# Summary

## S.1 Project Background

The California State Coastal Conservancy (Coastal Conservancy), U.S. Army Corps of Engineers (Corps), and California Department of Fish and Game (DFG) (project sponsors) are proposing a salinity reduction and habitat restoration project for the 9,456-acre Napa River Unit of the Napa-Sonoma Marshes Wildlife Area (NSMWA) (Napa River Unit). The parcel was purchased with funds from the Shell Oil Spill Settlement, State Lands Commission, Wildlife Conservation Board, and the Coastal Conservancy. The Napa River Unit is located at the northeast edge of San Pablo Bay, adjacent to the Napa River (Figure S-1).

The Napa River Unit was first diked off from San Pablo Bay during the 1850s for hay production and cattle grazing. Dike construction continued for several years and much of the land was converted to salt ponds in the 1950s for salt production through the solar evaporation of bay water. In the early 1990s, Cargill Salt Company stopped producing salt in the ponds on the west side of the Napa River and sold the evaporator ponds to the State of California, which assigned ownership and management to DFG.

The site consists of 7,190 acres of salt ponds and levees and 2,266 acres of fringing marsh and slough. For the purpose of this document, Ponds 1, 1A, 2, 3, 4, 5, 6, and 6A will be referred to as the *lower ponds*. Ponds 7, 7A, and 8 will be referred to as the *upper ponds*. The lower ponds are located south of Napa Slough; the upper ponds are located north of Napa Slough. Detailed site topography was collected and used for the project as described in Chapter 3, "Hydrology." Additional pond salinity and water quality information is provided in Chapter 4, "Water Quality."

Restoration of the Napa River Unit has long been a vision for local resource agencies, conservationists, and planners. It is one of the largest tidal restoration projects on the west coast of the United States, and one of many restoration projects throughout the San Francisco Bay area. Baywide restoration planning, including historical and existing conditions and future habitat recommendations, was conducted as part of the Baylands Ecosystem Habitat Goals Project (Goals Project 1999) and provides a regional framework for this project.

# S.2 Purpose and Need

The purpose of the project is to restore a mosaic of habitats, including tidal habitats and managed ponds, to this property and provide for better management of ponds in the Napa River Unit to support populations of fish and wildlife, including endangered species, migratory waterfowl, shorebirds, and anadromous and resident fish. Other important benefits of the project include improved water quality, the potential use of recycled water, and enhanced public open space and wildlife-compatible recreation opportunities. The long-term goal is to produce a natural, self-sustaining habitat that can adjust to naturally occurring changes in physical processes with minimum ongoing intervention.

The project is needed because of

- historical losses of marsh ecosystems and habitats;
- increasing salinity and declining ecological value in several of the ponds;
- deterioration of levees, which could lead to levee breaches and uncontrolled high-salinity discharges, resulting in potential fish kills;
- deterioration of water control structures, which exacerbates the increase in salinity;
- increased restoration costs associated with site deterioration;
- increasing operation and maintenance costs; and
- inadequate water supply, especially during the summer months, resulting in increased salinity, acidic conditions, and drying out of some ponds in summer.

Restoring tidal wetlands, including tidal marsh, within the Napa River Unit would benefit the natural environment by creating

- a large area of contiguous tidal marsh for a diversity of fish and wildlife, including threatened and endangered species (salt marsh harvest mouse, California clapper rail, and black rail);
- a greater variety of slough channel sizes, a large increase in slough habitat, and greater connections among San Pablo Bay, the Napa River, and the tidal salt marsh, which would benefit estuarine fish, including listed species (Delta smelt, splittail, steelhead trout, and chinook salmon) and other aquatic species, such as the Dungeness crab;
- a natural, self-sustaining system that could adjust to naturally occurring changes in physical processes, with minimum ongoing intervention;
- large tracts of tidal marsh that extend up the Napa River that allow fish and wildlife species to adjust to changes in salinity that occur seasonally and over longer periods because of variations in precipitation;
- increased tidal prism that would scour slough channels, eventually creating large tidal channels, benefiting fish and diving waterfowl;

- improved tidal circulation throughout the system, improving water quality; and
- greatly increased production of organic detritus by tidal marshes, increasing the ecological productivity of San Pablo Bay.

Diking or filling has destroyed approximately 82% of the original tidal wetlands of the San Francisco Bay area (Goals Project 1999). The loss of tidal wetlands has greatly reduced the amount of habitat available to many species of fish and wildlife. Several animal and plant species native to California, including the salt marsh harvest mouse and the California clapper rail, have been federally and state listed as endangered as a result of the severe reduction of wetland habitats.

Salinity is increasing and ecological values are declining in several of the ponds in the Napa River Unit. DFG's ability to maintain the levee system and to control water levels, salinity, and water quality in the ponds is limited by funding and infrastructure constraints. The primary limitations to DFG's successful management are the high cost of running poorly performing water intake pumps and the low hydroconnectivity between ponds. The current pumps do not supply enough water to prevent increases in salinity concentrations, especially during seasonal periods of low precipitation and high water evaporation. Upgraded water intake pumps combined with levee reconstruction would result in improved hydroconnectivity and would enable DFG to improve migratory waterfowl management activities.

Several of the salt pond levees are deteriorating. The ponds are considered a potential threat to the ecology of the north bay region because of the presence of large quantities and high concentrations of residual salts. It has been estimated that there are 2–4 million tons of salt in the ponds. During the commercial production of salt, the solar evaporation system moved bay water through the ponds in sequence as the salts became concentrated. As a result, the ponds further along in the system have salinity levels that exceed the salinity level of seawater (ranging from approximately 32 parts per thousand [ppt] to more than 400 ppt).

The salt production process also concentrated soluble salts other than sodium chloride. These additional salts were generally not harvested and accumulated in the pond system in solutions and precipitates known as *bittern*. The uncontrolled release of bittern would be detrimental to the aquatic environment. Additionally, the drying action of salt ponds creates undesirable low pH (acidic) values.

The annual evaporative water loss from the salt ponds substantially exceeds the amount of water replaced by annual rainfall. Therefore, without active water management, the salt ponds would become increasingly saline and turn into seasonally wet salt flats—or worse, bittern ponds—resulting in the loss of most of their present habitat value for waterbirds and other wildlife species.

Although the water lost through net evaporation can be replaced by water drawn from San Pablo Bay and the lower Napa River, these sources also contain salts that will become concentrated in the ponds over time. The limited capacity and

high operating costs of the pumps used to draw water into the ponds are also problematic. Additional infrastructure constraints further limit the ability of DFG to move replacement water into the ponds.

# S.3 Alternatives Screening Process

Several approaches were used to develop and screen alternatives for the Napa River Salt Marsh Restoration Project, including using a restoration decision flowchart developed by the project team (Figure S-2) and the Corps's *Economic and Environmental Principles and Guidelines for Water Related Land Resources Implementation Studies* identified in the Corps's *Planning Guidance Notebook (ER 1105-2-100)* (U.S. Army Corps of Engineers 2000a), which includes screening based on effectiveness, efficiency, completeness, and acceptability. Environmental, economic, and social screening criteria were also used to evaluate and screen restoration components.

Each of the alternatives includes salinity reduction and habitat restoration features. Because of the complexity of the restoration and desalination process, restoration options and salinity reduction options were developed and analyzed separately. A wide range of both types of options was identified and evaluated at a screening level. Options that were identified as viable in the first round of screening were retained for more detailed evaluation. Project alternatives were then created by combining salinity reduction options and habitat restoration options in various combinations (see Chapter 17, "Integration of Options and Alternative Selection"). Salinity reduction options were further subdivided into two components—the salinity reduction process, and supplemental (fresh or recycled) water delivery. By evaluating the salinity reduction and habitat restoration options separately, the maximum feasible range of integrated alternatives was considered.

Preliminary screening of the salinity reduction options was achieved by conducting initial hydrologic modeling runs to determine the feasibility of various salinity reduction approaches. The water delivery options were evaluated by assessing the economic and institutional feasibility. The habitat restoration options were screened by characterizing the evolution of the site over time with varying assumptions. The most viable options were carried forward for consideration as potential project options. Potential habitat restoration options were then presented to the Napa-Sonoma Marsh Restoration Group for review and critique.

Twenty-four salinity reduction, seven habitat restoration, and three supplemental water delivery options were considered at the screening stage. Of these, 21 salinity reduction options, three habitat restoration options, and two water delivery options were eliminated from further analysis because of criteria described above. These options fall into several general categories:

- salinity reduction options:
  - reverse operation of the ponds,

  - concentration of brine in one or more central ponds,
  - physical removal of the bittern,
  - use of only recycled water to desalinate all ponds, and
  - flood event salinity reduction;
- water delivery options:
  - maximum recycled water delivery and
  - use of site groundwater;
- habitat restoration options:
  - species-focused options,
  - land exchange, and
  - sediment-import options.

# S.4 Intent and Scope of the EIR/EIS

The intent of this environmental impact report/environmental impact statement (EIR/EIS) is to disclose the environmental impacts associated with this restoration project. The restoration effort would have substantial habitat benefits by restoring portions of the Napa River Unit to a mosaic of wildlife habitats consisting of managed ponds and tidal marsh but may result in significant hydrologic, water quality, and biological effects.

In accordance with both California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) regulations, this document individually describes environmental effects caused by the construction, operation, and maintenance activities related to restoring the Napa River Unit. It focuses on key issues, including hydrology, water quality, biological resources (vegetation, wildlife, and aquatic resources), and geology and soils. Other resource topics such as air quality, hazardous materials, noise, land use, recreation, and cultural resources are also addressed in this document.

# S.5 Options Evaluated in This EIR/EIS

Three sets of options are evaluated in this EIR/EIS. Because both salinity reduction and habitat restoration are required to complete the project, the habitat restoration options are combined with appropriate salinity reduction options and water delivery options (Chapter 17, “Integration of Options and Alternative Selection”) to document the full extent of potential impacts associated with complete alternatives. In addition, both CEQA and NEPA require evaluation of a no-project alternative. This section describes first the No-Project Alternative, then the salinity reduction options, the water delivery options, and the habitat restoration options.

## S.5.1 No-Project Alternative

Under this alternative (depicted in Figure S-3), site conditions would continue to deteriorate and salinity in the ponds would continue to increase. DFG would manage the site to reduce day-to-day pond salinity, if possible, by taking San Pablo Bay water into Ponds 1 and 1A and Napa River water into Pond 8 and moving water through the pond system via water control structures. Annually there would be a net increase in the total salt load within the ponds. Water would be delivered to the system from two locations: the new intake at Pond 8 and the pump station that transfers water from Pond 1 into Pond 2. The flow from the intakes to the remaining ponds is driven by elevation ("head") differential. The ponds would be expected to dry out more frequently as siphons continue to be or become inoperable as a result of increased salinity gradients. Other water control structures would continue to deteriorate, reducing DFG's ability to manage water levels and pond salinity for wildlife habitat.

As long as DFG attempts to maintain the ponds' water levels by compensating for annual net evaporation, the salt mass in the ponds would increase dramatically from year to year. In the short term, depending on the amount of make-up water available for each pond, some ponds could dry out each year. In the long term, the increasing salinity in the ponds would reduce evaporation rates sufficiently that the estimated available amount of water would be sufficient to keep the ponds wet all year. As long as the amount of make-up water delivered to the ponds was kept the same, water levels would then slowly start to rise, and eventually water deliveries would have to be cut back to avoid overfilling the ponds. However, salinities in the ponds, even after the wet season, would soon exceed 350 ppt (the approximate solubility of sodium chloride), and sodium chloride would start to precipitate. As the salinity continues to increase, the liquid in the ponds would gradually turn into bittern; all the sodium chloride would precipitate, and the remaining brine would have the same composition as the bittern waste left over after the saltmaking process.

