Appendix B7

USFWS Coordination Act Report under the Fish and Wildlife Coordination Act

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Bay Delta Fish and Wildlife Office
650 Capitol Mall 8th floor 8-300
Sacramento, California 95814

In Reply Refer to:
08-FBDT00-
2015-CPA-0001

JUL 21 2015

Thomas Kendall
Chief of Planning
U.S. Army Corps of Engineers
San Francisco District
1455 Market Street
San Francisco, California 94103-1398

Dear Sir:

Please find enclosed our final Fish and Wildlife Coordination Act report for the U.S. Army Corps of Engineers' South San Francisco Bay Shoreline Phase I Study. This report has been revised based on comments on our June 25, 2015, draft report.

If you have questions on this final report, please contact Steven Schoenberg of my staff at (916) 414-6564, or at Steven_Schoenberg@fws.gov.

Sincerely,

Kim Webb

Kim Webb
Acting Field Supervisor

Enclosure

cc:
Joseph Terry, Sacramento Fish and Wildlife Office, Sacramento, California
Anne Morkill, Refuge Manager, San Francisco Bay NWR, Fremont, California
William DeJager, San Francisco Corps of Engineers, San Francisco, California
Brenda Buxton, California Coastal Conservancy, Oakland, California
Tami Schane, California Department of Fish and Wildlife, Yountville, California
Rechelle Blank, Santa Clara Valley Water District, San Jose, California

UNITED STATES DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

FINAL FISH AND WILDLIFE COORDINATION ACT REPORT FOR THE SOUTH SAN FRANCISCO BAY SHORELINE PHASE I STUDY

PREPARED BY:

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PREPARED FOR:

U.S. Army Corps of Engineers
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SUMMARY

The South San Francisco Bay Shoreline Phase I Study addresses the risk of tidal flooding and ecological restoration of former industrial salt ponds in an area of south San Francisco Bay between Alviso Slough and Coyote Creek. This project includes building an engineered levee 15.2 feet high along the Alviso North levee alignment to the west and the Water Pollution Control Plant South levee alignment to the east, a 30:1 ecotone on the bay side of those levees adjacent to Ponds A12/13 and A18, and a tidal flood gate at Artesian Slough, and conducting tidal restoration actions in Ponds A9-A18. The proposed levees are needed to allow the adjacent tidal restoration actions to proceed and to protect the community of Alviso and the San Jose Water Pollution Control Plant from flood damage and sea level rise. The tidal habitat restored would benefit a diversity of aquatic and terrestrial species, including the listed salt marsh harvest mouse and California clapper rail, and other native species. The tidal restoration would be phased beginning with Ponds A12 and A18. Monitoring and adaptive management would be used following the initial restoration phase to best ensure that alternative habitat needs are balanced without major effects on species groups, and to guide the fate and design of future phases. The U.S. Fish and Wildlife Service supports the selection of the locally-preferred alternative (alternative 3) and recommends implementation of the project as proposed.

INTRODUCTION

This document constitutes the U.S. Fish and Wildlife Service's (Service) detailed report on the U.S. Army Corps of Engineers' (Corps) South San Francisco Bay Shoreline Phase I Study (project). The project is a combined flood control and habitat restoration effort encompassing ~7,450 acres (ac) at the south end of the bay between Alviso Slough and Coyote Creek, just north of urban development in San Jose, including the San Jose/Santa Clara Water Pollution Control Plant (WPCP), a facility that serves 1.4 million residents in the region. About 2,900 ac are former salt ponds currently owned by the Service and City of San Jose. The area has experienced significant subsidence due to groundwater overdrafting which exacerbates the flood risk in urban areas and affects habitat values and restoration potential. Because of this subsidence, the flood control elements involving levee construction must precede opening up the ponds to tidal action for the purpose of restoration.

It is estimated that 85% of the historic tidal marshes in San Francisco Bay have been lost due to development, much associated with the salt industry. Industrial salt ponds provide significant habitat values to some wildlife species, but not the same types nor all of the values of fully tidal marsh and mudflat. These retired salt ponds require perpetual management of non-engineered levees to retain these functions and provide only a modest level of flood protection to adjacent urban lands. Tidal habitats provide for much greater values to a diversity of vegetation and forage for birds, fishes, and invertebrates, including listed species, with reduced management costs. Restoring large contiguous blocks of tidal habitat in San Francisco Bay has become a primary goal of major initiatives to improve conditions for fish and wildlife resources (Goals Project 1999; USFWS and CDFW 2007). In 2003, about 15,100 ac of former salt ponds around the bay were acquired by the Service and California Department of Fish and Wildlife, and tidal restoration (among other actions such as enhancement of managed ponds) has been initiated in select ponds in 2008-2014 under Phase I of the South Bay Salt Pond Restoration Project (SBSPRP), including in the vicinity of the proposed project. Over the long term, the SBSPRP has a bay-wide goal to shift the habitat distribution from predominantly managed ponds to at least 50% tidal marsh by 2030 and to 90% tidal marsh over the longer term if wildlife needs can be balanced. While adjacent to and sharing the same goals and approach as the SBSPRP, the proposed project is a separate but related and complementary project to the SBSPRP effort.

There are a number of significant uncertainties which should be considered for tidal restorations in the South Bay generally that apply to the proposed project. The non-tidal ponds are heavily used by some wildlife species adapted to the water depth and salinity, conditions which will change with tidal restoration. When exposed to tidal action, these ponds will transition first to tidal mudflat and open water and then to mostly vegetated tidal marsh over the long term. Responses of wildlife populations to the conversion of non-tidal to tidal habitat cannot be easily predicted because they can depend on a variety of factors such as breeding grounds elsewhere (for migratory species), and the capacity of the remaining ponds to support populations. Tidal channels and adjacent fringe marsh will be expected to erode relatively soon after initial breaching due to the large increase in tidal prism, and perhaps rebuild over the long term as sediment accretes and the tidal prism is reduced. Salient processes in marsh evolution like sediment accretion and channel scour can only be coarsely estimated from models, and model predictions may differ from actual processes observed in the field. Other uncertain factors include the ability to manage non-native vegetation in restored tidal marsh, and the effect of mercury present in sediments in the Alviso area which may be mobilized by restoration actions. Because of these unknowns, only the initial phase in tidal pond restoration is affirmed for certain (Ponds A12 and A18). Thereafter, monitoring and adaptive management will be applied to inform resource managers and guide decisions on the fate of the remaining ponds in the project area.

The non-Federal sponsors, the California Coastal Conservancy and the Santa Clara Valley Water District, have identified a preferred alternative which the Corps intends to recommend for Congressional authorization. The purpose of this report is to provide the Service's analysis of the project alternatives, our recommendation regarding implementation of the preferred alternative, our evaluation of the effects of the preferred alternative on resource values, and our recommendations, if any, for project refinement or related aspects. In letters of December 26, 2012, and October 21, 2014, we expressed support for a new levee alignment along the Alviso railroad spur to the west, and to the south of Pond A18 near the WPCP to the east (also called the WPCP South alignment). In our letter dated March 31, 2015, we withdrew this recommendation, and instead recommended the Alviso Slough North and WPCP South alignment, the same levee alignment described in the preferred alternative. A draft version of this report was provided for comment to the Corps and key stakeholders on June 25, 2015.

Information considered in this final report includes: (1) the Shoreline Phase I Study Draft Interim Feasibility Report and Environmental Impact Statement Report, prepared December 2014 (Corps 2014); (2) observations and information gathered during a site visit on May 7, 2015; (3) a memorandum on modeling of accretion and habitat conditions for preliminary alternatives for the project (ESA PWA 2012); (4) documents on the SBSPRP available on the internet (http://www.southbayrestoration.org/); (5) documents on the results of contracted habitat assessments (NHI 2012, 2014); (6) comments on the draft version of this report; and (7) other information in our files including, but not limited to, formal and informal communications.

PHYSICAL SETTING

The project study area is located at the south end of San Francisco Bay between Alviso Slough and Coyote Creek (Figure 1). It includes New Chicago Marsh (NCM), a diked saltwater wetland, the San Jose/Santa Clara Water Pollution Control Plant (WPCP), Zanker landfill, and various former industrial solar salt ponds (Ponds A9-A15, A18). The WPCP includes active and retired sewage ponds. Most of the salt ponds and NCM are owned and managed by the Service for wildlife, with the exception of Pond A18 which is owned by the City of San Jose. There are various types of ponds (muted tidal/diked, batch, circulation) and other habitats discussed in more detail below (see Resource Categories and Mitigation Goals). Artesian Slough carries freshwater in the form of treated effluent from the WPCP to Coyote Creek, and is parallel to another unnamed tidal ditch which receives local runoff. Overall, the project area is about 7,450 ac of which 1,704 ac are some form of upland, 1,317 ac are a type of wetland, and 4,429 ac are a type of open water. There are another ~5,000 ac of other ponds in the Alviso pond complex that are adjacent to but not within the project area. These are in various states of restoration, enhancement, or are planned for such in the future under the SBSPRP. Much of the project area has experienced subsidence owing to groundwater withdrawal; we estimate the current ground

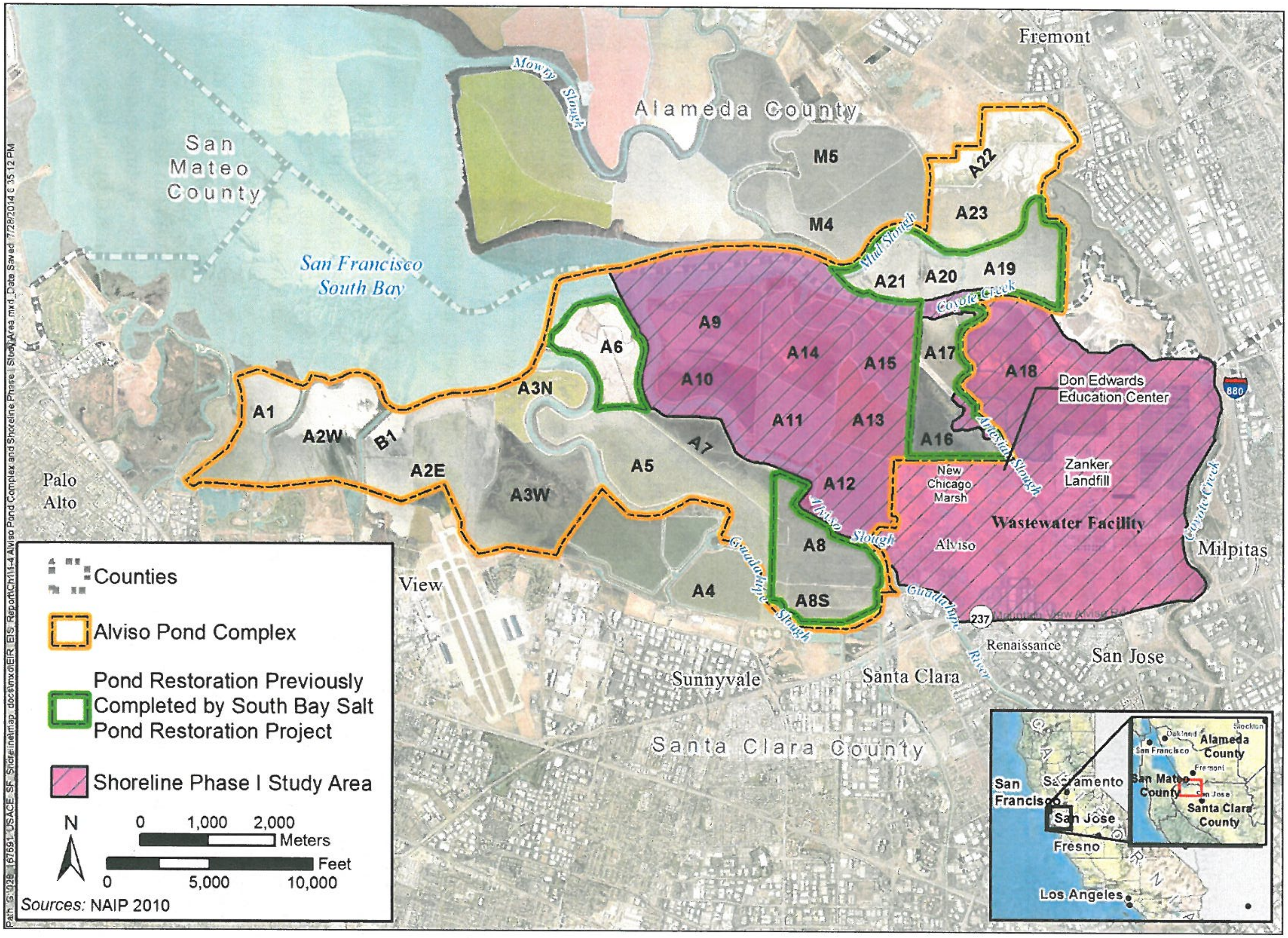

Figure 1. Area map for the SBSPRP Phase 1 actions and the South San Francisco Bay Shoreline Phase I Study project (Corps 2014).

elevations for ponds in the study area to vary from about 2.4 to 5.3 feet below mean tide level depending on the pond.

BIOLOGICAL RESOURCES

Studies of biological resources in the project area have been recently summarized (Harvey 2007) and various other studies have been carried out or commissioned by the Service (e.g., Amato and Vallopi 2015), the SBSPRP (http://www.southbayrestoration.org/), the San Francisco Estuary Project (e.g., Goals Project 1999), and other interests (e.g., Siegel and Bachand 2002; SFBO et al. 2008). Despite major historical losses of tidal wetlands, the project area still has significant habitat today that supports an array of fish and wildlife species, including rare, endemic, and/or listed species. San Francisco Bay as a whole, of which the study area is part, is of regional importance to migratory waterfowl and commercial fish species.

Fish: San Francisco Bay supports about 100 fish species and has been studied specifically to some extent for both tidal waters and pond habitats in the vicinity of the project area (Hobbs 2012). Hobbs (2012) observed a winter assemblage of species that tolerate a range of salinity such as longfin smelt, American shad, and Pacific herring. The summer assemblage included highly salinity and temperature tolerant species like Pacific staghorn sculpin and three-spine stickleback, both of which are also found in low-salinity ponds. The most abundant fish overall were Pacific staghorn sculpin, English sole, and northern anchovy. Harvey (2007) noted the most abundant fish in trawls of nearby open bay waters were northern anchovy, shiner surfperch, longfin smelt, white croaker, Pacific staghorn sculpin, bay goby, plainfin midshipman, English sole, and others. The dominant fish at beach seine stations were topsmelt, arrow and yellowfin goby, and jacksmelt. Results of slough channel sampling varied with the study, but were similar, with anchovy, staghorn sculpin, topsmelt, American and threadfin shad, longjaw mudsucker, longfin smelt, and others (Harvey 2007). Many of these same fish and others such as bat ray and leopard shark are also found in tidal sloughs and mudflats when inundated. The primary fish species in the lower salinity ponds are topsmelt, threespine stickleback, longjaw mudsucker, rainwater killifish, and yellowfin goby. Freshwater and freshwater tolerant species are present in Artesian Slough, such as Sacramento sucker, American shad, threespine stickleback, and common carp. No fish are present in ponds with a salinity greater than 100 parts per thousand.

Birds: The South Bay is recognized as contributing significant habitat support for a diverse and abundant bird community of resident and migratory birds, including several special status species. Shorebirds are the most abundant with an estimated 1 million resident and migrant shorebirds bay wide (SFBO et al. 2008). Most species are mudflat specialists, foraging at low tide in the project area generally in the vicinity of Coyote Creek and Alviso Slough. These include western and least sandpipers, dunlin, red knot, dowitchers, willet, long-billed curlew, and marbled godwit. These species could also use shallow waters of managed ponds at high tide. Other species tend to be pond specialists, such as phalaropes, black-necked stilt, American avocet, the threatened western snowy plover, pelicans, gulls (large populations in the project area), and terns. For these pond specialists, the ponds provide higher-quality nesting and/or foraging habitat than tidal habitats. Ponds and their levees are sometimes used by birds as refugia from wind and storm events.

Diving ducks are the most abundant wintering waterfowl, and include scaups, ruddy duck, canvasback, bufflehead, surf scoter, common goldeneye, and red-breasted merganser. The most abundant dabbling duck is the northern shoveler, followed by American wigeon, northern pintail, mallard, and gadwall. Use of South Bay ponds by dabbling ducks has increased from 2004-2011 (Pitkin and Wood 2011).

There are a number of species of large waders and other fish-eating birds present in the area including grebes, herons, cormorants, and egrets. The relatively uncommon white-faced ibis is known from Artesian Slough in the project area. Some other important birds in the project area include eared grebe, American coot, the State-listed as threatened California black rail, and the federally-listed as endangered California clapper rail (also called Ridgway's rail). There are various insectivorous passerine birds in the project area although the only nesting species are the marsh wren, Alameda song sparrow, and savannah sparrow.

Mammals: In the project area, there are mostly common species of mammals typical of the urban-wildland interface such as raccoon, opossums, rats, mice, and skunk. Other small mammals include the federally-listed endangered salt marsh harvest mouse and salt marsh wandering shrew (a California species of special concern), as well as more common species of bat, squirrel, rabbit, and fox. The Pacific harbor seal is the only marine mammal present in the area. Several non-native mammals are present such as Norway rat, red fox, and feral cat, all of which are subject to refuge control and removal under an ongoing predator management plan.

Vegetation: Vegetation in the project area has been recently mapped including tidal and non-tidal (muted tidal/diked) salt marsh, brackish marsh, and freshwater marsh. There are 322 ac of tidal salt marsh in the project study area, mostly along the bayward portions of Coyote Creek and Alviso Slough, with some additional tidal salt marsh just outside the project area in recently-restored Pond A17. Brackish marsh (432 ac) is found slightly farther upstream along the creek and slough, as well as in Triangle Marsh (just west of Pond A17) and along some of Artesian Slough. Freshwater marsh (93 ac) is restricted to the upper portions of Artesian Slough. Upland vegetation, mostly non-native grassland, is present in minor amounts on the various levees bordering the ponds, with much more present outside the project footprint in and around Zanker Landfill. The majority of the project area bayward of the proposed levees is unvegetated and consists of pond interior areas of open water or mudflat, a small area of pond islands, and barren portions of the levee subject to wavewash. Based on our May 7, 2015 site visit, shallower portions of Pond A18 do exhibit sparse vegetation, even though it is mapped as open water.

Several nonnative plant species are present in the project area but have not been quantified. The most significant of these which deserve management attention are smooth cordgrass (*Spartina alterniflora*) in tidal areas and perennial pepperweed (*Lepidium latifolium*) in many wetlands as well as in upland areas.

Listed Species: The following is basic information on special status species; for detailed information on these species, project effects, project-proposed avoidance and minimization measures, and terms and conditions, see the Service's Biological Opinions to the Corps and Service Refuge dated April 27, 2015 (USFWS 2015a-b).

Several special status fish species in the study area include chinook salmon, steelhead trout, green sturgeon, and longfin smelt. All are anadromous, spawning seasonally in freshwater. Salmon and steelhead spawn in Coyote Creek, the Guadalupe River, and other area streams, and are seasonally present in the project area during migration and rearing periods. Green sturgeon would be expected to forage in estuaries and bays including the South Bay and sloughs in the project area, but there are very little data on this species in the project area. Longfin smelt is much more abundant, and has been seasonally documented as part of the winter fish assemblage in the tidal sloughs in the project area.

Federally-listed bird species in the project area include the endangered California clapper rail and threatened western snowy plover. According to our Biological Opinions for this project, the rail has been occasionally detected along Alviso, Coyote, and Guadalupe Sloughs in the project area and most often near the mouth of Alviso Slough and around Triangle Marsh near Coyote Slough. According to Corps (2014), the plover breeds in and near the study area including ponds A13, A16-17, and A23, with additional birds present in the project area during winter. Nests have also been detected in the last 5 years in NCM and Pond A9 (personal communication, Strong 2015) The native habitat of the plover is tidal beach sand, although it is known to use salt ponds and levees. California clapper rails are generally associated with saltwater marshes dominated by pickleweed and Pacific cordgrass where they nest. They also forage along the edges of tidal channels.

The endangered salt marsh harvest mouse is the only federally-listed mammal species in the project area. It is typically associated with dense cover areas of tidal marsh, usually pickleweed but sometimes alkali bullrush in brackish marshes. In the South Bay, it has been captured in NCM, fringe marshes along various tidal creeks, Triangle Marsh, and the margin lands between Pond A18 and the WPCP (Figure 7 *in* Harvey 2007). NCM appears to have one of the largest blocks of pickleweed habitat outside of Triangle Marsh, as well as multiple captures of salt marsh harvest mice.

COVER-TYPES, RESOURCE CATEGORIES, AND MITIGATION GOALS

The Service's Mitigation Policy (Policy) (FR 46:15 January 23, 1981) provides general guidance in making recommendations to conserve fish and wildlife resources. Under the Policy, resources are assigned to one of four Resource Categories, with a mitigation goal consistent with the values provided to fish and wildlife and the rarity of that habitat (cover-type). A mitigation goal is assigned ranging from "no loss of existing habitat value" (Resource Category 1) for the most valuable kinds of habitat to "minimize loss of habitat value" (Resource Category 4) for the less valuable and most common kinds of habitat. Application of the Policy involves designating cover-types which may be affected and assigning evaluation species based on the sensitivity of those species to the project action, their role in the ecosystem, or association with Service-wide resource management issues such as anadromous fish and migratory birds. We then state the Resource Category, the rationale for that selection, and the corresponding mitigation goal.

For this project area, we have designated seven basic cover-types within the project area and adjacent areas affected by the project. If a cover-type is considered unaffected both directly and indirectly by the project, it is not discussed here. Due to differences in water depth and/or salinity, there may be several more specific habitats within these cover-types, which are noted below.

Subtidal slough/channels: These are represented by the unvegetated, consistently open waters of Alviso Slough, Artesian Slough and Coyote Creek. These are used as habitat by numerous resident and migratory fishes during all tide levels and by an array of birds which forage at the interface between the fringe marsh and the channel, including the endangered California clapper rail. Such channels carry sediment and organic matter between marshes, upland watersheds, and bay waters that are important for sustaining the productivity of the bay and marsh as well as maintaining the marsh elevation in the face of rising sea level. Pond breaching would create a larger tidal prism which may cause channel enlargement at the expense of fringe marsh, and would eventually create more channels within the restored ponds. Appropriate evaluation species would be the longfin smelt and Pacific staghorn sculpin. Slough/channel habitat has been reduced in extent and quality during the historic loss of tidal wetlands and extensive shoreline development to the edge of many channels in the Bay area. Due to the vital importance of the slough/channel network, it is designated Resource Category 2, with a mitigation goal of no net loss of in-kind habitat value.

Open bay waters: Open waters are represented by unvegetated, permanently inundated areas of south San Francisco Bay below mean lower low water. These waters would not be directly affected by project actions, but would indirectly benefit from the transport of organic matter and food organisms from tidal marsh restored by the project. This cover-type is important for saltwater fish species and diving ducks like canvasback and scaups. An appropriate evaluation species would be one of the numerically abundant resident fish, such as topsmelt. Bay waters have been indirectly affected by tidal marsh loss and urban pollutants and contaminants, but direct losses from fill have been limited and it remains regionally abundant. For this reason, we designate it Resource Category 3, with a mitigation goal of no net loss of habitat value while minimizing loss of in-kind habitat value.

Non-tidal pond waters: Non-tidal ponds constitute most of the project area which would be directly affected by the project. The ponds vary in depth, circulation, and chemistry. There are about 2,000 ac of somewhat lower salinity "circulation ponds" maintained by circulating bay water through a series of ponds linked by water control structures. These ponds support some species of saltwater resident fish in addition to benthic and pelagic invertebrate forage organisms. They are used by dabbling and diving ducks, and other bird groups, depending on depth for forage and shelter. About 800 ac of the project area are called "batch" ponds because there is less circulation and a higher maintained salinity. These ponds do not have fish but have abundant brine shrimp and brine flies that provide forage for other birds like eared grebes, phalaropes, and shorebirds. At least some of these ponds, and potentially all of them, would be converted to tidal marsh with the project. As evaluation species, we would select a resident shorebird such as the American avocet for the batch ponds, and a duck such as the northern shoveler for the circulation ponds. Non-tidal pond waters are moderately abundant, providing significant habitat to these evaluation species, and replacing some of the functions of higher marsh salt pannes in the historical landscape. Due to this abundance and medium-to-high value to the evaluation species, we designate it Resource Category 3, with a mitigation goal of no net loss of habitat value while minimizing loss of in-kind habitat value.

Microtidal/diked pond waters: This type of pond is represented by NCM (340 ac) in the project area. It receives water through a control structure through the levee bordering Pond A16, and water levels vary minimally. This cover-type has some of the same features as fully tidal marsh in terms of vegetation and chemistry, but with lower plant and fish diversity. The lack of tidal connection means that bird foraging on this cover-type may occur throughout the tidal cycle, but also that it does not contribute organic material to bay open waters, nor provide value for migratory fish. In the study area, this cover-type provides important habitat support for the listed salt marsh harvest mouse, western snowy plover, and California clapper rail, as well as for Forster's tern, black-necked stilt, American avocet and other small shorebirds. With the proposed project, a small portion of this pond would be directly affected by levee construction, and levee overtopping and associated flood effects would no longer occur. A shorebird like the black-necked stilt would be an appropriate evaluation species. Due to the modest diversity and ecological function, but high use by some bird species, and medium-to-high value to the evaluation species, we designate it Resource Category 3, with a mitigation goal of no net loss of habitat value while minimizing loss of in-kind habitat value.

Tidal emergent marsh: In the project area, tidal emergent marsh presently occurs mainly as a fringe marsh of varying width along Alviso Slough, Artesian Slough and Coyote Creek. Tidal restoration elements of the project would affect the quantity of this cover-type because the increased tidal prism would cause erosion of this fringe marsh. Over a longer period of up to several decades or more, the breached pond interiors would accrete sediment to the point at which vegetation would colonize the surface. Species composition varies with salinity and elevation, contributing to a high diversity of plants and wildlife which use this cover-type. Dominant vegetation species in the project area are cordgrass, pickleweed, and saltgrass, along with other salt tolerant species. This cover-type provides significant, high value habitat to an array of mammals like the salt marsh harvest mouse, birds such as the marsh wren and clapper rail, and many fishes. Additionally, tidal emergent marsh produces organic matter that supports invertebrate and small fish forage organisms, that in turn are used by fish-eating birds and larger predatory fish. It is also a nursery ground for juvenile estuarine fish and invertebrates. An appropriate evaluation species would be a tidal marsh specialist like the marsh wren or black rail. The value of tidal marsh increases disproportionately with unit size, making it important to plan restoration projects with large contiguous units. Regionally, most of the tidal marsh has been lost due to conversion to industrial salt production and other coastal development. Due to this regional scarcity and very high values to the evaluation species, we designate tidal emergent marsh as Resource Category 2, with a goal of no net loss of in-kind habitat value.

Mudflat: Mudflats are substantially unvegetated tidal areas between mean low and mean lower low water that are regularly exposed during low tide. Mudflats are present along the margins of lower Coyote Creek and Alviso Slough, and more exists just outside the project area in ponds which were recently breached (Ponds A7, A19-21). With the project, much more mudflat would form as an interim habitat in breached ponds exposed to tidal action as sediment accretes. Over the longer term (after 30-50 years), sediments would accrete to the point that vegetation would colonize the surface and these interim mudflats would decline. Mudflat areas typically have a productive benthic community which provides forage for the shorebirds which specialize on them, as well as for gulls, terns, larger wading birds like herons and egrets, and ducks (see *Birds*, above). At higher tide stages, fish enter the mudflats and forage. Shorebird species which specialize on recently exposed mud such as the western and least sandpiper would be appropriate evaluation species. While some mudflat has been lost due to fill and urban development, it has not been affected to the same extent as tidal emergent marsh. Due to the moderate amount of mudflat, and its high importance to the evaluation species, we designate mudflat as Resource Category 2, with a goal of no net loss of in-kind habitat value.

Upland: Upland in the project area occurs mostly as non-native annual grassland habitat on levee slopes, some of which would be temporarily disturbed by new levee construction. It supports common small mammals and passerine birds, many of which are non-native. A native species like the California vole would be an appropriate evaluation species. A modest area of upland adjacent to tidal emergent marsh has some value as a refugium for mammals like the salt marsh harvest mouse during tidal flood events. Considering its moderate abundance and value, we designate upland as Resource Category 4, with a mitigation goal to minimize loss of habitat value.

ALTERNATIVES

The Corps developed project alternatives using different combinations of flood risk management options for the Alviso segment levee alignment, levee height, and construction of transitional habitat on the outboard side of the levee adjacent to Ponds A12 and A18. The levee alignment also affects the extent of restoration. For all of the action alternatives, *common elements* would be: in-pond preparations in advance of tidal restoration, tidal restoration of Ponds A9-15 and A18, tide gates at Artesian Slough and a railroad crossing, a south alignment of the WPCP levee (no alignment options), replacing the siphon between Pond A16 and NCM, providing an alternative mechanism for brackish water transfer to a nontidal marsh area just south of Pond A18 and east of Artesian Slough, creating a small berm breach to restore freshwater flow between Artesian Slough and a parallel unnamed ditch and adjacent marsh to the west, staging areas, and recreational trails. Levees would be constructed of engineered earth fill and have 3:1 (horizontal:vertical) slopes. The components of the advance preparation for tidal restoration include: draining ponds and removing vegetation; internal fill features such as ditch blocks; internal dike lowering and internal breaches; and stabilizing pond dikes inboard of ponds to be breached. After this preparation, external channel work such as pilot channels would be completed, followed by the breaching and/or lowering of the outboard levees. Additionally, the sequence of restoration involves early tidal restoration of Ponds A12 and A18, with possible tidal restoration of the rest of the ponds to follow if warranted after 4-10 years of monitoring (Figure 2). The Corps would initially conduct actions on Ponds A12 and A18. For the purpose of this report, we assume that the monitoring, funding, and other considerations will lead to a decision by the Corps to proceed with future tidal restoration of the remaining Ponds A9-11 and A13-15.

Levee alignment options: The alternatives discussed below involve three options for the Alviso segment of the project (i.e., west of Artesian Slough) (Figure 3). The Alviso North alignment follows the western and northern outer levees of NCM along the margins of Ponds A12, A13, and A16. This alignment would exclude NCM from tidal restoration in the future, protect it from flooding, and preserve its current state as a diked marsh. The Alviso South alignment follows

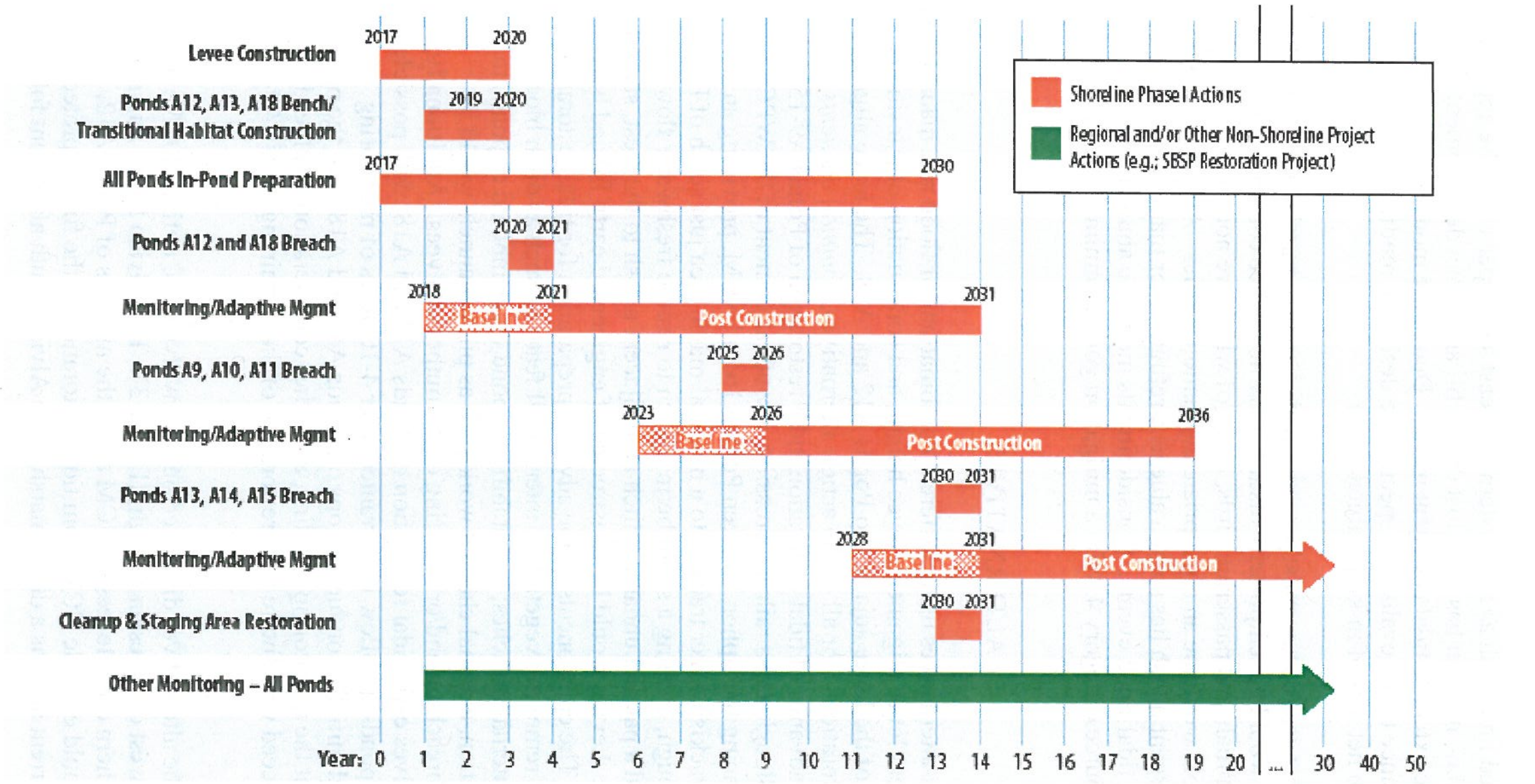

Figure 2. Construction Schedule for the South Bay Shoreline Phase 1 Study (personal communication, HDR 2015).

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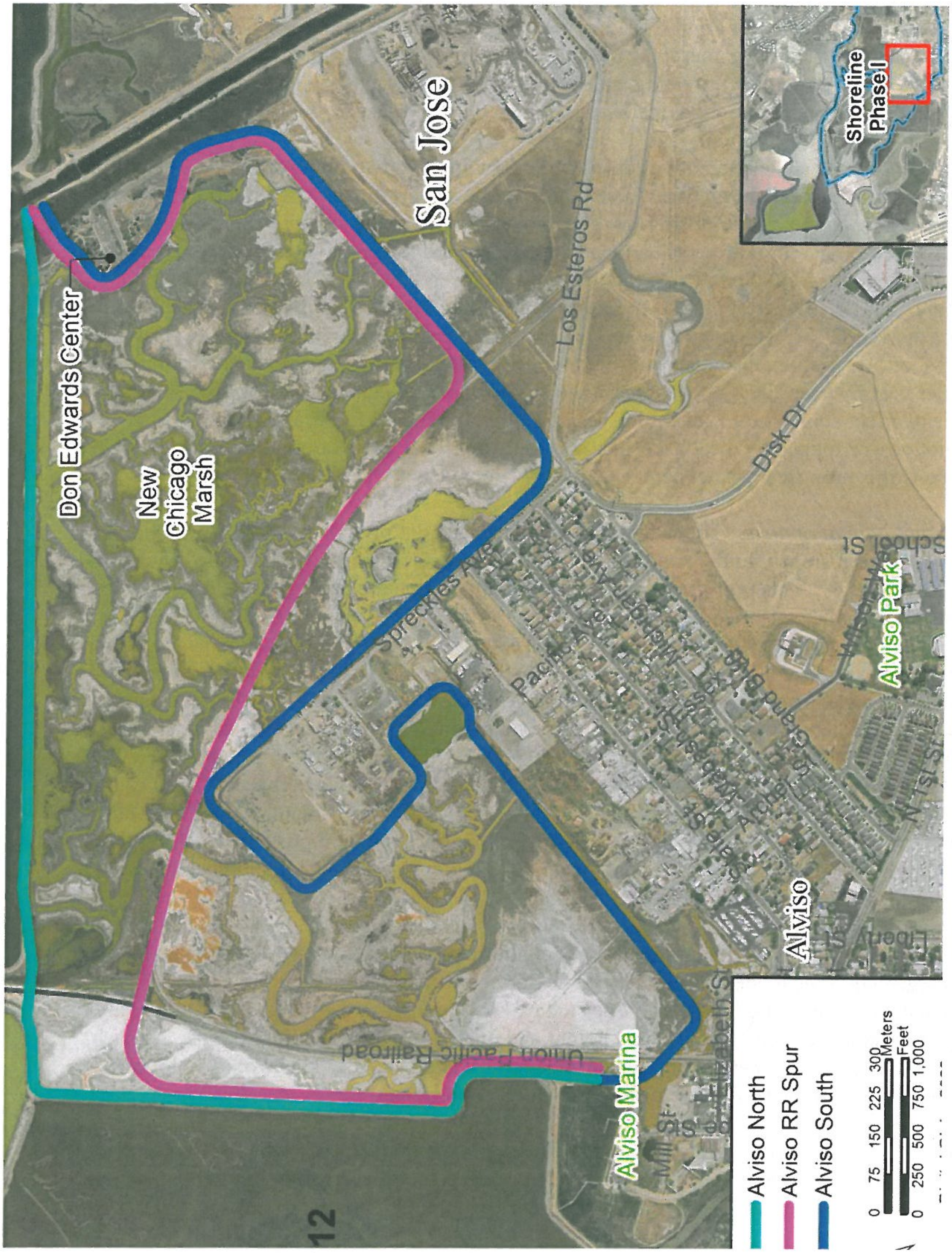

Figure 3. Alviso segment levee alignment options (Corps 2014).

