest mouse <i>Reithrodontomys raviventrus halicoetes</i>	Pickleweed habitat on the Stanly Ranch	Noise disturbance, construction activity harassment, temporary modification of habitat, direct mortality	W-4, W-5, W-6, and W-7
California horned lark <i>Eremophila alpestris</i>	Abandoned railroad bed on the Stanly Ranch	Noise disturbance, construction activity harassment, and temporary modification of habitat	W-4, W-5, W-6, and W-7
Salt marsh common yellowthroat <i>Geothlypis trichas sinuosa</i>	Brackish marsh on the Stanly Ranch	Noise disturbance, construction activity harassment, and temporary modification of habitat	W-4, W-5, W-6, and W-7
Tricolored blackbird <i>Agelaius tricolor</i>	Wetlands on the Stanly Ranch	Noise disturbance, construction activity harassment, and temporary modification of habitat	W-4, W-5, W-6, and W-7
San Pablo song sparrow <i>Melospiza melodia samuelis</i>	Pickleweed habitat on the Stanly Ranch	Noise disturbance, construction activity harassment, and temporary modification of habitat	W-4, W-5, W-6, and W-7

Water Delivery Project Component (CAC Pipeline)

The new portion of the CAC Pipeline would be constructed within Green Island Road. The pipeline would cross the Napa River using existing pipelines. The pipeline would not pass through special-status species habitat. Therefore, the potential for impacts on special-status species is less than significant.

Water Delivery Program Component

The exact alignments and construction methods for the Water Delivery Program Component pipelines have not yet been determined. However, the potential future pipelines from the LGVSD, Novato SD, and City of Petaluma WWTPs are anticipated to parallel roadways, railroads, and eventually turn east across the Wingo and Ringstrom Bay Units of the NSMWA. These potential future pipelines have the potential to affect special-status species listed in Table 6-2. Impacts on these species would occur only during construction and would be temporary. Impacts may include disturbance from project noise, harassment from construction activity and the presence of humans and equipment, and temporary modification of habitat during construction. Construction activities could also cause direct mortality of ground-dwelling special-status species by inadvertently striking them with construction equipment.

This impact is considered significant. Implementation of Mitigation Measure W-4, “Complete Focused Surveys for Special-Status Wildlife Species before Construction,” would reduce this impact to a less-than-significant level. This measure is described under “Water Delivery Project Component (Sonoma

Pipeline)” above. The results of these surveys may also require implementation of Mitigation Measures W-5, W-6, and W-7.

6.2.6.2 Impact W-6: Interference with the Movement of Wildlife

Water Delivery Project Component

Impacts on wildlife from constructing the Sonoma, Napa and CAC pipelines would be short-term and would occur only during the construction phase of the project. Because the pipeline would be buried, it would not act as a barrier to wildlife movement or migration once construction is complete. In addition, the pipelines would be constructed primarily within existing road and railroad ROWs, reducing any direct loss of habitat.

Construction of each pipeline is estimated to be completed within 1 year and would include activity in 200- to 300-foot stretches for approximately 5 days. Construction is not expected to adversely affect wildlife movement because construction would be completed quickly and only a limited amount of area (200–300 linear feet) would be disturbed at any time. Because construction would be limited, wildlife is expected to be able to safely move around the temporary construction site. This impact is considered less than significant. No mitigation is required.

Water Delivery Program Component

The exact alignments and construction methods for the potential future pipelines have not yet been determined. Impacts on migratory wildlife and wildlife corridors would occur only during construction and would be temporary. Because of construction activity, migrating wildlife would be required to divert around the construction area if possible; if diversion is not possible, migration would be affected. Wildlife corridors may be affected by any temporary losses of habitat resulting from construction. Use of nursery sites by wildlife for rearing young may be affected by harassment caused by noise and construction activity.

This impact is considered significant. Implementation of Mitigation Measure W-4, “Complete Focused Surveys for Special-Status Species before Construction,” would reduce this impact to a less-than-significant level. This measure is described under Impact W-3 above.