Although DFG would attempt to manage the ponds, as long as there is not a flow-through system, sufficient salt would accumulate in the ponds that all of the ponds that lack flow-through capability (i.e., Ponds 4–8) would turn first into highly saline brine and then into bittern ponds with a large precipitated salt mass. Thus, all of the ponds would eventually pose the type of ecological hazards currently posed by Pond 7. Coupled with the inevitable deterioration of the levees, the ponds would present a serious ecological threat.

Ongoing erosion of inboard levees by wind and waves and scour of outboard levees, in conjunction with high tides and high rainfall events, would likely result in one or more levee breaches. DFG would potentially fix the levees on an emergency basis as needed. Because of the remote locations and emergency contracting issues, however, these repairs often cannot be started in a timely manner, and much of the potential damage (i.e., possible fish kills) resulting from uncontrolled releases of highly saline water or bittern would be instantaneous.

In August 2002, an unknown party dug a small 2-foot-wide ditch between Pond 3 and South Slough. While this ditch provided some water exchange in Pond 3, it is also located very close to the siphon leading from Pond 3 to Pond 4 and, if it widens, could undermine the siphon, leading to a possible release from Pond 4. DFG subsequently obtained an emergency exemption to create a small 2-foot-wide ditch on the southeast side of Pond 3 to take the pressure off of the ditch on South Slough by facilitating some circulation of water in and out of Pond 3. USGS is currently monitoring salinity within and outside the small ditches. Initial findings indicate that the small amount of tidal exchange that occurs through these ditches has a negligible effect on water quality in the adjacent sloughs (Schoellhamer pers. comm.).

## S.5.2 Salinity Reduction Options

Salinity reduction is the first step in the habitat restoration process. Currently, many of the ponds have salinities that either preclude use of the ponds by wildlife, or limit use of the ponds to a very small number of species seasonally. Reducing the salinities in the ponds to a level that makes the ponds usable for a wide range of wildlife would be the first step in enhancing the habitat value of the ponds. Generally, once the ponds are desalinated, they could be opened up to tidal action or maintained as managed.

Salinity reduction is not currently required for Ponds 1, 1A, 2, and 2A. Ponds 1, 1A, and 2 all have salinities that are at or near ambient conditions (i.e., salinity levels near San Pablo Bay/Napa River levels), and Pond 2A has been restored to tidal marsh. Ponds 1, 1A, and 2 have water exchange (i.e., they can continue to function as ponds in the long term without salinity build-up in the ponds).

All salinity reduction options would use the existing water conveyance infrastructure to the degree possible. However, the existing water conveyance structures are deteriorated, and the engineering evaluation suggests that all siphons would require refurbishing or replacement. In addition, all three options require construction and/or repair of intakes, outfalls, and other water conveyance structures (such as pumps, siphons, weirs, and fish screens).

Levee repairs would be conducted at the start of the desalination period for those ponds requiring desalination. The amount of repairs required depends on the desalination option selected, because different ponds would be desalinated at different rates under the different options (i.e., the duration for which the levees would have to retain their integrity, and which levees are required to retain their integrity, vary by option). For ponds that require a long time for desalination (e.g., Pond 7), levee maintenance would be required before and during the desalination period. It is estimated that 5% of all levees would require repairs every year.

### S.5.2.1 Salinity Reduction Option 1: Napa River and Napa Slough Discharge

Under this option, salinity reduction in the lower ponds (3, 4/5, and 6/6A) would be achieved through a phased approach: restoration to near ambient Napa River salinity levels would begin at Pond 3, then continue to Ponds 4/5, and then to Ponds 6/6A. Primary discharges from the lower ponds would be to the Napa River. Salinity reduction in the upper ponds (7, 7A, and 8) would be carried out in a parallel phase. Primary discharges from the upper ponds would be to Napa Slough.

With a phased salinity reduction process, each pond would achieve full habitat value as soon as possible. Ponds that are slated to remain managed ponds would be fully functioning habitat as soon as salinity reduction is completed. Each of the ponds that is slated to be opened up to tidal action could be opened up to tidal action as soon as its salinity and water quality parameters are in the appropriate range as determined by the San Francisco Bay Regional Water Quality Control Board (RWQCB) and other regulatory agencies.

One of the concerns associated with existing conditions at the Napa River Unit is that one or more of the pond levees could breach and that that breach would result in an uncontrolled release of saline brine. However, controlled, managed breaches into the Napa River, especially for the less saline ponds, represent a potentially effective means of desalinating some of the ponds. The goal of the breaches proposed under this scenario would be to desalinate the ponds. Additional breaches would be added to allow full tidal exchange and return the ponds to tidal habitats.

The portion of the Napa River adjacent to Ponds 3 and 4/5 experiences a significant daily tidal flow, which would result in a high dilution rate for brines discharged in this area. Modeling has shown that controlled breaches for the lower ponds can be an effective means of desalinating these ponds.

Consequently, Salinity Reduction Option 1 has three suboptions: Option 1A, “Napa River and Napa Slough Discharge”; Option 1B, “Napa River and Napa Slough Discharge and Breach of Pond 3”; and Option 1C, “Napa River and Napa Slough Discharge with Breaches of Ponds 3 and 4/5” (Figures S-4, S-5, and S-6). The difference between the suboptions is in the way in which desalination of Ponds 3 and 4/5 would be conducted (via constructed intakes and outfalls, or via breaches).

### S.5.2.2 Salinity Reduction Option 2: Napa River and San Pablo Bay Discharge

Numerous reverse flow alternatives were considered but eliminated because they would increase desalination time (delay the time at which one or more ponds could be opened to tidal action) and could lead to unacceptably high increases in

salinity in the lower ponds, which are already viable habitat. However, reverse flow would allow discharge to San Pablo Bay, which could increase the San Francisco Bay RWQCB's allowable discharge rate for salt (because San Pablo Bay is more saline than the Napa River, has a larger tidal flow, and has much better mixing and dispersion).

This modified reverse-flow option addresses the issue of delay in opening the ponds, as well as controlling the salinity increases in the lower ponds, while still allowing discharge to San Pablo Bay. Under this option (Figure S-7), there would be two components: salinity reduction in Ponds 3, 4, and 5, with discharge to the Napa River; and salinity reduction in Ponds 7, 7A, and 8 via Ponds 1, 1A, 2, and 6/6A, with discharge to San Pablo Bay. Although salinity reduction is not required for Ponds 1, 1A, and 2, water would be discharged to San Pablo Bay through the existing culvert at Pond 1; therefore, this component includes transfer of increased saline water through Ponds 1, 1A, and 2, which are already managed tidal ponds. The salinity reduction process for these two components would occur simultaneously.

## S.5.3 Water Delivery Option

In addition to water delivery to the project site by the tidal influence of San Pablo Bay, this option includes the delivery of tertiary recycled water from wastewater treatment plants (WWTPs) in the north bay region. This option (Figures S-8 and S-9) includes a *Water Delivery Project Component* and a *Water Delivery Program Component*:

- *Water Delivery Project Component:* A combined 6,000–7,000 acre-feet (af)/year of tertiary recycled water would be provided from three local WWTPs—the Sonoma Valley County Sanitation District (SVCSD) WWTP, the Napa Sanitation District (NSD) WWTP, and the City of American Canyon (CAC) WWTP—for salinity reduction, and subsequently for agricultural irrigation. This component is considered feasible and therefore is currently a part of the Water Delivery Option.
- *Water Delivery Program Component:* Tertiary recycled water from other reclamation plants in the north bay region could be added to the system at some point in the future assuming the Project Component is implemented.

The impact analyses in Chapters 3–16 of this document are at a project level for the currently proposed concept (Water Delivery Project Component) and at a program level for the potential future phase(s) (Water Delivery Program Component). If specific proposals are made for such future phases, Sonoma County Water Agency (SCWA) would prepare more detailed information. The potential environmental impacts of those future detailed proposals would then be addressed at a project level of analysis through a separate supplemental environmental document.

## S.5.4 Habitat Restoration Options

The goal of the project is to provide a mosaic of wetland habitats within the Napa River Unit, including tidal habitats and managed ponds. This mix of habitats would benefit a diversity of wildlife, including special-status species, migratory waterfowl and shorebirds, anadromous and resident fish, and other aquatic animals. All of the habitat restoration alternatives provide a mix of tidal marsh and managed ponds, but vary in the extent of managed ponds restored to full tidal exchange.

Goals for tidal habitat restoration, which would include middle marsh, lower marsh, intertidal mudflat, and subtidal areas, are as follows:

- In a phased approach, restore large patches of tidal marsh that support a wide variety of fish, wildlife, and plants, including special-status species.
- Create connections between the patches of tidal marsh (in the project site and with adjacent sites) to enable the movement of small mammals, marsh-dependent birds, and fish and aquatic species.
- Restore tidal marsh in a band along the Napa River to maximize benefits for fish and other aquatic animals.

More than 7,000 acres of the Napa River Unit consist of inactive salt ponds that were used for salt production through the solar evaporation of bay water. These ponds, both historically and currently, serve as habitat for phytoplankton, invertebrates, fish, waterfowl, and shorebirds.

The habitat restoration options each provide for the continued management of at least five of the 12 ponds as ponds. Project goals for pond habitat are to enable DFG to better and more efficiently control water depth and salinity for the benefit of shorebirds and waterfowl. Waterfowl and shorebird use of the ponds is influenced by the water depth, salinity, and size of each pond. DFG will write a management plan for the Napa River Unit that will provide for pond management in the long term.

Levees and water control structures for all the ponds that would be preserved as ponds would need to be repaired or replaced so that salinity could be reduced in the short term and the water supply could be managed in the long term. The goal would be to maintain both the depth and salinity for a given pond within a specified range. The range would reflect both the needs of different bird species likely to be present in the project area throughout the year, as well as seasonal variations. Water from the Napa River or Napa Slough would be added to ensure that the ponds do not drop below a certain critical depth. Recycled water could also be used to help maintain the levels in the ponds but in the long term would primarily be used for local agriculture.

As described below and in Chapter 2, “Site Description and Alternatives,” the various habitat restoration options would evolve over different periods of time and achieve different mixes of habitats.

### S.5.4.1 Habitat Restoration Option 1: Mixture of Tidal Marsh and Managed Ponds

Habitat Restoration Option 1 provides for a mosaic of tidal habitats and managed ponds (Figure S-10). Under this option, the existing ponds would be managed as follows:

- Ponds 1, 1A, 2, and 2A would be maintained as they are, with levee repair and water control improvements as needed.
- Ponds 3 and 4/5 would be opened to the tidal prism in an orderly manner. Levee breaches would depend on accretion rates and sediment budget.
- Pond 6/6A would be maintained as a managed pond during the restoration of Ponds 3 and 4/5, an estimated 10–20 years. Adaptive management of the project would determine whether Pond 6/6A is converted to tidal marsh or retained as a pond in the long term.
- Ponds 7, 7A, and 8 would be managed as ponds after their salinity has been reduced to ambient or near-ambient levels. Levees would be repaired and water control improvements would be made as needed.