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the outer, generally south border between NCM and the town of Alviso, and would affect about 20 ac of diked marsh and 15 ac of developed land. This alignment would not protect any of NCM from flooding and it could be restored to tidal marsh. The Alviso Railroad Spur alignment follows some of the border of Pond A12, and then goes along an existing railroad spur levee through NCM. With this alignment, the roughly one third of the NCM area south of the new levee would be protected from flooding and would remain diked marsh. The area north of the new levee could be restored to tidal marsh.

Levee height options: The alternatives discussed below involve two options for levee height in addition to the no-project alternative. Recent history shows significant past flooding in Alviso about three times in the last 40 or so years due to overtopping of the slough levees. With the completion of flood control projects on Guadalupe River and lower Coyote Creek, the remaining risk is tidal flooding from the bay overtopping non-engineered levees. Under the no-project alternative, the risk of overtopping of the current, non-engineered levee is estimated at 1 in 3 years for the year 2017, which will rise to 1 in 2 years by the year 2067 due to sea level rise. For the 13.5-foot-high option, the chance of overtopping by the 1-percent event is reduced to 0.1-11.8% per year by year 2067, depending on the sea level rise scenario. The 15.2-foot-high option is two feet above the 1% event for year 2067, would meet FEMA accreditation, and would not be overtopped by the 1% event. The 15.2-foot levee height option is locally preferred and is the Corps proposed project height.

Transitional habitat options: There are two transitional habitat options, a 50-foot-wide flat bench with a steep slope into the pond bottom, and a broad, 30:1 sideslope "ecotone", about 350-feet wide (Figure 4). This transitional habitat would be built on the bayward side of the levee work bordering ponds intended for tidal restoration (Ponds A12, A13, and A18). No bench or ecotone would be constructed adjacent to Pond A16 because it would remain a managed pond. The bench or ecotone would be constructed of non-engineered fill. The 50-foot bench would be grassland, but the edge of the steep slope could have narrow bands of marsh. For the ecotone, the first 15 feet where it meets the levee would be maintained to low grass at most in accordance with Corps policy (Engineering Technical Letter 1110-2-571). The rest of the ecotone would be unmanaged (no mowing) and allowed to establish on its own to include herbaceous species like cordgrass, pickleweed, and other marsh plants, with occasional woody plants up to 5-feet-tall. Due to the scarcity of transitional habitat currently, either option would provide benefit in the forms of high tide refugium and early marsh habitat. However, there would be much more such benefit for the ecotone than for the bench option.

Alternative 1 (No-Project): Under the no-project alternative, no actions would be taken for flood risk management or ecosystem restoration. The Service would conduct the same types of maintenance of the existing levees as it does today, however, it is acknowledged that these are non-engineered levees and at insufficient height and quality to withstand tidal floods. As such, these levees would be expected to fail under moderately large events. This would be followed by attempts to repair the levees and restore pre-flood conditions.

Alternative 2: This alternative would combine the common elements with the Alviso North levee alignment (the current north border of NCM), a 13.5 foot levee height throughout, and a

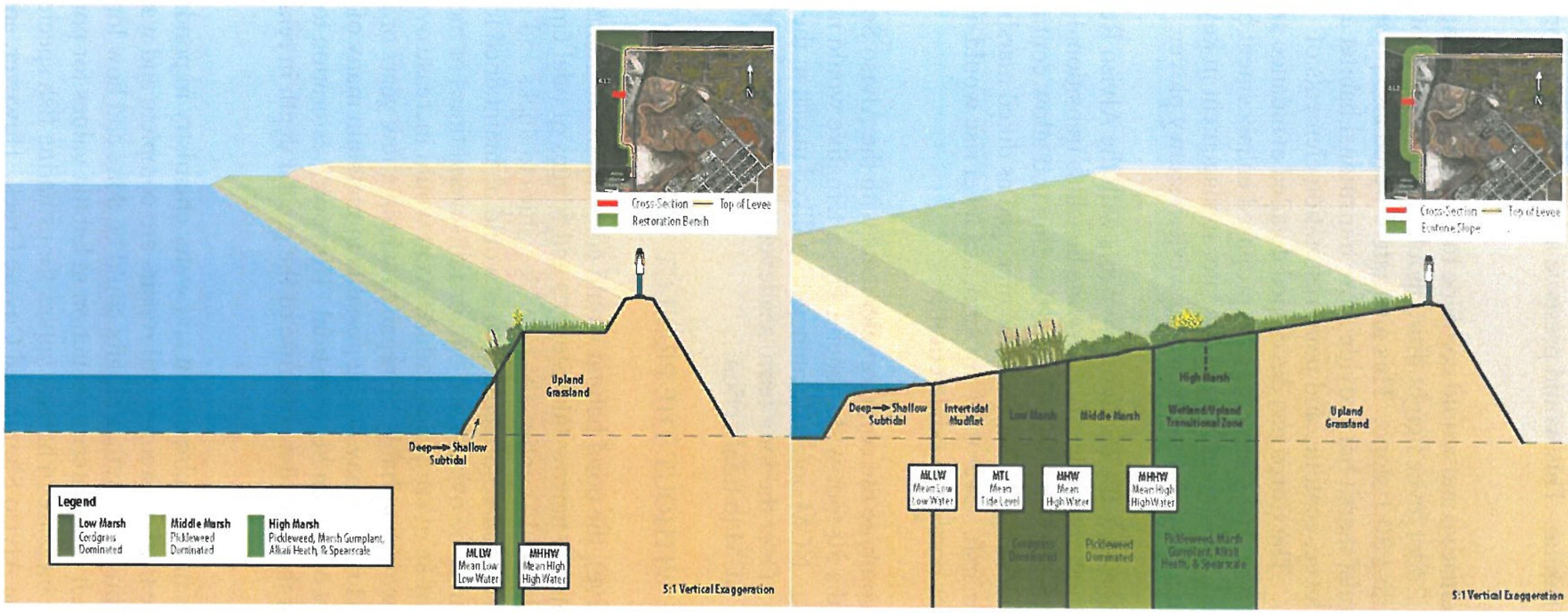

Figure 4. Transitional habitat options: Left - 50-foot-wide "bench"; Right - ~350-foot-wide "ecotone" (from Corps 2014).

flat 50-foot-wide bench as transitional habitat. This would preserve all of NCM in its present state as a diked tidal marsh.

Alternative 3: This is the preferred alternative and would combine the common elements with the Alviso North levee alignment, a 15.2 foot levee height throughout, and a broad, ~350-foot-wide transitional habitat constructed with a 30:1 slope. This alternative would also preserve all of NCM in its present state as a diked tidal marsh but provide more transitional habitat and more flood protection. The locations of the levee, ecotone, and pond restoration elements of Alternative 3 are illustrated in Figure 5. The Corps has developed detailed avoidance and minimization measures for this alternative. The Corps has also proposed enhancement of breeding substrate on one island in Pond A16 and enhanced predator management in key locations as compensatory conservation measures for impacts to western snowy plover.

Alternative 4: This alternative would combine the common elements with the Alviso Railroad alignment, a 15.2 foot levee height throughout, and a 50-foot-wide bench as transitional habitat. This alternative would protect about a third of NCM from tidal flooding and allow continued management as diked marsh. The remainder of NCM could be managed as diked marsh in the short term or actively restored to tidal marsh. Over the long term, sea level rise would overtop the non-engineered levees, exposing this portion to tidal action.

Alternative 5: This alternative would combine the common elements with the Alviso South alignment, a 15.2-foot levee height, and a 50-foot-wide bench. This alternative would not protect any of NCM from tidal flooding. NCM could be managed as diked marsh in the short term or actively restored to tidal marsh. Over the long term, sea level rise would overtop the non-engineered levees, exposing all of NCM to tidal action.

FUTURE WITHOUT THE PROJECT

Without the project (no-action alternative), the pond habitat would continue in the immediate term as managed open water, with relatively narrow tidal sloughs and fringes of tidal emergent marsh. The batch and circulation ponds would continue to provide values to ducks and pond specialists like the American avocet. The non-engineered levees would be maintained to the extent possible, but would almost certainly be overtopped and/or fail several times or more over a 50 year period of analysis. The risk of an overtopping/failure event would increase over this period with sea level rise. The levees would probably be repaired within a few years or less for a few decades. Eventually, with sea level rise, it may not be possible to maintain many of the levees. Most or all of the project area would then become tidal. However, restoration to tidal emergent marsh may not be possible at this later date because of the greater depth in relation to sediment accretion.

When uncontrolled levee failure events happen, circulation and water chemistry in ponds would be unmanaged and there could be some tidal exchange until repairs are complete and water circulation control is restored. Depending on whether repairs could be done and how long they take, uncontrolled breaching could result in an interim reduction in habitat values for pond specialist bird species together with an increase in habitat values for estuarine fish species due to the reconnection between the ponds and Alviso Slough and Coyote Creek. However, any such

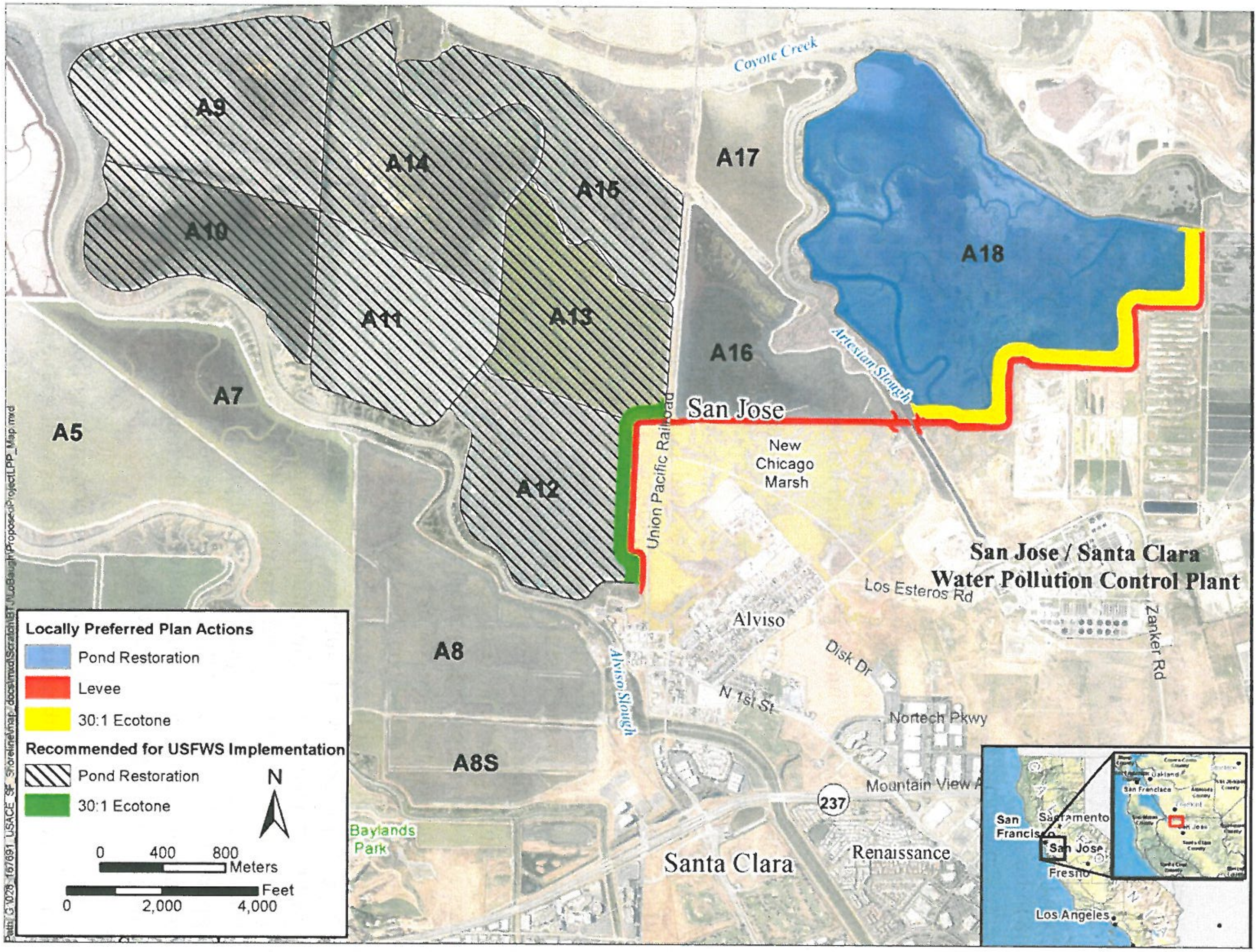

Figure 5. Preferred alternative (alternative 3) features (from Corps 2014).

tidal benefits under the no-action alternative with this kind of uncontrolled breaching would be lower than tidal benefits under the action alternative. The effect of uncontrolled breaching on birds which use ponds cannot be easily estimated because these birds may move to other areas and use habitat created by other regional restoration actions. Mammals, including the salt marsh harvest mouse, may be more adversely affected by levee failure under the no-action alternative because of the limited refugium at the urban-wildland interface, and their limited mobility.

FUTURE WITH THE PROJECT

With the project (alternative 3), pond habitat would be progressively converted from non-tidal managed ponds to tidal influence, beginning with Ponds A12 and A18. The expected result is that these would become emergent tidal marsh over time. However, complete restoration to tidal marsh will take many years and the final outcome is not certain. At the outset, there would be around 3 years of construction needed to build the major levee components and place the fill for the ecotone in both Alviso and WPCP segments (Figure 2). There would be considerable machinery movement and noise associated with this construction which is likely to reduce wildlife use in the immediate vicinity of the work, and could cause displacement of birds away from the levee or to other habitat in the vicinity. The total footprint for this levee work is about 63 ac, including about 9 ac of various wetland types, 38 ac of ponds or open water, and 16 ac of upland or development including the existing levee (Table 4.7-3 *in* Corps 2014). The wetland impact includes about 1.8 ac of muted/diked marsh habitat in NCM.

There would be some direct loss of tidal and diked marsh habitat associated with the new levees, the Artesian Slough flood gate, and excavation of the pilot channels and dike breaches of Pond A18. When a pond is breached, there would be a large increase in tidal prism, depending on specific depth, number and location of breaches, and slough capacity. One major effect of this tidal prism is that it will cause some erosion of outboard habitat at the breach location, and along the edges and bottoms of sloughs between the breach and the bay. The highest erosion rates would likely be near the breach location, at least initially. Initial accretion rates within a pond would be relatively high for the first few years after breaching because of this source of eroded material, and decrease thereafter. The habitat in the pond interiors for most of the next 30-40 years after breaching would be mudflat, with increasing time of mudflat exposure as the marsh plain accretes. This would provide increasing values to wildlife which use mudflat during this period. Whether this remains mudflat or becomes tidal emergent marsh, and how much becomes tidal marsh, would depend largely on the suspended sediment concentration (SSC) over the long term. At 100 milligrams per liter (mg/L) SSC it is predicted to remain mudflat after 50 years, but at 200 mg/L SSC, it is predicted to fully transition to emergent marsh after 40 years (ESA PWA 2012). As sediment accumulates, the initially enlarged tidal prism would decline, which may lead to narrowing of tidal channels and expansion of the outboard fringe marsh. If tidal emergent marsh is formed as is hoped, this would provide substantial ecosystem values in the form of support of tidal marsh wildlife, as well as production of organic matter. This organic matter would not only enhance the productivity of the bay, but would contribute to accretion rates and may offset the effect of sea level rise.

Thus, there is some uncertainty about the future conditions of the pond interiors related to the rate of sediment accretion within breached ponds, as well as the regional responses of wildlife to the changes in habitat distribution. To guard against adverse effects associated with these uncertainties, monitoring and adaptive management is proposed so that the decision on whether to breach more ponds in later phases, or what additional measures might be needed to promote tidal marsh, can be informed from data collected from initially-restored Ponds A12 and A18.

Because the ecotone area is at a higher elevation initially, we expect marsh vegetation to begin forming within one season of breaching (Figure 4). Planting or seeding could be done to accelerate colonization and favor desired plant species diversity. Once established, the vegetated ecotone would provide up to 60 ac of early tidal marsh habitat. Later, as tidal emergent marsh begins to form within the pond interior, the ecotone would also function as refugium for wildlife during high tides. The maximum post-construction tidal emergent marsh for the preferred alternative 3 is estimated at 2,783 ac (Table 4.6-8 *in* Corps 2014).

The other likely major effect of the increased tidal prism would be the effect of salinity on the plant community. Much of the fringe marsh along the major channels is vegetated by brackish species, and some of it has freshwater species. With the increased tidal prism, average salinity should increase, leading to an expansion of salt tolerant species such as pickleweed and saltgrass. This could have a positive effect on tidal marsh species like the salt marsh harvest mouse and California clapper rail.

Compared to without-project conditions, maintenance activities with the project would be more frequent and regular, but restricted to mowing on the slope of the engineered levees or portions thereof. Erosion of these new levees from windwaves or flood tides, and the need for repair of such damage, would be greatly reduced when the project is complete. Maintenance of the remaining levees around the ponds (also called "dikes"), outside of these engineered levees, would nevertheless remain until the later phases of the project. If later phases involved additional restoration of ponds to tidal action, levee maintenance around these ponds and associated effects of such maintenance on wildlife would be greatly reduced.

The with-project conversion of managed ponds into tidal salt marsh would have some effect on the value for managed pond specialist birds which use these ponds for foraging and roosting. One possible response would be that these specialist species would be displaced to nearby areas which would remain as ponds (e.g., NCM, Pond A16, and other managed ponds in the region). Pond A16 and other vicinity ponds under phase I of the SBSPRP have been separately enhanced under the SBSPRP to increase value to these specialists (Amato and Valoppi 2015). Or, the specialist species populations may decline to some extent. Over time, these specialists may begin to use salt pannes that could form within the restored tidal wetlands. It is expected that monitoring after the initial sequence of restoration will be sufficient to detect any regional, population-level effects on the species. Any initial adverse effects would likely be minimized by delaying further tidal restoration, and/or conducting other actions such as preserving or enhancing additional pond habitat if needed.

The project could also adversely affect diving ducks which currently use the non-tidal ponds for foraging, but the magnitude of these effects are uncertain. These species may not be habitat limited. There will be some remaining pond habitat in the region with the project, and tidal sloughs created by the proposed restoration may have some benefit that offsets the loss.

Migratory waterfowl populations may also be affected by factors in their breeding grounds away from the project area. Monitoring of diving ducks under the SBSPRP is ongoing and can be used to inform decisions on later phases of the project or further study needs if effects are observed.

The effect of the project on listed species (California clapper rail, western snowy plover, and salt marsh harvest mouse) is likely to be beneficial soon after levee construction is complete, with greater benefits over the long term. Flooding of NCM will be prevented, eliminating the effects of flooding and response to flooding (i.e., pumpout, levee repair) on habitat use or the displacement and mortality of individuals. Up to 60 ac of early marsh habitat expected to establish on the ecotone would benefit these species. Over time, restored tidal marsh would provide additional habitat that would allow expansion of populations of these species.

DISCUSSION

Alternative Evaluation: The locally-preferred alternative 3 has several benefits over the other alternatives from a fish and wildlife resource standpoint. Alternative 3 is the only alternative with the 30:1 sloped ecotone as transitional habitat. This type of transitional habitat would provide some substrate for early tidal marsh colonization, and would also serve as refugia from high tide events. The slope and width of the ecotone would result in more transitional habitat than would the flat bench in alternatives 2, 4, and 5. This habitat would also offset the direct loss of marsh on the margin of NCM and Artesian Slough that would have occurred due to construction of the levees and floodgates. Finally, the shallow slope of the ecotone is expected to more efficiently dissipate wave energy than would a flat bench or no transitional habitat. The Alviso North alignment in alternative 3 would preserve and protect the current water management of NCM, which is consistent with long term plans under the SBSPRP (USFWS and CDFW 2007). This current management provides for improved water quality in NCM and promotes salt marsh vegetation used by the salt marsh harvest mouse. NCM also functions as breeding and foraging habitat for the listed western snowy plover, and is adjacent to Pond A16 which is also used by this species for nesting. Other important species present on NCM include Forster's tern, American avocet, and black-necked stilt. Alternative 3 would largely preserve the habitat support for these wildlife species.

The construction impact on muted/diked tidal marsh for alternative 3 is 1.8 ac, compared to 20+ ac of such impact for alternatives 4 and 5. Because the levee section between NCM and Pond A16 under alternative 3 would be wider and taller than the existing dike, there could be some effect on the behavior of western snowy plovers and their use of NCM. For the purpose of this discussion, we assume this behavioral effect to be offset by the benefits of the proposed compensatory conservation measures. By comparison, constructing the levee alignments under alternatives 4 and 5 would not protect much of NCM from flood risk. Under these alternatives, with either active restoration or dike failure/overtopping with eventual sea level rise, the several hundred acres of unprotected muted/diked tidal marsh would become tidal. If active tidal restoration of NCM were attempted, the marsh plain would need to accrete 3 to 5 feet or more of sediment to begin to be recolonized by tidal marsh vegetation. Active tidal restoration of NCM would likely require early breaching, which could delay or affect the restoration of other ponds. Allowing the levees to fail at some later point due to sea level rise may result in permanent open tidal water rather than tidal marsh, due to the higher initial sea level at time of breaching.

The location of NCM poses challenges to tidal restoration. A railroad line is on its west border with Pond A12, which would be the access to tidal waters on Alviso Slough. A breach would be possible on that side, but it would likely be fixed rather than of flexible dimension. Pond A16, which is to be preserved as a managed pond, forms the north border with NCM, so it would be inconsistent with management to connect it to bay waters on that side. The east border is with Artesian Slough, which has a major freshwater influence that could affect (and be affected by) a pond breach. The town of Alviso is south of NCM and has been elevated above NCM by fill. Past subsidence is more pronounced in the south direction (Hecht and Seel 1990), which may explain the deeper surface at the south end of Pond A12 and possibly NCM as well. The result of this topography is that water would pond in the area of NCM, which also receives interior drainage from the town of Alviso. Considering the surroundings, current values to listed species at NCM, and the suite of alternatives evaluated, the Service concurs with the selection of alternative 3 as the preferred alternative, which preserves long-term management of NCM in its current state as a microtidal/diked marsh.

Habitat Evaluation: To assess the habitat values which would be produced by the project, we considered the change in habitat types and value shown in a Combined Habitat Assessment Protocol (CHAP) analysis (NHI 2014) as well as functions not represented by the CHAP method. The habitat type changes used in the CHAP analysis were based on modeled elevation data by ESA PWA (2012). Habitat value calculated by the CHAP method is based on the number of potential species associated with the habitat types. Habitat types with the project are projected to shift from the current dominance of managed pond to largely unvegetated mudflat in the intermediate term (5 to 20 years after initial breaching), and then tidal emergent marsh over the longer term (30 to 50 years after initial breaching). The CHAP method did not show major changes in habitat value over time with the project compared to other alternatives or the baseline condition[1]. This result is believed to be related to the inability of the CHAP method to consider the different conservation values of various habitats and their species associations, and the inherent emphasis of CHAP on species diversity.

Some loss in habitat value may occur with the project due to conversion of managed ponds to mudflat and then tidal marsh, and during associated project construction. Notwithstanding the shortcomings of the CHAP method just mentioned, total habitat units calculated by this method showed only modest differences between baseline and alternative scenarios (Table 3 *in* NHI 2014). While a reduction in habitat value deviates from our Policy goal of no net loss of habitat value for Resource Category 3, it is a small difference (<5%). In reality, we believe habitat values with the project will actually increase significantly due to factors not considered in the CHAP method (i.e., bay-wide benefits of tidal marsh such as from exported organic matter input; benefits to migratory fishes and listed species; large contiguous unit size). Additionally, the remaining managed ponds in the project vicinity along with ongoing and proposed pond enhancements under the SBSPRP are expected to provide adequate habitat, and likely improved habitat values to pond specialists in the region as a whole.

[1] An error in the baseline condition in the CHAP analysis was found involving the assumption that baseline conditions would involve uncontrolled and unrepaired breaching, resulting in similar values for the no project and with project alternatives. We did not correct this error, but do not believe it would change this report's conclusion.

The habitat benefit of the project can also be expressed in terms of its end point contribution to the long term habitat goals to increase tidal emergent marsh. The maximum post-construction total of tidal emergent marsh is estimated from modeling to be 2,783 ac, although the actual amount could be less than this due to formation of tidal channels and a lower SSC than the higher modeled condition (200 mg/L SSC). This habitat would provide a major contribution towards reversal of historical losses of emergent marsh, would benefit an array of wildlife species and native fishes, and would contribute towards the recovery of listed species. The tidal marsh would also contribute to the productivity of the bay through the production of organic matter and forage organisms used by wildlife. Compared to the current managed pond dominance, restoring the majority of the shoreline study area to tidal marsh as proposed would eventually result in less maintenance on refuge lands, allowing the Service to focus its management effort on other needs.

Adaptive Management: The proposed project involves significant uncertainties in how habitat will evolve after breaching, and how different wildlife groups will respond to habitat changes. Key uncertainties in tidal restoration involve: the rate of sediment accretion; the amount of scour of tidal sloughs, outboard marsh and fringe marsh; the associated formation of tidal emergent marsh and use by target species such as the harvest mouse and clapper rail; the productivity of estuarine fish; the extent and controllability of invasive species in restored tidal marsh; the region-wide responses of pond-associated birds to reduction in managed ponds; and any changes in mercury accumulation in the food web. The proposed project shares many of the same goals and objectives as the SBSPRP, and would be subject to the same guiding principles.

The SBSPRP employs two strategies to address the varying wildlife resource needs in the region while achieving restoration goals. These strategies are also applied in the design and implementation of the proposed project. The first strategy is to maintain and enhance a reduced area of managed ponds that can be used by wildlife associated with the ponds which will be converted to marsh. This has already been initiated in the region as part of phase I of the SBSPRP in advance of the proposed project, by enhancing some 477 ac of managed ponds. This will be done in the project area vicinity by retaining Pond A16 and NCM in their current state and by adding gravel to one island in Pond A16 as a compensatory conservation measure to benefit western snowy plover. The second strategy is to use the results of monitoring during the early years of tidal restoration to inform the decision-making process regarding future phases of the project, as well as additional management actions which could be employed to reach restoration targets.

For this project, the Corps has included a set of monitoring actions of key processes as part of the proposed project that can be used to measure early success and guide adaptive management. The physical monitoring includes water levels, sedimentation rates, and SSC. For example, it is hoped that sediment accretion will be sufficient to result in conversion to tidal marsh over the 50-year project life. Modeled rates can vary depending on actual SSC and tidal flows, and observed rates may differ substantially from the model predictions. If sedimentation is too slow to indicate progression towards tidal marsh (or sea level rise is faster than predicted), then the consequences could be examined, and responsive action taken. Potential actions might include importing fill or adding wave breaks to increase accretion, adjusting the project phasing schedule, or reconsideration of the target habitat distribution.

Biological monitoring for this project includes collection of data on coverage of tidal marsh, estuarine fish, invasive vegetation, and early vegetation in the transitional habitat (ecotone). It is less likely that this specific monitoring would have bearing on tidal restoration of later phases because the evolution into tidal marsh can vary and is slower for more deeply subsided sites such as Pond A12.

In addition to the monitoring for the proposed project, the SBSPRP has identified high priority applied study questions, many which would be addressed in association with the recently completed phase I of the SBSPRP (Appendix D *in* USFWS and CDFW 2007). Among these are bird use with changing habitat, effects on non-avian species, mercury effects, and so on. Bay-wide monitoring of wildlife could also be useful in determining whether populations are declining as a result of the project or are redistributing to other locations in the region. Lessons learned from results monitoring restoration efforts throughout the bay are expected to be useful in guiding adaptive management actions within the shoreline project area.

Although marsh evolution and wildlife responses of individual tidal systems cannot be predicted with precision, results of other area work are promising. Early monitoring of other tidal restoration sites under phase I of the SBSPRP indicates significant benefits to fish and wildlife such as an abundance of mysid shrimp and longfin smelt in recently restored Ponds A19-21 (Amato and Valoppi 2015). There are also some effects noted in this early work as well, such as increases in mercury in some ponds and eggs of birds that forage in them. Such effects are being carefully monitored to determine whether they persist or dissipate over time and the best course for management action if needed. Similarly, the use of phasing, monitoring and an adaptive management program for the proposed project are expected to maximize benefits while minimizing the potential for any shortcoming or unforeseen circumstance to become significantly adverse.

CONCLUSION

Based on our evaluation of the effects, uncertainties, and potential benefits of the proposed levee improvement and tidal restoration measures described above for the South San Francisco Bay Shoreline Phase I Study, and considering the restoration performance thus far in phase I of the SBSPRP, we recommend that the preferred alternative 3 be implemented as proposed. No modifications or additional measures have been identified.

RECOMMENDATIONS

We recommend that the Corps:

1. Evaluate measures to maximize the performance of the ecotone. Such measures may include establishing criteria for the physical and chemical properties of fill material. Different fill criteria may be appropriate for the fill within the rooting zone of plants to optimize growth. To promote the desired species of plants, the Corps should consider the use of seed, transplants, or translocated soils from marshes free of invasive species. Interim measures may be needed to suppress unwanted species during the ecotone construction period prior to breaching.

2 Perform pre-planning to identify sources of suitable quality material to raise marsh plain elevations, for possible placement in the event that accretion rates are too low.

3. Consider conducting some pre-construction studies to update baseline information where it is not current. One example might be salt marsh harvest mouse monitoring in the vicinity of the WPCP south alignment where construction is proposed and which has had past captures, but none recently.

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Strong, C. 2015. Electronic mail and four attachments, subject line: "New Chicago Marsh." Received June 24, 2015.

Appendix B8

Endangered Species Act Compliance

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET ST.
SAN FRANCISCO, CALIFORNIA 94103-1399

May 14, 2015

REPLY TO
ATTENTION OF

Planning Branch

Mr. Gary Stern
San Francisco Bay Region Supervisor
National Marine Fisheries Service
777 Sonoma Avenue, Room 325
Santa Rosa, CA 95404

Dear Mr. Stern:

In accordance with section 7(c)(1) of the Endangered Species Act of 1973 (16 U.S. Code 1536[c]), as amended, and section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (Public Law 104-297), the United States Army Corps of Engineers, San Francisco District (USACE), had previously prepared and submitted to the National Marine Fisheries Service (NMFS) a biological assessment (BA)/essential fish habitat (EFH) assessment evaluating the effects of proposed agency actions associated with the South Bay Shoreline Phase I Study on endangered, threatened, proposed, and candidate species, and designated and proposed critical habitats, designated essential fish habitat (EFH), and EFH-managed species, that are known to occur in the vicinity of the project. The previously drafted BA/EFH assessment was submitted to the NMFS by email on December 15, 2014.

Based on subsequent coordination with NMFS regarding project impacts on Central California Coast (CCC) steelhead (*Oncorhynchus mykiss*) Distict Population Segment (DPS) and North American Green Sturgeon southern DPS (*Acipenser medirostris*), USACE has modified our BA/EFH findings regarding project impacts on these species as described below. We now conclude that the proposed South Bay Shoreline Phase I Study project may affect, but is not likely to adversely affect CCC steelhead, green sturgeon, or their critical habitat.

As documented in the enclosed revised BA/EFH assessment, USACE has made the following findings for these species:

<u>*Central California Coast (CCC) Steelhead*</u>
Proposed construction activities associated with the project are not likely to adversely affect CCC steelhead. The only location where there is any potential for construction activities to affect steelhead is in Artesian Slough. However, steelhead have not been recorded there, there is a low probability that adult steelhead would move up the Slough, and there is the lowest probability of steelhead presence during the time of year in which activities associated with the project will be performed (June 1 to November 30). While construction activities will involve vibratory pile driving, based on the analysis of estimated noise associated with this activity, underwater sound-

pressure levels would not approach injury levels for adult or juvenile salmonids. If coffer dams are used, they will be constructed during low tide at times when water depths are very shallow to prevent entrainment and eliminate the need to relocate fish from isolated areas. Any potential effects related to movement of construction personnel and heavy equipment, increases in turbidity, and chemical leaks and spills associated will be minimized through conservation measures and would be localized and short-term. As a result, adverse impacts to steelhead are not expected to occur from construction.

Excavation of channels in outboard marshes along Artesian Slough could mobilize mercury-laden sediment, but given minimization measures mercury is not expected to result in adverse effects to steelhead. Mercury is present in relatively high concentrations in the slough, but exposure of CCC steelhead to sediments containing legacy mercury will be minimized during the project by a minimal period of disturbance; coordinating sediment disturbance to occur during periods when CCC steelhead are least likely to be in the project area; and the short duration of CCC steelhead presence in the Action Area. Exposure is not likely to result in greater bioaccumulation of mercury than currently exists in the vicinity. Additionally, if herbicides are necessary, the types of herbicides used and their application would be in accordance with methods determined by NMFS to be unlikely to adversely affect salmonids.

Operation of the project after construction is not expected to affect steelhead, given that there is little potential for human disturbance of steelhead resulting from use of the levee trails during project operation.

Finally, while construction activities may have localized, short term impacts on CCC steelhead critical habitat, restoration activities associated with the project are anticipated to have substantial, long-term benefits for steelhead by increasing the quantity and value of their critical habitat. Construction activities may result in degradation of water quality and reductions in forage in Artesian Slough but these would be very localized and short-term. Conversely, tidal restoration in Pond A18 (Led by USACE) and A9-A15 (Led by USFWS) will provide long-term benefits for CCC steelhead by increasing the quality and conservation value of steelhead critical habitat in the South Bay. Combined, these projects will create 2840 acres of new critical habitat providing extensive natural cover in the form of aquatic vegetation, increasing the abundance of invertebrates and prey fish, and likely improving water quality conditions over the long term.

Green Sturgeon

Most of the effects described above for the CCC steelhead and its designated critical habitat also apply to the green sturgeon and its critical habitat. The potential for effects of construction and conservation measures described for steelhead above also apply to green sturgeon. Because green sturgeon are primarily benthic-oriented organisms, and given the lack of any occurrence records in the action area as well as the localized effects of construction activities, the effects on green sturgeon from the proposed project will be minimal. Potential effects of mercury on the green sturgeon would be similar to those described for steelhead above. Due to the even more infrequent occurrence of green sturgeon in the Action Area than salmonids and the brevity of project-related disturbance that could result in mercury mobilization, exposure is not expected to result in adverse effects on green sturgeon or to result in greater bioaccumulation than currently exists in the vicinity. If herbicides are necessary, the types of herbicides used and their application would be in accordance with methods determined by NMFS to be unlikely to adversely affect salmonids and thus would also be anticipated not to result in adverse effects on green sturgeon. Similarly, there is also little potential for human disturbance of green sturgeon resulting from use of the levee trails during operation of the project after construction.

Construction activities may have the same localized, short term impacts on green sturegon critical habitat as described above for CCC steelhead critical habitat, yet restoration activities associated with the project are anticipated to have substantial, long-term benefits for green sturgeon by increasing the quantity and value of their critical habitat. Construction activities may have minor water quality and prey organism impacts but tidal restoration in Pond A18 (Led by USACE) and A9-A15 (Led by USFWS) will create 2840 acres of new critical habitat. Restoration actions will increase the diversity in depths of aquatic habitats due to scour and restoration of tidal action to large remnant sloughs in managed ponds, thereby creating more deep subtidal habitats used by green sturgeon. Moreover, restoration actions will improve habitat conditions for juvenile rearing by providing a high abundance of benthic invertebrates.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions affecting listed species and their critical habitat that are reasonably certain to occur in the action area considered in this biological assessment. The *Integrated Document* for the proposed action (HDR 2014) contains a detailed analysis of past, present, and reasonably foreseeable future projects within the San Francisco Bay area. The most important and relevant of these projects is the South Bay Salt Ponds Restoration Project (SBSPRP). That project will result in the restoration of thousands of acres of high-quality habitat for fish. Sea level rise associated with climate change may also have cumulative effects on species that utilize tidal marshes by reducing tidal marsh area while increasing subtidal habitat. The proposed Phase I Study project is not anticipated to contribute to adverse cumulative impacts on CCC steelhead or green sturgeon, but rather will help to ameliorate adverse effects of other projects on these species.

Based on these revised findings USACE has determined the following:

- The proposed Phase I Study project may affect, but is not likely to adversely affect CCC steelhead and designated critical habitat;

- The proposed Phase I Study project may affect, but is not likely to adversely affect green sturgeon and designated critical habitat;

Given these new determinations, we request that NMFS change the current consultation for these species from formal to informal consultation and provide written concurrence with our not likely to adversely affect determinations.

We further request completion of the EFH consultation as previously requested on December 15, 2014.

If you have any questions, comments, or requests for additional information related to this letter, or the enclosed revisions to the BA/EFH assessment, please contact William DeJager at (415) 503-6866 or at William.R.DeJager@usace.army.mil.

Sincerely,

FOR James L. Howell Jr.

Thomas R. Kendall, P.E.
Chief, Planning Branch

Anne Morkill
Project Leader
San Francisco Bay National Wildlife
Refuge Complex

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
777 Sonoma Avenue, Room 325
Santa Rosa, California 95404

May 19, 2015 **Refer to NMFS No:** WCR-2014-1850

Thomas R. Kendall, Chief
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Re: Endangered Species Act Section 7(a)(2) Concurrence Letter and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the South San Francisco Bay Shoreline Phase 1 Study

Dear Mr. Kendall and Ms. Morkill:

On May 14, 2015, NOAA's National Marine Fisheries Service (NMFS) received your request for written concurrence that the U.S. Army Corps of Engineers' (Corps) and U.S. Fish and Wildlife Service's (USFWS) proposed funding and construction, respectively, of the South San Francisco Bay Shoreline Phase 1 Study in Santa Clara County, California, near the City of Alviso is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparations of letters of concurrence.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete EFH consultation.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Public Consultation Tracking System (https://pcts.nmfs.noaa.gov/pcts-web/homepage.pcts).[1] A complete record of this consultation is on file at NMFS North Central Coast Office, Santa Rosa, California.