6.2.7 Habitat Restoration Option 1: Mixture of Tidal Marsh and Managed Ponds

Impacts under Habitat Restoration Option 1 are more extensive than those under Salinity Reduction Option 1A for Impacts W-3, W-4, and W-5 because of additional construction. Impacts unique to this option are described below.

6.2.7.1 Beneficial Impact W-7: Increase in Mudflat Foraging Habitat

Mudflats and shallow water are important foraging and resting habitat areas for shorebirds and dabbling waterfowl that migrate through and winter in the San Pablo Bay area. Breaching the outboard levees and introducing tidal flow to the selected ponds in the Napa River Unit would increase the area of tidal mudflat both around the edges of ponds and along channels in the project area. Tidal mudflats support benthic organisms that are prey for shorebirds. Currently there are approximately 80 acres of intertidal mudflat in the sloughs within the project area (Table 2-2). The acreage of intertidal mudflat is expected to increase to 2,490 acres by year 10. As middle marsh and lower marsh become established, the acreage of intertidal mudflat is expected to stabilize at 2,670 acres. This represents an increase of 2,420 acres from existing conditions. By year 50, intertidal mudflats would be limited primarily to slough channels and the margins of subtidal channels. The increase in mudflat areas is considered beneficial to shorebirds and other water birds. This impact is considered beneficial. No mitigation is required.

6.2.7.2 Beneficial Impact W-8: Long-Term Increase in Subtidal Habitat

Subtidal aquatic habitat is expected to increase under Habitat Restoration Option 1. As sediment deposition occurs, the open-water habitat created initially by breaching the levees would decrease. Currently, there are approximately 430 acres of subtidal habitat within the project area (Table 2-2). The acreage of subtidal habitat is expected to increase to 760 acres by year 10 of the project and then stabilize at 770 acres by year 50. This represents an increase of 430 acres from current conditions by year 50. Stable vegetated channels would develop, and the habitat value of open water would increase as these channels become deeper and wider. These channels could be used as rearing habitat for a variety of estuarine and marine fish species that would provide food for various marsh-associated piscivorous birds including egrets, herons, and grebes. The increase in aquatic habitat would benefit the fish, birds, and waterfowl dependent on this habitat. Therefore, this impact is considered beneficial. No mitigation is required.

6.2.7.3 Beneficial Impact W-9: Increase in Lower Marsh and Middle Marsh Habitats

Restoration of the tidal marshes in the Napa River Unit would result in a substantial increase in lower marsh and middle marsh habitats. These habitats support endangered species and species of special concern, including the California clapper rail, California black rail, salt marsh harvest mouse, Suisun ornate shrew, northern harrier, saltmarsh common yellowthroat, and San Pablo song sparrow. Currently there are approximately 30 acres of lower marsh and 1,210 acres of middle marsh habitat within the project area. These habitats are located along existing sloughs and in Pond 2A and are generally of low quality (Wilcox pers. comm.). The acreage of lower marsh is expected to increase to 300 acres by year 10 and then stabilize at 90 acres by year 50. This represents an increase of 60 acres of lower marsh habitat by year 50. Similarly, the acreage of middle marsh habitat is expected to increase to 2,180 acres by year 50 after declining by approximately 100 acres during the first 20 years of restoration. This represents an increase of 970 acres from current conditions by year 50. This impact is considered beneficial. No mitigation is required.

6.2.7.4 Beneficial Impact W-10: Lowering of Levees to Create Marsh Habitat

Construction of this habitat restoration option would result in the lowering of 22,200 feet of upland levee area to elevations consistent with marsh habitat. This represents roughly 10% of all levees in the project area and roughly 20% of the levees surrounding the ponds that would be restored to tidal marsh in this option. Levee upland areas provide some roosting, foraging, and refuge areas for wildlife but are of overall low quality (Wyckoff pers. comm.). Levees are typically covered with vegetation such as iceplant or weedy annuals that offer inferior high-tide cover for marsh wildlife (Baye pers. comm.). There would be a short-term loss in the function and value of the upland levees that would be replaced with middle and upper marsh habitat that is of higher quality for most marsh species. In areas graded to elevations consistent with upper marsh vegetation, gumplant (*Grindelia stricta*) will typically establish juveniles the first year and grow to full flowering height the second year after seed. Gumplant provides superior high-tide refugia for marsh wildlife, particularly rail species (Baye pers. comm.). Upper marsh vegetation will also provide shrub-nesting opportunities.