### S.5.4.2 Habitat Restoration Option 2: Tidal Marsh Emphasis

Habitat Restoration Option 2 provides for a mosaic of tidal habitats and managed ponds with an emphasis on tidal habitats (Figure S-11). Under this option, the existing ponds would be managed as follows:

- Ponds 1 and 1A, the western half of Pond 2 (Pond 2W), and Pond 2A would be maintained as they are, with levee repair and water control improvements as needed. A new levee would be built down the middle of Pond 2.
- Ponds 3, 4, 5, 6, and 6A, and the eastern half of Pond 2 (Pond 2E) would be opened to the tidal prism with levee breaches in an orderly manner depending on accretion rates and sediment budget. Design features would be used as needed for improved accretion rates and habitat evolution. Pond 3 would be opened to tidal action first, followed by Ponds 4 and 5, then Ponds 2E, 6, and 6A. Ponds 2 and 6/6A would be maintained as ponds, with levee repair and water control improvements as needed, until significant habitat development occurs in Ponds 3, 4, and 5.
- Ponds 7, 7A, and 8 would be managed as ponds after their salinity has been reduced to ambient or near-ambient levels, with levee repair and water control improvements as needed.

### S.5.4.3 Habitat Restoration Option 3: Pond Emphasis

Habitat Restoration Option 3 provides for a mosaic of tidal habitats and managed ponds, with an emphasis on managed ponds (Figure S-12). Under this option, the existing ponds would be managed as follows:

- Ponds 1, 1A, 2, and 2A would be maintained as they are, with levee repair and water control improvements as needed.
- Ponds 3 and 4 would be opened to the tidal prism with levee breaches in an orderly manner depending on accretion rates and sediment budget. Pond 3 would be opened to tidal action first, followed by Pond 4.
- Ponds 5, 6, 6A, 7, 7A, and 8 would be managed as ponds after their salinity has been reduced to ambient or near-ambient levels, with levee repair and water control improvements as needed.

### S.5.4.4 Habitat Restoration Option 4: Accelerated Restoration

Habitat Restoration Option 4 is identical to Habitat Restoration Option 1 in terms of the habitat mix; however, more extensive construction activities would occur at the ponds opened to tidal action. The additional construction activities, described below, are intended to accelerate marsh evolution (Figure S-13). The managed ponds (Ponds 1, 1A, 2, 7, 7A, and 8) would be constructed and operated in the same way as for Habitat Restoration Option 1.

- **Fill 100 Acres of Pond 4 (or a Similar Location).** Clean and local sediment would be placed in the southern portion of Pond 4, or a similar location with low historic slough channel density, to raise the pond elevation to within 1 foot of MHHW. This limited fill placement would speed initial vegetative colonization by raising the initial elevation of the site. This fill would help compensate for the anticipated temporary reduction in fringing marsh.
- **Number and Length of Starter Channels.** The total length of starter channels and associated berms would increase from 27,500 feet to 55,300 feet. The increased number and length of starter channels would increase the channelization within the marsh, and sediment transport into the interiors of the ponds. The increased amount of berms would provide more wave breaks, more sacrificial sediment sources, and more opportunities for early colonization by marsh vegetation.

The addition of these more extensive design features could accelerate the habitat evolution compared to the other habitat restoration options. The number of breaches and ditch blocks and the amount of levee lowering would be the same as under Habitat Restoration Option 1.

# S.6 Comparison of Options

A summary of impacts associated with each option and the level of significance and mitigation measures for each is contained in Tables S-1 and S-2.

# S.7 Identification of Alternatives

Based on a detailed option and alternative screening process, the following nine alternatives were included for detailed analysis:

- No-Project Alternative;
- Alternative 1: Napa River and Napa Slough Discharge (Salinity Reduction Option 1A), Recycled Water Delivery, and Mixture of Ponds and Tidal Marsh (Habitat Restoration Option 1);
- Alternative 2: Napa River and Napa Slough Discharge and Breach of Pond 3 (Salinity Reduction Option 1B), Recycled Water Delivery, and Mixture of Ponds and Tidal Marsh (Habitat Restoration Option 1);
- Alternative 3: Napa River and Napa Slough Discharge and Breach of Pond 3 (Salinity Reduction Option 1B), Recycled Water Delivery, and Tidal Marsh Emphasis (Habitat Restoration Option 2);
- Alternative 4: Napa River and Napa Slough Discharge and Breach of Pond 3 (Salinity Reduction Option 1B), Recycled Water Delivery, and Pond Emphasis (Habitat Restoration Option 3);
- Alternative 5: Napa River and Napa Slough Discharge and Breach of Pond 3 (Salinity Reduction Option 1B), Recycled Water Delivery, and Accelerated Restoration (Habitat Restoration Option 4);
- Alternative 6: Napa River and Napa Slough Discharge with Breaches of Ponds 3 and 4/5 (Salinity Reduction Option 1C), Recycled Water Delivery, and Mixture of Ponds and Tidal Marsh (Habitat Restoration Option 1);
- Alternative 7: Napa River and San Pablo Bay Discharge and Breach of Pond 3 (slight modification of Salinity Reduction Option 2), Recycled Water Delivery, and Accelerated Restoration (Habitat Restoration Option 4); and
- Alternative 8: Napa River and Napa Slough Discharge and Breach of Pond 3 (Salinity Reduction Option 1B), No Recycled Water, and Mixture of Ponds and Tidal Marsh (Habitat Restoration Option 1).

# S.8 Comparison of Alternatives

A summary of the significant impacts associated with each of the alternatives, and the level of significance and mitigation measures for each, is contained in

Table S-3. A summary of beneficial impacts associated with each alternative is contained in Table S-4.

# S.9 Impact Conclusions

## S.9.1 Environmentally Superior Alternative

The environmentally superior alternative is the alternative that would cause the least damage to the biological and physical environment and that would protect, preserve, and enhance the historical, cultural, and natural resources of the project area. As the proposed project is a restoration project, all alternatives, by definition, would benefit the biological and physical environment and are designed to enhance the natural resources in the project area. However, Alternative 6 is considered the environmentally superior alternative because it would result in relatively quick salinity reduction of the lower ponds (several weeks for Pond 3 and several months for Pond 4/5), reducing the potential for adverse effects to aquatic resources. Construction-related ground disturbance associated with this alternative is equivalent to Alternatives 1, 2, 5, 7, and 8, and less than Alternative 3. While there would be more construction-related ground disturbance than under Alternative 4, Alternative 4 does not result in the optimal mix of restored habitats. The short period of time for salinity reduction helps the habitat restoration process proceed sooner under Alternative 6 than all others except Alternative 5 (which requires the use of fill). Alternative 6 provides a mixture of pond and tidal marsh habitats that meets the project objectives and is phased in in a way that would minimize current and future adverse effects.

The No-Project Alternative is not considered the environmentally superior alternative because of the continued deterioration of the site and potential for long-term adverse water quality effects.

## S.9.2 Irreversible or Irretrievable Commitments of Resources

The project would result in the irretrievable commitment of fossil fuels and other energy sources to build, operate, and maintain the wetlands. The restoration of the site to wetlands, however, is not considered an irreversible or irretrievable commitment because the landscape could be converted to other land uses in the future.

## S.9.3 Environmental Commitments

The Corps and DFG will adhere to several basic environmental commitments as part of the project, including preconstruction surveys for wildlife and plants, and implementing the Bay Area Air Quality Management District's (BAAQMD's)

**Table S-1.** Summary Comparison of Impacts and Mitigation Measures for the Napa River Salt Marsh Project: No-Impact Alternative, Salinity Reduction Options, and Water Delivery Option



| | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| **Resources, Impacts, and Mitigation Measures*** | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Hydrology** | | | | | | |
| ***H-1: Reduced Risk of Property Damage, Injury, or Death as a Result of Flooding*** | NA | ***B*** | ***B*** | ***B*** | ***B*** | NA |
| H-2: Modification of Surface Drainage Patterns<br>Mitigation: Measure H-2 (Avoid Drainage Pattern Alteration in Plans for Future Pipeline Alignments) *(Water Delivery Program Component only)* | NA | LTS | LTS | LTS | LTS | *Project Component:* LTS<br>*Program Component:* S |
| H-3: Increased Risk of Property Damage, Injury, or Death as a Result of Flooding<br>Mitigation: Measure H-1 (Repair Unintended Levee Breaches) | NA | NA | S | S | NA | NA |
| H-4: Alteration of Groundwater Supplies or Recharge Patterns | NA | NA | NA | NA | NA | LTS |
| **Water Quality** | | | | | | |
| WQ-1: Long-Term Potential for Discharge of Contaminants to Adjacent Surface Water | S* | NA | NA | NA | NA | NA |
| WQ-2: Short-Term Construction-Related Water Quality Impacts<br>*(All SROs)* Mitigation: Measure WQ-1 (Obtain RWQCB Authorization under Waste Discharge Requirements or NPDES Stormwater Permit for General Construction Activity and Implement Best Management Practices)<br>*(SROs 1B / 1C)* Mitigation: Measure WQ-5 (Prepare Levees and Time Breaches)<br>*(Water Delivery Option)* Mitigation: Measure WQ-6 (Prepare and Implement Storm Water Pollution Prevention Plans) | NA | S | S | S | S | S |
| WQ-3: Increase in Salinity in the Napa River<br>Mitigation: Measure WQ-2 (Design Project in Compliance with Resource Agency Permit Conditions and Conduct Water Quality Monitoring) | NA | S | S | S | S | NA |
| WQ-4: Increase in Conventional and Toxic Constituents<br>Mitigation: Measure WQ-2 (see above) | NA | S | S | S | S | NA |
| WQ-5: Discharges of Priority Heavy Metal and Organic Constituents in the Napa River and Local Sloughs<br>Mitigation: Measure WQ-2 (see above) | NA | S | S | S | S | NA |

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**Table S-1.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Water Quality (continued)** | | | | | | |
| WQ-6: Increase in Contribution of Conventional Heavy Metal and Organic Constituents from Recycled Water<br>Mitigation: Measure WQ-3 (Design, Operate, and Monitor Use of Recycled Water in Accordance with RWQCB Requirements) | NA | S | S | S | S | NA |
| WQ-7: Water Quality Changes in the Salt Ponds<br>Mitigation: Measure WQ-4 (Monitor Pond Water Quality and Use Adaptive Management) | NA | S | S | S | S | NA |
| ***WQ-8: Long-Term Changes to Water Quality in Local Rivers and Salt Ponds from Project Operations*** | NA | NA | NA | NA | NA | *Project Component:* B<br>*Program Component:* LTS |
| **Biological Resources—Vegetation** | | | | | | |
| V-1: Loss of Common and Sensitive Vegetation Communities and Special-Status Plants as a Result of Levee Failure and Emergency Repairs | LTS | NA | NA | NA | NA | NA |
| V-2: Temporary Alteration of Common Vegetation and Sensitive Communities<br>*(Water Delivery Option only)* Mitigation: Measure V-2 (Conduct Preconstruction Surveys and Implement Impact Avoidance, Minimization, and Mitigation Measures) | NA | LTS | LTS | LTS | LTS | S |
| V-3: Removal of Soft Bird's-Beak<br>Mitigation: Measure V-1 (Avoid Ground Disturbance in Populations of Soft Bird's-Beak) | NA | S | S | S | S | NA |
| V-4: Removal of Other Special-Status Species | NA | LTS | LTS | LTS | LTS | NA |
| **Biological Resources—Wildlife** | | | | | | |
| W-1: Long-Term Decline in Habitat Value and Function | S* | NA | NA | NA | NA | NA |
| W-2: Temporary Disturbance of Wildlife | S* | NA | NA | NA | NA | NA |