Proposed Action and Action Area

The Corps is conducting a flood risk management (FRM) and ecosystem restoration study for the South San Francisco Bay shoreline. Phase I of the study, known as the South Bay Shoreline Phase I Study (proposed project), involves increasing the height and width of certain levees in the Alviso area in northern Santa Clara County, California, and breaching of other levees to restore tidal habitats in existing managed ponds. The proposed project's "Study Area" is bounded on the southwest by Alviso Slough; on the north by Coyote Slough, Ponds A16 and A17, the "Island Ponds" (Ponds A19, A20, and A21), and the Newby Island Landfill; on the east by the Coyote Creek levee; and on the south by State Route (SR) 237.

The proposed project consists of two main sets of actions:

1. Corps-led actions: these include flood risk management levee improvements and public access improvements funded by the Corps and Santa Clara Valley Water District (SCVWD), which will occur on Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) lands and lands of the City of San Jose, as well as tidal restoration actions on City of San Jose lands;

2. USFWS-led actions: these include tidal restoration and public access improvements proposed by the USFWS and SCVWD on Refuge lands.

The Study Area is at risk of tidal flooding due to having large areas of low-lying terrain that are bordered by pond levees originally designed and constructed for commercial salt pond purposes rather than for FRM. The proposed project will address this flooding risk by raising the heights of levees in key areas.

Ecosystem restoration and FRM issues are inseparable in the Study Area because opening up ponds to tidal action changes the hydraulic behavior of the ponds under both normal and high water conditions. Tidal restoration will alter both ecosystem conditions and potential flood risk to the surrounding areas. Engineered levees are necessary to replace the existing non-engineered pond levees, which were not intended to provide any FRM in order to address the potential change in flood risk.

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[1] Once on the PCTS homepage, use the following PCTS tracking number within the Quick Search column: WCR-2014-1850

<u>Corps-led Actions</u>

Flood Protection Actions

The Corps will construct 3.7 miles of new levee from the Alviso Marina northeastward to the northwestern corner of the San Jose/Santa Clara Water Pollution Control Plant (WPCP). The levee, which would provide FRM assuming a one percent Annual Chance of Exceedance, consists of the following three components:

1. The Alviso Segment consists of 1.7 miles of new levee construction, which is located entirely on Refuge lands, and will provide FRM for the community of Alviso. This levee segment follows the eastern border of Pond A12 and the southern border of Pond A16.

2. The Artesian Slough crossing will entail construction of a new tide gate across the slough to protect the WPCP from storm waters flooding the slough and backing up into the facility during extreme storm events. The proposed location of the tide gate will be at least 300 feet bayward of the existing WPCP outfall for treated water at Artesian Slough (the location shown in the Biological Assessment is approximate, and the actual location may be farther upstream along Artesian Slough). The gates will only be closed during extreme storm events. When the gates are closed, the WPCP will need to pump water outputs over the gate, or provide for internal excess water storage during a storm event. With or without the proposed project, the WPCP will develop a plan to pump or store waters during such events given increases in Bay water levels that correspond with future sea level rise scenarios.

3. The WPCP Segment consists of 2 miles of new levee construction, which is located on City of San Jose lands, and will provide FRM to the WPCP. It runs west to east in a stair-step pattern along the southern border of Pond A18, from the southwest corner of the pond to its northeast corner.

The engineered levee will be earthen. The proposed change in levee size from the existing levee (*e.g.*, along the southern edge of Pond A16) will be an increase of up to approximately 10 feet in height (after settlement) and about double in existing width. The average width at the crown of the levee will be 16 feet, with 3:1 (horizontal: vertical) slopes except where ecotones having a 30:1 slope will be constructed. Along the east edge of Pond A12, the Alviso Segment levee will have an additional 345-foot-wide ecotone along its west side.

The levee design will include vegetation as erosion protection on the bayward and landward side slopes. The vegetation that will be seeded or planted on the levee following construction will consist of marsh vegetation and peripheral halophytes at the toes of the levee and upland grasses at higher elevations. Where the FRM levee will cross the active railroad line just east of Pond A12, railroad floodgates will be installed. Concrete barriers will be installed on either side of the railroad right-of-way and will tie into the earthen levees. The metal floodgates will be connected to the barrier and will remain open during normal conditions and closed during flood conditions.
Other materials such as geotextile fabric, stone column, foundation over-excavation, or replacement with stronger soil may also need to be included in the final FRM levee design.

Fill for the FRM levee will be imported from local sources and delivered by truck. Dredge material originating from areas outside the proposed project area that is used for ditch blocks, or for portions of the ecotone and FRM levee that will be in contact with tidal waters, will need to meet the contaminants screening criteria as described in the Biological Assessment (HTH 2014).

The timing and duration of construction will be governed by both weather conditions and the need to avoid construction in sensitive areas during certain times of the year to avoid and minimize impacts to listed species. Types of construction equipment may include excavators, belly scrapers, front-end loaders, bulldozers, forklifts, vibratory rollers, dump trucks, and water trucks. Ancillary types of equipment that may be used include diesel generators, water pumps, and pile drivers. It is anticipated that dewatering and temporary installation of sheet piling will be necessary during the construction of water control structures such as tide gates. Dredge-locks or coffer dams may be constructed using earth levees or sheet piling to allow access for water-based equipment within a site. When possible, amphibious excavators, vibratory pile drivers, and other less-impacting equipment will be used.

Ecosystem Restoration Actions

The ecosystem restoration strategy to be implemented by the Corps is the conversion of Pond A18, which is currently managed for migratory waterbirds, into vegetated tidal wetlands with goals of maximizing long-term habitat benefits, particularly in consideration of potential sea level rise. Breaching of Pond A18 will restore approximately 736 acres of new tidal habitat (in addition to the upland transitional habitat discussed below). Ecosystem restoration also includes creation of a broad, gently sloping ecotone. In order to convert Pond A18 to tidal marsh it will be drained. This will occur passively, which may take several months, or water may be pumped out to expedite the process. Upland transitional habitat, ditch blocks, and pilot channels will be constructed to facilitate natural tidal flow within the pond. Ditch blocks inhibit flow through existing borrow ditches, promote scour and flow through the remnant historical channels, and provide some initial pickleweed habitat where located at the correct elevations. Three pilot channels will be constructed on the outboard side of Pond A18, two along Artesian Slough, and one will be constructed along South Coyote Slough. These pilot channels will be constructed at the locations of major historical tidal channels. The outboard levee will be breached in four locations along Artesian Slough and one location along South Coyote Slough. Breach size will be determined based on the hydrologic relationship between the tidal channel and marsh drainage area and on data from tidal channels in mature marshes throughout the Bay (ESA and Philip Williams & Associates, Ltd. 2012). Breaches are sized to long-term equilibrium dimensions to balance between excavation costs, scour potential, and tidal drainage consistent with Design Guidelines for Tidal Wetland Restoration in San Francisco Bay (Philip Williams & Associates, Ltd. and Faber 2004). Dimensions are adjusted to provide a cross-section with side slopes of 4:1 to 5:1 and a bottom width of approximately 10 feet. On the inboard side of the levee, the breach excavation will extend to the levee toe. The Pond A18 transitional habitat will be constructed simultaneously with levee construction.

When Pond A18 is breached, its bottom elevation will be too low for vegetated marshes to form immediately. Several feet of sediment will need to be deposited by natural processes before the pond bottom reaches a sufficient elevation for marsh vegetation to grow. This sedimentation process is expected to proceed at rates determined in part by suspended solids concentrations as well as by factors causing re-suspension of sediment, such as wave action and tidal currents, in the breached pond (ESA and Philip Williams & Associates, Ltd. 2012). Because these factors cannot currently be predicted, it is not known how quickly vegetated marsh will form in Pond A18.

Monitoring of the restoration process, and adaptive management if necessary to achieve vegetated tidal marsh, will occur per the Shoreline Study Monitoring and Adaptive Management Plan (MAMP). Once tidal marshes have begun to form in the former ponds, the rate of sedimentation will increase as the vegetation slows the water, catches sediment, and retains it. Eventually, with sufficient sediment, it is expected that Pond A18 will be largely vegetated, aside from tidal channels.

<u>USFWS-led Actions</u>

Ecosystem Restoration Actions

USFWS-led ecosystem restoration activities will involve tidal restoration of up to 2,010 acres in Ponds A9-A15, and ecotone construction along the eastern edge of Pond A12, similar to those described above for Pond A18. However, there is an additional activity that will occur in Ponds A9-A15 that will not be necessary in Pond A18 because A18 has no internal berms. For restoration of Ponds A9-A15, breaches in the internal berms will be necessary to reconnect historical channels and restore the hydrologic connections to the innermost ponds in the proposed project footprint. Breach excavations will be sized in a similar manner to those applied to the outboard levees and will extend beyond the levee into the remnant historical channels. Existing internal berms may be lowered in some areas during the breach excavation to create wave breaks to limit wave action, enhance sedimentation, and create vegetated marsh habitat on the berm crests in the short term while the ponds develop from mudflat to vegetated marsh. As Ponds A9-A15 are breached in a phased manner, berms in adjacent ponds not yet being breached will be temporarily raised to provide increased FRM inboard of the current pond breaching actions.

Pond A12 has experienced the greatest degree of subsidence and is proposed for the first phase of restoration (though see above for a discussion of the possibility that Pond A18 may be breached first). By limiting new tidal exchange to this pond (rather than breaching multiple ponds in the first phase), Pond A12 can undergo maximum tidal interaction and sediment deposition, thus helping to raise its bottom elevation to a point where colonization by marsh vegetation will occur. During the first three years (2017–2019), Pond A12 will be prepared for breaching and inundation through excavation of pilot channels in two locations along Alviso Slough and construction of borrow ditch blocks. Berms between Pond A12 and Ponds A11 and A13 will be temporarily (i.e., until tidal restoration in A11 and A13) raised to provide flood protection for A11 and A13. Surplus material excavated from pond preparation will be used to contribute to other in-pond construction activities requiring material, such as raising of internal levees, if determined suitable by Refuge staff. Subsequently, levee breaches will be implemented in Pond A12 to introduce tidal flow.

Following restoration of tidal flow to Pond A12, monitoring will be conducted to measure the effectiveness of tidal function equilibrium and restorative values. If necessary, corrective measures will be implemented. A period of approximately four years has been established for MAM associated with Pond A12.

Pond preparation for Ponds A9, A10, A11, and A18 would potentially be implemented based on the lessons learned as a result of monitoring and adaptive management conducted for Pond A18, including whether to breach these ponds and restore them to tidal marsh. This decision will be made according to the MAMP, which includes a series of decisions (based on those in the SBSPRP MAMP) regarding whether to continue breaching that involve monitoring of populations of pond-associated birds, monitoring of sediment accretion in the South Bay, and other factors. If the decision is made to breach these ponds, borrow ditch blocks and pilot channels will be constructed. Pond A11 will be connected to Ponds A10 and A12 with inboard berm breaches, but it will not be breached directly to Alviso Slough. Two breaches to Alviso Slough are planned in Pond A10, and one breach each to Alviso Slough and Coyote Slough are planned for Pond A9. Internal berms between Ponds A9-A11 and Ponds A13-A14 will be temporarily (i.e., until tidal restoration in A13 and A14) raised to provide flood protection for A13 and A14. Levee breaches for Ponds A9-A11 will be implemented in Year 8 (2025) of the proposed project.

Pond preparation for Ponds A13, A14, and A15 will potentially be implemented based on the lessons learned as a result of MAM conducted for previous ponds, including whether to breach these ponds and restore them to tidal marsh. If the decision is made to breach these ponds, borrow ditch blocks and a pilot channel will be constructed. Only one outboard breach will occur for tidal restoration in these three ponds; this breach will connect Pond A15 to Coyote Slough along a major historical channel. Inboard berm breaches at the locations of historical sloughs will connect Ponds A13 and A14 to surrounding ponds (A9, A11, A15, and A12) to provide tidal flows to A13 and A14. Levee breaches will be implemented in Year 13 (2030) of the proposed project.

Ecotone (low marsh, middle marsh, and wetland/upland transitional habitat) habitat will be created along approximately 4,000 linear feet of levee on the east side of Pond A12. Approximately 30 acres of new upland transitional habitat will be created in this area. Following construction of the ecotone area, it will be seeded with native grasses, forbs, and low shrubs.

Following the breaching of levees around Pond A18 and Ponds A9-A15, the only management activities that might occur within the restored tidal habitats are predator management and, if necessary, invasive plant management, both of which would be performed on an as-needed basis. Invasive plant management will be needed for the first few years following construction of the ecotone to ensure that perennial pepperweed and other invasives do not become dominant. Otherwise, invasive plant management would be performed if monitoring indicates that particularly invasive species colonize the newly restored ponds in a way that would jeopardize the habitat enhancements achieved through tidal restoration. The non-Federal sponsors (the CSCC, SCVWD, and City of San Jose) will be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the Pond A18 tidal restoration and ecotone, as well as the entire levee adjacent to Pond A18 and on Refuge property). An OMRR&R Manual will be prepared to describe these activities.

Recreation Actions

Multi-use trails on top of the new FRM levee, with connections to the Bay Trail network, along with viewing platforms, and trail upgrades to be made to an existing segment of the Bay Trail system along SR 237. A pedestrian bridge over Artesian Slough will be constructed to link the multi-use trails on top of the new FRM levee. The bridge would span the slough atop sets of four parallel piles spaced every 50 feet. This would result in the installation of a total of forty 12-inch-thick steel piles that would form the pedestrian bridge piers. A barge-mounted pile driver/crane or an in-water excavator with a vibratory hammer would be used to drive the 12-inch-thick steel piles. In addition, the proposed project will construct a trail segment along the north side of SR 237 between the Guadalupe River and Zanker Road (see Figure 18 in the Biological Assessment [HTH 2014]).

Construction of the recreation and public access components may consist of grading and, for all-weather trails, gravel application. Equipment required for trail construction may include small, Bobcat-sized equipment, backhoes or front-end loaders, graders, bulldozers, asphalt placement equipment, and dump trucks. Interpretive stations of varying size and scope and viewing platforms will also be constructed. Viewing platforms will be made of wood, metal, or plastic material and assembled in-place using a backhoe or excavator and hand tools. Interpretive stations will be built on-site, or will be prefabricated structures. Assembly and installation will require a backhoe or excavator and hand tools.

Avoidance and Minimization Measures

The Corps and USFWS propose the following measures to protect listed fish and the aquatic environment:

1. Construction activities in, or directly adjacent to, waters where CCC steelhead and longfin smelt are likely to be present will be performed between June 1 and November 30.

2. Levee breaching will not occur between February 1 and May 31 for the protection of out-migrating juvenile steelhead in, or directly adjacent to, waters where steelhead are likely to be present.

3. Activities that extend into the waters where listed fish and fish species managed according to Fisheries Management Plans may be present, such as pilot channel excavation, will be performed at low tide and/or under de-watered conditions.

4. Cofferdams will be used during construction and maintenance activities, as well as during implementation of any adaptive management actions, that could potentially result in substantial siltation of protected fish habitat.

5. All pumps used for dewatering where salmonids may be present will be screened according to NMFS and CDFW criteria for juvenile salmonids.

6. During tide gate construction on Artesian Slough, all pile driving will be performed using a vibratory hammer to minimize the potential effects of noise and pressure-waves on fish.

7. NMFS personnel will be immediately notified of any observed fish mortality events.

8. Tidally restored ponds will contain channels that are adequate for the ingress and egress of fish with tidal circulation. Inspections will be documented in a record that is available for review on request.

9. Treated wood will not be used in structures that may come into contact with water.

There are no interrelated or interdependent activities associated with the proposed action.

The action area includes the construction footprints for FRM and recreational access activities; the entirety of Ponds A9 through A15 and A18; portions of Pond A16 adjacent to the proposed project footprint; the northern and western boundaries of New Chicago Marsh; areas on the outboard (bayward) sides of those ponds where pilot channel excavation will occur; all staging, stockpiling, and access areas; the portions of Alviso Slough, Coyote Slough, South Coyote Slough, and Artesian Slough downstream from proposed levee breaches that may be subject to additional scour from increased tidal prism or temporarily increased sedimentation during construction; and areas surrounding the construction footprint.

Action Agency's Effects Determination

The Corps and USFWS have determined that the proposed project is not likely to adversely affect ESA-listed fish and designated critical habitat, and has requested NMFS' concurrence with this determination. The Corps and USFWS's finding of NLAA is based on the proposed measures to protect listed fish and the aquatic environment.

Available information indicates the following listed species (Distinct Population Segments [DPS] and Evolutionary Significant Units [ESU]) and critical habitat under the jurisdiction of NMFS may be affected by the proposed project:

Central California Coast steelhead (*Oncorhynchus mykiss*) **DPS**
Threatened (71 FR 834; January 5, 2006)
Critical habitat (70 FR 52488; September 2, 2005); and

North American Green Sturgeon southern DPS (*Acipenser medirostris***)**
Threatened (71 FR 17757; April 7, 2006)
Critical Habitat (74 FR 52300; October 9, 2009).

The life history of steelhead is summarized in Busby *et al.* (1996). Alviso Slough and Coyote Slough represent the lower tidal portions of the Guadalupe River and Coyote Creek systems, respectively. Central California Coast (CCC) steelhead spawn and rear in the Guadalupe River and Coyote Creek watersheds upstream from the action area. Juvenile CCC steelhead seasonally occur in the action area during their downstream migration from these watersheds during the months of February to May. Adult CCC steelhead migrate into the Guadalupe River and Coyote Creek to reach their natal streams for spawning primarily between the months of December and March, peaking in January and February.

The life history of green sturgeon in California is summarized in Adams et al. (2002) and NMFS (2005). The southern DPS of North American green sturgeon spawn in the deep turbulent sections of the upper reaches of the Sacramento River. As juvenile green sturgeon age, they migrate downstream and live in the lower delta and bays, spending from three to four years there before entering the ocean. Adult green sturgeon return from the ocean every few years to spawn, and generally show fidelity to their upper Sacramento River spawning sites. Green sturgeon appear to be relatively rare in the South Bay. Acoustic tag receivers placed in the main channel of Coyote Slough, at the confluence of Coyote and Alviso Sloughs, and in recently breached salt ponds in the Alviso area (Ponds A19 and A21 at the Island Ponds and Pond A6), detected no green sturgeon in those areas. However, given that green sturgeon are known to occur in estuaries away from spawning streams, individuals (particularly juveniles) could occasionally forage in tidal portions of the action area, such as in Alviso Slough, Coyote Slough, and Artesian Slough. Following breaching of ponds for tidal restoration, they could also potentially forage in the larger sloughs in restored tidal marshes.

The Corps and USFWS have determined that the proposed project would not have a substantial adverse impact on EFH. This finding is based on the project's avoidance and minimization measures. The project area is located within an area identified as EFH for various life stages of fish species managed through the Pacific Coast Salmon FMP, the Pacific Groundfish FMP, and the Coastal Pelagic FMP. The project area is also within an area designated as Habitat Areas of Particular Concern (HAPC) for various federally-managed fish species within the Pacific Groundfish FMP. HAPC are described in the regulations as subsets of EFH that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area. Designated HAPC are not afforded any additional regulatory protection under MSA; however, federal projects with potential adverse impacts to HAPC are more carefully scrutinized during the consultation process. As defined in the Pacific Groundfish FMP, San Francisco Bay, including the project area, is identified as estuary HAPC.

Consultation History

By letter dated December 11, 2014, the Corps and USFWS requested formal consultation for the proposed project. Corps, USFWS, NMFS, and the California State Coastal Conservancy (CSCC) representatives attended a site visit on January 23, 2015. A conference call with representatives of the Corps, USFWS, NMFS, and the CSCC was held on April 23, 2015, to clarify the effects of the proposed action and the consultation schedule. During this conference call, NMFS explained that their review of the project suggests construction activities may be conducted without adverse effects to listed fish or designated critical habitat if the proposed minimization measures were slightly modified. NMFS suggested the Corps and USFWS modify the minimization measures and reconsider their finding of "adverse effects" to NMFS-listed species. By letter dated May 14, 2015, the Corps and USFWS transmitted their revised determination that the proposed project is not likely to adversely affect ESA-listed fish and designated critical habitat, and requested NMFS' concurrence with this determination.

ENDANGERED SPECIES ACT

Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is not likely to adversely affect listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

The effects of construction of the FRM levee, tide gate, and pedestrian bridge, as well as restoration-related activities such as pilot channel construction, breaching, and scour from increased tidal prism are reasonably likely to include degradation of water quality, disturbance of benthic habitat, and elevated sound levels during construction and breaching activities. Internal pond improvements and recreational activities (i.e., use of recreational trails) will occur within diked areas isolated from tidal waters or on top of levees, respectively. Therefore, these activities will have no effect on steelhead and green sturgeon.

Construction of FRM levee, tide gate, and pedestrian bridge, as well as restoration-related activities such as pilot channel construction, breaching, and scour from increased tidal prism may result in temporary increases in turbidity. During these activities disturbance of the bottom substrate will likely result in suspension of sediment in the adjacent water column. In areas with a direct connection to tidal waters of San Francisco Bay, the Corps and USFWS will perform construction activities between June 1 and November 30, and limit these activities to periods of low tide when work sites are dry or very shallow. If the timing of tides does not allow the work to be done in dry conditions, a coffer dam will be installed at low tide to protect tidal waters from entering the work sites. Adequate water depths and carrying capacity in adjacent Bay waters will provide sufficient area for fish to disperse and disturbance associated with construction should not result in more than an insignificant effect on them. With these measures, NMFS anticipates turbidity will be localized, minor and temporary. Increased levels of turbidity and suspended sediment can affect listed fish species by disrupting normal feeding behavior, reducing growth rates, increasing stress levels, and reducing respiratory functions. However, increased levels of turbidity in the action area associated with implementation of this project are expected to be minor, localized and very short term. Steelhead are very unlikely to be present during the June 1 to November 30 in-water construction timeframe, and are therefore not expected to be exposed to increases in turbidity related to construction activities. Green sturgeon are expected to be tolerant of levels of turbidity that exceed levels expected to result from this project. For these reasons, the potential effects of minor and localized areas of elevated turbidity within this project's construction activities are expected to be insignificant to green sturgeon and steelhead.

Construction and restoration activities that are expected to disturb the substrate and result in increases in turbidity are likely to also result in re-suspension of sediment-borne contaminants. Mobilization and transport of suspended sediments from these activities make their adsorbed contaminants available to fish. Sediment within the action area may contain high concentrations of mercury. High concentrations of mercury in the water column and sediments can alter fish behavior and affect sensory systems involved in growth, reproduction, and survival (Eisler 2000). It can also affect prey sources through contamination or reduced availability. As described above, the Corps and USFWS have proposed several measures to reduce exposure of green sturgeon and steelhead to increases in turbidity and mercury. With these measures, NMFS anticipates mercury exposure will be less than the thresholds commonly cited as the cause of these possible behavioral and physical impacts. Re-suspension of sediment-borne mercury associated with project construction is expected to be insignificant to green sturgeon and steelhead.

The installation of forty 12-inch diameter steel piles for the pedestrian bridge with a vibratory hammer may affect listed fish through exposure to high underwater sound levels. Available information indicates that fish may be injured or killed when exposed to very high levels of elevated underwater sound pressure waves generated from use of impact hammers to install piles. However, vibratory hammers generate lower sound levels and different sound wave forms that are less injurious than impact hammers. The use of a vibratory hammer by this project is expected to avoid generation of underwater sound levels that are harmful to fish, so elevated sound levels during construction will not result in the injury or mortality of listed fish. Additionally, the Corps and USFWS propose to restrict in-water pile driving to the period between June 1 and November 30. Because of the included work window, ESA-listed steelhead are very unlikely to be present in the project's action area when in-water pile driving is occurring. If listed fish are present during use of the vibratory hammer, they may react behaviorally to elevated underwater sound levels and temporarily vacate the project action area during construction. Adequate water depths and carrying capacity in open water areas adjacent to the project site will provide startled fish sufficient area to disperse and these elevated sound levels should not result in more than an insignificant behavioral effect on green sturgeon and steelhead.

Perennial pepperweed control at restored sites will necessitate the use of glyohosate and/or imazapyr-based aquatic herbicides. Glyphosate and imazapyr-based herbicides are highly soluble in water. The USFWS and Corps propose the following general conservation measures related to herbicide application:

a. Herbicides will be applied by a certified applicator and in accordance with application guidelines and the manufacturer label.

b. Herbicide applications would be timed to coincide with ebbing tides to protect non-target vegetation, to allow a minimum of six hours dry time for glyphosate/imazapyr mixture applications, and at least one-hour dry time for imazapyr applications.

c. Herbicides will be applied directly to perennial pepperweed plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface.

d. All certified applicators will be trained to correctly identify perennial pepperweed, to distinguish this species from native species in the action area.

Implementation of these conservation measures are expected to reduce the potential for green sturgeon and steelhead to be exposed to glyphosate or imazapyr at concentrations known to be harmful to fish. Since these herbicides are considered relatively non-toxic to fish and do not bioaccumulate in the tissues of aquatic organisms (Gardener and Grue 1996; Giesy et al. 2000), NMFS does not expect any listed fish mortality, changes in growth rates, reduction of reproductive success or detectable effects on designated critical habitat in the action area associated with the application of these herbicides. For these reasons, the potential effects of vegetation removal with herbicides are expected to be insignificant.

The action area is located within designated critical habitat for CCC steelhead and the southern DPS of green sturgeon. Primary constituent elements (PCEs) of designated critical habitat for CCC steelhead include estuarine areas free of obstruction with water quality, water quantity, and salinity conditions supporting juvenile and adult physiological transitions between fresh- and saltwater; natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, and side channels; and juvenile and adult forage, including aquatic invertebrates and fishes, supporting growth and maturation. The PCEs of designated critical habitat for the southern DPS of green sturgeon in estuarine areas include food resources, water flow, water quality, migratory corridor, water depth, and sediment quality. PCEs include sites essential to support one or more life stages of the species. These sites in turn contain physical and biological features that are essential to the conservation of the species.

During construction, critical habitat will be temporarily affected by minor increases in turbidity and disturbance of benthic habitat. As discussed above, water quality effects in the form of increased turbidity are expected to be temporary and insignificant. Construction activities are expected to disturb bottom sediments and the associated benthic community in the action area. This disturbance could result in the temporary loss of benthic invertebrates. However, impacts to the benthic community are expected to be temporary and localized. Once completed, the project is expected to benefit designated critical habitat by creating 2,840 acres of new tidal marshland foraging areas for threatened green sturgeon and steelhead in South San Francisco Bay.

Conclusion

Based on this analysis, NMFS concurs with Corps and USFWS that the proposed action is not likely to adversely affect the subject listed species and designated critical habitats.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the Corps, USFWS, or by NMFS, where discretionary Federal involvement or control over the action has been retained or is authorized by law and (1) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or if (3) a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes the ESA portion of this consultation.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Under the MSA, this consultation is intended to promote the protection, conservation and enhancement of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem. For the purposes of the MSA, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity", and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10), and "adverse effect" means any impact which reduces either the quality or quantity of EFH (50 CFR 600.910(a)). Adverse effects may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Based on information provided by the Corps and USFWS, the proposed action may result in localized and temporary degradation of water quality, disturbance of the benthic habitat, and temporary increases in noise during pile installation and construction. Therefore, NMFS has determined the proposed action would adversely affect EFH. However, adverse effects are localized, temporary and minimal in nature. Furthermore, the proposed action will benefit EFH after completion by restoring tidal connectivity and creating 2,840 acres of tidal marsh along South San Francisco Bay. Therefore, NMFS has no practical EFH Conservation Recommendations to provide to avoid or reduce the magnitude of these effects.

USFWS or the Corps must reinitiate EFH consultation with NMFS if the proposed action is substantially revised in a way that may adversely affect EFH (50 CFR 600. 920(l)). This concludes the MSA portion of this consultation.

Please direct questions regarding this letter to Amanda Morrison, North Central Coast Office in Santa Rosa, California at (707) 575-6083, or via e-mail at Amanda.morrison@noaa.gov.

Sincerely,

for Jeffrey Jahn

William W. Stelle, Jr.
Regional Administrator

cc: William DeJager, Corps San Francisco District, San Francisco, CA
Anne Morkill, USFWS National Wildlife Refuges, Petaluma, CA
Copy to ARN File # 151422WCR2014SR00303
Copy to Chron File

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Suite W-2605
Sacramento, California 95825-1846

In Reply Refer to:
08ESMF00-
2012-F-0450-2

APR 27 2015

Mr. Thomas R. Kendall
Department of the Army
San Francisco District
U.S. Army Corps of Engineers
1455 Market Street
San Francisco, California 94103-1398

Subject: Biological Opinion on the South San Francisco Bay (South Bay) Shoreline Phase 1 Study in Santa Clara County, California

Dear Mr. Kendall:

This letter is in response to your December 11, 2014, request for formal consultation for the proposed South Bay Shoreline Phase 1 Study (proposed project) in Santa Clara County, California. Your request for consultation was received in our office on December 22, 2014. The proposed project involves flood risk management, levee construction, upland transitional habitat (ecotone) berm construction along Ponds A12 and A18, tidal marsh restoration in Ponds A9-A15 and Pond A18, trail construction, and operation and maintenance activities on lands owned and managed by the City of San Jose and the U.S. Fish and Wildlife Service's (Service) Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) in the South Bay. The U.S. Army Corps of Engineers (Corps) and the Service are each requesting the initiation of consultation for the Corps-led actions and Service-led actions of the proposed project, respectively. Your letter requested consultation on the endangered California clapper rail (*Rallus longirostris obsoletus*), endangered salt marsh harvest mouse (*Reithrodontomys raviventris*), threatened Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*), and endangered California least tern (*Sternula antillarum browni*). Critical habitat has been designated for the Pacific coast population of the western snowy plover but does not occur within the action area for the proposed project. This document is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act).

This document represents the Service's biological opinion on the effects of the proposed project on the California clapper rail, salt marsh harvest mouse, Pacific Coast population of the western snowy plover, and California least tern. The same biological opinion is being submitted to the Service. Currently the biological opinion is to both the Corps and the Service because the Corps is not authorized to expend funds on ecosystem restoration on lands controlled by another Federal agency, but it can expend funds on flood control on such lands. However, it is a possibility that the Corps may implement the entire action and, therefore, all aspects of the proposed project will be implemented by the Corps except those that were addressed in the South Bay Salt Pond Restoration Project (SBSPRP) Phase 1 Actions (Service file number 81420-F-08-0621-1, Service 2008).

The following sources of information were used to develop this biological opinion: (1) your letter requesting consultation on the proposed project dated December 11, 2014; (2) the November 2014 *Draft South San Francisco Bay Shoreline Phase 1 Biological Assessment for the Salt Marsh Harvest Mouse, California Ridgway's Rail, Western Snowy Plover, California Least Tern, Central California Coast Steelhead, Green Sturgeon, and Longfin Smelt and Essential Fish Habitat Assessment* (Biological Assessment) (H.T. Harvey & Associates (HTH) 2014); (3) the August 2008 *Formal Endangered Species Consultation on the South Bay Salt Pond Restoration Project Long-term Plan and the Project-level Phase 1 Actions, Alameda, Santa Clara, and San Mateo Counties, California* (Programmatic Biological Opinion) (Service file number 81420-F-08-0621-1, Service 2008); (4) electronic mail and conversations among the Corps, the Refuge, HTH, California State Coastal Conservancy (CSCC), San Francisco Bay Conservation and Development Commission (BCDC), Santa Clara Valley Water District (SCVWD), the City of San Jose, California Department of Fish and Wildlife (CDFW), the National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NMFS), and the Service; and (5) other information available to the Service.

CONSULTATION HISTORY

August 12, 2008	The Service issued the Programmatic Biological Opinion for the SBSPRP Phase 1 Actions (Service file number 81420-F-08-0621-1, Service 2008).
2008 – 2014	The Service continued coordination with the Corps, the Refuge, HTH, CSCC, BCDC, SCVWD, the City of San Jose, and CDFW on the SBSPRP and the proposed project.
October 15, 2014	The Service received via electronic mail from the Corps, the Refuge, and CSCC the October 2014 Draft Biological Assessment for the proposed project.
October 17, 2014	The Service provided via electronic mail comments on the October 2014 Draft Biological Assessment for the proposed project to the Corps, the Refuge, HTH, CSCC, SCVWD, and the City of San Jose.
October 28, 2014	The Service participated in a conference call among the Corps, the Refuge, HTH, CSCC, SCVWD, and the City of San Jose discussing the Service's comments on the Draft Biological Assessment for the proposed project.
November 17, 2014	The Service received via electronic mail from the Refuge and the Corps the revised Biological Assessment for the proposed project (HTH 2014).
December 22, 2014	The Service received from the Corps and the Refuge the letter requesting the initiation of formal consultation on the proposed project.
April 9, 2015	The Service submitted the draft biological opinion for the proposed project at the request of the Corps.

April 17, 2015 — The Service received via electronic mail from the Corps comments on the draft biological opinion for the proposed project.

BIOLOGICAL OPINION

Description of the Proposed Project

Background

The Corps is conducting a flood risk management and ecosystem restoration study for the South Bay shoreline. Phase I of the study, known as the South Bay Shoreline Phase I Study (proposed project), involves increasing the height and width of certain levees in the Alviso area in northern Santa Clara County, California, and breaching of other levees to restore tidal habitats in existing managed ponds. The proposed project's "Study Area" (Figure 1) is bounded on the southwest by Alviso Slough; on the north by Coyote Slough, Ponds A16 and A17, the "Island Ponds" (Ponds A19, A20, and A21), and the Newby Island Landfill; on the east by the Coyote Creek levee; and on the south by State Route (SR) 237.

The proposed project consists of two main sets of actions:

1. Corps-led actions: these include flood risk management levee improvements and public access improvements funded by the Corps and SCVWD, which will occur on Refuge lands and lands of the City of San Jose, as well as tidal restoration actions on City of San Jose lands;

2. Service-led actions: these include tidal restoration and public access improvements proposed by the Service and SCVWD on Refuge lands.

Proposed project activities on Refuge lands were included in the intra-Service Programmatic Biological Opinion for the SBSPRP, which addressed flood control, public access, and habitat restoration and management (Service file number 81420-F-08-0621-1, Service 2008). As a result, the intra-Service consultation for the South Bay Shoreline Phase I Study Project will tier off the programmatic consultation for the SBSPRP. However, portions of the South Bay Shoreline Phase I Study Project on City of San Jose lands were not included in the action area for the Programmatic Biological Opinion. Also, the Programmatic Biological Opinion did not cover effects to the longfin smelt which is currently a candidate for Federal listing but was not in 2008.

Flood Risk Management (FRM)

The Study Area is at risk of tidal flooding due to having large areas of low-lying terrain that are bordered by pond levees originally designed and constructed for commercial salt pond purposes rather than for FRM. The proposed project will address this flooding risk by raising the heights of levees in key areas.

Ecosystem Restoration

Ecosystem restoration and FRM issues are inseparable in the Study Area because opening up ponds to tidal action changes the hydraulic behavior of the ponds under both normal and high-water

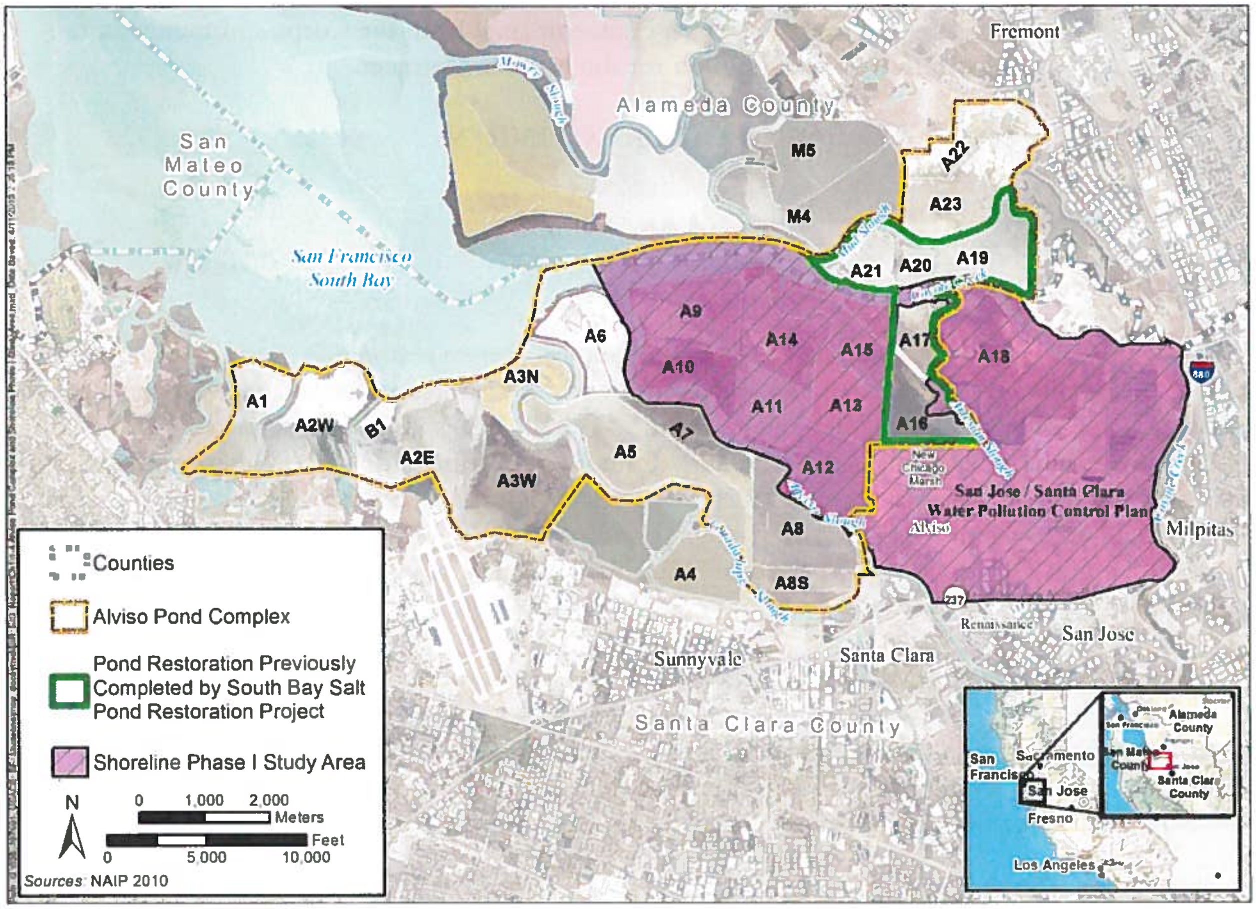

Figure 1. Map of the SBSPRP Phase 1 Actions and the Study Area for the South Bay Shoreline Phase I Study Project.

conditions. Tidal restoration will alter both ecosystem conditions and potential flood risk to the surrounding areas. Engineered levees are necessary to replace the existing non-engineered pond levees, which were not intended to provide any FRM in order to address the potential change in flood risk.