Levees can also provide access and habitat for predators (e.g., red fox and feral cats) that compromise the ecological objectives of restoration and are a threat to the local existence of endangered species and other marsh wildlife. Levees can also act as barriers to species migration by creating discontinuous habitat. Lowering of levees to marsh elevations in conjunction with breaches will inhibit access and reduce habitat for predators and will connect existing fringe marsh with the interior of the ponds being restored to tidal habitats, increasing opportunities for the movement of wildlife between these areas. This impact is considered beneficial. No mitigation is required.

Levee lowering would be conducted in areas adjacent to wide areas of existing fringe marsh habitat in order to provide upper marsh refugia, and/or in areas with small areas of fringe marsh habitat that would be subject to erosion as a result of the increased tidal prism in order to preserve species corridors. Exact locations of levee lowering would be determined during final design, in consultation with the resource agencies, in order to best serve marsh species. Levees would be pushed inward toward the ponds and borrow ditches rather than outward toward existing higher quality habitat. Levee grading would result in additional construction-related disturbance to or mortality of special-status species. Impacts on special-status species associated with ground disturbance are described in Impacts W-3, W-4, and W-5.

6.2.7.5 Impact W-11: Exposure of Wildlife to Contaminants in Sediments and Waters from San Pablo Bay and the Napa River

Restoration would entail reestablishment of substantial tidal connectivity to Ponds 3, 4/5, and possibly 6/6A at some future date. Reestablishing substantial tidal connectivity to these ponds would result in hydrologic exchange between restored marshlands and waters of San Pablo Bay and the Napa River, possibly resulting in the deposition of contaminant-laden sediments. As discussed in Chapter 4, “Water Quality,” reestablishing tidal exchange is expected to cause the quality of water and sediments within the ponds to become closer to the quality of water in San Pablo Bay and the Napa River. The levels of some constituents are expected to increase. Conversely, the levels of other constituents are expected to decrease. Contaminants may have an adverse effect on biological resources, including reduction in reproductive success at multiple levels of the ecosystem, immune system effects, and overall reduced population viability. Appendix C, “Contaminants Toxic to Wildlife,” includes information on the contaminants and associated biological effects.

Contaminants are found in the waters and sediments of the salt ponds, San Pablo Bay, and the Napa River. As indicated in Tables 4-5 and 4-6, some of these contaminants exceed sediment quality criteria established by NOAA and the water quality criteria established by the SWRCB (CTR). For example, the waters of the Napa River and San Pablo Bay exceed CTR water quality criteria for copper, mercury, nickel and total PAHs. In addition, sediments exceed the ER-L values for copper, mercury, nickel, arsenic, chromium, and DDT, but not the ER-M values for any constituent. The level these constituents would need to reach in combination with the duration of exposure to result in a substantial effect on wildlife abundance is not known. However, levels are not expected to be substantially different than what is currently occurring within the sloughs and channels outside of the ponds.

As discussed in Section 2.7.3.2, “Wildlife Monitoring in Managed Ponds and Restored Tidal Habitat,” USGS would continue to monitor conditions at the project site. At a minimum, monitoring would occur during the salinity reduction phase of the project and for 10 years after each pond is breached. This

information would be used to compare preproject and postproject conditions and to identify changes in the condition of biological resources. In addition, as discussed in Section 2.7.6.4, “Adaptive Management,” the project sponsors would implement an adaptive management plan. This plan would establish quantitative standards for the project. The combination of wildlife monitoring and adaptive management would ensure that adverse effects on wildlife are identified and addressed as the tidal marsh is restored. This impact is considered less than significant. No mitigation is required.