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**Table S-1.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Biological Resources—Wildlife (continued)** | | | | | | |
| W-3: Construction-Related Disturbance and Mortality of Special-Status Species<br>*(All SROs)* Mitigation: Measure W-1 (Avoid Construction Activities near Nesting Habitats during Breeding Season)<br>*(Water Delivery Project and Program Components)* Mitigation: Measures W-4 (Complete Focused Surveys for Special-Status Wildlife Species before Construction), W-5 (Educate Construction Crews regarding Special-Status Wildlife Species), W-6 (Use Trenchless Construction Techniques for Special-Status Wildlife Species Protection), and W-7 (Restore Habitat Modified by Construction) *(Impact would not be reduced to LTS for work under the Program Component.)* | NA | S | S | S | S | *Project Component:* S<br>*Program Component:* SU |
| W-4: Construction-Related Disturbance and Mortality of Salt Marsh Harvest Mouse and Suisun Ornate Shrew<br>Mitigation: Measures W-2 (Avoid Construction Activities near Occupied Suisun Ornate Shrew Habitat or Remove Shrews) and W-3 (Avoid Construction Activities near Occupied Salt Marsh Harvest House Habitat) | NA | S | S | S | S | NA |
| W-5: Exposure of Wildlife to Contaminants during Construction<br>Mitigation: Measure WQ-1 (see "Water Quality" above) | NA | S | S | S | S | NA |
| W-6: Interference with the Movement of Wildlife<br>Mitigation: Measure W-4 (Complete Wildlife Surveys before Construction) | NA | NA | NA | NA | NA | *Project Component:* LTS<br>*Program Component:* S |
| **Biological Resources—Aquatic Resources** | | | | | | |
| A-1: Reduced Water Quality as a Result of Uncontrolled Breaches of Levees | S* | NA | NA | NA | NA | NA |
| A-2: Reduced Water Quality during Construction Activities | LTS | NA | NA | NA | NA | NA |
| A-3: Disturbance of Substrate and Associated Benthic Organisms during Repair of Levee Breaches | LTS | NA | NA | NA | NA | NA |
| A-4: Stranding of Fish and Other Aquatic Organisms as a Result of Levee Repairs | S* | NA | NA | NA | NA | NA |

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* All significant impacts are reduced to a less-than-significant level with mitigation unless the impact is listed as Significant and Unavoidable (SU) or is listed under the No-Project Alternative (because this alternative would result in no project being implemented, no mitigation is proposed if this occurs).

**Table S-1.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Biological Resources—Aquatic Resources (continued)** | | | | | | |
| A-5: Entrainment of Fish and Other Aquatic Organisms through Diversions into the Managed Ponds<br>Mitigation: Measure A-1 (Minimize Entrainment of Sensitive Species) *(does not apply to No-Project Alternative)* | S* | S | S | S | S | NA |
| A-6: Short-Term Reduction in Aquatic Habitat Suitability during Construction Activities<br>*(SROs 1A / 2)* Mitigation: Measure A-2 (Install Cofferdams to Minimize In-Water Construction)<br>*(SROs 1B / 1C)* Mitigation: Measure WQ-1 (see "Water Quality" above)<br>*(Water Delivery Program Component)* Mitigation: Measure A-4 (Use Trenchless Technology during Construction to Protect Aquatic Species) | NA | S | S | S | S | *Project Component:* LTS<br>*Program Component:* S |
| A-7: Reduction in Aquatic Habitat Suitability as a Result of the Deterioration of Water Quality<br>*(SROs 1A / 1B / 1C)* Mitigation: Measures WQ-2, WQ-3, and WQ-4 ( see "Water Quality" above) and A-3 (Assess and Maintain Salinity Levels Protective of Aquatic Resources)<br>*(SRO 2)* Mitigation: Measure A-3 (see above) | NA | S | S | S | S | NA |
| A-8: Disturbance of Substrate and Associated Benthic Organisms during Construction Activities | NA | LTS | LTS | LTS | LTS | NA |
| A-9: Substantial Interference with the Movement or Migration of Fish Species<br>Mitigation: Measure A-4 (see above) | NA | NA | NA | NA | NA | *Project Component:* LTS<br>*Program Component:* S |
| **Geology and Soils** | | | | | | |
| Geo-1: Levee Failure as a Result of Strong Seismic Ground Shaking | S* | LTS | LTS | LTS | LTS | NA |
| Geo-2: Levee Failure as a Result of Erosion | S* | NA | NA | NA | NA | NA |
| Geo-3: Levee Failure or Structural Damage as a Result of a Rupture of a Known Earthquake Fault | NA | LTS | LTS | LTS | LTS | NA |

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* All significant impacts are reduced to a less-than-significant level with mitigation unless the impact is listed as Significant and Unavoidable (SU) or is listed under the No-Project Alternative (because this alternative would result in no project being implemented, no mitigation is proposed if this occurs).

| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Geology and Soils (continued)** | | | | | | |
| Geo-4: Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse as a Result of Construction on Unstable Soils *(Water Delivery Option only):* Mitigation: Measure Geo-2 (Remove Unstable or Expansive Soils and Backfill with Engineered Fill) | NA | LTS | LTS | LTS | LTS | S |
| Geo-5: Risk to Life or Property as a Result of Construction of Structures on Expansive Soils *(Water Delivery Option only):* Mitigation: Measure Geo-2 (see above) | NA | LTS | LTS | LTS | LTS | S |
| Geo-6: Flooding of the Project Area as a Result of Tsunamis | NA | LTS | LTS | LTS | LTS | NA |
| Geo-7: Potential Erosion as a Result of Excess Pond Water Height Mitigation: Measure Geo-1 (Maintain Water Level 2 Feet below Levee Crest) | NA | S | S | S | S | NA |
| Geo-8: Potential Erosion as a Result of Increased Tidal Prism Mitigation: Measure H-1 (see "Hydrology" above) | NA | NA | S | S | NA | NA |
| Geo-9: Exposure of People or Structures to Potential Adverse Effects as a Result of Fault Rupture, Ground Shaking, or Ground Failure | NA | NA | NA | NA | NA | LTS |
| Geo-10: Substantial Soil Erosion or Loss of Topsoil | NA | NA | NA | NA | NA | LTS |
| **Hazards and Hazardous Materials** | | | | | | |
| Haz-1: Potential Release of Bittern or Highly Saline Brines into the Environment as a Result of Uncontrolled Levee Breaching | S* | NA | NA | NA | NA | NA |
| Haz-2: Potential Exposure to and/or Release of Hazardous Materials/Waste Associated with Construction Activities Mitigation: Measure Haz-1 (Provide Enhanced Spill Prevention and Response Training, and Spill Response Preparation) | LTS | S | S | S | S | NA |
| Haz-3: Potential Releases of Irritant Dust from Desiccated Ponds | LTS | NA | NA | NA | NA | NA |
| Haz-4: Potential Releases of Residual Hazardous Materials or Constituents from Breaching of Levees Mitigation: Measure Haz-2 (Employ Explosives Experts when Breaching Levees) | NA | S | S | S | S | NA |
| Haz-5: Potential Releases of Irritant Dust as a Result of Construction Activities Mitigation: Measures Haz-3 (Develop and Implement a Health and Safety Plan) and Haz-4 (Monitor Perimeter Dust Concentrations during Work on and in the Vicinity of Pond 8) | NA | S | S | S | S | NA |

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* All significant impacts are reduced to a less-than-significant level with mitigation unless the impact is listed as Significant and Unavoidable (SU) or is listed under the No-Project Alternative (because this alternative would result in no project being implemented, no mitigation is proposed if this occurs).

| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Hazards and Hazardous Materials (continued)** | | | | | | |
| Haz-6: Accidental Breaching of Exterior Levees on Highly Saline/Bittern Ponds as a Result of Construction Activities | NA | LTS | LTS | LTS | LTS | NA |
| Haz-7: Hazard Resulting from the Routine Transport, Use, or Disposal of Hazardous Materials | NA | NA | NA | NA | NA | LTS |
| Haz-8: Hazard Created through Reasonably Foreseeable Upset and Accident Conditions Involving Release of Hazardous Materials | NA | NA | NA | NA | NA | LTS |
| Haz-9: Exposures Resulting from Exceeding Human Health Criteria<br>Mitigation: Measure Haz-5 (Prepare and Implement a Safety Plan) | NA | NA | NA | NA | NA | S |
| Haz-10: Safety Hazard Resulting from Proximity to an Airport | NA | NA | NA | NA | NA | *Project Component:* Sonoma Pipeline, NI; CAC Pipelines, LTS<br>*Program Component:* LTS |
| **Transportation and Circulation** | | | | | | |
| T-1: Temporary Increase in Traffic Volumes as a Result of Emergency Repairs | LTS | NA | NA | NA | NA | NA |
| T-2: Temporary Increase in Traffic Volumes as a Result of Project Construction | NA | LTS | LTS | LTS | LTS | LTS |
| T-3: Increase in Construction-Related Traffic Hazards<br>*(Project Component / Sonoma Pipeline and railroad ROW)*<br>Mitigation: Measure T-1 (Implement Safety Plan for Pipeline Construction along Rail Line)<br>*(Project Component / CAC Pipeline and Green Island Road)*<br>Mitigation: Measure T-2 (Implement Safety Plan for Construction along Public Roads)<br>*(Program Component)*<br>Mitigation: Measures T-1 and T-2 (see above) | NA | LTS | LTS | LTS | LTS | *Project Component:* Sonoma Pipeline / railroad ROW, S; Sonoma Pipeline/ Napa River Unit access road, LTS; CAC Pipeline / Green Island Road, SU; Napa Pipeline/Buchli Station Road, SU<br>*Program Component:* S |
| T-4: Increase in Watercraft Traffic in the Napa River | NA | LTS | LTS | LTS | LTS | NA |
| T-5: Individual or Cumulative Exceedance of an Established Level-of-Service Standard | NA | NA | NA | NA | NA | LTS |
| **Air Quality** | | | | | | |

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* All significant impacts are reduced to a less-than-significant level with mitigation unless the impact is listed as Significant and Unavoidable (SU) or is listed under the No-Project Alternative (because this alternative would result in no project being implemented, no mitigation is proposed if this occurs).