Tidal salt marshes are in dynamic equilibrium with water levels in San Francisco Bay (Bay) and can keep pace with rising sea levels through accretion of sediment if restoration activities begin soon, based on current and projected sediment availability. In addition, a vegetated marsh plain can slow down tidal surge velocity and reduce wave heights as they traverse the marsh surface. Therefore, having an established marsh in front of FRM infrastructure would increase the resiliency of the shoreline relative to the projected impacts of sea level rise (HDR 2014).

Project Components

Overview

Figures 2 and 3 below depict the portions of the Study Area where long-term physical changes are expected to occur as a result of proposed project activities led by the Corps and the Service,

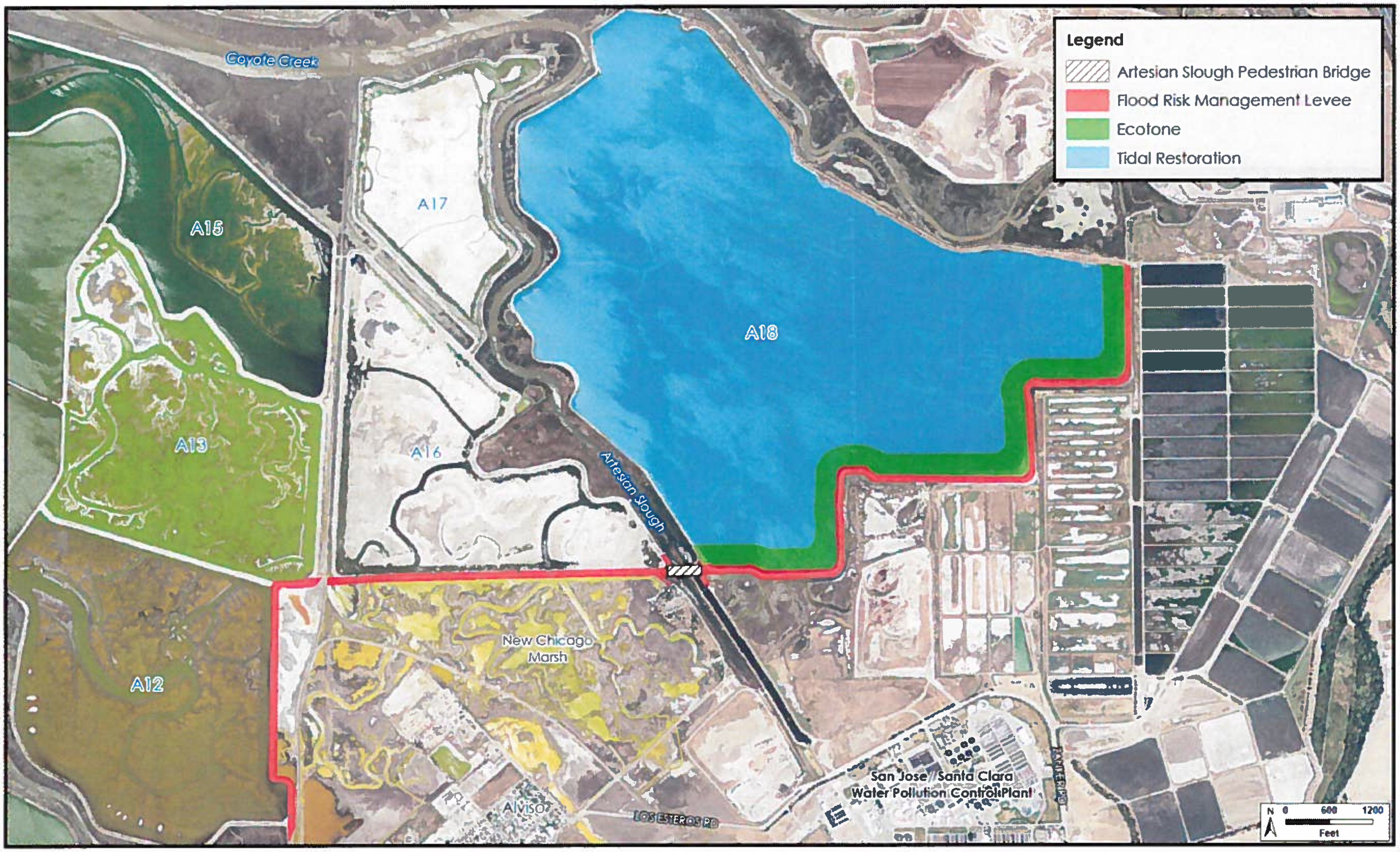

Figure 2. Corps-led Actions in the South Bay Shoreline Phase 1 Study Project (copied from HTH 2014).

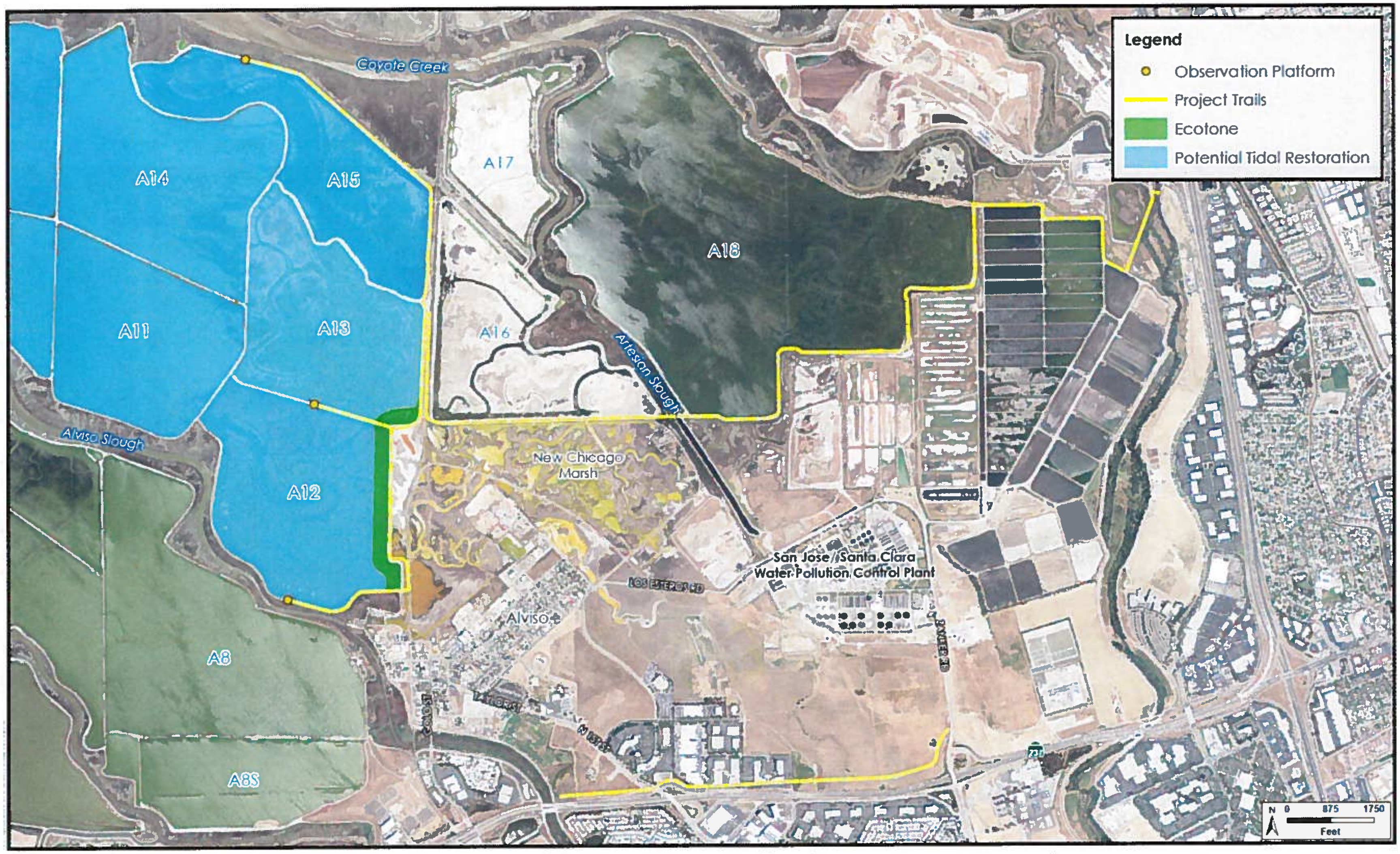

Figure 3. Service-led Actions in the South Bay Shoreline Phase 1 Study Project (copied from HTH 2014).

respectively. As noted previously, the proposed project consists of two main sets of actions: tidal restoration and public access improvements proposed by the Service and SCVWD on the Refuge (Figure 3), and flood control levee improvements, public access improvements, and tidal restoration funded by the Corps and SCVWD, both on Refuge lands and lands of the City of San Jose (Figure 2). For the purposes of this biological opinion, the Corps-led actions and the Service-led actions are described separately because the Corps is not authorized to expend funds on ecosystem restoration on lands controlled by another Federal agency, but it can expend funds on flood control on such lands. As a result, the Corps-led actions include flood improvements and public access improvements on Refuge lands, but the Corps cannot fund ecosystem restoration activities on the Refuge. The Corps can, however, fund ecosystem restoration on City of San Jose-owned portions of the Study Area, and thus the tidal restoration and ecotone (upland transitional zone) activities in Pond A18 are part of the Corps-led actions.

Regardless of the source of funding for various proposed project actions or the ownership of the lands on which these actions occur, all the actions described in this biological opinion are interrelated and interdependent. Tidal restoration in the proposed project area necessitates improved tidal FRM, the nature of tidal FRM along levees depends on whether adjacent ponds are tidal or not (*e.g.*, with higher and more robust levees needed if adjacent areas are tidal than if they are managed ponds), and public access and recreation opportunities differ depending on whether and where levee improvements and tidal restoration occur.

<u>Project Schedule and Phasing</u>

The construction-phasing schedule is illustrated in Figure 4 below. This schedule includes both Corps-led and Service-led activities and indicates the lead agency for each task. The South Bay Shoreline Phase I Study timeline includes a 50-year span (2017–2067).

Figure 4 and subsequent discussion regarding the sequence of proposed project activities reflect a scenario in which the first pond to be breached would be Pond A12; this is likely to be the case if the Corps is able to expend funds on restoration on Refuge lands. However, as noted above, the Corps is not currently authorized to expend funds on ecosystem restoration on lands controlled by another Federal agency. As a result, Pond A18 (which is not on Refuge lands) may be breached first, in which case the sequencing and timing of activities associated with A12 and A18 may be reversed. Resolution of the sequence will occur when the proposed project obtains interpretation of the Water Resources Reform and Development Act from Corps Headquarters.

Construction will commence in 2017 beginning with FRM levee construction; the ecotones at Ponds A12 and A18 will be constructed during the same period. Subsequently, Pond A12 will be prepared for breaching. The first breach is scheduled for 2020, followed by monitoring and adaptive management to inform the next potential phases of restoration. This period of monitoring and adaptive management will also be used to inform potential adjustments to Pond A12 and may extend beyond this four-year period. The second phase of ponds (Ponds A9-A11 and Pond A18) will be breached in 2025, assuming that monitoring results from the previous phase indicate that tidal marsh restoration should proceed, and will also be followed by a similar period of monitoring and adaptive management. The last phase of ponds will be breached in 2030 and will be followed by continued monitoring and adaptive management for all areas. Maintenance (e.g., of levees and trails) and management according to a long-term management plan (described in the "Conservation Measures" section below) will continue throughout the life of the proposed project.

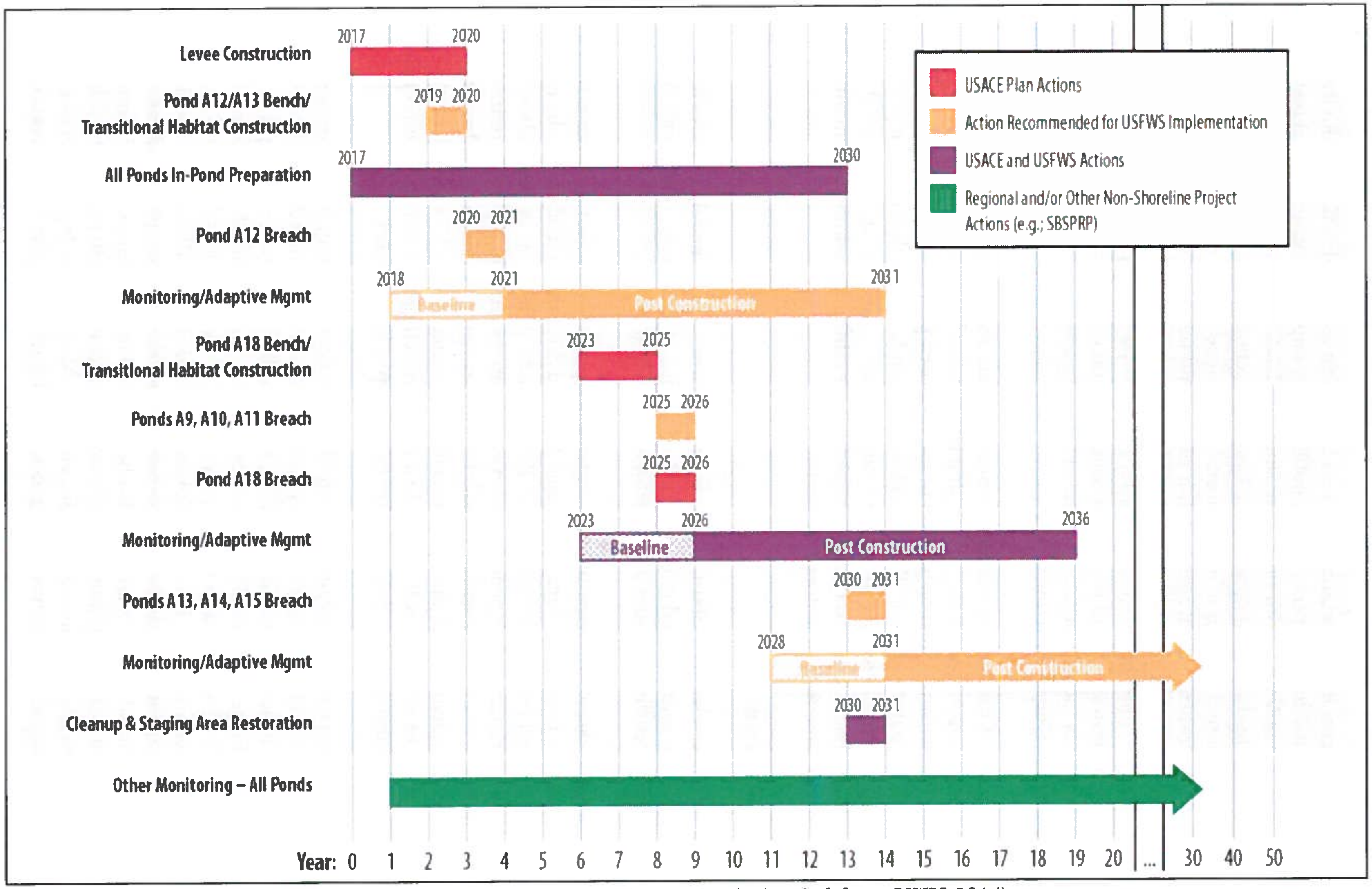

Figure 4. Construction Schedule for the South Bay Shoreline Phase 1 Study (copied from HTH 2014).

For the ecotone at Ponds A12 and A18, separate time frames are identified to construct each of these features. Material for construction of the ecotone at both ponds is assumed to be available on site and free of charge. This material is provided through agreements that the Refuge makes with local construction companies to acquire materials excavated from other regional construction sites, and with the SCVWD to acquire sediment dredged for stream maintenance purposes. After the new FRM levees are constructed, the Refuge and/or SCVWD will use these materials to construct transitional habitat. The construction phasing strategy allows for the accumulation of material needed to build the 345-foot-wide ecotones with 30:1 side slopes at Ponds A12 and A18.

Monitoring will continue throughout the life of the proposed project.

Corps-led Actions

Flood Protection Actions

The Corps conducted an analysis of potential FRM actions in order to identify the proposed project activities. Details of the analysis, including potential actions that were considered but that are not proposed and potential alternatives to the proposed project, are discussed in the Integrated Document (HDR 2014).

Construction

The Corps will construct 3.1 miles of new levee from the Alviso Marina northeastward to the northwestern corner of the San Jose/Santa Clara Water Pollution Control Plant (WPCP) (Figure 2). The levee, which would provide FRM assuming a one percent Annual Chance of Exceedance, consists of the following three components:

1. The 1.7-mile Alviso Segment, which is located entirely on Refuge lands, will provide FRM for the community of Alviso. This segment follows the eastern border of Pond A12 and the southern border of Pond A16.

2. The Artesian Slough crossing will entail construction of a new tide gate across the slough to protect the WPCP from storm waters flooding the slough and backing up into the facility during extreme storm events. The proposed location of the tide gate will be at least 300 feet bayward of the existing WPCP outfall for treated water at Artesian Slough (the location shown in the Biological Assessment is approximate, and the actual location may be farther upstream along Artesian Slough). The gates will only be closed during extreme storm events. When the gates are closed, the WPCP will need to pump water outputs over the gate, or provide for internal excess water storage during a storm event. With or without the proposed project, the WPCP will develop a plan to pump or store waters during such events given increases in Bay water levels that correspond with future sea level rise scenarios. To best meet the general operations requirements for the WPCP and allow for discharge during storm events, the tide gate will be designed in coordination with WPCP engineers.

3. The 2.1-mile WPCP Segment, which is located on City of San Jose lands, will provide FRM to the WPCP. It runs west to east in a stair-step pattern along the southern border of Pond A18, from the southwest corner of the pond to its northeast corner.

The engineered levee will be earthen. The proposed change in levee size from the existing levee (*e.g.*, along the southern edge of Pond A16) will be an increase of up to approximately 10 feet in height (after settlement) and about double in existing width. For example, the Alviso Segment levee along the southern edge of Pond A16 will increase in height from approximately 6 feet to 16 feet and increase in width at the toe from approximately 55 feet to 115 feet. The average width at the crown of the levee will be 16 feet, with 3:1 (horizontal: vertical) slopes except where ecotones having a 30:1 slope will be constructed (Figure 5). Along the east edge of Pond A12, the Alviso Segment levee will have an additional 345-foot-wide ecotone along its west side.

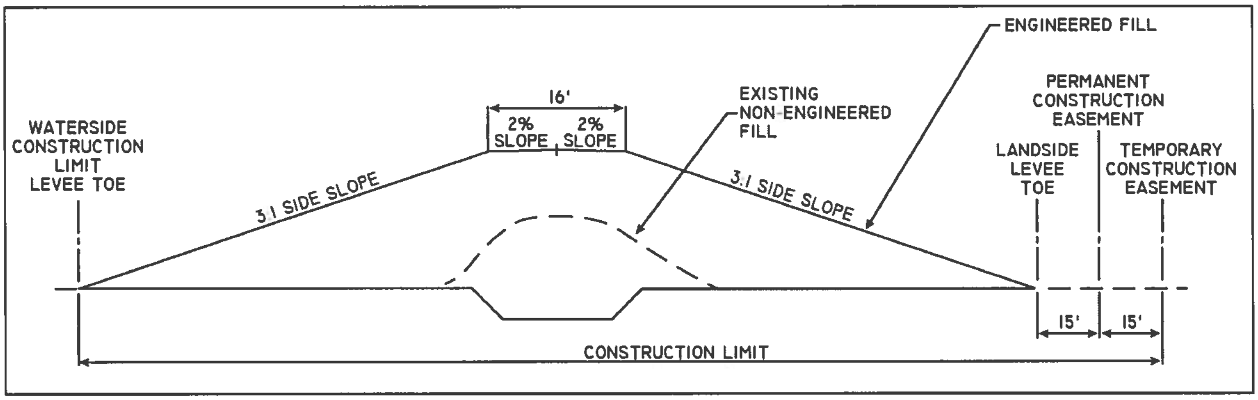

Figure 5. Example Cross-Section of Engineered FRM Levee.

Dredge material originating from areas outside the proposed project area that is used for ditch blocks, or for portions of the ecotone and FRM levee that will be in contact with tidal waters, will need to meet the contaminants screening criteria as described in the Biological Assessment (HTH 2014).

The levee design will include vegetation as erosion protection on the bayward and landward side slopes. Vegetation is anticipated to be continuous and able to provide erosion protection from overtopping of the levee. The vegetation that will be seeded or planted on the levee following construction will consist of marsh vegetation and peripheral halophytes at the toes of the levee and upland grasses at higher elevations. The combination of vegetation, buried stone, and/or transitional habitat fills (*i.e.*, planting berms) is proposed to balance requirements for levee safety with the need to limit disturbance from traditional maintenance activity (described below) such as regular mowing in/near habitat for sensitive species such as the salt marsh harvest mouse.

Proposed vegetation will include marsh species and peripheral halophytes, such as 12 to 18-inch tall pickleweed, from elevation 0 feet to 3 feet above the typical high water elevation. The high water elevation corresponds to approximately elevation 6 feet and 10 feet on the landward and bayward side slope, respectively. Upland grasses will occupy the side slopes between the levee crest and the pickleweed. Combinations of buried stone protection and buried gravel may be necessary to stunt the growth of native vegetation in lieu of regular mowing (i.e., to reduce the frequency of mowing) in an environmentally sensitive area, or to provide erosion protection where vegetation cannot be supported.

Where the FRM levee will cross the active railroad line just east of Pond A12, railroad floodgates will be installed. Concrete barriers will be installed on either side of the railroad right-of-way and will tie into the earthen levees. The metal floodgates will be connected to the barrier and will remain open during normal conditions and closed during flood conditions.

Certain locations may require special structures or treatment as follows:

1. Where the levee crosses an existing water feature such as a slough, structures will be installed to allow drainage during normal conditions and closure during flood conditions.

2. Where the levee crosses below-ground infrastructure (utilities, etc.), load-bearing structures may be needed to support the weight of levee materials.

Other materials such as geotextile fabric, stone column, foundation over-excavation, or replacement with stronger soil may also need to be included in the final FRM levee design.

Fill for the FRM levee will be imported from local sources and delivered by truck. Proposed staging areas and ingress/egress routes are shown on Figure 6 below. Potential staging areas #1 and #2 are both on WPCP land. Ingress and egress truck routes for these two areas are proposed on existing levee roads used currently by WPCP for materials hauling. Potential staging area #3 is on Zanker Landfill land and will be restricted in use for dirt stockpiling only.

The timing and duration of construction will be governed by both weather conditions and the need to avoid construction in sensitive areas during certain times of the year to avoid and minimize impacts to listed species. Types of construction equipment may include excavators, belly scrapers, front-end loaders, bulldozers, forklifts, vibratory rollers, dump trucks, and water trucks. Ancillary types of equipment that may be used include diesel generators, water pumps, and pile drivers. It is anticipated that dewatering and temporary installation of sheet piling will be necessary during the construction of water control structures such as tide gates. Dredge-locks or coffer dams may be constructed using earth levees or sheet piling to allow access for water-based equipment within a site. When possible, amphibious excavators, vibratory pile drivers, and other less-impacting equipment will be used.

Maintenance

Once construction of the Corps-led components is complete, the non-Federal sponsors (the CSCC, SCVWD, and City of San Jose) will be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of these components (*i.e.*, the Pond A18 tidal restoration and ecotone, as well as the entire levee both adjacent to Pond A18 and on Refuge property). An OMRR&R Manual will be prepared to describe these activities. It is anticipated that the following OMRR&R activities will be performed on the FRM levees:

1. Trash and anthropogenic debris removal along levee slopes and where it is causing obstruction in culverts or other problems.

2. Repairs on levee due to damage by small burrowing mammals, runoff/erosion, storm activities, or other factors.

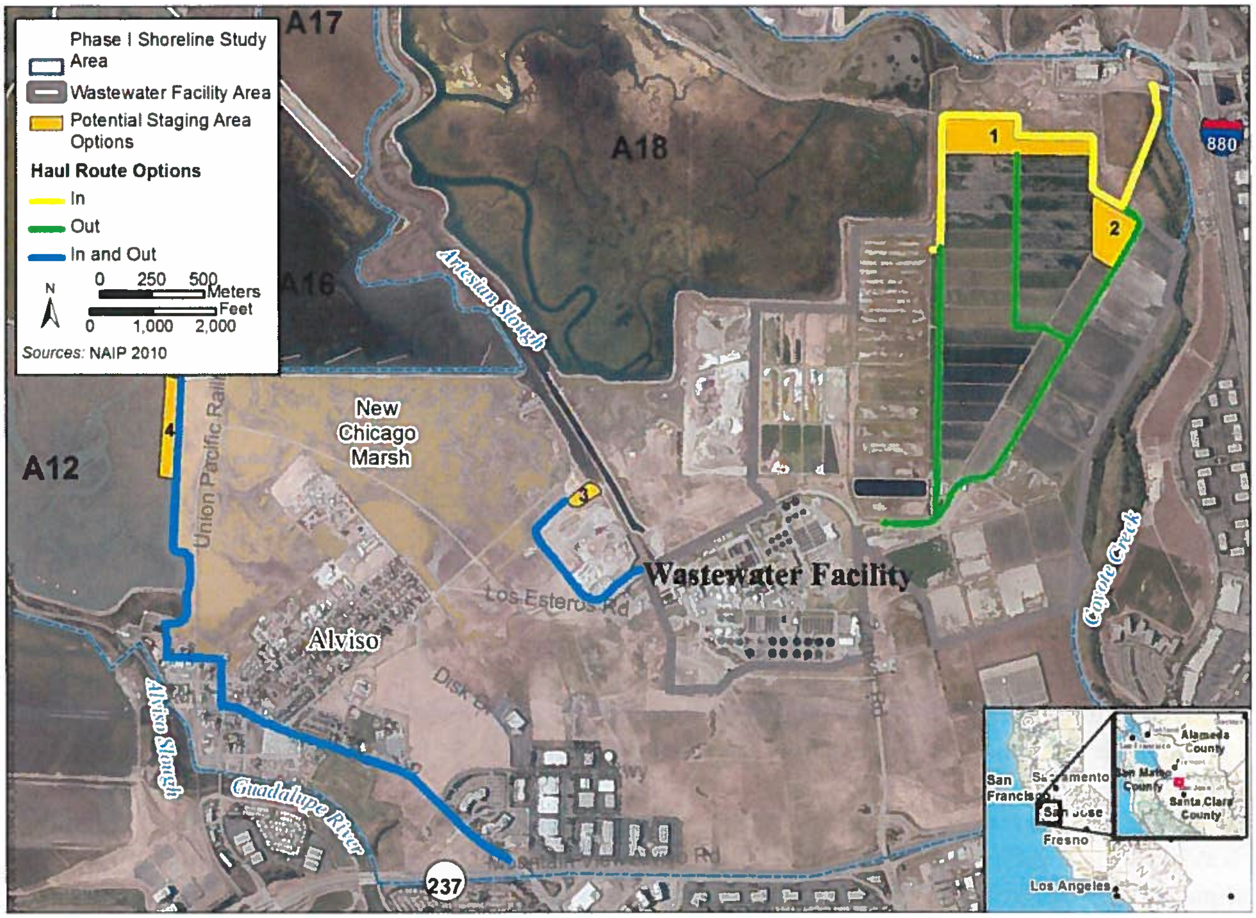

Figure 6. Proposed Access and Staging Areas.

3. Repairs along concrete flood wall structures (if included in plan) and other features, such as bridges and culverts.

4. Levee inspections conducted by SCVWD and the Corps.

5. Graffiti removal.

6. Access improvements and upkeep.

7. Vector monitoring (presence of mosquitoes and their larvae).

8. Vegetation management – As mentioned previously, the levee design will include vegetation as erosion protection on the bayward and landward side slopes.

    a. Combinations of buried stone protection and buried gravel may be used to stunt the growth of native vegetation to reduce the frequency of mowing in this environmentally sensitive area, or to provide erosion protection where vegetation cannot be supported.

b. It is anticipated that a reduced need for regular mowing will still include annual mowing of the levee side slopes within 12 to 15 feet of the levee crown. Such a narrow swath of vegetation management will likely require only two or three passes of a mower, once per year, which would minimize the disturbance of sensitive species in adjacent areas. Mowing will proceed from the top (closest to the crown, where habitat is of lowest quality) downward toward higher-quality habitat so that if any wildlife is using the area to be mown, the noise and movement of the mower may encourage wildlife to move downslope into the higher-quality habitat and out of the impact area. This area of mowing will correspond to the area above elevation 9 feet on the levee side slopes and higher elevations in reaches with ecotone fills.

c. No woody plant species greater than two inches in diameter will be allowed to become established on the levees to prevent roots from damaging the structural integrity of the levee. Due to salinity levels in lower-elevation areas, there is a low likelihood of woody vegetation establishment in many areas. Any woody vegetation that germinates in the higher-elevation mowing zone will be managed by mowing. Below the mowing zone, any woody plant removal that becomes necessary will be performed by hand; such hand-removal is expected to be necessary very infrequently (*e.g.*, once every few years, at most).

9. Burrowing mammal management – California ground squirrels may burrow into levees deep enough to affect the structural integrity of the levees, and thus squirrel management may be necessary. Ground squirrels are uncommon along the existing levees in the proposed project area and are thus not expected to require frequent or intensive management efforts. If ground squirrel management becomes necessary, it will be implemented using live traps with screens that have holes large enough to allow small mammals such as salt marsh harvest mice to easily exit the traps. Any mammals caught during such trapping that are potential predators of the salt marsh harvest mouse or California clapper rail, such as rats, striped skunks, red foxes, feral cats, raccoons, or opossums will be lethally removed.

Ecosystem Restoration Actions

The ecosystem restoration strategy to be implemented by the Corps is the conversion of Pond A18, which is currently managed for migratory waterbirds, into vegetated tidal wetlands with goals of maximizing long-term habitat benefits, particularly in consideration of potential sea level rise. Ecosystem restoration also includes creation of a broad, gently sloping ecotone.

Tidal Habitat Restoration

The following ground preparation actions will be involved in converting Pond A18 to tidal marsh:

1. Drain the pond to the extent feasible. The pond will be drained passively, so it may take several months to dry out; pumping would expedite the process and may be considered. Due to historic pond subsidence, some pond areas are not able to be completely dried. This step is also dependent on temporal proximity to the western snowy plover nesting season and/or if access to the area can be obtained without impacts to western snowy plovers, as dried pond areas may invite western snowy plover nesting.

2. Remove vegetation where needed (*i.e.*, around the breach locations) to discourage salt marsh harvest mice from using the impact areas.

3. Construct upland transitional habitat (described below).

4. Construct ditch blocks to inhibit flow through existing borrow ditches, promote scour and flow through the remnant historical channels, and provide some initial pickleweed habitat where located at the correct elevations. Without the construction of ditch blocks, the borrow ditches around the perimeter of the restored pond would capture the bulk of the flow, reducing the formation of complex dendritic channels in the restored marsh habitat.

5. Construct pilot channels on the outboard side of the A18 levee to facilitate flow between tidal sloughs and the restored tidal habitat in Pond A18. Three pilot channels will be constructed along Artesian Slough, and one will be constructed along South Coyote Slough. These pilot channels will be constructed at the locations of major historical tidal channels.

6. Breach the outboard levee in four locations along Artesian Slough and one location along South Coyote Slough. Breach size will be determined based on the hydrologic relationship between the tidal channel and marsh drainage area and on data from tidal channels in mature marshes throughout the Bay (ESA and Philip Williams & Associates, Ltd. 2012). Breaches are sized to long-term equilibrium dimensions to balance between excavation costs, scour potential, and tidal drainage consistent with *Design Guidelines for Tidal Wetland Restoration in San Francisco Bay* (Philip Williams & Associates, Ltd. and Faber 2004). Dimensions are adjusted to provide a cross-section with side slopes of 4:1 to 5:1 and a bottom width of approximately 10 feet. On the inboard side of the levee, the breach excavation will extend to the levee toe.

Pond A18 will be breached in five locations to facilitate flow of water into and through the pond, allow the tides to carry sediment into the pond, and allow for the retention of remnant channels in the pond bottom. Breaching of Pond A18 will restore approximately 736 acres of new tidal habitat (in addition to the upland transitional habitat discussed below). When Pond A18 is breached, its bottom elevation will be too low for vegetated marshes to form immediately. Several feet of sediment will need to be deposited by natural processes before the pond bottom reaches a sufficient elevation for marsh vegetation to grow. This sedimentation process is expected to proceed at rates determined in part by suspended solids concentrations as well as by factors causing re-suspension of sediment, such as wave action and tidal currents, in the breached pond (ESA and Philip Williams & Associates, Ltd. 2012). Because these factors cannot currently be predicted, it is not known how quickly vegetated marsh will form in Pond A18. Monitoring of the restoration process, and adaptive management if necessary to achieve vegetated tidal marsh, will occur per the *Shoreline Study Monitoring and Adaptive Management Plan* (MAMP) described previously. Once tidal marshes have begun to form in the former ponds, the rate of sedimentation will increase as the vegetation slows the water, catches sediment, and retains it. Eventually, with sufficient sediment, it is expected that Pond A18 will be largely vegetated, aside from tidal channels.

Because of the tidal flood protection functions currently provided by the outboard levees around Ponds A9-A15, tidal restoration within those ponds would not be feasible without enhancement of flood protection inboard from those ponds. As a result, the Service-led tidal restoration on Refuge lands described below could not occur but for the Corps-led construction of the levee and tide gate. Thus, tidal restoration on Refuge lands is dependent on Corps-led levee construction.

Upland Transitional Habitat Creation

Transitional habitat can attenuate waves and reduce wave run-up, increase habitat resiliency by providing space for marshes to retreat inland in the face of sea level rise, and provide refugia for animals such as the California clapper rail and salt marsh harvest mouse during very high tides, when the marsh plain is inundated. The upland transitional habitat adjacent to Pond A18 will be constructed along the interface between the new levee (along the southern and eastern edges of Pond A18) and the newly restored tidal habitat in the pond.

The non-Federal sponsors (the CSCC and SCVWD) recognize the enhanced value of having a gently sloped upland transitional habitat. As a result, the transitional habitat along Pond A18 will be constructed to incorporate a 30:1 slope, which will add up to 345 feet to the width of the bay side of the levee footprint. This ecotone will be constructed along approximately 14,000 linear feet of levee along Pond A18, for a total extent of 67 acres of new upland transitional habitat. Following construction of the ecotone area, it will be seeded and/or planted with native grasses, forbs, and low shrubs. Such an ecotone will provide substantial benefits for wildlife in the Study Area, as this sort of upland transitional habitat is not well represented in the South Bay. Vegetation allowed to establish in the upland transitional areas would be limited to non-woody and semi-woody plants (and possibly shallow-rooted shrubs) and would be otherwise unmanaged, except to control invasive plants from establishing. Figures 13 and 14 in the Biological Assessment (HTH 2014) depict cross-sectional views of how the upland transitional habitat will relate to restored tidal habitats (using Pond A12 as an example) at construction completion (2020) and as anticipated to evolve by 2067, respectively. Within a narrow (15 feet or less) strip of ecotone fill along the edge of the exposed levee surface, vegetation will be managed the same as on the levee (see "Maintenance" section above) to ensure compliance with the Corps' levee vegetation policy.

As indicated in Figure 4, the Pond A12 ecotone will be constructed concurrently with construction of the FRM levee, using the same staging areas and access routes as for levee construction. The Pond A18 ecotone will similarly be constructed simultaneously with levee construction.

Maintenance

Following the breaching of levees around Pond A18, the only management activities that might occur within the restored tidal habitats are predator management and, if necessary, invasive plant management, both of which would be performed on an as-needed basis. If monitoring determines that predator management is necessary to protect special-status and sensitive species, such as California clapper rails and salt marsh harvest mice, from predators such as California gulls, northern harriers, American crows, common ravens, red foxes, striped skunks, feral cats, and raccoons, then adaptive predator management would be implemented. Predator management would be focused on specific areas where predation problems are occurring (or areas, such as poles or towers, used as nesting sites or hunting perches by raptors), and culling would be limited to certain individuals; target mammalian predators that are captured would be lethally removed, while target avian predators would be either lethally removed (*e.g.*, crows and ravens) or relocated (*e.g.*, raptors). Because it is not currently known whether, and to what extent, predator management at Pond A18 will be needed, and habitat for the California clapper rail and salt marsh harvest mouse will take years to develop after A18 is breached, the local sponsor (*e.g.*, the SCVWD), rather than the Corps, will fund any necessary predator management. Invasive plant management will be needed for the first few years following construction of the ecotone to ensure that perennial pepperweed and other invasives do not become dominant. Otherwise, invasive plant management would be performed if monitoring indicates that particularly invasive species colonize Pond A18 in a way that would jeopardize the habitat enhancements achieved through tidal restoration.