6.2.7.6 Impact W-12: Loss of Open-Water Habitat

Implementation of Habitat Restoration Option 1 would result in the loss of open-water habitat provided by managed ponds when the levees surrounding Ponds 3, 4, and 5 are breached. This action would result in the loss of existing saline open-water habitat historically used by a variety of shorebirds, waterfowl, and other waterbirds, such as grebes and phalaropes, prior to the increases of salinity within the ponds. Ponds 3, 4, and 5 provided high-quality waterfowl foraging and refuge habitat during salt production and since DFG took ownership of the property in 1994; however, these habitat values have declined over the last ~~1–2~~ several years because of dramatically increasing salinities, which have resulted from an inability to take adequate water into Ponds 3, 4, and 5 and the lack of a discharge point within the pond system.

Currently, there are approximately 6,460 acres of open-water habitat within the project area, although not all pond areas are currently suitable habitat. The amount of open-water habitat is expected to decrease to 3,550 acres by year 10 of the project, a decrease of 2,910 acres from existing conditions. If Ponds 6 and 6A are also restored to tidal marsh after 10–20 years, there would be an additional loss of 1,146 acres of open-water habitat, bringing the total amount to 2,404 acres by year 50. The loss of this open-water pond habitat is expected to be offset by the increase in mudflat and subtidal habitat, the increased productivity and habitat values of the restored ponds, and by salinity reduction and improved management of Ponds 6, 6A, 7A, ~~8~~, and ultimately ~~7 and 8~~. Ponds 1, 1A, and 2 would continue to be managed as ponds to benefit migratory shorebirds and waterfowl.

The project sponsors, in coordination with USGS, would conduct 10 years of monitoring after restoration of Ponds 3, 4, and 5 in order to evaluate the changes in ecological values and productivity and develop adaptive management approaches as needed, such as maintaining Ponds 6 and 6A as managed ponds. Therefore, the direct impact on waterfowl and shorebirds is considered less than significant. No mitigation is required. The long-term regional effect of current and planned habitat restoration projects on waterfowl habitat is described in Chapter 18, “Cumulative Impacts and Other Required Analyses.”

6.2.8 Habitat Restoration Option 2: Tidal Marsh Emphasis

Impacts under Habitat Restoration Option 2 are more extensive than those under Salinity Reduction Option 1A for Impacts W-3, W-4, and W-5 because of additional construction, and nearly the same as that under Habitat Restoration Option 1 for Impact W-11. Beneficial Impacts W-7, W-8, W-9, and W-10 and Impacts W-12 and W-13 are slightly different and are described below.

6.2.8.1 Beneficial Impact W-7: Increase in Mudflat Foraging Habitat

Under this option, the acreage of intertidal mudflat is expected to increase to 3,840 acres by year 10 and to stabilize at 2,800 acres by year 50. This represents an increase of 2,720 acres from current conditions. Mudflats serve as foraging habitat for shorebirds and other waterbird species. Therefore, this impact is considered beneficial. No mitigation is required.

6.2.8.2 Beneficial Impact W-8: Long-Term Increase in Subtidal Habitat

Subtidal aquatic habitat is expected to increase under Habitat Restoration Option 2. As sediment deposition occurs, the open-water habitat created initially by breaching the levees would decrease. Currently, there are approximately 430 acres of subtidal habitat within the project area (Table 2-2). The acreage of subtidal habitat is expected to increase to 920 acres by year 10 of the project and to stabilize at 930 acres by year 50. This represents an increase of 500 acres from current conditions. Stable vegetation channels would develop, and the habitat value of open water would increase as these channels become deeper and wider. These channels could be used as rearing habitat for a variety of estuarine and marine fish species that would provide food for various marsh-associated piscivorous birds including egrets, herons, and grebes. The increase in aquatic habitat would benefit the fish, birds, and waterfowl dependent on this habitat. Therefore, this impact is considered beneficial. No mitigation is required.

6.2.8.3 Beneficial Impact W-9: Increase in Lower Marsh and Middle Marsh Habitats

Under this option, by year 50 the acreages of lower marsh habitat and middle marsh habitat are expected to increase to 230 and 2,180 acres, respectively. The increase in the amount of lower marsh and middle marsh habitats would substantially increase suitable habitat for California clapper rail, California black rail, salt marsh harvest mouse, Suisun ornate shrew, northern harrier, saltmarsh

common yellowthroat, and San Pablo song sparrow in the project area. This impact is considered beneficial. No mitigation is required.