**Table S-1.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| AQ-1: Increase in Fugitive Dust Emissions Resulting from Increased Desiccation of the Ponds | LTS | NA | NA | NA | NA | NA |
| AQ-2: Increase in Ambient Pollutant Levels | NA | LTS | LTS | LTS | LTS | LTS |
| AQ-3: Potential Releases of Irritant Dust as a Result of Construction Activities<br>Mitigation: Measures AQ-1 (Minimize Dust Generation in and Implement Dust Control Measures for Work Areas with Salt Crusts) and Haz-4 and Haz-5 (see "Hazards and Hazardous Materials" above) | NA | S | S | S | S | NA |
| AQ-4: Public Exposure to Substantial Pollutant Concentrations | NA | NA | NA | NA | NA | LTS |
| **Noise** | | | | | | |
| N-1: Temporary Increase in Ambient Noise Levels as a Result of Emergency Repairs | S* | NA | NA | NA | NA | NA |
| N-2: Temporary Increase in Ambient Noise Levels as a Result of Construction<br>Mitigation: Measure N-1 (Decrease Noise Levels with Use of Noise Reduction Devices)<br>*(Water Delivery Option Project Component [Napa and CAC Pipeline only] and Program Component impact would not be reduced to LTS)* | NA | LTS | LTS | LTS | LTS | *Project Component:* Sonoma Pipeline, LTS; Napa Pipeline, SU; CAC Pipeline, SU<br>*Program Component:* S |
| N-3: Temporary Increase in Noise Levels as a Result of Blasting Activities | NA | LTS | LTS | LTS | LTS | NA |
| N-4: Exposure of People to Excessive Ground Vibration | NA | NA | NA | NA | NA | LTS |
| **Land Use and Planning** | | | | | | |
| LU-1: Compatibility with Land Use Goals and Objectives<br>Mitigation: Measure N-1 (see "Noise" above) | NA | LTS | LTS | LTS | LTS | *Project Component:* Sonoma Pipeline, LTS; Napa and CAC Pipelines, SU (noise only)<br>*Program Component:* SU (noise only) |
| LU-2: Consistency with Existing or Planned Land Uses | NA | LTS | LTS | LTS | LTS | NA |

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**Table S-1.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Public Services and Utilities** | | | | | | |
| PS-1: Conflict with Existing Utilities | LTS | LTS | NA | NA | LTS | NA |
| PS-2: Increased Risk of Instability of Power Towers<br>Mitigation: Measure PS-1 (Ensure the Stability of the Power Towers) | NA | NA | S | S | NA | NA |
| **Recreation, Public Access, Visual Resources, and Public Health** | | | | | | |
| ***R-1: Enhanced Recreational Opportunities*** | NA | ***B*** | ***B*** | ***B*** | ***B*** | NA |
| R-2: Consistency with Existing or Proposed Public Access Plans | NA | LTS | LTS | LTS | LTS | NA |
| R-3: Accelerated Physical Deterioration of a Recreational Facility or Adverse Effects from Facility Expansion | NA | LTS | LTS | LTS | LTS | NA |
| R-4: Temporary Effect of Construction on Public Access | NA | LTS | LTS | LTS | LTS | NA |
| R-5: Substantial Adverse Effect on a Scenic Vista | NA | LTS | LTS | LTS | LTS | LTS |
| R-6: Increased Mosquito Production<br>Mitigation: Measure R-1 (Coordinate Project Activities with the Napa County Mosquito Abatement District) | NA | NA | S | S | S | NA |
| R-7: Conflicts with Existing or Planned Recreational Uses, and Recreation Plans and Policies<br>Mitigation: Measure R-2 (Prepare a Public Access Plan) | NA | NA | NA | NA | NA | *Project Component:* Sonoma and Napa Pipelines, S; CAC Pipeline, NI<br>*Program Component:* S |
| **Cultural Resources** | | | | | | |
| C-1: Potential to Materially Impair Significant Cultural Resources | NA | LTS | LTS | LTS | LTS | NA |
| C-2: Potential for Ground-Disturbing Activities to Damage Previously Unidentified Buried Cultural Resources Sites<br>Mitigation: Measure C-1 (Stop Work If Cultural Resources Are Discovered during Ground-Disturbing Activities) | NA | S | S | S | S | NA |

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**Table S-1.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | | |
|---|---|---|---|---|---|---|
| | **No-Project** | **SRO 1A** | **SRO 1B** | **SRO 1C** | **SRO 2** | **Water Delivery Option** |
| **Cultural Resources (continued)** | | | | | | |
| C-3: Potential to Damage Previously Unidentified Human Remains<br>Mitigation: Measure C-2 (Comply with State Laws Pertaining to the Discovery of Human Remains) | NA | S | S | S | S | NA |
| C-4: Changes in the Significance of a Historic and/or Archaeological Resource<br>*(Project Component)* Mitigation: Measures C-3 (Conduct Archaeological Monitoring of Construction Activities in the Vicinity of CA-NAP-224, C-164, and CA-NAP-230)<br>*(Program Component)* Mitigation: Measure C-4 (Conduct Records Search and Visual Survey) | NA | NA | NA | NA | NA | S |
| C-5: Disturbance of Human Remains<br>Mitigation: Measure C-2 (see above) | NA | NA | NA | NA | NA | S |
| **Cumulative Impacts** | | | | | | |
| Cu-1: Cumulative Hydrologic Changes in the Lower Napa River<br>Mitigation: Measure Cu-1 (Implement Monitoring and Adaptive Management Program) | NA | S | S | S | S | NA |
| Cu-2: Cumulative Adverse Change in Water Quality<br>Mitigation: Measures Cu-1 (see above), WQ-2 (see "Water Quality" above)<br>*(Project and Program Component)* Mitigation: WQ-2 (see "Water Quality" above) | NA | S | S | S | S | S |
| ***Cu-3: Cumulative Change in Sensitive Plant Communities*** | NA | ***B*** | ***B*** | ***B*** | ***B*** | NA |
| Cu-4: Increase in Nonnative Smooth Cord Grass<br>Mitigation: Measure V-3 (Monitor and Manage Invasive Exotic Plant Species) | NA | S | S | S | S | NA |
| Cu-5: Cumulative Reduction in Sensitive Vegetation Species and Their Habitats<br>Mitigation: Measure Cu-2 (Conduct Biological Surveys for Sensitive Biological Resources) | NA | NA | NA | NA | NA | S |
| ***Cu-6: Long-Term Increase in Lower and Middle Marsh Habitat Suitable for Special-Status Species*** | NA | ***B*** | ***B*** | ***B*** | ***B*** | NA |
| Cu-7: Loss of Open-Water Habitat for Migratory Shorebirds and Waterfowl | NA | LTS | LTS | LTS | LTS | NA |
| Cu-8: Cumulative Reduction in Sensitive Wildlife Species and Their Habitats<br>Mitigation: Measure Cu-2 (see above) | NA | NA | NA | NA | NA | S |
| ***Cu-9: Increase in Subtidal Habitat*** | NA | ***B*** | ***B*** | ***B*** | ***B*** | NA |

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**Table S-2.** Summary Comparison of Impacts and Mitigation Measures for the Napa River Salt Marsh Restoration Project: No-Project Alternative and Habitat Restoration Options



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | |
|---|---|---|---|---|---|
| | **No-Project** | **HRO 1** | **HRO 2** | **HRO 3** | **HRO 4** |
| **Hydrology** | | | | | |
| ***H-2: Modification of Surface Drainage Patterns*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| ***H-5: Increased Flood Conveyance Capacity*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| H-6: Continued Adjustment of Invert Elevation and Channel Form Near Breached Channel Segments | NA | LTS | LTS | LTS | LTS |
| H-7: Potential Increase in Flood Risk on Adjacent Properties as a Result of Increased Discharge in Tidal Channels<br>Mitigation: Measure H-3 (Refine Project Design to Limit Adverse Effects of Increased Tidal Discharge) | NA | S | S | S | S |
| H-8: Potential Increase in Flood Risk on Adjacent Properties as a Result of Wave Erosion<br>Mitigation: Measure H-4 (Evaluate Susceptibility of Levees to Wind-Driven Wave Erosion and Conduct Repairs as Needed) | NA | S | S | S | S |
| H-9: Potential Navigation Hazard as a Result of Increased Velocity in Mare Island Strait | NA | LTS | LTS | LTS | LTS |
| **Water Quality** | | | | | |
| WQ-1: Long-Term Potential for Discharge of Contaminants to Adjacent Surface Water | S* | NA | NA | NA | NA |
| WQ-2: Short-Term Construction-Related Water Quality Impacts<br>*(All HROs)* Mitigation: Measures WQ-1 (Obtain RWQCB Authorization under Waste Discharge Requirements or NPDES Stormwater Permit for General Construction Activity and Implement Best Management Practices)<br>*(HROs 1/3)* Mitigation: Measure WQ-5 (Prepare Levees and Time Breaches) | NA | S | S | S | S |
| WQ-3: Increase in Salinity in the Napa River<br>Mitigation: Measures WQ-2 (Design Project in Compliance with Resource Agency Permit Conditions and Conduct Water Quality Monitoring) and WQ-5 (see above) | NA | S | S | S | S |
| WQ-4: Increase in Conventional and Toxic Constituents<br>Mitigation: Measure WQ-2 (see above) | NA | S | S | S | S |

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**Table S-2.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | |
|---|---|---|---|---|---|
| | **No-Project** | **HRO 1** | **HRO 2** | **HRO 3** | **HRO 4** |
| **Water Quality (continued)** | | | | | |
| WQ-5: Discharges of Priority Toxic Constituents in the Napa River and Local Sloughs<br>Mitigation: Measure WQ-2 (see above) | NA | S | S | S | S |
| WQ-6: Increase in Contribution of Conventional and Toxic Constituents from Recycled Water<br>Mitigation: Measure WQ-3 (Design, Operate, and Monitor Use of Recycled Water in Accordance with RWQCB Requirements) | NA | S | S | S | S |
| WQ-7: Water Quality Changes in the Salt Ponds<br>Mitigation: Measure WQ-4 (Monitor Pond Water Quality and Use Adaptive Management) | NA | S | S | S | S |
| **Biological Resources—Vegetation** | | | | | |
| V-1: Loss of Common and Sensitive Vegetation Communities and Special-Status Plants as a Result of Levee Failure and Emergency Repairs | LTS | NA | NA | NA | NA |
| V-2: Temporary Alteration of Common Vegetation and Sensitive Communities | NA | LTS | LTS | LTS | LTS |
| V-3: Removal of Soft Bird's-Beak<br>Mitigation: Measure V-1 (Avoid Ground Disturbance in Populations of Soft Bird's-Beak) | NA | S | S | S | S |
| V-4: Removal of Other Special-Status Species | NA | LTS | LTS | LTS | LTS |
| ***V-5: Long-Term Enhancement of Common Vegetation and Sensitive Communities*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| V-6: Short-Term Impacts on Common Vegetation and Sensitive Communities | NA | LTS | LTS | LTS | LTS |
| V-7: Invasion of Nonnative Species<br>Mitigation: Measure V-3 (Monitor and Manage Invasive Exotic Plant Species) | NA | S | S | S | S |
| **Biological Resources—Wildlife** | | | | | |
| W-1: Long-Term Decline in Habitat Value and Function | S* | NA | NA | NA | NA |
| W-2: Temporary Disturbance of Wildlife | S* | NA | NA | NA | NA |
| W-3: Construction-Related Disturbance and Mortality of Special-Status Species<br>Mitigation: Measure W-1 (Avoid Construction Activities near Nesting Habitats during Breeding Season) | NA | S | S | S | S |

Key: HRO = Habitat Restoration Option; NA = Not Applicable.
Significance determinations: B = Beneficial, NI = No Impact, LTS = Less than Significant, S = Significant, SU = Significant and Unavoidable. (Beneficial impacts are shown in ***bold italic***.)

* All significant impacts are reduced to a less-than-significant level with mitigation unless the impact is listed as Significant and Unavoidable (SU) or is listed under the No-Project Alternative (because this alternative would result in no project being implemented, no mitigation is proposed if this occurs).