Monitoring and Adaptive Management Actions

The Corps and/or local sponsors (*i.e.*, the SCVWD, CSCC, or the City of San Jose) will provide initial funding for monitoring and adaptive management (MAM) at Pond A18, whereas MAM at the other proposed project ponds will be funded by the Service, SCVWD, City of San Jose, or CSCC. Funding for maintenance and MAM provided by the SCVWD will take the form of an allocation in the SCVWD's annual budget. Given the stability of, and the public need for, the SCVWD, the commitment of long-term funding through the SCVWD's annual budget process will ensure the availability of adequate funding to meet its responsibilities to the proposed project. The entity that will manage Pond A18 in the long-term is not currently known. The City of San Jose and the Corps will identify an appropriate manager for Pond A18 after breaching occurs, and that manager will then be subject to Service approval. Funding for maintenance and MAM at Pond A18 will be provided by the SCVWD, CSCC, and/or City of San Jose. If in the future, Pond A18 is conveyed to the Refuge, an agreement between the City of San Jose, SCVWD, and the Refuge to provide funding for maintenance and MAM at Pond A18 would need to be reached.

MAM for the proposed project falls into three categories: (1) MAM associated with meeting ecosystem restoration objectives, (2) MAM associated with "adaptive implementation" (*i.e.*, decisions about whether to continue or halt the restoration of tidal marsh habitat depending on the monitoring of the effects of pond-to-marsh conversion), and (3) MAM associated with permit compliance. The Corps will cost-share activities associated with meeting ecosystem restoration objectives at Pond A18, for a period of 10 years; the non-Federal sponsors will provide funding for other required MAM. The MAMP includes a discussion of MAM's scientific basis and institutional structure, specific MAM activities, and cost estimates. Because the South Bay Shoreline Phase I Study Project includes a subset of ponds within the SBSPRP, the MAMP for the South Bay Shoreline Phase I Study Project draws heavily from the monitoring and applied studies being conducted by the larger SBSPRP. Monitoring activities to be funded by the Corps at Pond A18 include the following:

1. Water levels, sediment accretion rates, and suspended sediment concentrations;

2. Tidal marsh habitat acreage;

3. Presence and abundance of California clapper rails and salt marsh harvest mice in newly established tidal habitat; given the length of time that may be required for suitable habitat for these species to become established in Pond A18, it is possible that this monitoring may not occur within the 10-year period of Corps cost-shared monitoring, although salt marsh harvest mice may occupy the ecotone within 10 years;

4. Abundance and health of estuarine fish;

5. Count of migrating salmonids;

6. Abundance of non-native plants;

7. Plant species composition in upland transition zones; and

8. Mammalian and avian predators of California clapper rails and salt marsh harvest mice.

Recreation Actions

The only specific recreation-related action that will be funded by the Corps is the construction of a pedestrian bridge over Artesian Slough. This bridge will be constructed to link the multi-use trails on top of the new FRM levee (construction of the trails will not be Corps-funded). The bridge would span the slough atop sets of four parallel piles spaced every 50 feet. This would result in the installation of a total of forty 12-inch-thick steel piles that would form the pedestrian bridge piers. A barge-mounted pile driver/crane or an in-water excavator with a vibratory hammer would be used to drive the 12-inch-thick steel piles.

Service-led Actions

Ecosystem Restoration Actions

The activities involved in tidal restoration in Ponds A9-A15, and ecotone construction along the eastern edge of Pond A12, are similar to those described in above for Pond A18. However, there is an additional activity that will occur in Ponds A9-A15 that will not be necessary in Pond A18 because A18 has no internal berms. For restoration of Ponds A9-A15, breaches in the internal berms will be necessary to reconnect historical channels and restore the hydrologic connections to the innermost ponds in the proposed project footprint. Breach excavations will be sized in a similar manner to those applied to the outboard levees and will extend beyond the levee into the remnant historical channels. Existing internal berms may be lowered in some areas during the breach excavation to create wave breaks to limit wave action, enhance sedimentation, and create vegetated marsh habitat on the berm crests in the short term while the ponds develop from mudflat to vegetated marsh. As Ponds A9-A15 are breached in a phased manner, berms in adjacent ponds not yet being breached will be temporarily raised to provide increased FRM inboard of the current pond breaching actions.

Pond A12 has experienced the greatest degree of subsidence and is proposed for the first phase of restoration (though see above for a discussion of the possibility that Pond A18 may be breached first). By limiting new tidal exchange to this pond (rather than breaching multiple ponds in the first phase), Pond A12 can undergo maximum tidal interaction and sediment deposition, thus helping to raise its bottom elevation to a point where colonization by marsh vegetation will occur. During the first three years (2017–2019), Pond A12 will be prepared for breaching and inundation through excavation of pilot channels in two locations along Alviso Slough and construction of borrow ditch blocks. Berms between Pond A12 and Ponds A11 and A13 will be temporarily (*i.e.*, until tidal restoration in A11 and A13) raised to provide flood protection for A11 and A13. Surplus material excavated from pond preparation will be used to contribute to other in-pond construction activities requiring material, such as raising of internal levees, if determined suitable by Refuge staff. Subsequently, levee breaches will be implemented in Pond A12 to introduce tidal flow.

Following restoration of tidal flow to Pond A12, monitoring will be conducted to measure the effectiveness of tidal function equilibrium and restorative values. If necessary, corrective measures will be implemented. A period of approximately four years has been established for MAM associated with Pond A12.

Pond preparation for Ponds A9, A10, A11, and A18 would potentially be implemented based on the lessons learned as a result of MAM conducted for Pond A18, including whether to breach these ponds and restore them to tidal marsh. As described previously, this decision will be made according to the MAMP, which includes a series of decisions (based on those in the SBSPRP MAMP) regarding whether to continue breaching that involve monitoring of populations of pond-associated birds, monitoring of sediment accretion in the South Bay, and other factors. If the decision is made to breach these ponds, borrow ditch blocks and pilot channels will be constructed. Pond A11 will be connected to Ponds A10 and A12 with inboard berm breaches, but it will not be breached directly to Alviso Slough. Two breaches to Alviso Slough are planned in Pond A10, and one breach each to Alviso Slough and Coyote Slough are planned for Pond A9. Internal berms between Ponds A9-A11 and Ponds A13-A14 will be temporarily (*i.e.*, until tidal restoration in A13 and A14) raised to provide flood protection for A13 and A14. Levee breaches for Ponds A9-A11 will be implemented in Year 8 (2025) of the proposed project.

Pond preparation for Ponds A13, A14, and A15 will potentially be implemented based on the lessons learned as a result of MAM conducted for previous ponds, including whether to breach these ponds and restore them to tidal marsh. If the decision is made to breach these ponds, borrow ditch blocks and a pilot channel will be constructed. Only one outboard breach will occur for tidal restoration in these three ponds; this breach will connect Pond A15 to Coyote Slough along a major historical channel. Inboard berm breaches at the locations of historical sloughs will connect Ponds A13 and A14 to surrounding ponds (A9, A11, A15, and A12) to provide tidal flows to A13 and A14. Levee breaches will be implemented in Year 13 (2030) of the proposed project.

Ecotone habitat will be created along approximately 4,000 linear feet of levee on the east side of Pond A12. Approximately 30 acres of new upland transitional habitat will be created in this area. Following construction of the ecotone area, it will be seeded with native grasses, forbs, and low shrubs.

Breaching of Ponds A9-A15 would restore up to 2,010 acres of new tidal habitat (including the upland transitional habitat discussed below). As discussed for Pond A18 above, sediment accretion will need to occur within these ponds in order to raise pond bottoms to elevations that will support marsh vegetation. Once tidal marshes have begun to form in the former ponds, the rate of sedimentation will increase as the vegetation slows the water, catches sediment, and retains it. Eventually, with sufficient sediment, it is expected that, if breached, Ponds A9-A15 will be largely vegetated, aside from tidal sloughs. The considerable increase in tidal prism that will occur once these ponds are breached is expected to draw saline water from the Bay into these ponds, resulting in dominance of restored marsh by salt marsh species. An analysis performed by HTH (2012) predicted that the majority of the Pond A9-A15 system will be dominated by salt marsh vegetation. In addition, this increase in tidal prism will draw more saline water into and around the marshes downstream, thus converting some existing brackish marsh along Alviso and Coyote Sloughs to salt marsh habitat.

Maintenance

Following the breaching of levees around Ponds A9-A15, the only management activities that might occur within the restored tidal habitats are predator management and invasive plant management, as discussed previously. Predator management currently performed according to the Refuge's predator management plan (Foerster and Takekawa 1991, as updated in Service 2012a; Refuge 2012) will continue to be implemented on Refuge lands.

Recreation Actions

Recreation activities were incorporated into the proposed project to replace the loss of public access as the ponds in the Service-managed Refuge are breached and restored to tidal marsh. The proposed recreation measures associated with Service-led actions are multi-use trails on top of the new FRM levee, with connections to the Bay Trail network, along with viewing platforms, and trail upgrades to be made to an existing segment of the Bay Trail system along SR 237 (Figure 3).

Under existing conditions, a loop trail extends around Ponds A9 through A15, with an interior trail also existing between A15 and A13/14. These trails can be accessed from the Alviso Marina or via a spur that crosses the railroad tracks between Ponds A16 and A15. Restoration of tidal action to Ponds A9 through A15 will involve breaches in the outboard levees, thus interrupting the perimeter trail. Around Ponds A9-A15, the only trails that would remain following the completion of tidal restoration would consist of short segments in the eastern part of this group of ponds, as shown on Figure 3 (see also Figure 18 in the Biological Assessment (HTH 2014)).

The proposed project includes a new section of maintenance trail along the crest of the new WPCP Segment, which will be available for pedestrian traffic. Consistent with the WPCP Master Plan, the eastern extent of the levee maintenance trail will connect to a designated route at the existing bridge at McCarthy Boulevard. The existing pedestrian walkway on the bridge will take recreationists to the Coyote Creek Trail that runs along the east bank of the creek. This proposed trail connection will be refined in final design with consideration of both public safety and the addition of features (*e.g.*, fencing) to limit public access to sensitive wildlife areas. In addition, because the westernmost extent of the proposed levee's maintenance trail will end (with the levee itself) at existing high ground adjacent to the Alviso Marina, this will facilitate another connection to the Bay Trail if the City of San Jose's proposed plans to connect the Alviso Marina to the larger trail network are realized. In addition, the proposed project will construct a trail segment along the north side of SR 237 between the Guadalupe River and Zanker Road (see Figure 18 in the Biological Assessment (HTH 2014)).

Construction Equipment/Activities for Recreation Components

Construction of the recreation and public access components may consist of the following activities:

1. Grading and, for all-weather trails, gravel application. Equipment required for trail construction may include small, Bobcat-sized equipment, backhoes or front-end loaders, graders, bulldozers, asphalt placement equipment, and dump trucks.

2. Constructing trails, including some trails designed to accommodate vehicular use, trails to provide access to a staging area, and trails for disabled access.

3. Constructing interpretive stations of varying size and scope, which will include interactive features that can operate independently or can be enhanced with the assistance of docents.

4. Constructing viewing platforms at vista points where important information about the landscape can be described. Viewing platforms will be made of wood, metal, or plastic material and assembled in-place using a backhoe or excavator and hand tools. Interpretive stations will be built on-site, or will be prefabricated structures. Assembly and installation will require a backhoe or excavator and hand tools.

Maintenance of Recreation Components

Once construction of the recreation components is complete, the SCVWD, likely in a cooperative agreement with the City of San Jose, will be responsible for their operation, maintenance, repair, replacement, and rehabilitation. It is anticipated that the following operations and maintenance activities will be performed on the trails and the Artesian Slough pedestrian bridge:

1. Trash and anthropogenic debris removal;

2. Repairs due to damage by people, small mammals, storm activities, or other factors;

3. Trail and bridge inspections;

4. Graffiti removal;

5. Access improvements and upkeep;

6. Predator and invasive species management;

7. Enforcement of conservation measures; and

8. A long-term management plan will be prepared to describe the implementation of these activities.

Monitoring and Adaptive Management Actions

MAM will be implemented in Ponds A9-A15 as described previously for Pond A18. The MAMP includes a discussion of the scientific basis and institutional structure for implementation, specific MAM activities, and cost estimates. Monitoring activities to be performed for the restoration activities at Ponds A9-A15 include those listed previously. Other monitoring of more regional issues, such as regional changes in mudflat and tidal marsh acreages, changes in bird populations (including sensitive species and predators such as gulls), and mercury bioavailability, will continue to occur through the SBSPRP as it currently does.

Conservation Measures

The operational implementation of proposed project activities incorporates a number of measures, including general and species-specific measures, to avoid and minimize impacts during construction. All of these measures apply both to Corps-led and Service-led activities. Residual impacts remaining after implementation of the general and species-specific avoidance and minimization measures are addressed through compensatory conservation measures. These conservation measures are further described below.

General Avoidance and Minimization Measures

Below, the general conservation measures that will be implemented during proposed project activities to avoid and minimize adverse effects on sensitive species and habitats are described, followed by conservation measures specific to individual special-status species. Additional details and measures are provided in the proposed project's *Integrated Document* (HDR 2014). All permit conditions, legal requirements, and appropriate excavation and engineering practices shall be followed to avoid and minimize environmental impacts associated with the proposed project. The term "project site" below refers to any of the potential work locations related to FRM and restoration activities that will occur throughout the proposed project's action area.

1. Earthen materials (*e.g.*, existing levees) will be reused to the extent feasible to reduce the amount of imported material and stockpile and landfill material.

2. Staging, access, and parking areas will be located outside of sensitive habitats to the extent feasible.

3. Areas of disturbance will be limited to the smallest footprint necessary.

4. All equipment will be maintained free of petroleum leaks. All vehicles operated within 150 feet of any water body will be inspected daily for leaks and, if necessary, repaired before leaving the staging area. Inspections will be documented in a record that is available for review on request.

5. Spill prevention kits will always be in close proximity to construction activities (*e.g.*, crew trucks and other logical locations) when using hazardous materials. Feasible measures will be implemented to ensure that hazardous materials are properly handled and the quality of aquatic resources is protected.

6. No fueling will be performed in wetland or aquatic habitats unless equipment stationed in these locations is not readily relocated (*e.g.*, Aquamog, pumps, generators, dredge barges). For stationary equipment that must be fueled on site, containment will be provided in such a manner that any accidental spill of fuel will not be able to enter the water or contaminate sediments that may come in contact with water.

7. A hazardous materials management/fuel spill containment plan will be developed and implemented by the construction contractor and given to all contractors and biological monitors working on the proposed project, with at least one copy of the plan located onsite at all times. The purpose of the plan is to provide onsite construction managers, environmental compliance monitors, and regulatory agencies with a detailed description of hazardous materials management, spill prevention, and spill response/cleanup measures associated with the construction of the proposed project elements. The primary objective of the plan is to prevent a spill of hazardous materials. Elements of the plan include, but are not limited to the following:

a. A discussion of hazardous materials management, including delineation of hazardous material and hazardous waste storage area, access and egress routes, waterways, emergency assembly areas, and temporary hazardous waste storage areas;

b. Materials Safety Data Sheets for all chemicals used and stored on site;

c. An inventory list of emergency equipment;

d. Spill control and countermeasures including employee spill prevention/response training;

e. Notification and documentation procedures; and

f. Monthly reporting plan.

8. Vehicles will be washed only at an approved area. No washing of vehicles will occur at job sites.

9. A berm or other sediment-control devise will be installed around stockpiled soil material to prevent runoff from transporting sediment into sensitive habitats.

10. Any large wood or weed-free topsoil displaced by construction will be stockpiled for use during site restoration. Native vegetation displaced by construction will be stockpiled if it would be useful during site restoration.

11. The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris and discarded materials. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains, water bodies, or waterways. Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site.

12. A stormwater management plan will be developed to ensure that, during rain events, construction activities do not increase the levels of erosion and sedimentation. This plan will include the use of erosion-control materials (*e.g.*, baffles, fiber rolls, or hay bales; temporary containment berms) and erosion-control measures such as straw application or hydroseeding with native grasses on disturbed slopes; and floating sediment booms and/or curtains to minimize any impacts that may occur due to increased mobilization of sediments. Suitable erosion control, sediment control, source control, treatment control, material management, and non-stormwater management best management practices will be implemented consistent with the latest edition of the California Stormwater Quality Association "Stormwater Best Management Practices Handbook," available at www.capmphandbooks.com.

13. All disturbed areas will be stabilized within 12 hours of any break in work unless construction will resume work within seven days. Earthwork will be completed as quickly as possible, and site restoration will occur immediately following use.

14. For each activity, the supervising construction personnel will participate in a Service-approved worker environmental awareness program. Under this program, construction personnel will be informed about the presence of listed species and habitats associated with the species and that unlawful take of the animal or destruction of its habitat is a violation of the Act. Prior to construction activities, a qualified biologist approved by the Service will instruct all construction personnel about: (1) the description and status of the species; (2) the importance of their associated habitats; and (3) a list of measures being taken to reduce impacts on these species during proposed project construction and implementation. The awareness program will apply to construction occurring within or adjacent to tidal marsh or slough habitat and within or adjacent to managed pond habitat. A fact sheet conveying this information will be prepared for distribution to the construction crew and anyone else who enters the proposed project site. A Service representative will be appointed who will be the contact source for any employee or contractor who might encounter a listed species. The representative(s) will be identified during the environmental awareness program. The representative's name and telephone number will be provided to the Service prior to the initiation of any activities.

15. No firearms (except for Federal, State, or local law enforcement officers and security personnel) will be permitted at the proposed project site to avoid harassment, killing, or injuring of wildlife, with the exception of hunters who are authorized by the Service to pass through an area to access hunting areas.

16. No animals (*e.g.*, dogs or cats) will be brought to the proposed project site to avoid harassment, killing, or injuring of wildlife.

17. Ingress and egress points will be clearly identified in the field using orange construction fence. Work will not be conducted outside the designated work area.

18. In order to minimize the spread of invasive plants, all equipment (including personal gear) will be cleaned of soil, seeds, and plant material prior to arriving on the proposed project site to prevent introduction of undesirable plant species.

19. The proposed project site will be maintained trash-free, and food refuse will be contained in secure bins and removed daily during construction.

20. Nighttime work near tidal marsh habitat will be avoided to the extent feasible. If nighttime work cannot be avoided, lighting will be directed to the work area and away from habitat for the salt marsh harvest mouse, California clapper rail, and western snowy plover.

21. Interpretive signage prohibiting access to areas that are closed to the public, and indicating the importance of protection of sensitive biological resources, will be placed in key locations, such as along trails near sensitive habitats.

22. Prior to construction, all high-quality habitat for listed species will be mapped and provided to the Service. Vehicles driving on levees adjacent to such habitat for construction or monitoring activities will then travel at speeds no greater than 10 miles per hour to minimize noise and dust disturbance.

23. All clean fill material proposed for upland and wetland placement will meet the qualifications set forth in the Regional Water Quality Control Board's (RWQCB's) waste discharge requirements (Tentative Order), and will meet the screening criteria listed in the Biological Assessment (HTH 2014). If the above-mentioned thresholds are not attained but the material is approved for use by the RWQCB, consultation will be reinitiated to analyze the potential effects of the contaminated material to listed species.

24. The restored tidal marsh wetlands will be monitored for possible infestation by non-native cordgrass, perennial pepperweed, and other invasive, non-native plant species that could result in a substantial reduction in the ecological value of the tidal restoration and ecotone construction. It is expected that some non-natives that are not particularly invasive will colonize the ecotones, but if any particularly invasive plant species are found, a qualified botanist will recommend specific measures to control the spread of non-native plant species. All infestations of non-native cordgrass within the restored tidal marsh wetlands will be controlled and removed in coordination with the San Francisco Estuary Invasive *Spartina* Project without substantially hindering or harming the establishment of native vegetation in the restored wetlands. If perennial pepperweed control is necessary, spraying with glyphosate or imazapyr formulated for aquatic use may be necessary, as described by Hogle *et al.* (2007) for the San Pablo Bay National Wildlife Refuge. Otherwise, preferred vegetation management will involve non-mechanized methods of removal including hand-pulling, saline spray, pond flooding (during non-breeding seasons), and substrate-based controls. Aside from glyphosate and imazapyr for pepperweed control, the use of any herbicides will be subject to Service and NMFS approval.

25. If spraying for perennial pepperweed is necessary, the following general conservation measures will be implemented (measures specific to the California clapper rail are described below):

    a. Herbicides will be applied by a certified applicator and in accordance with application guidelines and the manufacturer label.

    b. Herbicide applications would be timed to coincide with ebbing tides to protect non-target vegetation, to allow a minimum of six hours dry time for glyphosate/imazapyr mixture applications, and at least one-hour dry time for imazapyr applications.

    c. Herbicides will be applied directly to perennial pepperweed plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface.

    d. All certified applicators will be trained to correctly identify perennial pepperweed, to distinguish this species from native species in the action area, and to adhere to the conservation measures in this biological opinion.

26. Long-term maintenance and monitoring will be performed outside of peak migration periods of, and breeding seasons of, sensitive wildlife species to the maximum extent feasible.

27. A Service-approved biological monitor will be present during all work activities in or immediately adjacent to habitat that could be occupied by federally listed species to look for

individuals that may be impacted by construction; activities are considered "immediately adjacent" to sensitive habitat if those activities could result in the physical disturbance of the habitat (*e.g.*, as a result of mobilization of sediment into the habitat) or if individual listed species could move from that habitat into the proposed project area (*e.g.*, seeking refuge under construction equipment). The biologist will have stop-work authority if any individual of a federally listed species is detected in an area where it may be injured or killed by construction activities.

28. Any fencing near habitat for the salt marsh harvest mouse, California clapper rail, or western snowy plover will incorporate raptor perch deterrents to minimize raptor predation on listed species.

29. To avoid the loss of individual California clapper rails and salt marsh harvest mice, construction, maintenance, and management activities (including mowing) within or adjacent to habitat for these species will not occur within two hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge and adjusted to the timing of local high tides), when the marsh plain is inundated, because protective cover for these species is limited and activities could prevent them from reaching available cover.

30. No dogs will be allowed on trails (or elsewhere) on Refuge lands. On City of San Jose lands, all dogs must be on leashes and must remain on established trails.

31. <u>Long-term Predator Management and Invasive Plant Species Control Plans</u>: A long-term management plan will be prepared to describe predator management, invasive plant species control, litter cleanup, and patrols/enforcement along the trails in the proposed project area. This plan will be implemented under a cooperative agreement between the SCVWD, the Refuge, and the City of San Jose, and it will be funded by the SCVWD.

<u>Avoidance and Minimization Measures for the California Clapper Rail</u>

The following measures will be implemented to avoid and minimize effects on California clapper rails:

1. To avoid causing the abandonment of an active California clapper rail nest, activities (including construction and maintenance activities) within 700 feet of vegetated tidal marsh providing suitable breeding habitat for California clapper rails will be avoided during the rail's breeding season from February 1 through August 31 unless protocol-level surveys are conducted by a Service-approved biologist to determine California clapper rail locations and territories. If breeding California clapper rails are determined to be present, activities will not occur within 700 feet of an identified calling center. If the intervening distance across a major slough channel (*e.g.*, Alviso, Coyote, or Artesian Sloughs) or across a substantial barrier between the California clapper rail calling center and any activity area is greater than 200 feet, then work may proceed at that location within the breeding season. Aside from continued use of recreational trails established prior to the start of the breeding season (which may continue), only inspection, maintenance, research, or monitoring activities that have little potential for effects on California clapper rails due to their short durations, distance from rail habitat, or low-magnitude effects may be performed during the California clapper rail's breeding season in areas within or adjacent to California clapper rail breeding

habitat, with approval of the Service under the supervision of a qualified biologist. Otherwise, with Service approval on a case-by-case basis, construction activities may take place after July 15 in a given area if the activity is thought to be minimally disturbing to breeding California clapper rails.

2. To be effective, perennial pepperweed control has to occur when the plant is in bud (May-July), during the California clapper rail breeding season. If perennial pepperweed control must be performed in California clapper rail habitat, the following measures will be implemented to minimize impacts on rails:

    a. Vehicle and foot access pathways to perennial pepperweed through tidal marsh will be minimized and use of existing roads and trails for control work will be maximized. Shortest possible access paths through the marsh to treatment patches will be identified prior to marsh access. Control methods to be used in each area will be selected to minimize potential impacts to marsh habitat and listed species from control operations.

    b. If breeding California clapper rails are determined to be present in a marsh, marsh access using aquatic-tracked vehicles (ARGOs) will not be allowed in contiguous marsh areas within 700 feet of an identified California clapper rail calling center (also referred to as the "700-ft Buffer Area") to avoid nest destruction, nest abandonment, and harassment of breeding California clapper rails. If the intervening distance across a major slough channel or across a substantial physical barrier between the California clapper rail calling center and the proposed access area is greater than 200 feet, then access may proceed within the breeding season.

    c. ARGOs will not travel within 50 feet of slough channels to avoid crushing high vegetation, such as gumplant, that grows along channels.

    d. Boats will be used to access marsh areas (where feasible) to treat large areas of perennial pepperweed along slough edges (*e.g.*, use of intelli-sprayer with 300 feet of hoseline) to further reduce the necessity of walking long distances through the marsh.

    e. Crews will be instructed to walk carefully through the marsh, avoiding high pickleweed cover (*e.g.*, greater than one foot) and wrack where salt marsh harvest mice are likely to nest or find cover.

    f. All personnel entering the marsh will be trained to identify and avoid direct and indirect disturbance to listed species and associated habitats. Training material will include taped recordings of California clapper rail calls and the "Walking in the Marsh" protocol (see Appendix A of this biological opinion) which addresses potential disturbance effects to California clapper rails and salt marsh harvest mice.

    g. Before spray operations commence each year, a qualified California clapper rail biologist familiar with the project area will familiarize the spray crew with the area and ensure that all crew members know the location of each "700-ft Buffer Area" for protection of nesting California clapper rails. Crews will be instructed to avoid these areas unless accompanied by a qualified California clapper rail biologist.

h. During the California clapper rail breeding season, before crews are allowed to enter a California clapper rail "700-ft Buffer Area" to conduct control work, the Refuge Biologist, or designee, will work with other qualified California clapper rail biologists and the spray crew to develop a strategy for control that will minimize the amount of time the crew spends in each "700-ft Buffer Area" while conducting control. This planning session will include use of detailed maps showing perennial pepperweed locations within each "700-ft Buffer Area".

i. During the California clapper rail breeding season, a qualified California clapper rail biologist such as a Refuge Biologist, will accompany spray crews into "700-ft Buffer Areas" and will supervise and guide control operations within these areas.

j. Crews will limit time within a California clapper rail nesting area (call center + 700-ft Buffer Area) to 30 minutes or less to minimize disturbance to adult rails and to avoid potential nest destruction or nest abandonment.

k. If California clapper rail nests are encountered during control work, observers will immediately leave the vicinity of the nest and report findings to the Service.

l. If California clapper rail adults are encountered during control work, observers will move away from the birds if they are giving alarm calls or otherwise appear agitated.

<u>Avoidance and Minimization Measures for the Salt Marsh Harvest Mouse</u>

To minimize potential effects on the salt marsh harvest mouse, the following measures (in addition to those described above for the California clapper rail during perennial pepperweed control) will be implemented:

1. To avoid the loss of individual salt marsh harvest mice from any excavation, fill, or construction activities in suitable habitat, vegetation removal will be limited to the minimum amount necessary to permit the activity to occur. Wherever feasible, sufficient pickleweed habitat, as determined by a Service-approved biologist, will remain adjacent to the activity area to provide refugia for displaced individuals.

2. Within areas where vegetation potentially supporting salt marsh harvest mice will be impacted, vegetation and debris that could provide cover for salt marsh harvest mice will be removed using only hand tools at least three weeks prior to the commencement of construction activities. Vegetation removal will occur under the supervision of a Service-approved biologist. This vegetation will be removed on a progressive basis, such that the advancing front of vegetation removal moves toward vegetation that would not be disturbed. In some cases, temporary berms may need to be constructed over borrow ditches to enable suitable escape routes, or temporary shelter consisting of dead vegetation may be positioned to provide escape routes to suitable habitat. A Service-approved biologist will monitor the vegetation removal and make specific recommendations with respect to the rate of vegetation removal (to ensure that any salt marsh harvest mice present are able to escape

to cover that will not be impacted), whether vegetation needs to remain in a certain area temporarily to facilitate dispersal of salt marsh harvest mice into habitat outside the impact area, and whether any berms are necessary to allow salt marsh harvest mice to disperse across channels.

3. Following the hand-removal of vegetation, exclusion fencing will be erected as needed between construction areas and salt marsh harvest mouse habitat that is to remain unimpacted to define and isolate protected salt marsh harvest mouse habitat. This fencing will consist of heavy plastic sheeting or metal material that cannot be climbed by salt marsh harvest mice, buried at least four inches below the ground's surface, and with at least one foot (but no more than four feet) above the ground. All supports for the fencing will be placed on the inside of the work area. A four-foot buffer will be maintained free of vegetation around the outside of the exclusion fencing. The fencing will be inspected daily during construction, and any necessary repairs will be made within 24 hours of when they are found. If any breaks in the fencing are found, the Service-approved biologist will inspect the work area for salt marsh harvest mice.

4. Although individual salt marsh harvest mice cannot be handled on non-Federal land, because the species is fully protected according to the California Fish and Game Code, individuals can be handled on Federal land (*i.e.*, the Refuge). If any individual salt marsh harvest mice are found within the impact footprint on Refuge land, and they do not move on their own to vegetated areas outside the impact footprint, they will be relocated by hand to suitable habitat outside the impact zone by a qualified biologist.

5. During construction, a Service-approved biologist will check underneath vehicles and equipment for salt marsh harvest mice before such equipment is moved, unless the equipment is surrounded by salt marsh harvest mouse-proof exclusion fencing.

6. During mowing of vegetation along the FRM levee, mowing will start from the top (the area of least suitable habitat) and proceed downslope toward more suitable habitat so any salt marsh harvest mice present in the narrow swath to be mown can move away from the disturbance of the mower and out of the mowing area.

7. Below the zone at the top of the levee that will be mown, any woody plant removal that becomes necessary will be performed by hand; such hand-removal is expected to be necessary very infrequently (*e.g.*, once every few years, at most).

Avoidance and Minimization Measures for the Western Snowy Plover

The following measures will be implemented to avoid and minimize effects on western snowy plovers:

1. No activities will be performed within 600 feet of an active western snowy plover nest during the western snowy plover's breeding season, March 1 through September 14 (or as determined through surveys). Vehicles driving on levees and pedestrians walking on recreational trails established prior to the start of the breeding season (which may continue) will remain at least 300 feet away from western snowy plover nests and broods to the extent feasible, although because these trails are already accessible to the public, nesting western

plovers are expected to continue to adjust the location of nesting based on their tolerance of distance from these trails. If necessary, signage, temporary fencing such as roped-off areas, or other markers will indicate areas that vehicles and pedestrians should avoid to protect nesting western snowy plovers, and Refuge staff will enforce these closures. In addition, personnel that must stop at a specific site for brief inspections, maintenance, or monitoring activities will remain 600 feet away from western snowy plover nests and broods. *Exception*: Only inspection, minor maintenance (such as water level management within a pond), research, or monitoring activities may be performed during the western snowy plover breeding season in areas within or adjacent to western snowy plover breeding habitat with approval of the Service under the supervision of a qualified biologist. If western snowy plover chicks are present and are foraging along any levee that will be accessed by vehicles (*e.g.*, for construction, inspection, or access), vehicle use will be under the supervision of a qualified biologist (to ensure that no chicks are present within the path of the vehicle).

2. Breaching of ponds that contain suitable western snowy plover habitat will not be performed during the breeding season (March 1 through September 14) unless surveys have documented that no active nests or unfledged chicks are present within the ponds to be flooded by breaching.

3. Viewing platforms, kiosks, benches, interpretive displays, and other focal areas for public use will be located a minimum of 600 feet from suitable western snowy plover nesting habitat.

<u>Avoidance and Minimization Measures for the California Least Tern</u>

Although California least terns are not known or expected to nest in or very near the action area, the following measures required by the Service's biological opinion for the SBSPRP are incorporated into the proposed project:

1. No activities will be performed within 300 feet of an active California least tern nest during the California least tern's breeding season, which is April 15 to August 15 (or as determined through surveys). *Exception*: Only inspection, maintenance, research, or monitoring activities may be performed during the California least tern's breeding season in areas within or adjacent to California least tern breeding habitat with approval of the Service under the supervision of a qualified biologist.

2. Breaching of ponds that contain suitable California least tern nesting habitat will not be performed during the breeding season unless surveys have documented that no active nests or unfledged chicks are present within the ponds to be flooded by breaching.

3. To avoid or minimize potential adverse effects from public access and recreation features constructed near tidal marsh, trails adjacent to some nesting areas for sensitive bird species will be closed during the breeding season. Public trails within 300 feet of suitable California least tern nesting habitat will be closed during the breeding season. In addition, if trails are to be open during the breeding season of this species, viewing platforms, kiosks, benches, interpretive displays, and other focal areas for public use will be located a minimum of 600 feet from suitable nesting habitat. The locations of trail segments to be closed, and the periods of closure will depend on whether sensitive bird species, such as California least terns, are nesting in certain areas in a given year and whether nesting areas are located in

close proximity to the trails. Decisions about whether to close a particular trail segment will be made early in the breeding season (and possibly later in the season as conditions change) following surveys for nesting birds within a given pond adjacent to a trail.

Avoidance and Minimization Measures for the Longfin Smelt and Other Special-Status Fish Species

To minimize potential effects on the longfin smelt and other special-status fish species managed according to the Fishery Management Plans, the following measures will be implemented:

1. Construction activities in, or directly adjacent to, waters where Central California Coast steelhead and longfin smelt are likely to be present will be performed between June 1 and November 30.

2. Levee breaching will not occur between February 1 and May 31 for the protection of out-migrating juvenile steelhead in, or directly adjacent to, waters where steelhead are likely to be present.

3. Activities that extend into the waters where listed fish and fish species managed according to Fishery Management Plans may be present, such as pilot channel excavation, will be performed at low tide and/or under de-watered conditions, to the extent practicable.

4. Cofferdams will be used to the extent feasible during construction and maintenance activities, as well as during implementation of any adaptive management actions, that could potentially result in substantial siltation of protected fish habitat.

5. All pumps used for dewatering where salmonids may be present will be screened according to NMFS and CDFW criteria for juvenile salmonids.

6. During tide gate construction on Artesian Slough, all pile driving will be performed using a vibratory hammer to minimize the potential effects of noise and pressure-waves on fish.

7. NMFS personnel will be immediately notified of any observed fish mortality events.

8. Tidally restored ponds will contain channels that are adequate for the ingress and egress of fish with tidal circulation. Inspections will be documented in a record that is available for review on request.

9. Treated wood will not be used in structures that may come into contact with water.

Western Snowy Plover Compensatory Conservation Measures

The Corps will implement the following compensatory mitigation for effects to western snowy plovers from levee construction:

1. Breeding habitat for the western snowy plover will be enhanced on an island in Pond A16. Islands were constructed in Pond A16 in 2012 and 2013 as part of Phase I activities of the SBSPRP, for the purpose of providing nesting, roosting, and foraging habitat for a variety of pond-associated bird species, including western snowy plovers. Western snowy plovers

nested on one of these islands in 2013. However, the dark substrate of the islands, and their relatively homogeneous surfaces, could make western snowy plovers on the islands relatively conspicuous to predators. The South Bay Shoreline Phase I Study Project will provide small gravel (or other appropriate substrate) that will be distributed in patches on one of the islands in A16 (with the island to be selected by the Refuge), and the proposed project will fund the maintenance of this gravel. Pea gravel has been intentionally provided in some areas as a substrate for use by nesting western snowy plovers (Paton and Bachman 1996, Sexson and Farley 2012), and in the Bay, some western snowy plovers at the Eden Landing Ecological Reserve nest in fine gravel along roads.

2. Predator management is currently performed on Refuge lands, but as partial compensation for adverse proposed project effects on western snowy plovers, the intensity of this management will be increased in Pond A16 and New Chicago Marsh during the western snowy plover breeding season. This enhanced predator management will include more frequent monitoring for predators nesting (*e.g.*, gulls and corvids), roosting, or foraging in these areas islands; more frequent trapping of mammalian predators in New Chicago Marsh and along Artesian Slough; and ongoing identification and implementation of deterrence or removal measures for those predators. This measure will consist of funding a predator management technician for an additional 10 hours per week during the period March 1 through September 14 (approximately 28 weeks).

The Corps will fund the initial enhancement of nesting islands in Pond A16 with gravel. The SCVWD will fund the long-term maintenance of the gravel substrate on those islands and the incremental increase in predator management in Pond A16 and New Chicago Marsh. This funding will take the form of annual allocations in the SCVWD's budget specifically for these purposes.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The "effects of the action" to be analyzed in this biological opinion are defined as the direct and indirect effects of the action, together with the effects of other activities that are interrelated or interdependent with that action (such as activities implemented or funded by the local sponsors, the CSCC and SCVWD, in conjunction with the Corps' and Service's activities). The action area includes the construction footprints for FRM and recreational access activities; the entirety of Ponds A9 through A15 and A18; portions of Pond A16 adjacent to the proposed project footprint and on the island where western snowy plover habitat enhancement will occur; the northern and western boundaries of New Chicago Marsh; areas on the outboard (bayward) sides of those ponds where pilot channel excavation will occur; all staging, stockpiling, and access areas; the portions of Alviso Slough, Coyote Slough, South Coyote Slough, and Artesian Slough downstream from proposed levee breaches that may be subject to additional scour from increased tidal prism or temporarily increased sedimentation during construction; and areas surrounding the construction footprint and trails where indirect effects such as disturbance (*e.g.*, areas within 600 feet for nesting western snowy plovers and 700 feet for nesting California clapper rails) may occur.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analyses in this biological opinion relies on four components: (1) the *Status of the Species*, which evaluates the California clapper rail's, salt marsh harvest mouse's, western snowy plover's, and California least tern's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of these species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of these listed species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the California clapper rail, salt marsh harvest mouse, western snowy plover, and California least tern; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on these species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the California clapper rail's, salt marsh harvest mouse's, western snowy plover's, and California least tern's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these species in the wild.