6.2.8.4 Beneficial Impact W-10: Lowering of Levees to Create Marsh Habitat

Construction of this habitat restoration option would result in the lowering of 34,600 feet of upland levee area to elevations consistent with marsh habitat. This represents roughly 15% of all levees in the project area and roughly 20% of the levees surrounding the ponds that would be restored to tidal marsh in this option. Overall, these effects would be positive for marsh wildlife, as described in Habitat Restoration Option 1. Therefore, this impact is considered beneficial. No mitigation is required.

Levee grading would result in additional construction-related disturbance or mortality to special-status species. Impacts on special-status species associated with ground disturbance are described in Impacts W-3, W-4, and W-5.

6.2.8.5 Impact W-12: Loss of Open-Water Habitat

Under this option, the acreage of open-water habitat provided by managed ponds would be 2,080 acres. This represents a decrease of 4,380 acres from current conditions. Option 2 would result in a greater loss of saline open-water habitat used by shorebirds and other waterbirds than would Habitat Restoration Options 1, 3, or 4. The loss of this habitat would be generally offset by the creation of new mudflat and subtidal habitat and by salinity reduction and management of other ponds in the project area. Therefore, this impact is considered less than significant. No mitigation is required.

6.2.9 Habitat Restoration Option 3: Pond Emphasis

Impacts under Habitat Restoration Option 3 are more extensive than those under Salinity Reduction Option 1A for Impacts W-3, W-4, and W-5 because of additional construction and nearly the same as that under Habitat Restoration Option 1 for Impact W-11. Beneficial Impacts W-7, W-8, W-9, and W-10 and Impacts W-12 and W-13 are slightly different and are described below.

6.2.9.1 Beneficial Impact W-7: Increase in Mudflat Foraging Habitat

Under this option, the acreage of intertidal mudflat is expected to increase to 1,790 acres by year 10 and to stabilize at 930 acres by year 50. This represents an increase of 850 acres from current conditions. Mudflats serve as foraging

habitat for shorebirds and other waterbird species. Therefore, this impact is considered beneficial. No mitigation is required.

6.2.9.2 Beneficial Impact W-8: Increase in Subtidal Habitat

Subtidal aquatic habitat is expected to increase under Habitat Restoration Option 3. As sediment deposition occurs, the open-water habitat created initially by breaching the levees would decrease. Currently, there are approximately 430 acres of subtidal habitat within the project area (Table 2-2). The acreage of subtidal habitat is expected to increase to stabilize at 680 acres by year 10 of the project. This represents an increase of 250 acres from current conditions. Stable vegetation channels would develop, and the habitat value of open water would increase as these channels become deeper and wider. These channels could be used as rearing habitat for a variety of estuarine and marine fish species that would provide food for various marsh-associated piscivorous birds including egrets, herons, and grebes. The increase in aquatic habitat would benefit the fish, birds, and waterfowl dependent on this habitat. Therefore, this impact is considered beneficial. No mitigation is required.

6.2.9.3 Beneficial Impact W-9: Long-Term Increase in Lower Marsh and Middle Marsh Habitats

Under this option, by year 50 the amounts of lower marsh habitat and middle marsh habitat are expected to increase to 80 and 1,010 acres, respectively. The increase in the amounts of lower marsh and middle marsh habitats would substantially increase suitable habitat for California clapper rail, California black rail, salt marsh harvest mouse, Suisun ornate shrew, northern harrier, saltmarsh common yellowthroat, and San Pablo song sparrow in the project area. This impact is considered beneficial. No mitigation is required.

6.2.9.4 Beneficial Impact W-10: Lowering of Levees to Create Marsh Habitat

Construction of this habitat restoration option would result in the lowering of 14,600 feet of upland levee area to elevations consistent with marsh habitat. This represents roughly 5% of all levees in the project area and roughly 20% of the levees surrounding the ponds that would be restored to tidal marsh in this option. Overall, these effects would be positive for marsh wildlife, as described in Habitat Restoration Option 1. Therefore, this impact is considered beneficial. No mitigation is required.