**Table S-2.** Continued



| Resources, Impacts, and Mitigation Measures* | | Impact Level by Alternative/Option | | | | |
|---|---|---|---|---|---|---|
| | | No-Project | HRO 1 | HRO 2 | HRO 3 | HRO 4 |
| **Biological Resources—Wildlife (continued)** | | | | | | |
| W-4: | Construction-Related Disturbance and Mortality of Salt Marsh Harvest Mouse and Suisun Ornate Shrew<br>Mitigation: Measures W-2 (Avoid Construction Activities near Occupied Suisun Ornate Shrew Habitat or Remove Shrews) and W-3 (Avoid Construction Activities near Occupied Salt Marsh Harvest Mouse Habitat) | NA | S | S | S | S |
| W-5: | Exposure of Wildlife to Contaminants during Construction<br>Mitigation: Measure WQ-1 (see "Water Quality" above) | NA | S | S | S | S |
| ***W-7:*** | ***Increase in Mudflat Foraging Habitat*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| ***W-8:*** | ***Long-Term Increase in Subtidal Habitat*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| ***W-9:*** | ***Increase in Lower Marsh and Middle Marsh Habitats*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| ***W-10:*** | ***Lowering of Levees to Create Marsh Habitat*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| W-11: | Exposure of Wildlife to Contaminants in Sediments and Waters from San Pablo Bay and the Napa River | NA | LTS | LTS | LTS | LTS |
| W-12: | Loss of Open-Water Habitat | NA | LTS | LTS | LTS | LTS |
| **Biological Resources—Aquatic Resources** | | | | | | |
| A-1: | Reduced Water Quality as a Result of Uncontrolled Breaches of Levees | S* | NA | NA | NA | NA |
| A-2: | Reduced Water Quality during Construction Activities | LTS | NA | NA | NA | NA |
| A-3: | Disturbance of Substrate and Associated Benthic Organisms during Repair of Levee Breaches | LTS | NA | NA | NA | NA |
| A-4: | Stranding of Fish and Other Aquatic Organisms as a Result of Levee Repairs | S* | NA | NA | NA | NA |
| A-5: | Entrainment of Fish and Other Aquatic Organisms through Diversions into the Managed Ponds | S* | NA | NA | NA | NA |
| ***A-10:*** | ***Substantial Increase in Habitat Area and Types*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| A-11: | Short-Term Construction-Related Impacts<br>Mitigation: Measure WQ-1 (see "Water Quality" above) | NA | S | S | S | S |
| A-12: | Stranding of Fish in Restored Tidal Habitat | NA | LTS | LTS | LTS | LTS |

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**Table S-2.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | |
|---|---|---|---|---|---|
| | **No-Project** | **HRO 1** | **HRO 2** | **HRO 3** | **HRO 4** |
| **Geology and Soils** | | | | | |
| Geo-1: Levee Failure as a Result of Strong Seismic Ground Shaking | S* | LTS | LTS | LTS | LTS |
| Geo-2: Levee Failure as a Result of Erosion | S* | NA | NA | NA | NA |
| Geo-3: Levee Failure or Structural Damage as a Result of a Rupture of a Known Earthquake Fault | NA | LTS | LTS | LTS | LTS |
| Geo-4: Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse as a Result of Construction on Unstable Soils | NA | LTS | LTS | LTS | LTS |
| Geo-5: Risk to Life or Property as a Result of Construction of Structures on Expansive Soils | NA | LTS | LTS | LTS | LTS |
| Geo-6: Flooding of the Project Area as a Result of Tsunamis | NA | LTS | LTS | LTS | LTS |
| Geo-7: Potential Erosion as a Result of Increased Tidal Prism<br>Mitigation: Measures H-1 (Repair Unintended Levee Breaches) and H-3 and H-4 (see "Hydrology" above) | NA | S | S | S | S |
| Geo-8: Potential Erosion as a Result of Excess Pond Water Height<br>Mitigation: Measure Geo-1 (Maintain Water Level 2 Feet below Levee Crest) | NA | S | S | S | S |
| **Hazards and Hazardous Materials** | | | | | |
| Haz-2: Potential Exposure to and/or Release of Hazardous Materials/Waste Associated with Construction Activities<br>Mitigation: Measure Haz-1 (Provide Enhanced Spill Prevention and Response Training, and Spill Response Preparation) | LTS | S | S | S | S |
| Haz-4: Potential Releases of Residual Hazardous Materials or Constituents from Breaching of Levees<br>Mitigation: Measure Haz-2 (Employ Explosives Experts when Breaching Levees) | NA | S | S | S | S |
| **Transportation and Circulation** | | | | | |
| T-1: Temporary Increase in Traffic Volumes as a Result of Emergency Repairs | LTS | NA | NA | NA | NA |
| T-2: Temporary Increase in Traffic Volumes as a Result of Project Construction | NA | LTS | LTS | LTS | LTS |
| T-3: Increase in Construction-Related Traffic Hazards | NA | LTS | LTS | LTS | LTS |
| T-4: Increase in Watercraft Traffic in the Napa River | NA | LTS | LTS | LTS | LTS |

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**Table S-2.** Continued



| Resources, Impacts, and Mitigation Measures* | Impact Level by Alternative/Option | | | | |
|---|---|---|---|---|---|
| | **No-Project** | **HRO 1** | **HRO 2** | **HRO 3** | **HRO 4** |
| **Air Quality** | | | | | |
| AQ-1: Increase in Fugitive Dust Emissions Resulting from Increased Desiccation of the Ponds | LTS | NA | NA | NA | NA |
| AQ-2: Increase in Ambient Pollutant Levels | NA | LTS | LTS | LTS | LTS |
| AQ-3: Potential Releases of Irritant Dust as a Result of Construction Activities<br>Mitigation: Measure AQ-1 (Minimize Dust Generation in and Implement Dust Control Measures for Work Areas with Salt Crusts), Haz-4 (Monitor Perimeter Dust Concentrations during Work on and in the Vicinity of Pond 8), and Haz-5 (Prepare and Implement a Safety Plan) | NA | S | S | S | S |
| **Noise** | | | | | |
| N-1: Temporary Increase in Ambient Noise Levels as a Result of Emergency Repairs | SU* | NA | NA | NA | NA |
| N-2: Temporary Increase in Ambient Noise Levels as a Result of Construction | NA | LTS | LTS | LTS | LTS |
| N-3: Temporary Increase in Noise Levels as a Result of Blasting Activities | NA | LTS | LTS | LTS | LTS |
| **Land Use and Planning** | | | | | |
| LU-1: Compatibility with Land Use Goals and Objectives | NA | LTS | LTS | LTS | LTS |
| LU-2: Consistency with Existing or Planned Land Uses | NA | LTS | LTS | LTS | LTS |
| **Public Services and Utilities** | | | | | |
| PS-1: Conflict with Existing Utilities | LTS | NA | NA | NA | NA |
| PS-2: Increased Risk of Instability of Power Towers<br>Mitigation: Measure PS-1 (Ensure the Stability of the Power Towers) | NA | S | S | S | S |
| **Recreation, Public Access, Visual Resources, and Public Health** | | | | | |
| ***R-1: Enhanced Recreational Opportunities*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| R-2: Consistency with Existing or Proposed Public Access Plans | NA | LTS | LTS | LTS | LTS |
| R-3: Accelerated Physical Deterioration of a Recreational Facility or Adverse Effects from Facility Expansion | NA | LTS | LTS | LTS | LTS |
| R-4: Temporary Effect of Construction on Public Access | NA | LTS | LTS | LTS | LTS |

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* All significant impacts are reduced to a less-than-significant level with mitigation unless the impact is listed as Significant and Unavoidable (SU) or is listed under the No-Project Alternative (because this alternative would result in no project being implemented, no mitigation is proposed if this occurs).

**Table S-2.** Continued



| Resources, Impacts, and Mitigation Measures* | | Impact Level by Alternative/Option | | | | |
|---|---|---|---|---|---|---|
| | | No-Project | HRO 1 | HRO 2 | HRO 3 | HRO 4 |
| **Recreation, Public Access, Visual Resources, and Public Health (continued)** | | | | | | |
| R-6: | Increased Mosquito Production<br>Mitigation: Measure R-1 (Coordinate Project Activities with the Napa County Mosquito Abatement District) | NA | S | S | S | S |
| ***R-8:*** | ***Enhancement of Existing Visual Character*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| **Cultural Resources** | | | | | | |
| C-1: | Potential to Materially Impair Significant Cultural Resources | NA | LTS | LTS | LTS | LTS |
| C-2: | Potential for Ground-Disturbing Activities to Damage Previously Unidentified Buried Cultural Resources Sites<br>Mitigation: Measure C-1 (Stop Work If Cultural Resources Are Discovered during Ground-Disturbing Activities) | NA | S | S | S | S |
| C-3: | Potential to Damage Previously Unidentified Human Remains<br>Mitigation: Measure C-2 (Comply with State Laws Pertaining to the Discovery of Human Remains) | NA | S | S | S | S |
| **Cumulative Impacts** | | | | | | |
| Cu-1: | Cumulative Hydrologic Changes in the Lower Napa River<br>Mitigation: Measure Cu-1 (Implement Monitoring and Adaptive Management Program) | NA | S | S | S | S |
| Cu-2: | Cumulative Adverse Change in Water Quality<br>Mitigation: Measures Cu-1 (see above) and WQ-2 (see "Water Quality" above) | NA | S | S | S | S |
| ***Cu-3:*** | ***Cumulative Change in Sensitive Plant Communities*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| Cu-4: | Increase in Nonnative Smooth Cord Grass<br>Mitigation: Measure V-3 (Monitor and Manage Invasive Exotic Plant Species) | NA | S | S | S | S |
| ***Cu-6:*** | ***Long-Term Increase in Lower and Middle Marsh Habitat Suitable for Special-Status Species*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |
| Cu-7: | Loss of Open-Water Habitat for Migratory Shorebirds and Waterfowl | NA | LTS | LTS | LTS | LTS |
| Cu-8: | Exposure of wildlife to contaminants in sediments and water from San Pablo Bay and the Napa River | NA | S | S | S | S |
| ***Cu-10:*** | ***Increase in Subtidal Habitat*** | NA | ***B*** | ***B*** | ***B*** | ***B*** |

Key: HRO = Habitat Restoration Option; NA = Not Applicable.
Significance determinations: B = Beneficial, NI = No Impact, LTS = Less than Significant, S = Significant, SU = Significant and Unavoidable. (Beneficial impacts are shown in ***bold italic***.)

* All significant impacts are reduced to a less-than-significant level with mitigation unless the impact is listed as Significant and Unavoidable (SU) or is listed under the No-Project Alternative (because this alternative would result in no project being implemented, no mitigation is proposed if this occurs).

**Table S-3.** Summary of Significant Environmental Effects and Mitigation Measures



| Resource/Effect | LOS Before Mitigation * | Mitigation | LOS After Mitigation * | Applicable Alternatives |
|---|---|---|---|---|
| **Hydrology** | | | | |
| H-2: Modification of Surface Drainage Patterns | S | Measure H-2 (Avoid Drainage Pattern Alteration in Plans for Future Pipeline Alignments) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| H-3: Increased Risk of Property Damage, Injury, or Death as a Result of Flooding | S | Measure H-1 (Repair Unintended Levee Breaches) | LTS | 2, 3, 4, 5, 6, 8 |
| H-7: Potential Increase in Flood Risk on Adjacent Properties as a Result of Increased Discharge in Tidal Channels | S | Measure H-3 (Refine Project Design to Limit Adverse Effects of Increased Tidal Discharge) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| H-8: Potential Increase in Flood Risk on Adjacent Properties as a Result of Wave Erosion | S | Measure H-4 (Evaluate Susceptibility of Levees to Wind-Driven Wave Erosion and Conduct Repairs as Needed) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Water Quality** | | | | |
| WQ-1: Long-Term Potential for Discharge of Contaminants to Adjacent Surface Water | S | None required for No-Project Alternative | NA | No-Project |
| WQ-2: Short-Term Construction-Related Water Quality Impacts | S | Measure WQ-1 (Obtain RWQCB Authorization under Waste Discharge Requirements or NPDES Stormwater Permit for General Construction Activity and Implement Best Management Practices) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure WQ-5 (Prepare Levees and Time Breaches) | LTS | 1, 2, 4, 6, 8 |
| | | | S | 3, 5 |
| | | Measure WQ-6 (Prepare and Implement Storm Water Pollution Prevention Plans) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| WQ-3: Increase in Salinity in the Napa River | S | Measure WQ-2 (Design Project in Compliance with Resource Agency Permit Conditions and Conduct Water Quality Monitoring) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure WQ-5 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| WQ-4: Increase in Conventional and Toxic Constituents | S | Measure WQ-2 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |

* LOS = Level of Significance; LTS = Less than Significant; S = Significant; SR = salinity reduction component of alternative; SU = Significant and Unavoidable.