The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the California clapper rail, salt marsh harvest mouse, western snowy plover, and California least tern and the role of the action area in the survival and recovery of the California clapper rail, salt marsh harvest mouse, western snowy plover, and California least tern as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

California Clapper Rail

The status of the California clapper rail and information about its biology, ecology, distribution, and current threats is available in the *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Recovery Plan; http://www.fws.gov/sacramento/es/Recovery-Planning/Tidal-Marsh/es_recovery_tidal-marsh-recovery.htm; Service 2013). Critical habitat has not been designated for this species. Recent genetic analyses of rail species resulted in a change in the common name and taxonomy of the large, "clapper-type" rails (*Rallus longirostris*) of the west coast of North America to Ridgway's rail (*Rallus obsoletus*) (Maley and Brumfield 2013, Chesser *et al.* 2014). Thus the California clapper rail is now referred to in the scientific community as the California Ridgway's rail (*Rallus obsoletus obsoletus*). The change in the common name and taxonomy of the California clapper rail, however, does not change the listing status of the species.

Salt Marsh Harvest Mouse

There are two subspecies of the salt marsh harvest mouse: the northern subspecies (*R. r. halicoetes*) and the southern subspecies (*R. r. raviventris*). Both subspecies are listed as endangered. The status of the salt marsh harvest mouse and information about its biology, ecology, distribution, and current threats is available in the Recovery Plan (http://www.fws.gov/sacramento/es/Recovery-

Planning/Tidal-Marsh/es_recovery_tidal-marsh-recovery.htm; Service 2013). Critical habitat has not been designated for this species.

Pacific Coast Population of the Western Snowy Plover

The status of the Pacific coast population of the western snowy plover and information about its biology, ecology, distribution, and current threats is available in the *Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (Charadrius alexandrinus nivosus)* (http://ecos.fws.gov/docs/recovery_plan/070924_2.pdf, Service 2007).

California Least Tern

The status of the California least tern and information about its biology, ecology, distribution, and current threats is available in the five-year review (http://ecos.fws.gov/docs/five_year_review/doc775.pdf, Service 2006).

Environmental Baseline

<u>Proposed Project Location and Existing Conditions</u>

The proposed project is located in the community of Alviso, part of the City of San Jose, Santa Clara County, California. The Study Area is bounded on the southwest by Alviso Slough; on the north by Coyote Slough, Ponds A16 and A17, the "Island Ponds" (Ponds A19, A20, and A21), and the Newby Island Landfill; on the east by the Coyote Creek levee; and on the south by SR 237 (Figure 1).

Figure 1 depicts the Study Area in relation to the Alviso complex of the SBSPRP (on Refuge lands). The Alviso pond complex of the SBSPRP area bisects the Study Area, with managed ponds A9 through A17, Alviso Slough, and portions of Coyote Slough within the SBSPRP's Alviso complex, and Pond A18, New Chicago Marsh, and the WPCP being outside the SBSPRP's Alviso complex. However, the entire Study Area is within the action area for the SBSPRP's section 7 consultation (Service 2008).

Tidal marshes along both Alviso Slough and Coyote Slough are fresh/brackish in their upper reaches, where they are dominated by California bulrush, alkali bulrush, cattails, and invasive perennial pepperweed, but this vegetation transitions into salt marsh species such as Pacific cordgrass, pickleweed, and marsh gumplant toward the downstream portions of these sloughs. Artesian Slough, into which the WPCP discharges treated wastewater, is dominated primarily by freshwater marsh, which transitions to brackish marsh toward its confluence with Coyote Slough. Marshes along all three of these sloughs are relatively narrow and thus, in most places, lack the extensive channel networks that characterize larger marshes. Pond A17 has only recently been opened to tidal action, and thus rather than being vegetated, is inundated during the higher portion of the tidal cycle and consists mostly of mudflat at low tide; eventually, it is expected and intended that A17 will be dominated by tidal marsh. New Chicago Marsh is a diked, muted tidal salt marsh dominated by pickleweed, saltgrass, jaumea, and other halophytes in some areas, but with extensive open water and salt panne habitat as well.

Ponds A9, A10, A11, A14, A16, and A18 are managed ponds, with varying water depths and salinities similar to or slightly higher than Bay salinities. Ponds A9, A10, A11, and A14 are joined by breaches in their levees; water control structures along Alviso Slough at Pond A9 and Coyote Slough at Pond A14 allow water to enter these ponds. Ponds A12, A13, and A15 are also managed ponds, but are referred to as "batch ponds", because they are managed for higher salinities. Pond A16, which will be a managed pond under the SBSPRP, receives water from Pond A17 through a control structure, and water flows out of A16 through another structure in its southeastern corner; a structure along the southern edge of Pond A16 allows water to discharge into New Chicago Marsh as well. Pond A18 is not managed in concert with the other ponds; water in this pond is managed via two control structures, one in the northwest and one in the southwest portion of the pond. Currently, all managed and batch ponds on Refuge lands (A9-A15) are managed primarily as habitat for pond-associated waterbirds; Pond A18 is managed to maintain ambient conditions, with ancillary benefits to waterbirds. The Study Area also includes developed areas associated with the community of Alviso and an electrical generation plant, landfills, the WPCP water/sewage treatment areas, and upland grassland/ruderal habitat in the WPCP buffer lands.

The South Bay Shoreline Study is closely interrelated, and in some cases overlaps, with the ongoing implementation of the SBSPRP. The planning process for the South Bay Shoreline Phase I Study is being coordinated with the SBSPRP actions, as both efforts have similar FRM, ecosystem restoration, and recreation objectives. A final SPSPRP Environmental Impact Statement/ Environmental Impact Report, including both programmatic and project-specific actions, was released in December 2007 (EDAW *et al.* 2007). The total SBSPRP area consists of 15,100 acres of former salt ponds and adjacent habitats in the South Bay that the Service and CDFW acquired from Cargill, Inc. in 2003. The SBSPRP area includes the Eden Landing pond complex in the cities of Hayward and Fremont, Alameda County; the Ravenswood pond complex in the City of Menlo Park, San Mateo County; and the Alviso pond complex, which extends from the City of Mountain View southeastward to the Alviso area in Santa Clara County. The SBSPRP also includes ponds A22 and A23 in the City of Fremont, Alameda County, and the aforementioned Island Ponds (Figure 1).

The Refuge owns and manages the 8,000-acre Alviso pond complex, within which are located New Chicago Marsh and 2,100 acres of ponds included in the current South Bay Shoreline Phase I Study Area. Pond A18 (about 856 acres), owned by the City of San Jose, is also included in the South Bay Shoreline Phase I Study Area, although it is not included in the SBSPRP Study Area and was not covered by the SBSPRP's section 7 consultations. Although Pond A18 was not considered in the SBSPRP, primarily due to not being a Service-managed property, the actions being proposed for the pond are similar to those proposed for the rest of the Alviso complex ponds, and the addition of Pond A18 to the South Bay Shoreline Phase I Study Area is consistent with the goals for the greater South Bay tidal restoration.

SBSPRP Phase I construction started in 2008; the final SBSPRP Phase I restoration actions were initiated in 2011 at Alviso Complex Ponds A16 and A17. Because both Ponds A16 and A17 were restored or reconfigured as part of SBSPRP Phase I implementation, no focused South Bay Shoreline Phase I restoration actions are proposed for these two ponds (although one of the islands in A16 will be enhanced for use by western snowy plovers).

California Clapper Rail

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the California clapper rail (Service 2013). The Central/South San Francisco Bay Recovery Unit supports the majority of California clapper rail populations. Populations in this unit are widely separated from northern ones, but there may be occasional dispersal between these areas. Predation by mammalian and avian predators is one of the primary threats to California clapper rails in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2013, Overton *et al.* 2014). Overton *et al.* (2014) tracked 108 radio-marked California clapper rails at four marshes within the Central/South San Francisco Bay Recovery Unit (*i.e.*, Colma Marsh, Arrowhead Marsh, Laumeister Marsh, and Cogswell Marsh) and estimated survival rates over 166 weeks between 2007 and 2009. Overton *et al.* (2014) found that most of the California clapper rails (53 percent) died due to predation with raptors depredating 30 individual California clapper rails (28 percent) and mammals depredating 27 individual California clapper rails (25 percent). The annual survival rate for California clapper rails at Laumeister Marsh, a native tidal marsh managed by the Refuge near the City of East Palo Alto, San Mateo County, was 0.227 (Overton *et al.* 2014). The Refuge intermittently conducts mammal predator management on some Refuge lands within the Central/South San Francisco Bay Recovery Unit; however, the extent of mammal predator management implemented at the Refuge is limited by the lack of funding. The Refuge recently finalized an avian predator management plan to control avian predators of the California clapper rail on Refuge lands within the Central/South San Francisco Bay Recovery Unit; however, the Refuge lacks the resources to adequately monitor and control avian predators at the Refuge.

Breeding-season surveys of South Bay marshes for California clapper rails through the early 1990s, summarized by Foin *et al.* (1997), indicated that the most substantial populations of California clapper rails in the South Bay were, predictably, in the largest sections of tidal salt marsh at: Mowry Marsh and Dumbarton Marsh (in the eastern Bay between the Dumbarton Bridge and Mowry Slough in Alameda County), the Faber/Laumeister Tracts and other marshes in the Palo Alto/East Palo Alto area in San Mateo and Santa Clara counties, and Greco Island in the City of Redwood City, San Mateo County. California clapper rails occurred in many other marshes as well, including Ideal Marsh, La Riviera Marsh, and Calaveras Marsh in the City of Fremont, Alameda County, and Triangle Marsh in the community of Alviso, Santa Clara County. Surveys by HTH and others since the early 1990s, as well as observation by birders (including HTH staff), have documented California clapper rails in a number of areas in the far South Bay, including lower San Francisquito Creek; the Palo Alto Baylands; Hook's Isle; the mouth of Charleston Slough; lower Permanente and Stevens creeks; Guadalupe Slough (primarily from its confluence with Moffett Channel downstream); Alviso Slough; a number of locations along Coyote Slough, extending upstream through the reach of the slough between Newby Island Landfill and the WPCP (known as South Coyote Slough or the lower Coyote Creek Bypass); and in the Warm Springs marshes. Although site-specific surveys have not been conducted in all suitable habitat for California clapper rails in the South Bay, this species is likely to occur in tidal salt marsh habitats in a number of additional areas as well.

Habitats and Occurrences within the Action Area

Within the action area, California clapper rails are most likely to occur in tidal salt marsh and brackish marsh along the lower and middle reaches of Alviso Slough (*e.g.*, from the northwest corner of Pond A12 downstream) and Coyote Slough (*e.g.*, from the vicinity of the Artesian Slough confluence downstream), and near the mouth of Artesian Slough. Although California clapper rails are known to be present in the downstream reaches of these sloughs, where the tidal marsh is dominated by salt-marsh plant species, they are less likely to occur in areas dominated by freshwater vegetation (*e.g.*, California bulrush and cattail) along the upper portions of Coyote, Artesian, and Alviso sloughs. In recent years, few surveys for California clapper rails have been conducted along the upper reaches of Alviso Slough, or anywhere in Artesian Slough or along upper Coyote Slough (upstream from its confluence with Artesian Slough).

In 2007, PRBO Conservation Science conducted surveys for California clapper rails along the middle and lower reaches of Guadalupe and Alviso sloughs (L. Liu, PRBO Conservation Science, pers. comm. cited in HTH 2013). Single California clapper rails were detected near the mouths of these sloughs (*i.e.*, along Guadalupe Slough near the Pond A5/A6 levee and along Alviso Slough east of Pond A6), but none were heard farther upstream.

More recently, surveys for the Invasive *Spartina* Project have been conducted along Alviso Slough from Pond A11 downstream to its confluence with Coyote Slough, and along Coyote Slough from the vicinity of the railroad tracks downstream along Ponds A12, A14, and A9 (data provided by Olofson Environmental, Inc.). From 2010 through 2014, all California clapper rail detections along Alviso Slough were at its mouth, near the northwest corner of Pond A9: between nine and 10 California clapper rails were detected in 2010, between four and six were detected in 2011, between one and two were detected in 2012, and between two and four California clapper rails were detected in 2014 near the mouth of Alviso Slough (Olofson Environmental, Inc. 2012, 2014).

On one occasion, a California clapper rail was recorded in brackish/freshwater transition marsh along upper Alviso Slough between the Alviso Marina and the Gold Street Bridge (February 14, 1997; Scott B. Terrill, pers. obs.). Earlier (approximately 1989) an individual California clapper rails was detected in the Alviso Marina (Ron Duke, pers. obs. cited in HTH 2013). However, no California clapper rails have been observed along upper Alviso Slough within recent years. For example, surveys conducted by the San Francisco Bay Bird Observatory at the Alviso Marina found no California clapper rails during early spring 2003 and 2004 (C. Strong, Refuge, pers. comm. 2012). Also, pre-construction California clapper rail surveys conducted by the Refuge prior to Pond A8 notch construction in 2010 did not find any California clapper rails in this reach of upper Alviso Slough (C. Strong, Refuge, pers. comm. 2012). Therefore, any occurrence of California clapper rails in upper Alviso Slough would likely be by occasional non-breeding birds.

California clapper rails have also been detected along Guadalupe Slough as far as the nontidal freshwater ponds between Calabazas and San Tomas Aquino Creeks north of SR 237 (16 August 1998; Steve Rottenborn, HTH, pers. obs.). Between one and two California clapper rails were detected along upper Guadalupe Slough again in 2012 near the Moffett Channel (Olofson Environmental, Inc. 2012). However, such rails are likely wandering and foraging individuals, and their occurrence in these areas is expected to be sporadic.

Along Coyote Slough, all California clapper rails detections since 2010 have been from Triangle Marsh (north of Pond A15) downstream to Pond A9 except for a single detection near the northwest corner of Pond A18, at the Coyote Slough/Artesian Slough confluence. Call count surveys along South Coyote Slough detected between nine and 10 California clapper rails in 2011, between six and 10 rails in 2012, and between eight and 10 rails in 2014 between Pond A15 and Triangle Marsh (Olofson Environmental, Inc. 2012, 2014).

Therefore, based on the known occurrences of the California clapper rail within the action area, the Service believes the California clapper rail is likely to occur within the action area in all suitable tidal salt marsh and tidal brackish marsh habitat along Alviso Slough, Artesian Slough, Coyote Slough, and South Coyote Slough.

Salt Marsh Harvest Mouse

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the salt marsh harvest mouse (Service 2013). The Central/South San Francisco Bay Recovery Unit is within the range of the southern subspecies of the salt marsh harvest mouse (*R. r. raviventris*) (Service 2013). The population status of the southern subspecies is more precarious than that of the northern subspecies (*R. r. halicoetes*). Few major, resilient, or secure populations of the southern subspecies of the salt marsh harvest mouse persist within the Central/ South San Francisco Bay Recovery Unit. The current populations within this recovery unit are very small and isolated compared with the historical pattern of distribution and abundance of the subspecies. All major population centers of the southern subspecies are remote from one another based on dispersal distances known for the species. Predation by mammalian and avian predators and spread of invasive plant species (*e.g.,* perennial pepperweed) are major threats to salt marsh harvest mice in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2010, Service 2013).

Occurrences near the Action Area

The salt marsh harvest mouse has been detected during trapping studies in a number of locations within and near the action area, including Alviso Slough near the northwest corner of Pond A12, Triangle Marsh, New Chicago Marsh, the mitigation wetlands on the south side of Pond A18, the Coyote Creek Bypass area, and Guadalupe Slough (San Francisco Estuary Institute, http://www.sfei.org/content/salt-marsh-harvest-mouse-database-and-maps, site numbers 21, 57, 249, and 306; California Natural Diversity Database (CNDDB) occurrence numbers 91, 92, 115, 116, 147, 132, and 133; CDFW 2014). The highest-quality habitat for this species within the action area occurs in tidal salt marsh along the lower reaches of Alviso and Coyote Sloughs, and at the mouth of Artesian Slough, as well as in diked salt marsh within New Chicago Marsh and within the mitigation wetlands on the south side of Pond A18. Brackish marshes farther upstream along Alviso, Coyote, and Artesian Sloughs represent lower-quality habitat, and salt marsh harvest mice have a lower probability of occurrence (and if present, likely occur in lower densities) in such brackish marshes. However, as a result of this species' detection in brackish marshes in the Warm Springs area in 2006 (HTH 2007), it could occur in at least small numbers in brackish marshes. The freshwater marshes in the upper reaches of Alviso Slough (*i.e.,* from the southwestern part of Pond A12 upstream to the Alviso Marina and above) and Artesian Slough (*i.e.,* from the vicinity of the southeastern corner of Pond A17 upstream), as well as those in the South Coyote Slough area north of the northeastern corner of Pond A18, are less suitable habitat for the species.

There is no recent survey data available for salt marsh harvest mice within or near the action area. However, based on known occurrences of the salt marsh harvest mouse within and near the action area and the occurrence of suitable habitat within the action area, the Service believes that the salt marsh harvest mouse is likely to occur within all suitable tidal salt and brackish marshes, diked salt and brackish marshes, and adjacent upland habitats (*e.g.*, contiguous grassland habitat within 328 feet of suitable marsh habitat (Service 2010, 2013)) throughout the action area.

Pacific Coast Population of the Western Snowy Plover

San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the San Francisco Bay Recovery Unit for the Pacific coast population of the western snowy plover (http://ecos.fws.gov/docs/recovery_plan/070924_2.pdf, Service 2007). One of the delisting criteria for the Pacific coast population of the western snowy plover is for the maintenance of 500 individual breeding western snowy plovers within the San Francisco Bay Recovery Unit (Service 2007). The SBSPRP has committed to the maintenance of at least 250 individual breeding western snowy plovers in the South Bay through adaptive management of salt pond breeding habitat and predator management within the SBSPRP area. The Refuge intermittently conducts avian and mammal predator management within some of the larger western snowy plover nesting populations in the South Bay.

In the South Bay, the highest numbers of nesting western snowy plovers occur in portions of Alameda and San Mateo counties outside the action area. Nearly all of the Bay nesting occurs south of State Route 92 (San Mateo Bridge) in the South Bay (Page and Stenzel 1981, Page *et al.* 1991, Service 2007). Abundance of western snowy plovers during surveys around the Bay may vary considerably from year to year. Summer window-survey data for the years 2009-2014 detected 147, 275, 249, 147, 202, and 178 individual western snowy plovers within the San Francisco Bay Recovery Unit during those six years (http://www.fws.gov/arcata/es/birds/WSP/plover.html, Service 2014b).

Habitats and Occurrences within the Action Area

Western snowy plover summer window-survey data for the years 2009-2014 detected eight, zero, 11, 20, 10, and zero individual western snowy plovers during those six years in the Alviso area of northern Santa Clara County (http://www.fws.gov/arcata/es/birds/WSP/plover.html, Service 2014b). In the action area itself, western snowy plovers have nested recently (*i.e.*, 2012-2014) in New Chicago Marsh, Ponds A9, A12, A13, and A16, and in the impoundment between Pond A12 and the railroad tracks (just north of the old Alviso Marina; hereafter "Alviso impoundment"). Of 13 western snowy plover nests in 2012, four each were in Ponds A16 and A17, which were being dried out for construction of islands in A16 and tidal restoration in A17 (Donehower *et al.* 2012). The other five western snowy plover nests were in Pond A13. Of the 10 western snowy plover nests in the vicinity of the action area in 2013, six were in Pond A16; one was on a recently constructed island and five were on the dried-out pond bottom when the pond was drawn down for island creation, but this area was eventually re-flooded (Robinson-Nilsen *et al.* 2013). The others included single western snowy plover nests in New Chicago Marsh and the Alviso impoundment, and two in Pond A9. In 2014, western snowy plovers have been documented nesting in Pond A9 (one nest that was flooded) and A13 (two nests that hatched young). Due to variability in water level management in Ponds A9-A15, the suitability of habitat for nesting in these ponds has varied from year to year, and Pond A12 has provided nesting habitat in some years. Western snowy plovers have never been known or suspected to breed in the action area east of Artesian Slough (*i.e.*, in the vicinity of Pond A18).

California Least Tern

In the Bay, the primary California least tern breeding colonies are at Alameda Point in the City of Alameda and Hayward Regional Shoreline in Alameda County, and at the Montezuma Wetlands near Suisun City, Solano County. California least terns also nested in 2000 and 2001 in the City of Albany (near Alameda), Alameda County, with up to 12 pairs in 2000. In the City of Pittsburg, Contra Costa County on Suisun Bay, 13 pairs nested in 2001 and eight pairs nested in 2003. Historically, small numbers of birds have nested at the Oakland International Airport (last reported in 1995), Bay Farm Island (last reported 1975), Bair Island (last reported 1984), Port Chicago (last reported in 1988), the Bay Bridge Sand Spit (one-time attempt in 1985), and Tern Island (one-time attempt in 1990, U.S. Geological Survey preliminary data, unpubl.)

California least terns have never been recorded nesting in the vicinity of the South Bay Shoreline Phase I Study Project's action area, or anywhere else in Santa Clara County or nearby areas of Alameda County. In recent years, the main post-breeding staging area for California least terns in the South Bay has been in the complex of ponds immediately north of Moffett Field (Ponds AB1, A2E, and AB2), which are located approximately two miles west of the action area. These areas are used for roosting and foraging by adults and juveniles in July and August every year, with typical counts of 20 to 100 California least terns, although 276 were observed there in July 2004 (S. Rottenborn, HTH, pers. obs.). California least terns have also been recorded foraging or roosting at other South Bay ponds, including A1, A2E, A3N, A3W, A4, A5, A7, A9, A10, A11, and A14 (Marschalek 2006; J. Krause, CDFW, pers. comm.; U.S. Geological Survey preliminary data, unpubl.). Ravenswood ponds in San Mateo County are also used occasionally for foraging and roosting, with counts of 96 California least terns in July 2002, 42 in July 2003, and 110 in July 2004 (U.S. Geological Survey preliminary data, unpubl.). Eden Landing ponds in Alameda County are used irregularly for foraging including E2, E4, E5, E8A, E9, E10, and E11. California least terns do not generally forage in smaller sloughs or channels adjacent to managed ponds but rather prefer more open waters, including the Bay waters; 50 of 58 California least terns observed foraging at one South Bay location in July 2004 were doing so over the open waters of the Bay while the other eight were foraging in ponds (S. Rottenborn, HTH, pers. obs.).

California least terns are not known to nest in the action area. California least terns have been observed foraging in the action area's ponds (A9, A11, and A14) only rarely, and they have not been observed foraging in Pond A18, despite occasional visits by birders and biologists to A18 and birder coverage of A18 (using spotting scopes) from the Pond A16 levee. Although California least terns could potentially forage in any of these ponds that contain fish, survey data collected for the SBSPRP and incidental observations by birders indicate that California least terns visit the action area (as a post-breeding forager) irregularly and in low numbers.

Effects of the Proposed Project

The footprint of ground disturbance from the proposed project consists of a total of approximately 165 acres. Table 1 below lists the acreages of each of habitat type that will be disturbed by the proposed Corps-led actions (*e.g.*, construction of the levees, the Artesian Slough tide gate, the

Table 1. Habitat Disturbance from the Proposed Project.

Habitat Type	Impacts of Corps-Led Actions (acres)		Impacts of Service-Led Actions (acres)	Total Habitat Disturbance (acres)
	Levee/Tide Gate/ Bridge Construction	A18 Ecotone/ Tidal Restoration	A12 Ecotone/ Tidal Restoration	
Brackish marsh	0.20	0.07	0.03	0.3
Freshwater marsh	1.04	0.06	<0.01	1.1
Muted tidal/diked marsh	1.80	0.00	0.00	1.8
Tidal salt marsh	1.64	0.03	0.03	1.7
Non-tidal salt marsh	8.20	0.00	0.00	8.2
Seasonal wetland	3.65	0.00	0.05	3.7
Mudflat	0.59	0.01	0.00	0.6
Batch pond	3.60	0.00	29.00	32.6
Managed pond	12.07	66.13	0.00	78.2
Open water	9.40	0.00	0.00	9.4
Upland vegetation	1.00	0.00	0.00	1.0
Water/sewage treatment	0.10	0.00	0.00	0.1
Levee	18.49	0.33	0.88	19.7
Developed	6.15	0.24	0.01	6.4
TOTAL	67.93	66.87	30.00	164.8

pedestrian bridge, and the Pond A18 ecotone and tidal restoration activities) and Service-led actions (*e.g.*, construction of the Pond A12 ecotone and Ponds A9-A15 tidal restoration activities). Construction of trails and other recreational facilities, which is a Service-led activity, will occur entirely on existing levees and berms, or in ruderal grassland along SR 237, and thus the acreage of such habitat disturbance from trail construction is not included in Table 1.

In the following sections discussing effects on individual listed species, effects are separated for Corps-led and Service-led activities as appropriate. Because of the tidal flood protection functions currently provided by the outboard levees around Ponds A9-A15, tidal restoration within those ponds would not be feasible without enhancement of flood protection inboard from those ponds. As a result, the effects of Service-led tidal restoration on Refuge lands could not occur but for the Corps-led construction of the levee and tide gate, and thus, the benefits that accrue from tidal restoration on Refuge lands are dependent on Corps-led levee construction.

California Clapper Rail and Salt Marsh Harvest Mouse

Habitat Restoration

Effects of Corps-led Actions

The highest-quality habitat for the California clapper rail and salt marsh harvest mouse consists of tidal salt marsh, although these species will also use tidal brackish marshes to some extent. Tidal restoration in Pond A18 is expected to result in the creation of approximately 119 acres of tidal salt marsh and 398 acres of brackish marsh habitat for the California clapper rail and salt marsh harvest mouse (HTH 2012). In addition, approximately 67 acres of ecotone habitat will be created along the southern and eastern edges of Pond A18. The ecotone created along the southern and eastern edges of Pond A18 will provide high quality extreme high tide refugia cover for California clapper rails and salt marsh harvest mice which will reduce the risk of predation. The grassland habitat along the ecotone will also provide foraging and dispersal habitat for salt marsh harvest mice. The ecotone will also allow for the landward transgression of the tidal marsh in the face of sea level rise and provide a buffer between the marsh and developed areas. This ecotone habitat is expected to develop more quickly than the tidal marsh in A18, which will not become vegetated until sedimentation has elevated the former pond bottom to the point where vegetation can colonize it. Within a few years, it is expected that vegetation along the ecotone will provide habitat that is of higher quality for salt marsh harvest mice than the narrow strip of vegetation that is currently present along the southern and eastern edges of Pond A18.

Effects of Service-led Actions

Assuming that all of Ponds A9-A15 are eventually restored to tidal action, approximately 2,010 acres of new tidal marsh will be restored within these ponds. All of this restored tidal marsh is predicted to be salt marsh (HTH 2012). In addition, 30 acres of ecotone habitat will be created along the eastern edge of Pond A12; habitat along the ecotone is expected to become suitable for use by salt marsh harvest mice within a few years after seeding and planting occur. If only Ponds A12 and A18 are restored, then approximately 300 acres of suitable tidal marsh will be restored in A12 and 517 acres of suitable tidal/brackish marsh habitat will be restored in A18. The ecotone habitat created along the eastern edge of the restored tidal marsh in Pond A12 will benefit the California clapper rail and salt marsh harvest mouse by providing transitional habitat for the rail and the mouse to utilize as cover during extreme high tide and flooding events which will reduce the risk of predation. The ecotone will also provide foraging and dispersal habitat for the salt marsh harvest mouse. The ecotone will also allow for the landward transgression of the tidal marsh in the face of sea level rise and provide a buffer between the marsh and developed areas.

Habitat Restoration Effects Common to Corps-led and Service-led Actions

All of these marshes (in Pond A18 and A9-A15) will support complex channel networks. These channels will provide extensive foraging habitat for California clapper rails, and the larger channels will provide natural levees supporting taller cordgrass and gumplant, which serve as rail nesting habitat and high-tide refugia.

Because the rate of evolution of tidal habitats is dependent largely on sediment availability, which is difficult to predict, the precise rates of evolution of these marshes are unknown. However, the following general timeline of expected marsh evolution predicted for restored South Bay marshes by the SBSPRP indicates the likely habitat progression expected over the 50-year timeline of the South Bay Shoreline Phase I Study Project.

Habitat restoration in the action area described above for California clapper rail will result in similar benefits for the salt marsh harvest mouse. Because salt marsh harvest mice reach their highest densities in mature marshes with pickleweed, which form in the highest marshes, the evolution of suitable habitat for salt marsh harvest mice within restored marshes will be slower than for California clapper rails, as it will take longer for marsh elevations to reach elevations appropriate for pickleweed dominance. However, development of suitable habitat for salt marsh harvest mice in the ecotones will be relatively rapid. Once suitable habitat is restored, the high fecundity of salt marsh harvest mice will ensure that this species will rapidly colonize and spread throughout the restored pickleweed marshes from occupied habitat along Coyote or Alviso sloughs or other suitable habitat.

The amount of habitat for the California clapper rail and salt marsh harvest mouse that will be restored by both the Corps-led and Service-led actions is expected to substantially increase South Bay populations of these species, and contribute greatly to their survival and recovery. In addition, the restoration of ecotones in Ponds A18 and A12 will provide high-quality refugia during extreme high tides that inundate the rest of the marsh plain, thus helping to improve winter survival rates. The ecotones will also provide seasonal foraging and dispersal habitat for the salt marsh harvest mouse in addition to providing some residence habitat for this species.

Estimated Timeline for Tidal Marsh Establishment

In 2020, Pond A12 will be breached, restoring full tidal action to approximately 300 acres of salt pond (though see the previous discussion of the possibility that Pond A18 may be breached first). By Year 10 (2027), enough sediment is expected to have accumulated in other areas of this former pond that low tidal marsh vegetation dominated by Pacific cordgrass will start to become established. Use of the restored marshes by California clapper rails is expected to occur as soon as enough vegetation is present to provide cover for foraging California clapper rails. Even though this vegetation may not be dense and/or extensive enough to provide nesting habitat by Year 10, California clapper rails are expected to forage on intertidal mudflats near vegetative cover, which may occur near the breach locations.

In 2023, the Pond A18 ecotone will be constructed and seeded providing suitable habitat for colonization by salt marsh harvest mice from nearby areas. In 2025, additional breaching may restore tidal action to approximately 875 acres in Ponds A9, A10, A11, and 736 acres in Pond A18. By 2027, tidal marsh vegetation will begin to colonize the edges of levees and berms, but by the end of Year 10 (2027), the bottoms of Ponds A9, A10, A11, and A18 may still be too low for substantial vegetation establishment.

As sediment continues to accumulate in the restored ponds, bottom elevations will be raised, and the areas at elevations suitable for colonization by tidal marsh vegetation will increase. By Year 20 (2037), vegetation will be expanding outward from the ecotone area and the edges of other levees and berms, and it is expected that sufficient sediment will have accumulated in other portions of Ponds A9-A12 and A18 that low marsh suitable for use by California clapper rails for nesting and foraging will have developed.

In 2030, an additional 850 acres of tidal restoration may occur via breaching of Ponds A13, A14, and A15. Thus, by Year 13 (2030), approximately 2,010 acres of new tidal habitat in Ponds A9-A15 and 736 acres in Pond A18 will have been restored. Evolution of marshes within Ponds A13-A15 will occur gradually as described above for other ponds.

In Years 20-50 (2037-2067), vegetated marsh will continue to expand in area and increase in elevation as sediment accumulates. Although sea level rise will raise the elevation of water within the restored marshes, thus restricting the rate of marsh development to some extent, it is predicted that the rate of sediment accumulation will outpace sea level rise, so that vegetated marshes will colonize all but the lowest-elevation areas such as tidal sloughs and channels (ESA and Philip Williams & Associates, Ltd. 2012, HTH 2012). Suitable nesting habitat and cover for the California clapper rail and salt marsh harvest mouse will continue to expand, and higher-marsh areas that form on natural levees along the larger tidal sloughs will provide high-tide refugia. By Year 50, it is expected that approximately 2,130 acres of restored tidal salt marsh and 398 acres of restored brackish marsh suitable for use by California clapper rails and salt marsh harvest mice will have been restored.

Increased Salinity and Beneficial Marsh-Type Conversion

Effects of Corps-led Actions

Breaching of Pond A18 will result in an increased tidal prism and salinization of brackish and fresh marshes throughout all of Artesian Slough and Coyote Slough, thus resulting in the expansion and enhancement of California clapper rail and salt marsh harvest mouse habitat over large areas of existing brackish and freshwater marsh along these sloughs. In addition, this change in the tidal gradient will result in the development of higher-quality habitat in already-breached Pond A17 and the Island Ponds than would develop in the absence of breaching of A18. The effects on salinities within existing marshes would be immediate, and within a period of just a few years, it is expected that considerable expanses of brackish marshes dominated by bulrush and pepperweed will have begun conversion to marshes dominated by Pacific cordgrass, pickleweed, and gumplant.

Effects of Service-led Actions

Restoration of tidal action to Ponds A9-A15 will result in an increased tidal prism and salinization of brackish and fresh marshes along Alviso Slough upstream to Pond A12 and along lower Coyote Slough, thus resulting in the expansion and enhancement of California clapper rail and salt marsh harvest mouse habitat in these areas. In addition, this change in the tidal gradient will result in the development of higher-quality habitat in already-breached Pond A6 and the Island Ponds than would develop in the absence of breaching of Ponds A9-A15. These effects are expected to occur rapidly.

Increased Salinization Effects Common to Corps-led and Service-led Actions

As levees are breached and ponds are subjected to tidal action, these ponds will draw considerable amounts of water through the breaches on rising tides. As a result, the rate of water flowing "upstream" along Alviso, Artesian, and Coyote sloughs, from the Bay into the breached ponds, on rising tides will be considerably higher than it currently is. This will result in the transportation of more saline Bay water upstream, and higher upstream, along these sloughs than currently occurs.

The effect of this change in tidal prism and the upstream migration of the salinity gradient will be the salinization of marshes along these sloughs that are currently brackish and fresh marshes due to the inputs of freshwater from Coyote Creek, the Guadalupe River, and WPCP effluent. Because outboard levee breaches will be located high up these sloughs, such as at Pond A12 along Alviso Slough, in the southwest corner of Pond A18 along Artesian Slough, and in the northeast corner of Pond A18 along Coyote Slough, more saline water will be drawn far up these sloughs, and this salinization will affect the plant species composition of marshes on a very large scale. The result will be the conversion of extensive areas of brackish marsh to salt marsh and conversion of extensive areas of freshwater marsh to brackish marsh. As a result, habitat conditions within existing brackish and fresh marshes along Alviso Slough, Artesian Slough, and Coyote Slough will become much more suitable for California clapper rails and salt marsh harvest mice. Furthermore, the upstream migration of the salinity gradient will result in higher-salinity marshes in recently restored areas such as the Island Ponds, Pond A6, and Pond A17, thus helping to enhance habitat for California clapper rails and salt marsh harvest mice beyond the conditions that would be created in the absence of the South Bay Shoreline Phase I Study Project.

In particular, given the vast extent of brackish and freshwater marsh along Coyote Slough, the breaching of Pond A18 will result in considerable expansion of California clapper rail and salt marsh harvest mouse habitat up Coyote Slough and much higher-quality rail and mouse habitat in Pond A17 and the Island Ponds. Marsh evolution predictions for the proposed project took the increased tidal prism along Coyote Slough, resulting from Pond A18 breaching into account when predicting that the entirety of restored tidal habitat in Ponds A9-A15 would be salt marsh instead of brackish marsh (HTH 2012). Thus, the increase in California clapper rail and salt marsh harvest mouse habitat and enhancement of rail and mouse habitat quality as a result of both the Corps-led and Service-led actions will be far greater than just the increase in tidal marsh within the ponds to be breached.

The salinization of tidal marsh that will result from the proposed project will also expedite project benefits to the California clapper rail and salt marsh harvest mouse. As described previously, there will be a lag between breaching of levees and development of California clapper rail and salt marsh harvest mouse habitat due to the need for sediment accumulation to elevate pond bottoms enough that vegetation can colonize the restored habitat. In the case of increased salinization, however, the effects on salinities within existing marshes would be immediate, and within a period of just a few years, it is expected that considerable expanses of brackish marshes dominated by bulrush and pepperweed will have begun the conversion to marshes dominated by Pacific cordgrass, pickleweed, and gumplant.

Loss of Habitat

Effects of Corps-led Actions

Artesian Slough Tide Gate and Pedestrian Bridge

Construction of the Artesian Slough tide gate and Artesian Slough pedestrian bridge will result in the loss of suitable habitat for the California clapper rail and salt marsh harvest mouse through the placement of fill in salt and brackish marsh habitat, but no suitable nesting habitat for California clapper rails will be directly affected. Construction of the tide gate and pedestrian bridge in Artesian Slough will result in the direct disturbance of about 1.04 acres of non-breeding tidal freshwater marsh habitat that may be occasionally utilized by a low number of foraging and dispersing California clapper rails and salt marsh harvest mice. As indicated in Table 1, 1.64 acres of tidal salt marsh will be disturbed; however, this marsh is located in a narrow strip along the Alviso impoundment and is not truly tidal, receiving tidal inflow only during the highest tides. As a result, the disturbance of muted tidal marsh along the Alviso impoundment will disturb potential habitat for the salt marsh harvest mouse but not the California clapper rail.

Excavation of Pilot Channels and Pond A18 Breaches

Excavation of pilot channels in the outboard marsh around Pond A18 will occur in five locations, four along Artesian Slough and one at South Coyote Slough. The marsh vegetation at these breach locations consists of brackish marsh at three locations and freshwater marsh at two locations. Excavation of pilot channels and breaching will result in the direct disturbance of about 0.07 acre of brackish marsh and 0.04 acre of tidal salt marsh that could potentially support low densities of California clapper rails and salt marsh harvest mice. It is possible that the salt and brackish marsh provides suitable nesting and foraging habitat for California clapper rail. However, given the paucity of California clapper rail occurrences along Artesian Slough and the extreme eastern end of South Coyote Slough in recent years, it is likely that very few rails use this habitat, and then only occasionally (and likely only during the non-breeding season).