Levee grading would result in additional construction-related disturbance of or mortality to special-status species. Impacts on special-status species associated with ground disturbance are described in Impacts W-3, W-4, and W-5.

6.2.9.5 Impact W-12: Loss of Open-Water Habitat

Under this option, the acreage of open-water habitat provided by managed ponds would be 4,290 acres. This represents a decrease of 2,170 acres from current conditions. Habitat Restoration Option 3 would result in a lesser loss of saline open-water habitat used by shorebirds and other waterbirds than would Habitat Restoration Options 1, 2, or 4. The loss of this habitat would be generally offset by the creation of new mudflat and subtidal habitat and by salinity reduction and management of other ponds in the project area. Therefore, this impact is considered less than significant. No mitigation is required.

6.2.10 Habitat Restoration Option 4: Accelerated Restoration

Impacts under Habitat Restoration Option 4 are more extensive than those under Salinity Reduction Option 1A for Impacts W-3, W-4, and W-5 because of additional construction and nearly the same as that under Habitat Restoration Option 1 for Impact W-11. Beneficial Impacts W-7, W-8, W-9, and W-10 and Impacts W-12 and W-13 are slightly different and are described below.

6.2.10.1 Beneficial Impact W-7: Increase in Mudflat Foraging Habitat

Under this option, the acreage of intertidal mudflat is expected to increase to 2,210 acres by year 10 and to stabilize at 900 acres by year 50. This represents an increase of 820 acres from current conditions. Mudflats serve as foraging habitat for shorebirds and other waterbird species. Therefore, this impact is considered beneficial. No mitigation is required.

6.2.10.2 Beneficial Impact W-8: Long-Term Increase in Subtidal Habitat

Currently, there are approximately 430 acres of subtidal habitat within the project area (Table 2-2). The acreage of subtidal habitat is expected to increase to 760 acres by year 10 and stabilize at 770 acres by year 50. This represents an increase of 340 acres from current conditions. Stable vegetation channels would develop, and the habitat value of open water would increase as these channels become deeper and wider. These channels could be used as rearing habitat for a variety of estuarine and marine fish species that would provide food for various marsh-associated piscivorous birds including egrets, herons, and grebes. The increase in aquatic habitat would benefit the fish, birds, and waterfowl dependent on this habitat. Therefore, this impact is considered beneficial. No mitigation is required.

6.2.10.3 Beneficial Impact W-9: Increase in Lower Marsh and Middle Marsh Habitats

Under this option, by year 50 the amounts of lower marsh habitat and middle marsh habitat are expected to increase to 640 and 2,360 acres, respectively. The increase in the amount of lower marsh and middle marsh habitats would substantially increase suitable habitat for California clapper rail, California black rail, salt marsh harvest mouse, Suisun ornate shrew, northern harrier, saltmarsh common yellowthroat, and San Pablo song sparrow in the project area. This impact is considered beneficial. No mitigation is required.

6.2.10.4 Beneficial Impact W-10: Lowering of Levees to Create Marsh Habitat

Construction of this habitat restoration option would result in the lowering of 22,200 feet of upland levee area to elevations consistent with marsh habitat. This represents roughly 10% of all levees in the project area and roughly 20% of the levees surrounding the ponds that would be restored to tidal marsh in this option. Overall, these effects would be positive for marsh wildlife, as described in Habitat Restoration Option 1. Therefore, this impact is considered beneficial. No mitigation is required.

Levee grading could result in additional construction-related disturbance of or mortality of special-status species. Impacts on special-status species associated with ground disturbance are described in Impacts W-3, W-4, and W-5.

6.2.10.5 Impact W-12: Loss of Open-Water Habitat

Under this option, the acreage of open-water habitat provided by managed ponds would be 3,550 acres. This represents a decrease of 2,910 acres from current conditions. Habitat Restoration Option 4 would result in the same loss of saline open-water habitat used by shorebirds and other waterbirds as Habitat Restoration Option 1. The loss of this habitat would be generally offset by the creation of new mudflat and subtidal habitat and by salinity reduction and management of other ponds in the project area. Therefore, this impact is considered less than significant. No mitigation is required.