**Table S-3.** Continued



| Resource/Effect | LOS Before Mitigation * | Mitigation | LOS After Mitigation * | Applicable Alternatives |
|---|---|---|---|---|
| **Water Quality (continued)** | | | | |
| WQ-5: Discharges of Priority Toxic Constituents in the Napa River and Local Sloughs | S | Measure WQ-2 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| WQ-6: Increase in Contribution of Conventional and Toxic Constituents from Recycled Water | S | Measure WQ-3 (Design, Operate, and Monitor Use of Recycled Water in Accordance with RWQCB Requirements) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| WQ-7: Water Quality Changes in the Salt Ponds | S | Measure WQ-4 (Monitor Pond Water Quality and Use Adaptive Management) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Biological Resources—Vegetation** | | | | |
| V-2: Temporary Alteration of Common Vegetation and Sensitive Communities | S | Measure V-2 (Conduct Preconstruction Surveys and Implement Impact Avoidance, Minimization, and Mitigation Measures) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| V-3: Removal of Soft Bird's-Beak | S | Measure V-1 (Avoid Ground Disturbance in Populations of Soft Bird's-Beak) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| V-7: Invasion of Nonnative Species | S | Measure V-3 (Monitor and Manage Invasive Exotic Plant Species) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Biological Resources—Wildlife** | | | | |
| W-1: Long-Term Decline in Habitat Value and Function | S | None required for No-Project Alternative | NA | No-Project |
| W-2: Temporary Disturbance of Wildlife | S | None required for No-Project Alternative | NA | No-Project |
| W-3: Construction-Related Disturbance and Mortality of Special-Status Species | S | Measure W-1 (Avoid Construction Activities near Nesting Habitats during Breeding Season) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure W-4 (Complete Focused Surveys for Special-Status Wildlife Species before Construction) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| | | Measure W-5 (Educate Construction Crews regarding Special-Status Wildlife Species) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| | | Measure W-6 (Use Trenchless Construction Techniques for Special-Status Wildlife Species Protection) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| | | Measure W-7 (Restore Habitat Modified by Construction) | LTS | 1, 2, 3, 4, 5, 6, 7 |

* LOS = Level of Significance; LTS = Less than Significant; S = Significant; SR = salinity reduction component of alternative; SU = Significant and Unavoidable.

**Table S-3.** Continued



| Resource/Effect | LOS Before Mitigation * | Mitigation | LOS After Mitigation * | Applicable Alternatives |
|---|---|---|---|---|
| **Biological Resources—Wildlife (continued)** | | | | |
| W-4: Construction-Related Disturbance and Mortality of Salt Marsh Harvest Mouse and Suisun Ornate Shrew | S | Measure W-2 (Avoid Construction Activities near Occupied Suisun Ornate Shrew Habitat or Remove Shrews) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure W-3 (Remove Salt Marsh Harvest Mice from the Immediate Vicinity of Operating Equipment) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| W-5: Exposure of Wildlife to Contaminants during Construction | S | Measure WQ-1 *(see "Water Quality" above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| W-6: Interference with the Movement of Wildlife | S | Measure W-8 (Complete Wildlife Surveys before Construction) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| **Biological Resources—Aquatic Resources** | | | | |
| A-1: Reduced Water Quality as a Result of Uncontrolled Breaches of Levees | S | None required for No-Project Alternative | S | No-Project |
| A-4: Stranding of Fish and Other Aquatic Organisms as a Result of Levee Repairs | S | None required for No-Project Alternative | S | No-Project |
| A-5: Entrainment of Fish and Other Aquatic Organisms through Diversions into the Managed Ponds | S | None required for No-Project Alternative | S | No-Project |
| | | Measure A-1 (Minimize Entrainment of Sensitive Species) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| A-6: Short-Term Reduction in Aquatic Habitat Suitability during Construction Activities | S | Measure WQ-1 *(see "Water Quality" above)* | LTS | 2, 3, 4, 5, 6, 8 |
| | | Measure A-2 (Install Cofferdams to Minimize In-Water Construction) | LTS | 1, 7 |
| | | Measure A-4 (Use Trenchless Technology during Construction to Protect Aquatic Species) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| A-7: Reduction in Aquatic Habitat Suitability as a Result of the Deterioration of Water Quality | S | Measure WQ-2 *(see "Water Quality" above)* | LTS | 1, 2, 3, 4, 5, 6, 8 |
| | | Measure WQ-3 *(see "Water Quality" above)* | LTS | 1, 2, 3, 4, 5, 6, 8 |
| | | Measure WQ-4 *(see "Water Quality" above)* | LTS | 1, 2, 3, 4, 5, 6, 8 |
| | | Measure A-3 (Assess and Maintain Salinity Levels Protective of Aquatic Resources) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| A-9: Substantial Interference with the Movement or Migration of Fish Species | S | Measure A-4 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7 |
| A-11: Short-Term Construction-Related Impacts | S | Measure WQ-1 *(see "Water Quality" above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |

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**Table S-3.** Continued



| Resource/Effect | LOS Before Mitigation * | Mitigation | LOS After Mitigation * | Applicable Alternatives |
|---|---|---|---|---|
| **Geology and Soils** | | | | |
| Geo-1: Levee Failure as a Result of Strong Seismic Ground Shaking | S | None required for No-Project Alternative | S | No-Project |
| Geo-2: Levee Failure as a Result of Erosion | S | None required for No-Project Alternative | S | No-Project |
| Geo-4: Landslide, Lateral Spreading, Subsidence, Liquefaction, or Collapse as a Result of Construction on Unstable Soils | S | Measure Geo-3 (Remove Unstable or Expansive Soils and Backfill with Engineered Fill) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| Geo-5: Risk to Life or Property as a Result of Construction of Structures on Expansive Soils | S | Measure Geo-3 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7 |
| Geo-7: Potential Erosion as a Result of Increased Tidal Prism | S | Measures H-1, H-3, and H-4 *(see "Hydrology" above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Geo-8: Potential Erosion as a Result of Excess Pond Water Height | S | Measure Geo-2 (Maintain Water Level 2 Feet below Levee Crest) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Hazards and Hazardous Materials** | | | | |
| Haz-1: Potential Release of Bittern or Highly Saline Brines into the Environment as a Result of Levee Breaching | S | None required for No-Project Alternative | S | No-Project |
| Haz-2: Potential Exposure to and/or Release of Hazardous Materials/Waste Associated with Construction Activities | S | Measure Haz-1 (Provide Enhanced Spill Prevention and Response Training, and Spill Response Preparation) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Haz-4: Potential Releases of Residual Hazardous Materials or Constituents from Breaching of Levees | S | Measure Haz-2 (Employ Explosives Experts when Breaching Levees) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Haz-5: Potential Releases of Irritant Dust as a Result of Construction Activities | S | Measure Haz-3 (Develop and Implement a Health and Safety Plan) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure Haz-4 (Monitor Perimeter Dust Concentrations during Work on and in the Vicinity of Pond 8) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Haz-9: Exposures Resulting from Exceeding Human Health Criteria | S | Measure Haz-5 (Prepare and Implement a Safety Plan) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| **Transportation and Circulation** | | | | |
| T-3: Increase in Construction-Related Traffic Hazards | S | Measure T-1 (Implement Safety Plan for Pipeline Construction along Rail Line) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| | | Measure T-2 (Implement Safety Plan for Construction along Public Roads) | LTS | 1, 2, 3, 4, 5, 6, 7 |

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**Table S-3.** Continued



| Resource/Effect | LOS Before Mitigation * | Mitigation | LOS After Mitigation * | Applicable Alternatives |
|---|---|---|---|---|
| **Air Quality** | | | | |
| AQ-3: Potential Releases of Irritant Dust as a Result of Construction Activities | S | Measure AQ-1 (Minimize Dust Generation and Implement Dust Control Measures for Work Areas with Salt Crusts) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure Haz-4 *(see "Hazards and Hazardous Materials" above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure Haz-5 *(see "Hazards and Hazardous Materials" above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Noise** | | | | |
| N-1: Temporary Increase in Ambient Noise Levels as a Result of Emergency Repairs | SU | None required for No-Project Alternative | SU | No-Project |
| N-2: Temporary Increase in Ambient Noise Levels as a Result of Construction | SU | Measure N-1 (Decrease Noise Levels with Use of Noise Reduction Devices) | SU | 1, 2, 3, 4, 5, 6, 7 |
| **Land Use and Planning** | | | | |
| LU-1: Compatibility with Land Use Goals and Objectives | S | Measure N-1 *(see "Noise" above)* | LTS | 1, 2, 3, 4, 5, 6, 7 |
| **Public Services and Utilities** | | | | |
| PS-2: Increased Risk of Instability of Power Towers | S | Measure PS-1 (Ensure the Stability of the Power Towers) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Recreation, Public Access, Visual Resources, and Public Health** | | | | |
| R-6: Increased Mosquito Production | S | Measure R-1 (Coordinate Project Activities with the Napa County Mosquito Abatement District) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| R-7: Conflicts with Existing or Planned Recreational Uses, and Recreation Plans and Policies | S | Measure R-2 (Prepare a Public Access Plan) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| **Cultural Resources** | | | | |
| C-2: Potential for Ground-Disturbing Activities to Damage Previously Unidentified Buried Cultural Resources Sites | S | Measure C-1 (Stop Work If Cultural Resources Are Discovered during Ground-Disturbing Activities) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |

* LOS = Level of Significance; LTS = Less than Significant; S = Significant; SR = salinity reduction component of alternative; SU = Significant and Unavoidable.