FRM Levee Construction

Construction of the FRM levee will result in the loss of non-tidal salt and brackish marsh habitat and adjacent upland habitat along the edges of Ponds A16 and A18 and New Chicago Marsh that are suitable habitat for the salt marsh harvest mouse but not the California clapper rail. Areas with vegetation that potentially supports the salt marsh harvest mouse, and that will be disturbed by fill placed for the levee, include non-tidal and muted tidal/diked salt marsh along the southern, western, and northern edges of the Alviso impoundment; the northern edge of New Chicago Marsh, adjacent to the southern levee of Pond A16; and both the northern and southern sides of the existing Pond A18 levee. The loss of suitable salt marsh harvest mouse habitat will result from the widening of the levee, relative to its existing footprint, and will affect a total of about 13.65 acres of vegetation dominated by pickleweed, alkali heath, grasses, and non-native weedy species that provide at least marginal-quality habitat for salt marsh harvest mice. No suitable California clapper rail habitat will be disturbed by the widening of the levee footprint because the marshes along the existing levee are non-tidal and thus not likely to support the rail.

No high-quality salt marsh harvest mouse habitat will be impacted by widening of the levee. The habitat that will be disturbed consists of narrow strips of vegetation located between the existing bare levee and either bare salt panne/mud (along the Alviso impoundment), the waters of Ponds A16 and A18, or a borrow ditch (on the south side of the levee at Ponds A16 and A18). The impacted habitat is very narrow, which increases the risk of predation on any salt marsh harvest mice that might be present in those strips of vegetation, and is separated by unsuitable habitat (*e.g.*, open ground without vegetation or open water) from more extensive, higher-quality expanses of habitat, such as that in New Chicago Marsh and in the wetlands south of Pond A18 and east of Artesian Slough. Even along the southern edge of the Pond A16 levee, the strip of pickleweed and other vegetation between the levee and New Chicago Marsh is narrow, includes much dead and sparse vegetation, and supports only a patchy distribution of dense, tall, high-quality pickleweed. As a result, the quality of habitat, and the expected density of salt marsh harvest mice within the habitat to be impacted, is low, and the effects on salt marsh harvest mouse populations from the loss of these narrow strips of vegetation will be low.

Furthermore, these narrow strips of vegetation do not provide high-quality dispersal habitat for the salt marsh harvest mouse. The strips on the outboard (northern) side of the Pond A18 levee are separated by the bare levee itself from potential source populations of salt marsh harvest mice in New Chicago Marsh, the wetlands east of Artesian Slough, or the Coyote Creek Bypass. Open, unvegetated areas may act as barriers to movement of salt marsh harvest mice (Shellhammer 1978, Geissel *et al.* 1988), and thus salt marsh harvest mice likely cross the levee to and from this habitat very infrequently. In order for this vegetation to serve an important dispersal function, salt marsh harvest mice would have to cross bare levees from one source population, move long distances through the narrow strip of vegetation (or survive over generations within that narrow strip so that progeny eventually disperse long distances over time), and cross the bare levee again to reach another high-quality habitat area. Such occurrences are unlikely, or happen very infrequently. The narrow strip of vegetation along the western edge of the Alviso impoundment is even further removed from high-quality habitat, being separated from New Chicago Marsh by a broad salt panne and the railroad tracks.

Following levee construction, unimpacted pickleweed-vegetated areas between the Zanker Landfills/WPCP and the new levee will continue to provide suitable dispersal and residence habitat for salt marsh harvest mice. More importantly, a broad ecotone along the southern and eastern sides of A18 will be constructed. This ecotone will provide much higher-quality residence and dispersal habitat than what will be impacted. This 345-foot-wide ecotone will extend from the levee top downslope to Pond A18. The native plants that will be seeded or planted on this ecotone area will provide suitable dispersal habitat for salt marsh harvest mice, and wetland vegetation and peripheral halophytes near the lower edge of the ecotone area will provide residence habitat for the salt marsh harvest mouse that is at least as suitable (or of much higher quality) as what will be impacted. This ecotone will thus compensate (and more) for any loss of habitat along Pond A18, both in terms of the acreage of habitat impacted and linearly, replacing low-quality habitat with higher-quality habitat in the same areas linearly along the levee. Although no broad ecotone habitat is proposed at Pond A16 to replace the narrow strips of vegetation lost due to levee widening, the lower slopes of the levee will be allowed to be vegetated, and pickleweed of similar quality and extent to that currently present is expected to colonize these lower slopes. This pickleweed will not be mowed, as mowing would occur only on the higher portions of the levee. Along the eastern edge of Pond A12, the vegetation to be lost (*i.e.*, between the A12 levee and the Alviso impoundment) is so narrow that it likely serves little function, either as residence or dispersal habitat, for salt marsh harvest mice. As a result, the loss of this habitat to FRM levee construction does not warrant immediate compensation in situ by the Corps. Rather, the broad ecotone to be constructed by the Service and local sponsors on the west side of the FRM levee at Pond A12 will more than compensate for any lost salt marsh harvest mouse habitat in the A12 vicinity. Although the construction of the Pond A12 ecotone is a Service-led activity, it would not be feasible but for the construction of the FRM levee by the Corps, and thus the Corps' levee construction is enabling that important habitat restoration component.

Construction of the FRM levee on the existing Pond A18 levee footprint will modify the structures that convey water in and out of the non-tidal wetlands east of Artesian Slough and south of Pond A18. These wetlands contain extensive pickleweed and are thus expected to support resident salt marsh harvest mice. The proposed project will replace any modified or removed water control structures so that flow in and out of these wetlands can continue and existing conditions within the wetlands will be maintained.

Scour of Tidal Marsh Habitat

Following breaching of Pond A18, the increased tidal prism will result in the scour of sediment, and some vegetated marsh, from channels leading between the Bay and the breach locations. As a result, some loss of existing fringe marsh for the California clapper rail and salt marsh harvest mouse will occur along Artesian and Coyote sloughs. This marsh will consist primarily of brackish and freshwater marsh, but some salt marsh along lower Coyote Slough will be lost to scour as well. The acreage of marsh expected to be lost due to scour resulting from the breaching of Pond A18 is unknown. The SBSPRP predicted that 220-250 acres of marsh loss to scour would occur over a 50-year period resulting from restoration of tidal action to as much as 11,500 acres for the entire SBSPRP (*i.e.*, scour of about 2 percent of the marsh restored). Given the 736 acres of tidal restoration proposed at Pond A18, the extent of marsh loss for the California clapper rail and salt marsh harvest mouse due to scour might be roughly estimated at 17 acres. Such marsh loss would be gradual, and this total represents the total loss due to scour over the 50-year proposed project period.

The fringe marshes of the South Bay, which will be the marshes adversely affected by this scour, often provide the only habitat connecting the larger patches of marsh habitat that contain the "core" populations of salt marsh harvest mice. The loss of these marshes in the short term, before the restored marshes have matured to vegetated high marsh, could temporarily reduce the connectivity between the salt marsh harvest mouse populations of the South Bay. However, the short-term loss of salt marsh harvest mouse habitat and connectivity from fringe marsh scour will be offset by an order of magnitude when the restored marsh matures to a point that it can support salt marsh harvest mice. In the meantime, the marsh loss due to scour will be far less than the expected extent of marsh-type conversion (*i.e.*, from fresh or brackish marsh to salt marsh) due to increased salinization related to increased tidal prism. As a result, the enhancement of California clapper rail and salt marsh harvest mouse habitat from increased salinization will outpace any adverse effects of marsh loss due to levee construction, breaching, and localized scour while new tidal salt marsh is developing within restored Pond A18. The short-term nature of any reduction in connectivity from construction and scour suggests that it will not adversely affect the metapopulation dynamics or genetic diversity of the salt marsh harvest mouse in the South Bay.

To put the loss of marsh from excavation of pilot channels and downstream scour of fringing marsh into perspective, this 17 acres of marsh loss is far less than the expected extent of marsh-type conversion (*i.e.*, fresh or brackish marsh to salt marsh) due to increased salinization related to increased tidal prism. As a result, the beneficial effects on California clapper rail and salt marsh harvest mouse populations due to enhancement of habitat resulting from increased salinization will outpace any adverse effects of marsh loss due to breaching and localized scour in the near term while the much more extensive tidal salt and brackish marsh is developing within restored Pond A18.

During any construction or excavation activities that may result in impacts to tidal marsh habitat, the limits of work will be clearly delineated to limit effects to existing California clapper rail and salt marsh harvest mouse habitat. Side-casting of dredged materials into tidal marsh habitat (*e.g.*, during excavation) will be limited so that a minimum amount of marsh is filled. Conservation measures incorporated into the proposed project will minimize effects of human activity within marshes on California clapper rail and salt marsh harvest mouse habitat.

Effects of Service-led Actions

The only Service-led activities that could result in the loss of existing California clapper rail and salt marsh harvest mouse habitat will occur as a result of tidal restoration at Ponds A9-A15. Excavation of pilot channels in the outboard tidal marsh around these ponds will disturb about 0.03 acre of salt marsh, 0.03 acre of brackish marsh, and <0.01 acre of freshwater marsh at five breach locations along Alviso Slough and one breach location along Coyote Slough. Because recent surveys for California clapper rails conducted for the Invasive *Spartina* Project along Alviso Slough have only detected California clapper rails at the mouth of the slough, pilot channel construction and breaching at the four breach locations on Ponds A10 and A12 are likely to have little effect on habitat that is used by nesting California clapper rails; rather, this habitat is likely used only by occasional, foraging, non-breeding individuals. The breach in the northwest corner of Pond A9 is closer to areas where California clapper rails have been recently detected, but it is located at an existing tide gate where the marsh along Alviso Slough is extremely narrow, too narrow to provide suitable nesting habitat or high-quality foraging habitat for California clapper rails. The only location where pilot channel excavation could affect habitat that has any likelihood of being used by breeding California clapper rails is in the northeastern corner of Pond A9, where the pilot channel will be excavated out to Coyote Slough. It is likely that salt marsh harvest mouse abundance in most of the breach locations is low owing to the brackish and/or very narrow nature of the marshes at these locations. However, the breach in the northeast corner of Pond A9 is located in tidal salt marsh that is more suitable for this species. Vegetation is almost completely absent from the internal berms within the Ponds A9-A15 system, and thus within-pond preparation activities for tidal breaching will not disturb any suitable salt marsh harvest mouse habitat.

Prior to or concurrent with restoration of tidal action in Ponds A9, A10, and A11, the berm between Ponds A11 and A12 will be breached. If California clapper rail and salt marsh harvest mouse habitat has developed within Pond A12 by that time, there may be a temporary loss of habitat due to breaching. However, that habitat will be quickly offset by continued marsh development. Similarly, berms between A14 and A9/A11, and between A13 and A12, will be breached prior to or concurrent with restoration of tidal action in Ponds A13-A15, potentially resulting in temporary losses of California clapper rail and salt marsh harvest mouse habitat. Again, any such losses will quickly self-restore.

As mentioned above, the increased tidal prism resulting from restoration of tidal action to Ponds A9-A15 will cause the scour of sediment, and some vegetated marsh, from channels leading between the Bay and the breach locations. As a result, some loss of fringe marsh along Alviso Slough and Coyote Slough will occur. Such scour will reduce habitat for the California clapper rail and salt marsh harvest mouse and may limit dispersal of salt marsh harvest mice along these sloughs to some extent in the short term. Assuming that the loss of marsh to scour might comprise approximately 2 percent of that restored, up to 40 acres of tidal marsh might be lost to scour over the 50-year proposed project period. This marsh would be limited to Alviso Slough downstream from Pond A12 and a small area of Coyote Slough from the northwest corner of Pond A9 downstream. Such marsh loss will occur gradually due to the phasing of breaching at these ponds (Pond A12 in 2020, A9-11 in 2025, and A13-15 in 2030). However, the beneficial effects on California clapper rail and salt marsh harvest mouse populations due to enhancement of habitat resulting from increased salinization are expected to outpace any adverse effects of marsh loss due to breaching and localized scour while new tidal salt and brackish marsh is developing within the restored marshes in Ponds A9-A15. Once cordgrass and pickleweed-dominated habitat colonizes the restored marsh within these former ponds, California clapper rail and salt marsh harvest mouse habitat will be expanded by orders of magnitude.

Small-scale, localized disturbance of habitat for the California clapper rail and salt marsh harvest mouse may also occur from walking through marshes or grounding boats in marshes during monitoring, research, or predator management efforts. Such disturbance would be very limited, particularly with implementation of proposed conservation measures (*e.g.*, for perennial pepperweed control). Effects to California clapper rails and salt marsh harvest mice resulting from monitoring, research, and predator management on the Refuge will be covered by the existing biological opinion for the SBSPRP and a future biological opinion for the Refuge's Comprehensive Conservation Plan. Effects to California clapper rails and salt marsh harvest mice resulting from perennial pepperweed control are discussed below under the "Perennial Pepperweed Control" section."

<u>Direct Effects to Individuals</u>

Effects of Corps-led Actions

<u>California Clapper Rail</u>

Construction of the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge has the potential to disturb areas where California clapper rails are occurring only at Artesian Slough. Due to the low quality of this freshwater marsh for use by California clapper rails, there is a very low probability that a rail would be anywhere in the vicinity of the tide gate/pedestrian bridge construction area when activities are occurring in the tidal marsh. Furthermore, because the freshwater habitat in that location is not suitable for use by breeding California clapper rails, no nests, eggs, or young would be affected by activities at that location, and any California clapper rail present in the vicinity would move away from construction activities long before it could be physically injured or killed. Therefore, no loss of individuals, nests, eggs, or young will occur from construction of the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge.

Excavation of pilot channels in the outboard marsh around Pond A18 is also unlikely to result in the loss of any California clapper rails. The brackish marsh habitat at three of the pilot channel locations does not provide high-quality nesting habitat, due both to its brackish nature and the narrow nature of the marsh at those locations, and there is a low probability that California clapper rails would be breeding in those areas. Further, if pilot channel excavation in brackish or salt marsh habitat is conducted during the breeding season (February 1 – August 31), surveys for California clapper rails will be conducted prior to proposed project activities to determine whether nesting California clapper rails are present in the vicinity. If California clapper rails are detected, buffers between rail activity centers and construction will be followed. During any construction or excavation activities that may result in effects to California clapper rails, the limits of work will be clearly delineated to limit effects to this species. These conservation measures will minimize effects of human activity within marshes on California clapper rails.

Disturbance such as loud noise or the presence and movement of people and heavy equipment in or near California clapper rail habitat may alter bird behavior in ways that result in altered foraging or sheltering behavior and reduced nesting success. Such disturbance could result in temporary or permanent habitat loss due to California clapper rail avoidance of areas that have suitable habitat but intolerable levels of disturbance; abandonment of nests, eggs, or young by nesting pairs; a reduction in foraging efficiency if high-quality foraging areas are impacted; and increased movement or flushing from cover, or altered activity patterns, that reduce energy reserves and increase predation risk. The potential for disturbing breeding California clapper rails will be avoided by delaying construction activities within suitable California clapper rail breeding habitat until after the breeding season unless protocol-level surveys determine California clapper rails are absent from a 700-foot-buffer around the proposed work area. The level of disturbance of California clapper rails will also be minimized by having a Service-approved biological monitor supervise the work.

Loss of individual California clapper rails due to predation could be exacerbated by the proposed project. The restoration of tidal marsh habitat will increase habitat for northern harriers, which may prey on California clapper rails (especially chicks). However, because habitat for northern harriers is suitable for California clapper rails as well, the increase in California clapper rail populations due to habitat restoration in a given area is expected to outpace any adverse effects of predation by northern harriers. Local increases in predation on California clapper rails may occur due to marsh restoration in close proximity to areas frequented by California gulls, such as the Newby Island Landfill, Pond A16, and New Chicago Marsh; electrical towers within Pond A18 that provide known nesting sites for common ravens and red-tailed hawks, and perches for peregrine falcons; and upland areas providing sources of predators such as cats, rats, foxes, raccoons, white-tailed kites, and American crows. Although terrestrial pathways used by mammalian predators to access marshes will be reduced through the breaching of levees in some areas, marshes that abut upland areas will be subject to predation by land-based predators. In addition, rock at the bridge abutments and surrounding electrical towers in Pond A18 may provide refugia for rats that may prey on California clapper rail eggs. The risk of predation on California clapper rails will be reduced by the implementation of a Service-approved long-term predator management and litter cleanup program under a cooperative agreement among the SCVWD, the Refuge, and the City of San Jose that will be funded by the SCVWD.

Maintenance activities along the FRM levee have the potential to disturb California clapper rails in Ponds A12, A13, and A18 after tidal restoration has occurred and rail habitat has developed within those former ponds. Recreational use of the Bay Trail segment atop the levee will affect California clapper rails in adjacent areas to the point that rails present in those restored marshes during levee maintenance activities will already be habituated to some level of human activity on the levee. In addition, the 345-foot wide ecotones will limit the potential for levee maintenance activities to adversely affect California clapper rails. As a result, routine inspections and minor maintenance activities are not expected to result in an increase in California clapper rail disturbance, relative to other types of levee use. Even mowing along the levee tops is unlikely to cause substantial disturbance of California clapper rails given the very narrow swaths to be mown, the brevity of mowing operations, and the distance (330 feet or more) between mowing and California clapper rail habitat. However, maintenance activities involving heavy equipment would be conducted outside of the California clapper rail's nesting season to the extent practicable, and if seasonal avoidance is not possible, pre-construction surveys would be conducted for nesting California clapper rails, and appropriate buffers would be implemented between proposed project activities and nesting rails as necessary.

Salt Marsh Harvest Mouse

Construction of the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge will result in fill of vegetated areas that could potentially support small numbers of salt marsh harvest mice. Excavation of pilot channels in the outboard marsh around Pond A18 will also result in removal of brackish marsh that could potentially support low densities of salt marsh harvest mice. Although the number of individual salt marsh harvest mice that may be present in habitat to be impacted by levee construction and pilot channel excavation is low, individual salt marsh harvest mice could potentially be injured or killed by crushing or smothering during the placement of sediment or other materials in suitable habitat, or by excavation of habitat. Conservation measures such as hand-removal of vegetation in potential salt marsh harvest mouse habitat under the supervision of a Service-approved biologist, measures to ensure that salt marsh harvest mice leave areas prior to impacts, and salt marsh harvest mouse exclusion fencing will be implemented to minimize the potential for injury and mortality of individual salt marsh harvest mice.

Disturbance such as loud noise or the presence and movement of people and heavy equipment in or near salt marsh harvest mouse habitat may alter mouse behavior in ways that result in alteration of foraging and sheltering activities or reduced breeding success. Disturbance may result in displacement of salt marsh harvest mice from protective cover and their territories/home ranges (through noise and vibrations) and/or direct injury or mortality (through crushing). These disturbances are likely to disrupt normal behavior patterns of breeding, foraging, sheltering, and dispersal, and are likely to result in the displacement of salt marsh harvest mice from their territory/home range in the areas where their habitat is destroyed. Displaced salt marsh harvest mice may have to compete for resources in occupied habitat, and may be more vulnerable to predators. Disturbance of female salt marsh harvest mice, particularly during the period of March through November, may cause abandonment or failure of the current litter. Thus, displaced salt marsh harvest mice may suffer from increased predation, competition, mortality, and reduced reproductive success.

Noise from construction activities associated with the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge close to suitable salt marsh harvest mouse habitat may alter mouse breeding, foraging, and sheltering behavior. Salt marsh harvest mice may be similarly disturbed during excavation of pilot channels, preparation of ponds for breaching (*e.g.*, construction of ditch blocks), and access of construction areas by heavy equipment along existing levee roads.

Loss of individual salt marsh harvest mice due to predation could be exacerbated by the proposed project, at least in localized areas, as described for California clapper rail. Predator management and MAM performed by the Refuge and the SBSPRP will help to minimize the risk of predation.

Vegetation management along the levees has some potential to result in the injury or mortality of individual salt marsh harvest mice and the disturbance of foraging, sheltering, and dispersal activities. However, the potential for take and number of individuals that could be taken is very low, for several reasons. First, the strip of vegetation that will be mowed along the levee top will be very narrow (expected to be 15 feet or less). Only ruderal grassland foraging/dispersal habitat and no suitable pickleweed breeding habitat will be mowed; therefore, the potential for disturbing breeding salt marsh harvest mice or a salt marsh harvest mouse nest will be avoided because breeding mice will not be present in these areas. Mowing from the levee top downslope will result in slight disturbance of downslope areas that might encourage salt marsh harvest mice to move downslope, away from the mowing activity. In addition, vegetation along the levee top is not expected to be particularly dense, especially in comparison to vegetation lower on the levee/ecotone slopes. As a result, it is possible that salt marsh harvest mice will make little use, if any, of the vegetation that needs to be mown. Maintenance such as mowing in or adjacent to salt marsh harvest mouse habitat will also be avoided during extreme high tides when salt marsh harvest mouse are most likely to approach the levee top to escape the flooding marsh. If trapping of California ground squirrels is necessary to control burrows within the levees, live traps with openings large enough to allow salt marsh harvest mice to exit the traps will be used.

Disturbance of salt marsh harvest mice from recreational trail use may occur, due to the expected occurrence of salt marsh harvest mice in ecotones and vegetated lower levee slopes and in the salt marsh harvest mouse habitat adjacent to lower Coyote Creek, where the levee trail connection to the existing Bay Trail segment will be provided. However, such disturbance will be minimized by the physical separation of the bare-topped trail and the vegetated slopes where salt marsh harvest mice may occur. Trail use may also result in indirect effects, such as increased trash (which may attract predators) and increased invasive plants, which may adversely affect habitat quality. Predator management and invasive plant species control implemented along the trails will minimize these adverse effects.

Effects of Service-led Actions

<u>California Clapper Rail</u>

Excavation of pilot channels in the outboard marsh around Ponds A9-A15 has the potential to affect individual California clapper rails, including nests, eggs, and young, directly. Such effects are most likely along the pilot channel excavation area near the northeast corner of Pond A9, which provides suitable nesting habitat for California clapper rails. As noted above, the probability of nesting California clapper rails is low in the brackish marsh and narrow areas of salt marsh where breaches and pilot channels are proposed along Alviso Slough.

As mentioned previously, prior to or concurrent with restoration of tidal action in Ponds A9, A10, and A11, the berm between Ponds A11 and A12 will be breached. If California clapper rail habitat has developed within Pond A12 by that time, there is some potential for effects to individuals or nests due to breaching. Similarly, berms between A14 and A9/A11, and between A13 and A12, will be breached prior to or concurrent with restoration of tidal action in Ponds A13-A15, potentially resulting in effects to individual California clapper rails.

If pilot channel excavation in brackish or salt marsh habitat, or breaching of berms for Phases 2 and 3 near suitable California clapper rail habitat, is conducted during the breeding season, protocol-level surveys for California clapper rails will be conducted prior to proposed project activities to determine whether nesting rails are present in the vicinity. If any California clapper rails are detected, 700-foot buffers between rail activity centers and construction will be followed. During any construction or excavation activities that may result in effects to California clapper rails, the limits of work will be clearly delineated to limit effects to this species. These conservation measures will minimize effects of human activity within marshes on California clapper rails.

As noted previously, tidal restoration will result in an increase in the abundance of marsh-associated predators such as northern harriers. However, mammalian predators will have less access to these restored marshes due to the breaching of levees and the presence of Alviso and Coyote sloughs on two sides of the A9-A15 complex. Further, because no high-tension powerlines run through these ponds, perch sites for most predatory raptors will be limited.

A large colony of California gulls nests on the interior berms separating Ponds A9, A10, and A14. Tidal restoration would result in the intentional lowering of these berms or eventual erosion of these berms through tidal action, thus causing these gulls to move elsewhere to nest. These displaced gulls may select nesting sites in close proximity to California clapper rail habitat elsewhere. The displacement of gulls from areas of lower quality California clapper rail habitat to areas of higher quality habitat could result in increased predation pressure by gulls on the rail. Predator management and MAM performed by the Refuge and the SBSPRP will help to minimize the risk of predation.

Monitoring, research, and predator management efforts involving people walking through tidal marshes or boats grounding on marshes could result in effects to individual California clapper rails. Adult California clapper rails are unlikely to be injured or killed during such activities, as they are expected to flee an area subject to such activities before injury or mortality occurs. However, these activities could destroy or damage California clapper rail nests or eggs, or result in the injury or mortality of less mobile young California clapper rails. Such activities are expected to be very localized, and implementation of conservation measures (such as minimizing such activities during the California clapper rail's breeding season) will minimize the potential for such effects.

Following complete restoration of Ponds A9-A15, the extent of trails at these ponds will be limited to a trail along the eastern edges of Ponds A12, A13, and A15, with shorter spurs in three areas. Observation platforms would be constructed at the ends of these spurs. Human activity use may increase in areas where trails and observation platforms are to be opened or improved. Use of the trail along the new FRM levee is likely to increase once this levee is connected to other Bay Trail segments at its northeast end, but the removal of a loop trail in the A9-A15 complex may tend to reduce trail use. Management of potential disturbances in adjacent habitat areas from recreational human activity may not be effectively regulated or controlled, even with the proposed conservation measures to maintain public use and activities along the developed trails.

Increased recreational trail use in areas where existing trails occur adjacent to California clapper rail habitat could result in the flushing of California clapper rails at high tides, increasing predation risk. No new trails are proposed to be opened adjacent to existing California clapper rail habitat, but rails that colonize the restored tidal marshes in Ponds A12, A13, A15, and A18 would be subjected to human disturbance from trail users. The breadth of the ecotone (345 feet) will limit disturbance of California clapper rails by people using the new FRM levee along eastern Pond A12 and southern Pond A18, as humans on the top of the levee will be far removed from suitable rail habitat. People using the spur trails and the levee trail along the southern Pond A12 levee, the Pond A12/A13 levee, and the northern Pond A15 levee will be closer to California clapper rail habitat, however, due to the absence of a constructed ecotone.

Interpretive signage will be installed at the edges of sensitive California clapper rail habitat areas discouraging human entry into those areas. If monitoring indicates that disturbance of California clapper rails by humans is adversely affecting rail populations, seasonal closures of portions of these trails would be considered as an adaptive management measure.

Salt Marsh Harvest Mouse

Excavation of pilot channels in the outboard marsh around Ponds A9-A15 has the potential to injure or kill salt marsh harvest mice by crushing or smothering them during the placement of sediment or other materials in suitable habitat, or by excavation of habitat. Such effects are most likely along the pilot channel excavation area near the northeast corner of Pond A9, which provides the highest-quality habitat for this species of all the breach locations. Abundance of salt marsh harvest mice is low in the brackish marsh and narrow areas of salt marsh where breaches and pilot channels are proposed along Alviso Slough. As mentioned previously, prior to or concurrent with restoration of tidal action in Ponds A9, A10, and A11, the berm between Ponds A11 and A12 will be breached. If salt marsh harvest mouse habitat has developed within Pond A12 by that time, there is some potential for effects to individuals due to breaching. Similarly, berms between A14 and A9/A11, and between A13 and A12, will be breached prior to or concurrent with restoration of tidal action in Ponds A13-A15, potentially resulting in effects to salt marsh harvest mice. Conservation measures will be implemented to minimize the potential for impacts to individual salt marsh harvest mice.

Disturbance of salt marsh harvest mice from pilot channel excavation, ditch block construction, breaching of berms prior to second or third phase breaching, and equipment access for these restoration-related activities would be similar to that described above. Disturbance of salt marsh harvest mice from recreational trail use would be similar to that described for California clapper rail above.

As described for California clapper rail, loss of individual salt marsh harvest mice due to predation could be exacerbated by the proposed project, at least in localized areas, and displacement of the California gull colony from the interior berms separating Ponds A9, A10, and A14 could cause these gulls to relocate in areas where they may be more likely to prey on salt marsh harvest mice.

Monitoring, research, and predator management efforts involving people walking through tidal marshes or boats grounding on marshes could also result in injury or mortality of salt marsh harvest mice or disturbance of breeding, foraging, and sheltering activities. Such activities are expected to be very localized. Effects to salt marsh harvest mice resulting from monitoring, research, and predator management on the Refuge will be covered by the existing biological opinion for the SBSPRP and a future biological opinion for the Refuge's Comprehensive Conservation Plan. Effects to salt marsh harvest mice resulting from perennial pepperweed control are discussed below under the "Perennial Pepperweed Control" section.

Effects Due to an Increase in Mercury Exposure

Effects of Corps-led Actions

It is well known that the Guadalupe River system, including Alviso Slough, has a relatively high concentration of mercury resulting from sediments washed from historical mercury mines in the upper watershed. Recent testing in Artesian Slough has revealed high mercury concentrations there as well, with total mercury being lower but methylmercury, the bioavailable form, being higher in Artesian Slough than Alviso Slough (City of San Jose 2013). Such mercury may be mobilized when pilot channels are excavated in outboard marshes along Artesian Slough prior to breaching, and the tidal action through those channels, as well as the increase in tidal prism and associated scour of sediments in Artesian Slough, could mobilize mercury-laden sediment from the slough.

Although the abundance of California clapper rails in the immediate vicinity of Artesian Slough is currently very low, mercury could be mobilized downstream into and along Coyote Slough. Mercury accumulation in eggs is known to affect California clapper rails in the Bay Estuary, with the South Bay containing the highest mercury levels. Although intake is generally not acute enough to result in lethal toxosis of adults or young, mercury is extremely toxic to embryos and thus results in low levels of egg viability, and reduced California clapper rail fecundity. Schwarzbach *et al.* (2006) found high mercury levels and low hatching success (due both to predation and, presumably, mercury) in California clapper rail eggs throughout the Bay. They also suggested that mercury exposure could slow or stunt development of young, possibly increasing predation risk. Mercury exposure has been also linked to reduced body condition in California clapper rails (Ackerman *et al.* 2011), suggesting there are potential detrimental effects on survivorship of adult birds as well. Mean mercury concentrations in captured California clapper rail blood samples were 0.56 micrograms/gram (μg/g; or parts per million), 9.87 μg/g in head feathers, and 9.04 μg/g in breast feathers (Ackerman *et al.* 2011). Birds with mercury concentrations in blood over 1.0 μg/g and 9.0 μg/g in feathers are considered at risk for impaired reproduction (Evers *et al.* 2004, Burger and Gochfeld 1997), and several individuals captured in that study had mercury levels above those thresholds. The mercury concentrations in both head and breast feathers in the Ackerman study suggest that rails were exposed to mercury over long periods of time, as those two feather tracts are grown in different stages of molt. This suggests that mercury exposure was chronic and accumulated over time.

Mercury is taken in by California clapper rails primarily through contaminated prey in the form of methylmercury. Methylmercury, unlike elemental mercury, is bioavailable in that it readily binds to living tissue and accumulates in aquatic food webs. For instance, in failed-to-hatch California clapper rail eggs in the Schwarzbach *et al.* (2006) study, methylmercury accounted for 95 percent of total mercury in those eggs, and this ratio of elemental to methylmercury has been found in previous studies as well (see Ackerman *et al.* 2011). In addition to reproductive failure, studies have shown that captive egrets fed doses of 0.5 milligrams of methylmercury were less motivated to hunt food, and had a reduced appetite (Bouton *et al.* 1999, Spalding *et al.* 2000). These effects may be related to reduced body condition, which could ultimately lower survivorship.

Inorganic mercury tends to be converted to methylmercury, primarily under somewhat anoxic conditions (Marvin-DiPasquale *et al.* 2003). California clapper rails are currently exposed to methylmercury when foraging on mudflats and in sloughs with high levels of mercury contamination. The proposed project has the potential to increase the exposure of California clapper rails to mercury by stirring up sediments during vegetation removal and dredging activities. Methylmercury may also be mobilized by the frequent wetting and drying of mercury-contaminated sediments during construction activities. Mercury-contaminated sediments that are currently buried too deep to adversely affect California clapper rails and other species could be mobilized by these activities, thus entering the food chain. The extent to which excavation of pilot channels and scour of sediments in Artesian Slough will release mercury such that it may be more bioavailable to California clapper rails, and to which any increased level of bioavailable mercury affects California clapper rails, is difficult to quantify.

Compared to a managed pond environment, mercury deposited in well-oxygenated marsh plains is not expected to methylate as readily (Grenier *et al.* 2010). Also, it is likely that there will be a relatively low temporal exposure after breaching occurs for mercury to circulate in the slough or restored ponds, methylate, and be incorporated into the food web. Therefore, if there is an increase in methylmercury, it will likely occur for only a short duration. Preliminary data collected for SBSPRP mercury monitoring suggest this is the case. Mercury levels in fish collected in Alviso Slough increased after the Pond A8 notch was opened in June 2011 but had already decreased by October 2011 (SBSPRP 2013). The increase in mercury levels was more pronounced around the notch than at downstream sampling locations, suggesting the effect was localized. Therefore, the loss of individual California clapper rails or reduction in reproductive success of rails is not expected to occur as a result of increased mercury exposure associated with the proposed project.

The effects of mercury on salt marsh harvest mice are largely unknown. However, this species is likely exposed to methylmercury through the tidal marsh food web and mercury concentrations in tidal marshes. Although Artesian Slough methylmercury concentrations are high, tidal marshes show no evidence of increased bioaccumulation of mercury compared to other South Bay tidal marshes, possibly due to a paucity of organic material in the sediment (Grenier *et al.* 2010). For example, resident songbirds captured in tidal marshes in Alviso Slough showed similar bioaccumulation of mercury as other South Bay marshes (Grenier *et al.* 2010). Because increases in mercury availability are expected to be short-term, as described for the California clapper rail, the potential for increased salt marsh harvest mouse exposure to mercury is relatively low. Therefore, salt marsh harvest mice are not expected to be affected by an increase in mercury exposure related to pilot channel excavation and sediment scour.

Effects of Service-led Actions

Because of the mercury contamination of the Guadalupe River from the New Almaden mine, some of the sediment in Alviso Slough may contain high concentrations of mercury. Such mercury may be mobilized when pilot channels are excavated in outboard marshes along Alviso Slough prior to breaching, and the tidal action through those channels, as well as the increase in tidal prism and associated scour of sediments in Alviso Slough, could mobilize mercury-laden sediment from Alviso Slough and Ponds A9-A15. Effects of this mercury mobilization on California clapper rails would be as described above for Corps-led activities. The effects of mercury mobilization on salt marsh harvest mice from Service-led activities are expected to be relatively low similar to those described above for Corps-led activities.

<u>Perennial Pepperweed Control</u>

Effects of Corps-led and Service-led Actions

Potential effects on California clapper rail and salt marsh harvest mouse foraging and nesting due to perennial pepperweed control could result from habitat alterations (*e.g.*, native plant mortality) and marsh access through California clapper rail and salt marsh harvest mouse habitat for treatment/ eradication, monitoring, or re-vegetation activities. Ground based spraying via foot or ARGOs and post-treatment monitoring requires access through the marsh and may result in vegetation trampling or salt marsh harvest mouse nest disturbance. Use of ARGOs for control will cause temporary disturbance of marsh vegetation. All treatment crew members will be supervised by a qualified biologist and will be trained to follow the guidelines presented in the "Walking In the Marsh:

Methods to Increase Safety and Reduce Impacts to Wildlife & Plants" protocol (Appendix A), thereby minimizing disturbance of California clapper rails, salt marsh harvest mice, and their habitats.

Disturbance of the marsh by field crews on-foot will be minimal because crews will be traversing through the marsh only once or twice per year to conduct treatment and monitoring, trails will not be established through the marsh, and no residual effects on marsh habitat quality are anticipated. Field crews will not crush any salt marsh harvest mice or their nests because they will be supervised by a qualified biologist and will avoid walking on high pickleweed vegetation and on wrack, where salt marsh harvest mice are likely to forage or nest. In addition, since crews will be walking slowly, any salt marsh harvest mice present will be able to move out of the immediate area. Due to the minimal amount of habitat disturbance caused by field crews and avoidance of direct impacts to salt marsh harvest mice, access of marshes by field crews on-foot for perennial pepperweed control will avoid the injury and mortality of salt marsh harvest mice and minimize the level of disturbance.

Field crews accessing the marsh via ARGOs for perennial pepperweed control may result in the temporary disturbance of marsh vegetation (habitat degradation) or crushing of individual salt marsh harvest mice or their nests beneath the ARGOs. These vehicles are designed to operate with low ground pressure (about 0.67 pounds per square inch) and distribute weight on specialized tracks. ARGOs exert a ground pressure approximately five times less than that of humans; however, a greater area of marsh vegetation would be disturbed by fields crews on ARGOs than on-foot.

ARGOs may crush and cause dieback of marsh vegetation, particularly sub-shrubby vegetation with brittle stems, such as pickleweed, the primary habitat of the salt marsh harvest mouse. Due to this identified impact, the quantity of suitable California clapper rail and salt marsh harvest mouse habitat directly affected by ARGOs is calculated by the distance within tidal marsh they will be driven to access and treat perennial pepperweed patches. There is a five-foot wide "track impact" from an ARGO traveling through the marsh. This impact would consist of temporary compaction or crushing of pickleweed and other marsh plants, with the vegetation expected to recover fully within a few months of impact. The travel path of ARGOs will be planned to minimize the amount of impact to California clapper rail and salt marsh harvest mouse habitat by traveling in mudflats whenever feasible.