**Table S-3.** Continued



| Resource/Effect | LOS Before Mitigation * | Mitigation | LOS After Mitigation * | Applicable Alternatives |
|---|---|---|---|---|
| **Cultural Resources (continued)** | | | | |
| C-3: Potential to Damage Previously Unidentified Human Remains | S | Measure C-2 (Comply with State Laws Pertaining to the Discovery of Human Remains) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| C-4: Changes in the Significance of a Historic and/or Archaeological Resource | S | Measure C-3 (Conduct Archaeological Monitoring of Construction Activities in the Vicinity of CA-NAP-224, C-164, and CA-NAP-230) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| | | Measure C-4 (Conduct Records Search and Visual Survey) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| C-5: Disturbance of Human Remains | S | Measure C-2 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7 |
| **Cumulative Impacts** | | | | |
| Cu-1: Cumulative Hydrologic Changes in the Lower Napa River | S | Measure Cu-1 (Implement Monitoring and Adaptive Management Program) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Cu-2: Cumulative Adverse Change in Water Quality | S | Measure WQ-2 *(see "Water Quality" above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| | | Measure Cu-1 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Cu-4: Increase in Nonnative Smooth Cord Grass | S | Measure V-3 *(see "Biological Resources—Vegetation" above)* | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Cu-5: Cumulative Reduction in Sensitive Vegetation Species and their Habitats | S | Measure Cu-2 (Conduct Biological Surveys for Sensitive Biological Resources) | LTS | 1, 2, 3, 4, 5, 6, 7 |
| Cu-8: Exposure of Wildlife to Contaminants in Sediments and Waters from San Pablo Bay and the Napa River | S | Measure Cu-3 (Contribute to Regional Research Efforts on the Exposure of Wildlife to Contaminants) | LTS | 1, 2, 3, 4, 5, 6, 7, 8 |
| Cu-9: Cumulative Reduction in Sensitive Wildlife Species and their Habitats | S | Measure Cu-2 *(see above)* | LTS | 1, 2, 3, 4, 5, 6, 7 |

* LOS = Level of Significance; LTS = Less than Significant; S = Significant; SR = salinity reduction component of alternative; SU = Significant and Unavoidable.

**Table S-4.** Summary of Beneficial Impacts

| Resource/Effect | Applicable Alternatives |
|---|---|
| **Hydrology** | |
| H-1: Reduced Risk of Property Damage, Injury, or Death as a Result of Flooding | 1, 2, 3, 4, 5, 6, 7, 8 |
| H-5: Increased Flood Conveyance Capacity | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Water Quality** | |
| W-8: Long-Term Changes to Water Quality in Local Rivers and Salt Ponds from Project Operations | 1, 2, 3, 4, 5, 6, 7 |
| **Biological Resources—Vegetation** | |
| V-5: Long-Term Enhancement of Common Vegetation and Sensitive Communities | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Biological Resources—Wildlife** | |
| W-7: Increase in Mudflat Foraging Habitat | 1, 2, 3, 4, 5, 6, 7, 8 |
| W-8: Long-Term Increase in Subtidal Habitat | 1, 2, 3, 4, 5, 6, 7, 8 |
| W-9: Increase in Lower Marsh and Middle Marsh Habitats | 1, 2, 3, 4, 5, 6, 7, 8 |
| W-10: Lowering of Levees to Create Marsh Habitat | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Biological Resources—Aquatic Resources** | |
| A-10: Substantial Increase in Habitat Area and Types | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Geology and Soils; Hazards and Hazardous Materials; Transportation and Circulation; Air Quality; Noise; Land Use and Planning; Public Services and Utilities** | |
| No beneficial impacts for these resource areas. | |
| **Recreation, Public Access, Visual Resources, and Public Health** | |
| R-1: Enhanced Recreational Opportunities | 1, 2, 3, 4, 5, 6, 7, 8 |
| **Cultural Resources** | |
| No beneficial impacts for this resource area. | |
| **Cumulative Impacts** | |
| C-3: Cumulative Change in Sensitive Plant Communities | 1, 2, 3, 4, 5, 6, 7, 8 |
| C-6: Long-Term Increase in Lower and Middle Marsh Habitat Suitable for Special-Status Species | 1, 2, 3, 4, 5, 6, 7, 8 |
| C-9: Increase in Subtidal Habitat | 1, 2, 3, 4, 5, 6, 7, 8 |

soil management best management practices (BMPs) to minimize airborne dust. BMPs may include the following list:

- All construction areas, unpaved access roads, and staging areas will be watered as needed during dry soil conditions, or soil stabilizers will be applied.
- All trucks hauling soil or other loose material will be covered or have at least 2 feet of freeboard. Wherever possible, construction vehicles will use paved roads to access the construction site.
- Vehicle speeds will be limited to 15 mph on unpaved roads and construction areas, or as required to control dust.
- Streets will be cleaned daily to remove soil material carried onto adjacent public streets.
- Soil stabilizers will be applied daily to inactive construction areas as needed.
- Exposed stockpiles of soil and other excavated materials will be enclosed, covered, watered twice daily, or applied with soil binders as needed.
- Vegetation will be replanted in disturbed areas as quickly as possible following the completion of construction.

In addition, under the habitat restoration options, pond management in the long term would be based on a DFG management plan, which could be developed under DFG and CEQA guidelines.

## S.9.4 Growth Inducement

Section 15162.2(d) of the State CEQA Guidelines requires that an EIR address the potential growth-inducing impacts of a proposed project. Specifically, the EIR shall "discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing either directly or indirectly, in the surrounding environment."

The salinity reduction and habitat restoration components of the project would not contribute to regional urbanization as no urban infrastructure or facilities are proposed as part of the project; therefore, they would not result in any growth-inducing effects. However, implementation of the Water Delivery Option could have a growth-inducing impact relative to the potential future use of recycled water for agricultural irrigation. The growth of agricultural activity in the north bay region is currently constrained by the availability of water suitable for irrigation. The provision of recycled water suitable for agricultural irrigation could foster economic growth in the north bay region, especially relative to vineyard operations in Napa and Sonoma Counties.

## S.9.5 Unresolved Issues

Several issues remain unresolved as part of the project, including exact impacts on hydrology, water quality, and biological resources. As the final hydrologic modeling has not been completed, the magnitude of the hydrologic effects remains unknown; there would likely be areas of scour and increased velocities that result in localized erosion. However, specific modeling, design refinement, and monitoring would ensure that these effects are minimized. Similarly, the final water quality analysis is not complete for salinity reduction with and without the use of recycled water, but predicted discharge concentrations are within a range that DFG can manage to achieve water quality objectives. Furthermore, ongoing monitoring and compliance with the San Francisco Bay RWQCB standards will ensure that these effects are minimized. The recycled water program component remains unresolved as specific WWTPs have not indicated whether they would participate; however, further environmental compliance would be required for the programmatic components analyzed.

The long-term evolution of habitats in the project area would affect biological resources, and some of these effects remain unresolved. There remains some uncertainty about the rate of evolution of the habitats, as there are assumptions associated with sediment deposition rates, waterborne sediment resuspension rates, and plant colonization rates. Although the analysis is conservative, portions of the project could take more or less time to evolve. The long-term use of the site by migratory waterfowl and endangered species also remains unresolved, but would be monitored and future management decisions would be influenced by this information. Similarly, contaminants and potential bioaccumulation could pose a threat to the long-term ecological health of some wildlife and aquatic resources. These resources would also be monitored over time to determine the most appropriate management decisions for the project area.

## S.9.6 Issues of Known Controversy

The public and the resource agencies are largely supportive of this project; however, several areas of known controversy exist, particularly related to water quality and ecosystem effects. Water quality concerns relate to the potential for adverse environmental effects on aquatic resources, including those effects resulting from the potential project discharges. The ecosystem concerns relate to the short-term impacts and long-term evolution and use of the site by various fish and wildlife species (i.e., controversy over whether endangered species habitat [marsh] should take priority over migratory waterfowl habitat [ponds]). Two other potential areas of controversy relate to how quickly the levees are likely to deteriorate, thereby necessitating quick salinity reduction, and the potential interim loss of accreted marsh habitat.

# S.10 Permit and Environmental Review and Consultation Requirements

In addition to CEQA and NEPA, the Napa River Salt Marsh Restoration Project will require compliance with other federal, state, regional, and local environmental laws, including

- Section 7 of the federal Endangered Species Act;
- the Magnuson-Stevens Fishery Conservation and Management Act;
- the Fish and Wildlife Coordination Act;
- Sections 404, 401, 402, and 313 of the Clean Water Act;
- the Clean Air Act;
- the Coastal Zone Management Act;
- the National Historic Preservation Act;
- Executive Order 11988—Floodplain Management;
- Executive Order 11990—Protection of Wetlands;
- Executive Order 12898—Environmental Justice;
- the Migratory Bird Treaty Act;
- the McAteer-Petris Act;
- the California Fish and Game Code (Section 1600 Lake or Streambed Alteration Agreement program);
- California Department of Transportation encroachment permit requirements;
- disabilities regulations (Americans with Disabilities Act, Rehabilitation Act, and Architectural Barriers Act); and
- National Pollutant Discharge Elimination System permitting and Section 401 water quality certification processes through the San Francisco Bay RWQCB and State Water Resources Control Board.

# S.11 Public Involvement and Scoping

The project sponsors have provided the public and public agencies several opportunities for involvement with the project, which included discussions about key issues for the EIR/EIS. These opportunities occurred at public meetings in 1998 and 2001 and a series of agency and restoration planning meetings between 1998 and 2002.

The public involvement process was initiated when the Coastal Conservancy issued a notice of preparation for the project on July 17, 1998, and the Corps issued a notice of intent for the project on July 16, 1998 (63 *Federal Register*

136). The first public scoping meeting was held on July 21, 1998, in the Napa County Board of Supervisors offices. The second public workshop was held on October 23, 2001, in the Napa City-County Library Community Meeting Room, Napa, California.

Specific questions raised during scoping include the following:

- How would the project affect existing species and habitat?
- Would fish be entrained in pumps or trapped in the ponds?
- Would viable populations of threatened and endangered species be maintained in the area during construction and implementation?
- Would construction of the project be planned around critical time periods for different species?
- Would the sources of fresh water be turned off when desalination is finished?
- Would the use of fresh water change the salinity balance of the system?
- Would the project sponsors coordinate with the mosquito abatement districts and other agencies, particularly the U.S. Fish and Wildlife Service (USFWS), to make sure this project does not interfere with their objectives?
- Would opening up the ponds too quickly lead to a scouring out of vegetation in the slough channels?
- Would the waters become too deep for high-tide roosting of shorebirds?
- Would wintering diving birds that use Ponds 1, 1A, 2, and 3 be adversely affected by the project?
- Is dilution the most appropriate solution?
- What other alternatives have been studied?
- What are the potential impacts on privately and publicly held adjacent lands?
- Are there public health implications associated with the use of recycled water?
- Would discharged diluted salt pond water affect the Napa River, San Pablo Bay, or sloughs of the Napa River Unit?

These issues are presented and analyzed in this EIR/EIS for decision-makers to evaluate the project. An initial study was prepared for the project and is included as Appendix A.

The Napa-Sonoma Marsh Restoration Group, a technical working group, held meetings intermittently between 1998 and 2002 and monthly to quarterly meetings beginning in August 2001. The initial purpose of these meetings was to coordinate data collection efforts and update key stakeholders on the status of the project. More recent meetings were designed to update stakeholders on the technical analysis of the project, and obtain input and critiques of the technical analysis (e.g., salinity modeling) and habitat restoration and salinity reduction

approaches to be evaluated in the EIR/EIS. Members of this group included staff from

- the Coastal Conservancy;
- the Corps;
- DFG;
- the University of California, Davis;
- the U.S. Geological Survey;
- the San Francisco Estuary Institute;
- Save The Bay;
- The Bay Institute;
- the San Francisco Bay RWQCB;
- Ducks Unlimited;
- Cargill, Inc.;
- the National Audubon Society;
- the Napa County Resource Conservation District;
- the Southern Sonoma County Resource Conservation District;
- USFWS;
- the National Marine Fisheries Service;
- the Sonoma, Napa, and Solano County Mosquito Control Districts;
- the San Pablo Bay National Wildlife Refuge;
- San Francisco Bay Joint Venture;
- San Francisco Bay Conservation and Development Commission; and
- Sonoma County Water Agency.