The only perennial pepperweed control action that may temporarily disturb nesting California clapper rails is a portion of the marsh access for eradication activities. Backpack spraying will be used to treat perennial pepperweed within "700-ft Buffer Areas", and disturbance will be localized and very temporary (usually less than 30 minutes). California clapper rails may be harassed by treatment access within "700-ft Buffer Areas" where there is greater than one acre of infested perennial pepperweed and where treatment is likely to exceed 30 minutes. Boat-mounted spraying will be used to treat relatively larger clones along slough edges and may result in a larger scale disturbance (noise), but little immediate habitat destruction. ARGOs will not be used in "700-ft Buffer Areas" for California clapper rails. It is expected that control activities in areas with large acreages targeted for control will result in relatively more disturbance than in those areas with small acreages, given similar California clapper rail densities.

Any ARGOs used in control activities will stay 700 feet from known California clapper rail calling centers and will stay at least 50 feet from channel edges, thereby avoiding rail nest destruction or rail disturbance. However, if the intervening distance across a major slough channel or across a substantial physical barrier between the California clapper rail calling center and the proposed access area is greater than 200 feet, then access may proceed within the breeding season.

Areas where California clapper rails have been detected contain channels and low marsh vegetation used for mating, foraging, and nesting. The majority of perennial pepperweed patches occur in the transition zone and along channel edges dominated by gumplant. Perennial pepperweed patches also occur adjacent to *Spartina foliosa* patches of low marsh tidal deposition areas (wrack lines). Sensitive eradication areas include channel edges and areas where low marsh (*S. foliosa*-dominated) interfaces the pickleweed plain. Herbicide applications are not expected to cause direct mortality of *S. foliosa* and other native plant species if conservation measures are implemented to reduce herbicide spray drift and subsequent mortality of non-target plants. The eradication of perennial pepperweed is not likely to harm California clapper rails as a result of habitat loss because: (1) California clapper rails are not known to use perennial pepperweed as a habitat component, and (2) conservation measures will be implemented that avoid non-target plant eradication.

The herbicides, adjuvants, and dyes proposed for eradication of perennial pepperweed within the action area are also being used to eradicate invasive *Spartina* species in other parts of the Bay Estuary. The herbicides proposed were determined not to have any direct toxic effects to California clapper rails (California State Coastal Conservancy and Service 2003, California State Coastal Conservancy 2005). Direct toxicity of herbicide, surfactant, and colorant applications is unlikely to have significant toxic effects to California clapper rails since herbicides are directed to the upper portion of the plant and dry quickly on the plant leaf surface (usually within a few minutes of application), and exposure of rails to spray solutions would be very temporary. Even if California clapper rails are exposed to small amounts of spray solutions, they will not be injured since these chemicals are considered practically non-toxic to birds (California State Coastal Conservancy and Service 2003). The chemical treatment of perennial pepperweed will reduce expansion and formation of perennial pepperweed monocultures which alter soil conditions and crowd out native plant species used by California clapper rails for nesting and sheltering.

Salt marsh harvest mice are unlikely to come into contact with spray solutions applied to perennial pepperweed since the mice primarily inhabit pickleweed and other high marsh vegetation not targeted for control. Even if salt marsh harvest mice are exposed to small amounts of imazapyr, glyphosate, surfactants, or colorants used in the spray solutions, they would not likely be harmed since these chemicals are considered non-toxic to mammals (California State Coastal Conservancy and Service 2003, California State Coastal Conservancy 2005).

California clapper rails and salt marsh harvest mice will not lose habitat when perennial pepperweed is removed, since the rail and the mouse are not known to utilize perennial pepperweed. Removal of invasive perennial pepperweed and revegetation of the marsh-upland transition zone will provide high quality high tide refugia, a critical component of the habitat for the California clapper rail and salt marsh harvest mouse. Non-native perennial pepperweed threatens the transition zone refugia and tidal marsh habitat for the California clapper rail and salt marsh harvest mouse. Perennial pepperweed displaces higher quality tidal marsh vegetation including marsh gumplant and pickleweed. Perennial pepperweed also provides poor quality high tide refugia cover for the California clapper rail and salt marsh harvest mouse because it is leafless in the winter when the rail and the mouse are in most need of suitable upland cover during the frequent winter extreme high tide and storm events. Without suitable cover, the California clapper rail and salt marsh harvest mouse are vulnerable to predation during extreme high tide events. Therefore, perennial pepperweed control will provide a long-term benefit to the California clapper rail and salt marsh harvest mouse.

Revegetation will occur within the transition zone. Revegetation is not expected to disturb breeding California clapper rails because this activity will occur outside of the rail's breeding season. The transition zone is used by California clapper rails and salt marsh harvest mice primarily during extreme high tide events; therefore, restricting revegetation of the transition zone to low tides will minimize the potential for disturbing any California clapper rails and salt marsh harvest mice. The restoration of native plants within the transition zone will provide California clapper rails and salt marsh harvest mice with high quality high tide refugia, a critical component of population recovery for the rails and the mice.

Pacific Coast Population of the Western Snowy Plover

Loss of Habitat

Effects of Corps-led Actions

Western snowy plovers are not known or expected to nest or forage along the WPCP segment of the FRM levee or in or around Pond A18 under current conditions. As a result, construction and restoration east of Artesian Slough will not result in a net loss of western snowy plover habitat. However, prior to breaching, Pond A18 may be drawn down to facilitate within-pond preparations such as construction of ditch blocks. When Ponds A16 and A17 were drawn down prior to SBSPRP Phase I activities, western snowy plovers used the dried-out pond bottoms for nesting. If Pond A18 is drawn down prior to breaching, then the dried-out pond bottom is likely to attract nesting western snowy plovers. As a result, breaching will flood this temporarily created western snowy plover habitat.

Aside from impacts to temporarily created habitat if Pond A18 is drawn down, construction of the FRM levee will not directly affect any suitable nesting habitat for the western snowy plover. Although this species has nested in the Alviso impoundment, in Ponds A12, A13, and A16, and in New Chicago Marsh, portions of which will be directly impacted by levee construction, the western snowy plover does not nest near the existing non-engineered levees that occur within the proposed construction footprint. Rather, western snowy plovers nest farther from levees, apparently due to the disturbance associated with human use of the levees, use of levees by predatory mammals, and the species' inability to see over levees (and thus detect approaching predators) if the nest is placed too close to the levee. Thus, even under existing conditions, there is a zone close to the levees that has not been used for nesting by western snowy plovers.

However, for these same reasons, FRM levee construction could result in indirect effects to western snowy plovers by causing plovers to avoid using habitat that is otherwise suitable. The ultimate height of the FRM levee is expected to be approximately 10 feet higher than the existing levee on the south side of Pond A16, and the very low levee along the eastern side of A12 is likely to be raised even more, relative to its existing height. The levees may initially be built even higher, as some subsidence is expected over time as materials settle. As a result, the FRM levee will be substantially taller and wider than the existing levees. Western snowy plovers are unlikely to nest very close to the levee for the reasons discussed above, especially when the Bay Trail is developed atop the levee and human activity is even greater than it currently is. As a result, the zone near levees that western snowy plovers avoid for nesting would shift farther from the levee.

The extent of this indirect effect (*i.e.*, the amount of otherwise suitable nesting habitat that will no longer be used by nesting western snowy plovers) is unknown. Western snowy plovers nesting in New Chicago Marsh, on islands in Pond A16, and in Ponds A12 and A13 tend to nest well away from the Pond A16 levee. As a result, it is possible that they nest so far from the levee already that an increase in height of, and human activity along, the levee would have no effect on the plovers' perception of suitable habitat availability. In addition, tidal restoration in Ponds A12 and A13 would make those ponds completely unsuitable for use by nesting western snowy plovers. However, it is possible that increasing the height of the levee would cause plovers to retreat even farther from the levee. It is unknown whether western snowy plovers would continue to nest in the Alviso impoundment after FRM levee construction, and it is possible that plovers might view the entire impoundment as being no longer suitable due to the taller, wider levee. Use of this impoundment by nesting western snowy plovers has been sporadic (*i.e.*, less than annual), and usually by only a single pair when it is used at all.

Although the number of pairs of western snowy plovers that may no longer nest in the vicinity of the action area as a result of raising the height of the levee is unknown, it is likely that no more than one or two pairs would be affected because areas near the action area levees have been inconsistently used by few plovers in the past. The proposed project will implement compensatory conservation measures by distributing pea gravel or other appropriate substrate on an island in Pond A16, maintaining this island for use by nesting western snowy plovers, and increasing the intensity of predator management in the vicinity. Gravel may make it more difficult for predators such as California gulls and northern harriers to detect western snowy plovers due to camouflage (*e.g.*, plovers may be difficult to distinguish within the gravel from a distance) and increased topographic relief associated with the gravel and footprints left by people distributing the gravel. As a result, predation rates on both western snowy plover eggs and chicks are likely to be lower in areas with such gravel, and more plovers may be attracted to nest in areas with gravel. Providing gravel on an island in Pond A16 is expected to increase western snowy plover nesting abundance, and possibly nesting success, thus compensating for the adverse effects of other proposed project activities on nesting western snowy plovers. These measures are expected to minimize any adverse effects of Corps-led actions on the availability of suitable western snowy plover habitat, or western snowy plover abundance or productivity.

Expansion of the FRM levee into pond, seasonal wetland, and muted tidal/diked marsh habitat will result in filling of ostensibly suitable foraging habitat and, as discussed above, the possible avoidance of foraging habitat that is otherwise suitable but would be too close to the levee following construction. However, western snowy plovers are very rarely seen foraging close to the eastern edges of Ponds A12 and A13, the southern edge of Pond A16, or the northern edge of New Chicago Marsh. As a result, effects of levee construction on western snowy plover foraging habitat are likely limited to reduced use of the Alviso impoundment. As foraging habitat in the vicinity is not likely limiting western snowy plover populations (based on the expanses of suitable foraging habitat present in managed ponds and New Chicago Marsh that is unoccupied at any given time, as well as the abundance of prey in these area), the effects of Corps-led actions on western snowy plover foraging habitat are unlikely to have a substantive effect on western snowy plover populations.

Effects of Service-led Actions

Service-led tidal restoration will result in the loss of all western snowy plover nesting habitat in Ponds A9-A15, as western snowy plovers do not nest in tidal habitats. Further, because this species forages infrequently on tidal mudflats, western snowy plovers are expected to make little use of Ponds A9-A15, even for foraging, once they are restored to tidal action. Based on data from 2012, when five of 13 nests in the proposed project vicinity were in Pond A13 (Donehower *et al.* 2012), and 2013, when two of 10 nests in the proposed project vicinity were in Pond A9 (Robinson-Nilsen *et al.* 2013), up to five pairs of western snowy plovers may be displaced by tidal restoration. Because restoration will be phased, some western snowy plover nesting habitat is expected to be present in Ponds A9-A15 until 2030, when the last of these ponds may be breached.

As discussed previously, the MAM for the SBSPRP will help to achieve the goal of supporting at least 250 individual breeding western snowy plovers in the SBSPRP area, which is half of the number of breeding western snowy plovers required within the San Francisco Bay Recovery Unit for delisting (Service 2007). The SBSPRP will implement adaptive management measures, such as more intensive management of certain ponds for western snowy plovers, as necessary to achieve that goal. The MAM associated with the SBSPRP would therefore assist in compensating for impacts to western snowy plovers from loss of nesting habitat in Ponds A9-A15 by helping to manage for plovers in other SBSPRP ponds. Because some western snowy plover nesting habitat will remain in the Ponds A9-A15 complex until 2030, there is ample time for the MAM associated with the SBSPRP to determine how to increase western snowy plover densities elsewhere prior to complete loss of plover nesting habitat from Ponds A9-A15. As described in previous sections, if the MAM indicates impacts to waterbirds (including western snowy plovers) are too severe, then fewer ponds will be restored to tidal action.

Development of a Bay Trail segment on the FRM levee, which is a Service-led activity, will increase recreational use of the levee top. This will contribute to disturbance of western snowy plovers nesting in adjacent areas, leading to an effective loss of habitat use. Research shows that nesting western snowy plovers within the South Bay are very sensitive to disturbance by recreational trail users and construction activities within 600 feet of their nests (Robinson 2008, San Francisco Bay Bird Observatory and Service 2010).

Direct Effects to Individuals

Effects of Corps-led Actions

As described for California clapper rail above, disturbance such as loud noise or the presence and movement of people, and heavy equipment near western snowy plover habitat may alter bird behavior in ways that result in injury, mortality, or reduced nesting success. Such disturbance could result in temporary or permanent habitat loss due to western snowy plover avoidance of areas that have suitable habitat but intolerable levels of disturbance; abandonment of nests, eggs, or young by nesting pairs; a reduction in foraging efficiency if high-quality foraging areas are impacted; and increased movement or flushing, or altered activity patterns, that reduce energy reserves and increase predation risk. Construction of the Alviso Segment of the FRM levee near western snowy plover habitat in Ponds A12 and A13, the Alviso impoundment, New Chicago Marsh, and A16 could result in disturbance of nesting and foraging plovers in those areas. However, moderate to fairly heavy human use already exists along the levees adjacent to western snowy plover habitat in the proposed project area. Numerous pedestrians and cyclists use the levees around the Ponds A9-A15 complex, between Ponds A15 and A13/A14, and between A16 and New Chicago Marsh on a daily basis. As a result, the western snowy plovers that use habitat adjacent to these levees (a) tend to avoid areas close to the levees used by humans, and (b) are already habituated to the use of humans along those levees. This reduces the extent to which western snowy plovers will be disturbed by levee construction and use of the levees by humans following levee completion.

Nevertheless, to minimize such impacts, work in and adjacent to potential western snowy plover nesting habitat would be conducted outside of the nesting season to the extent practicable. If seasonal avoidance is not possible, surveys before and during construction would be conducted for nesting western snowy plovers, and appropriate buffers (*i.e.*, 600 feet during construction activities) would be implemented between proposed project activities and nesting western snowy plovers.

Because western snowy plovers are not known or expected to nest very close to the existing levees, no western snowy plover nests or eggs would be located within the footprint of FRM levee construction. If nesting has occurred in areas adjacent to the levees, such as the Alviso impoundment, it is possible that young western snowy plovers could move into the construction footprint. However, if nesting occurs in the construction zone, then a Service-approved biologist will need to clear the area before construction can continue.

If Pond A18 is drawn down prior to breaching, as described previously, then breeding western snowy plovers could be nesting in the pond when construction of ditch blocks and breaching occurs. While adult breeding western snowy plovers would not be injured or killed by restoration-related construction activities or breaching, as they would flee the vicinity of any such activities, their nests, eggs, or young could be crushed, trampled, buried, or lost to flooding as a result of displacement of sediment into nesting habitat during construction of ditch blocks, or levee breaching and flooding of occupied habitat. For example, in 2010, two western snowy plovers nests at Ravenswood Pond SF2 were depredated when construction crews for the SBSPRP were working within 600 feet of the nests (San Francisco Bay Bird Observatory and Service 2010). Therefore, there is the potential for construction activities within 600 feet of a western snowy plover nest to flush the western snowy plover from its nest exposing the nest to depredation. To minimize such impacts, work in and adjacent to potential breeding western snowy plover nesting habitat would be conducted outside of the nesting season to the extent practicable. If seasonal avoidance is not possible, surveys prior to and during construction would be conducted for nesting breeding western snowy plovers, and appropriate buffers (*i.e.*, 600 feet during construction activities) would be implemented between proposed project activities and nesting western snowy plovers.

Loss of individual western snowy plovers (including eggs and chicks) due to predation could be exacerbated by the proposed project, at least in localized areas. The restoration of tidal marsh habitat will increase habitat for northern harriers, which are known to prey on western snowy plovers. Compensatory mitigation involving an increase in predator management in the New Chicago Marsh/A16 vicinity will reduce any increase in predation resulting from increased northern harrier populations from Corps-led activities.

Maintenance activities along the FRM levee have the potential to disturb nesting and foraging western snowy plovers as well. Recreational use of the Bay Trail segment atop the levee will affect western snowy plovers in adjacent areas to the point that plovers present in areas such as Pond A16 or New Chicago Marsh during levee maintenance activities will already be habituated to some level

of human activity on the levee. As a result, routine inspections and minor maintenance activities are not expected to result in an increase in western snowy plover disturbance, relative to other types of levee use. Even mowing along the levee tops is unlikely to cause substantial disturbance of western snowy plovers given the very narrow swaths to be mowed, the brevity of mowing operations, and the distance (330 feet or more) between mowing and western snowy plover habitat. Other maintenance activities involving heavy equipment would be conducted outside of the nesting season to the extent practicable, and if seasonal avoidance is not possible, pre-construction surveys would be conducted for nesting western snowy plovers, and appropriate buffers would be implemented between proposed project activities and nesting western snowy plovers as necessary.
Even with the implementation of conservation measures to minimize disturbance of nesting western snowy plovers, snowy plovers that disperse away from disturbance may not successfully establish new breeding territories and breed. Plovers forced to disperse would need to either maintain existing pair bonds or develop new pair bonds and establish new breeding territories in other suitable habitat areas. Disturbance that occurs during the non-breeding season could also result in injury, mortality, or the disturbance of western snowy plover foraging and sheltering activities. Displaced individuals could be subjected to injury or mortality from starvation, physiological stress, and increased predation.

Effects of Service-led Actions

Disturbance of western snowy plovers using Ponds A9-A15 may occur due to pilot channel excavation, ditch block construction, and equipment access for these restoration-related activities. The effects of such disturbance would be similar to that described above.

If drawdown of Ponds A9-A15 occurs to facilitate within-pond preparations, western snowy plovers are expected to nest in at least some of these ponds. While adult western snowy plovers would not be injured or killed by restoration-related construction activities, as they would flee the vicinity of any such activities, their nests, eggs, or young could be crushed, trampled, buried, or lost to flooding as a result of displacement of sediment into nesting habitat during berm lowering or construction of ditch blocks, or levee breaching and flooding of occupied habitat. To minimize such impacts, work in and adjacent to potential western snowy plover nesting habitat would be conducted outside of the nesting season to the extent practicable. If seasonal avoidance is not possible, pre-and during construction surveys would be conducted for nesting western snowy plovers, and appropriate buffers would be implemented between proposed project activities and nesting western snowy plovers.

As described for California clapper rail above, loss of individual western snowy plovers, eggs, and young may increase as a result of predation. An increase in tidal marsh habitat will result in an increase in northern harrier populations, and displacement of the California gull colony on the interior berms separating Ponds A9, A10, and A14 may cause gulls to relocate to areas closer to high densities of nesting western snowy plovers. Both the northern harrier and California gull are important predators of western snowy plovers in the South Bay. Predator management and MAM performed by the Refuge and the SBSPRP will help to minimize the risk of predation on western snowy plovers.

Service-led activities include the provision of recreational trails. Human activity may increase in areas where trails and observation platforms are to be opened or improved. Studies of the effects of recreational trail use in the South Bay on western snowy plovers showed that trail users caused

western snowy plovers to flush from their nests when walkers approached on average within 538 feet when approached directly or 478 feet when passed tangentially (Robinson 2008). Use of the trail along the new FRM levee is likely to increase once this levee is connected to other Bay Trail segments at its northeast end, but the removal of a loop trail in the A9-A15 complex may tend to reduce trail use. Management of potential disturbances in adjacent habitat areas (such as Ponds A9-A15 that have not yet been converted to tidal habitats) from recreational human activity may not be effectively regulated or controlled, even with the proposed conservation measures to maintain public use and activities along the developed trails. Increased recreational trail use adjacent to western snowy plover habitat could have the same disturbance effects as described above.
Interpretive signage will be installed at the edges of sensitive habitat areas discouraging human entry into those areas. If monitoring indicates that disturbance of western snowy plovers by humans is adversely affecting plover populations, seasonal closures of portions of these trails would be considered as an adaptive management measure.

Effects Due to an Increase in Mercury Exposure

Effects of Corps-led Actions

Studies in San Diego County (Hothem and Powell 2000), at Point Reyes (Schwarzbach *et al.* 2005), and in the South Bay (Schwarzbach and Adelsbach 2003) have found elevated mercury levels in western snowy plover eggs. At Point Reyes, high levels of mercury in unhatched eggs were thought to be a possible reason for the inviability of these eggs. In the San Diego County and South Bay studies, however, concentrations of mercury in western snowy plover eggs were below known embyrotoxic thresholds established for other species.

Western snowy plovers are currently exposed to mercury in ponds containing mercury-contaminated water or sediment. Proposed tidal restoration activities that stir up contaminated sediments, such as pilot channel excavation, construction of ditch blocks, and scour due to increased tidal prism would all occur just prior to, or as a result of, tidal restoration. Although western snowy plovers foraging on intertidal mudflats may be affected by increased mercury mobilization resulting from these activities, activities that stir up mercury-laden sediments in tidal habitats are expected to have little effect on snowy plovers due to the infrequency with which snowy plovers forage in intertidal habitats in the proposed project area. Furthermore, western snowy plovers are not known to use the Pond A18 area under existing conditions, and proposed project activities are not expected to enhance conditions for western snowy plovers in A18 after proposed project completion.

Effects of Service-led Actions

Potential effects of mercury mobilization and exposure on western snowy plovers, resulting from Service-led activities, are expected to be similar to those described above for the Corps-led activities.

California Least Tern

California least terns do not nest in the action area, and thus the proposed project is not expected to result in in any effects to nesting California least terns. California least terns have been observed foraging in the action area's ponds (A9, A11, and A14) only rarely, and they have not been observed foraging in Pond A18. Although they could potentially forage in any of these ponds that contain fish, survey data collected for the SBSPRP and incidental observations by birders indicate that

California least terns visit the action area (as a post-breeding forager) only irregularly and in low numbers.

Habitat Modification

Effects of Corps-led Actions

Construction of the FRM levee and the tide gate and pedestrian bridge in Artesian Slough will not affect California least tern foraging or roosting habitat. Although California least terns have not been recorded foraging in Pond A18, they could potentially forage there (albeit irregularly and in low numbers, given the lack of records). Drawing down Pond A18 prior to breaching would eliminate California least tern foraging habitat in the pond in the short term, and restoration of Pond A18 to tidal habitats would reduce the extent of suitable foraging habitat available to California least terns in the longer term. However, tidal marsh restoration is expected to benefit fish populations considerably by providing nursery habitat in the extensive channel networks that will be restored and by exporting organic material to aquatic habitats outside the restored habitat. As a result, tidal restoration is expected to increase fish abundance (through improved water quality, food resources, and spawning and rearing habitat) in the open waters of the Bay where California least terns also forage (in addition to foraging in managed ponds), thus increasing prey availability in the South Bay for California least terns. Due to the low level of California least tern use of Pond A18 and the benefits of tidal restoration to prey fish populations, Corps-led actions will not have a substantive adverse effect on California least tern habitat and prey, and they may have a beneficial effect.

Effects of Service-led Actions

Service-led tidal restoration will result in the conversion of managed pond habitat in Ponds A9-A15 to tidal habitats. Drawing down these ponds prior to breaching would eliminate California least tern foraging habitat in the ponds in the short term, and in the longer term, there would be a net reduction in potential foraging habitat for the California least tern due to the conversion of aquatic habitat within these ponds to mostly vegetated habitats. However, California least terns have only been recorded foraging in Ponds A9-A15 infrequently and in low numbers. Also, as noted previously, tidal restoration is expected to have substantial beneficial effects on South Bay fish populations. Due to the low level of California least tern use of Ponds A9-A15 and the benefits of tidal restoration to prey fish populations, Service-led restoration activities will not have a substantive adverse effect on California least tern habitat and prey, and they may have a beneficial effect.

Disturbance of Foraging Individuals

Effects of Corps-led Actions

Because California least terns have not been recorded using Pond A18 or any of the other ponds near the FRM levee (*i.e.*, A12, A13, or A16), there is little potential for disturbance of foraging California least terns from Corps-led actions. If individuals were to forage in these ponds during FRM levee construction and they were disturbed by construction activities, they would simply move away to other, more traditionally used foraging areas.

Effects of Service-led Actions

Disturbance such as loud noise or the presence and movement of people and heavy equipment near California least tern foraging habitat may alter the tern's foraging behavior. Such disturbance could result in temporary or permanent habitat loss due to California least tern avoidance of areas that have suitable habitat but intolerable levels of disturbance; a reduction in foraging efficiency if high-quality foraging areas are impacted; and increased movement or altered activity patterns that reduce energy reserves and increase predation risk.

Because California least terns have been recorded using Ponds A9-A15 for foraging infrequently and in low numbers, the number of individuals that could be disturbed by Service-led construction or recreational activities is very low. If individuals were to forage in these ponds during restoration-related construction or breaching activities, or during high levels of recreation-related activity, and they were disturbed by those activities, they would simply move away to other, more traditionally used foraging areas.

<u>Effects Due to an Increase in Mercury Exposure</u>

Effects of Corps-led Actions

Because fish bio-accumulate methylmercury, and California least terns eat almost exclusively small fish, there is some potential for mercury mobilized by Corps-led restoration activities (as described above for California clapper rail) to adversely affect California least terns. California least terns are currently exposed to mercury in the South Bay by foraging on fish in contaminated tidal habitats containing mercury-contaminated water or sediment during their post-breeding period. Restoration activities in Pond A18 will mobilize contaminated sediments, and therefore there is the potential to increase California least terns' exposure to mercury. Methylmercury may also be mobilized by the frequent wetting and drying of mercury-contaminated sediments during construction activities. Such exposure could potentially affect the development of juveniles that ingest mercury in food taken during the post-breeding period and may affect fecundity in adults that ingest contaminated fish.

Recent biosentinel sampling in South Bay managed ponds and marshes indicates that mercury concentrations in fish are above the Bay mercury total maximum daily load of 0.03 μg/g for small fish (San Francisco Bay Regional Water Quality Control Board 2006). Mean mercury levels of longjaw mudsuckers and threespine sticklebacks in Alviso Slough fringe marshes were 0.11 μg/g and 0.16 μg/g, respectively (Grenier *et al.* 2010). These levels were higher (but not significantly) than in other South Bay reference sites (mudsuckers: 0.08 μg/g, stickleback: 0.11 μg/g). Based on this information, California least terns foraging in the South Bay could be exposed to mercury levels that are detrimental to piscivorous birds even in the absence of the proposed project. This is evident in Forster's terns (*Sterna forsteri*), a better-studied tern species that breeds in the South Bay, and thus has higher exposure to mercury than California least terns. In a contaminants study of Forster's terns, approximately 50 percent of captured terns were considered at or above moderate risk (> 1.0 μg/g), 13 percent were at or above high risk (>3.0 μg/g), and 9 percent were at or above extra-high risk (>4.0 μg/g) for impaired reproduction based on their blood mercury concentrations (Ackerman *et al.* 2008a). Blood sampling over time (between pre-breeding and breeding stages), suggests that breeding terns were at higher risk due to mercury increasing in their blood, suggesting terns' mercury concentrations increased with the time they spent foraging while in the Bay (Ackerman *et al.* 2008a).

Blood mercury concentrations were highest in terns captured in the southernmost portions of the Bay, in the Alviso salt pond complex, including Pond A8 (Ackerman *et al.* 2008a). Unexpectedly, blood mercury concentrations in Forster's terns were substantially higher approximately two months after arriving in the Bay (*i.e.*, the period between pre-breeding and breeding) than observed in Caspian terns (*Hydroprogne caspia*) during the same time period (Eagles-Smith *et al.* 2009). Caspian terns had much higher mercury levels upon arriving, but Forster's terns mercury levels were soon elevated beyond those of Caspian terns, despite the fact that Caspian terns forage on larger prey (*i.e.*, at higher trophic levels). This was likely due to differences in foraging ecology, as Caspian terns tend to forage in the open bay waters or at inland reservoirs and Forster's terns forage mainly in ponds and tidal marsh channels (Ackerman *et al.* 2008b). As noted above, open waters in the Bay are less likely to methylate mercury than tidal marsh areas (Marvin-DiPasquale *et al.* 2003), and ponds have the potential to methylate mercury due to high levels of degradable organic matter (Grenier *et al.* 2010). Therefore, terns that forage in ponds are much more likely to be exposed to mercury than those foraging in open bay waters.

Although mercury concentrations in post-breeding California least terns in the South Bay are largely unknown, it would be expected that California least terns' exposure to mercury in the South Bay is substantially less than both Caspian and Forster's terns. Because California least terns occur only in the South Bay during post-breeding periods, they would be exposed to mercury for a relatively brief period of time. Further, because they tend to forage in open bay waters or in managed ponds in the Mountain View area (where legacy contamination by mercury should be lower than in areas that receive drainage from the mercury mines in the Guadalupe River watershed or in Artesian Slough), their exposure to mercury should be less than those of Forster's terns. Also, because they eat smaller fish than Caspian terns, California least terns likely accumulate mercury slower than Caspian terns.

California least terns do appear to have some exposure to mercury from central San Francisco Bay (Central Bay) foraging areas near their colonies. Hothem and Zador (1995) analyzed contaminant levels in California least tern eggs collected at the Oakland airport and Alameda Point colonies, and from five colonies along San Diego Bay. Mercury was detected in all eggs, but concentrations were higher in eggs from the Central Bay, with an average of 1.88 μg/g in Central Bay colonies and 1.07 μg/g in San Diego colonies. In comparison, concentrations of mercury in collected Forster's tern eggs averaged 1.35 μg/g (Ackerman and Eagles-Smith 2009). Egg mercury concentrations above 1.0 μg/g is considered high enough for impaired hatchability and embryonic mortality in birds (Scheuhammer *et al.* 2007), and although eggs with concentrations above 1.0 μg/g can hatch, there may be residual effects of mercury on chick mortality after hatching (Ackerman and Eagles-Smith 2009). This suggests that Forster's terns' exposure to mercury during the pre-breeding and breeding periods in the South Bay is higher than California least terns foraging in the Central Bay during the same periods, due in part to overall higher mercury concentrations in the South Bay and their use of pond and tidal marsh foraging sites (as opposed to open bay waters). Because maternally-deposited mercury in eggs is a result of recent dietary exposure (Heinz and Hoffman 2003), mercury in California least tern eggs likely is associated with foraging sites near colonies and not associated with mercury from the South Bay that they are exposed to during post-breeding periods.

Although the potential effects of increased mercury exposure on California least terns resulting from the proposed project are difficult to determine, California least terns are unlikely to be affected substantially by an increase in mercury exposure from the proposed project. This is because California least terns tend to forage in open water habitats in the Bay or managed ponds in the

Mountain View area, where their exposure to mercury is lower than if they foraged more frequently in ponds in the Alviso area and/or in marshes like Forster's terns. Also, mercury that may impair California least tern reproduction is more likely to be derived from pre-breeding and breeding foraging sites than post-breeding staging areas in the South Bay. Finally, the increase in mercury mobilization resulting from Corps-led activities is expected to be relatively brief in duration.

Effects of Service-led Actions

Potential effects of mercury mobilization and exposure on California least terns, resulting from Service-led activities in Ponds A9-A15, are expected to be similar to those described above for Corps-led activities.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act.

Climate Change

The global average temperature has risen by approximately 0.6 degree Centigrade during the 20th Century (International Panel on Climate Change [IPCC] 2001, 2007a, 2007b; Adger *et al.* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IPCC 2001, 2007a, 2007b; Adger *et al.* 2007), and that it is "very likely" that it is largely due to man-made emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007). Ongoing climate change (Inkley *et al.* 2004, Adger *et al.* 2007, Kanter 2007) likely imperils the California clapper rail, salt marsh harvest mouse, Pacific Coast population of the western snowy plover, and California least tern and the resources necessary for their survival, since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, diseases, and non-native competitors. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat. Rising sea levels are likely to inundate much of the remaining salt marsh habitat available for the California clapper rail and salt marsh harvest mouse. Without upland habitat buffers available for the landward transgression of the marsh, the amount of suitable salt marsh habitat is likely to decrease with rising sea levels. The proposed project will reduce the cumulative effects of the loss of suitable salt marsh habitat within the action area from sea level rise by construction of the 345-foot-wide ecotone berms along Ponds A12 and A18 which will create an upland habitat buffer that will allow for the landward transgression of the marsh.

Conclusion

After reviewing the current status of the California clapper rail and salt marsh harvest mouse, the environmental baseline for these species within the action area, the effects of the proposed project and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of these species. We based this determination on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual California clapper rails and salt marsh harvest mice; (2) the avoidance of disturbing any breeding California clapper rails; (3) the restoration of at least 517 acres of tidal salt marsh/brackish marsh habitat and creation of 67 acres of ecotone habitat for the California clapper rail and salt marsh harvest mouse within Pond A18; (4) the restoration of at least 300 acres of tidal salt marsh habitat and creation of 30 acres of ecotone for the California clapper rail and salt marsh harvest mouse within Pond A12; (5) the restoration of additional tidal marsh habitat for the California clapper rail and salt marsh harvest mouse within some of the Ponds A9-A15 under an adaptive management plan; (6) the enhancement of tidal marsh habitat for the California clapper rail and salt marsh harvest mouse along Artestian, Coyote, and Alviso sloughs through salinization of freshwater and brackish marsh habitat from increased tidal prism; and (7) the implementation of a long-term predator management plan and invasive plant species control plan.

After reviewing the current status of the Pacific coast population of the western snowy plover, the environmental baseline for this species within the action area, the effects of the proposed project and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of this species. We based this determination on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual western snowy plovers; (2) the avoidance of disturbing any breeding western snowy plovers during construction of the proposed project; (3) the implementation of a long-term predator management plan; (4) the enhancement of nesting habitat for western snowy plovers within Pond A16; and (5) the proposed project will enable the SBSPRP to fulfill their commitment to maintaining at least 250 breeding individual western snowy plovers within the SBSPRP area through adaptive management of suitable nesting habitat.

After reviewing the current status of the California least tern, the environmental baseline for this species within the action area, the effects of the proposed project and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of this species. We based this determination on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual California least terns; (2) the avoidance of disturbing any breeding California least terns; and (3) the increase in the abundance of prey fish populations for the California least tern in the South Bay through tidal marsh restoration.

INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act and Federal regulations pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. The Service defines harassment as an intentional or negligent act or omission that creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. The Service defines harm to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), take that is incidental to and not intended as part of the agency action is not considered to be prohibited, provided such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below for the California clapper rail, salt marsh harvest mouse, Pacific coast population of the western snowy plover, and California least tern are nondiscretionary, and must be implemented by the Corps and the Refuge so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption under section 7(o)(2) to apply. The Corps and the Refuge have a continuing duty to regulate the activity that is covered by this incidental take statement. If the Corps or the Refuge: (1) fail to require the applicant or any of its contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or the Refuge must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take

California Clapper Rail

The Service anticipates incidental take of individual California clapper rails will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of California clapper rails that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment of all California clapper rails within the 1.04 acres of tidal freshwater marsh foraging/dispersal habitat disturbed along Artesian Slough during tide gate and pedestrian bridge construction.

2. The harassment of all California clapper rails within the 0.11 acre of tidal/brackish marsh foraging/dispersal habitat disturbed along the outboard Pond A18 levee during breaching and excavating the pilot channels.

3. The harassment and non-lethal harm of all California clapper rails within 17 acres of tidal marsh habitat lost due to scour along Artesian and Coyote sloughs.

4. The annual harassment of all California clapper rails within perennial pepperweed treatment areas in Pond A18.

5. The ongoing harassment by trail users of all California clapper rails within 50 feet of the pedestrian bridge constructed over Artesian Slough.

Service-led Actions

1. The harassment of all California clapper rails within the 0.06 acre of tidal/brackish marsh foraging/dispersal habitat disturbed along the outboard levees of Ponds A9-A15 during breaching and excavating the pilot channels.

2. The harassment and non-lethal harm of all California clapper rails within 40 acres of tidal marsh habitat lost due to scour along Alviso and Coyote sloughs.

3. The ongoing harassment by trail users of all California clapper rails within 50 feet of the segments of the trails constructed without a wide ecotone berm along the southern Pond A12 levee, the Pond A12/A13 levee, and the northern Pond A15 levee once tidal marsh is restored to these ponds.

4. The ongoing harassment of all California clapper rails within 50 feet of the Ponds A9-A15 levees during levee operation and maintenance activities.

5. The annual harassment of all California clapper rails within perennial pepperweed treatment areas in Ponds A9-A15.

Salt Marsh Harvest Mouse

The Service anticipates incidental take of individual salt marsh harvest mice will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of salt marsh harvest mice that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment and harm of all salt marsh harvest mice within the 13.65 acres of low quality salt marsh habitat disturbed along the edges of the Alviso impoundment, the northern edge of New Chicago Marsh, adjacent to the southern levee of Pond A16, and along both northern and southern sides of the existing Pond A18 levee during construction of the FRM levee and the Artesian Slough tide gate and pedestrian bridge.

2. The harassment and harm of all salt marsh harvest mice within the 0.11 acre of salt/brackish marsh habitat disturbed on the outboard Pond A18 levee along Artesian and South Coyote sloughs during breaching and excavation of the pilot channels.

3. The harassment and non-lethal harm of all salt marsh harvest mice within 17 acres of tidal marsh habitat lost due to scour along Artesian and Coyote sloughs.

4. The ongoing harassment and harm of all salt marsh harvest mice within 25 feet of the FRM levee top during levee operation and maintenance activities (*e.g.*, mowing a 15-foot wide strip of ruderal grassland habitat adjacent to the levee crown once per year).

5. The ongoing harassment by trail users of all salt marsh harvest mice within 25 feet of the pedestrian bridge constructed over Artesian Slough.

6. The annual harassment of all salt marsh harvest mice within perennial pepperweed treatment areas in Pond A18.

Service-led Actions

1. The harassment and harm of all salt marsh harvest mice within the 0.06 acre of tidal/brackish marsh habitat disturbed along the outboard levees of Ponds A9-A15 during breaching and excavating the pilot channels.

2. The harassment and non-lethal harm of all salt marsh harvest mice within 40 acres of tidal marsh habitat lost due to scour along Alviso and Coyote sloughs.

3. The capture of all salt marsh harvest mice on Refuge lands within the construction footprint in the action area during construction of the proposed project.

4. The ongoing harassment by trail users of all salt marsh harvest mice within 25 feet of the trails constructed along New Chicago Marsh and Ponds A12, A13, A15, and A18 once tidal marsh is restored to these ponds and ecotone habitat is created along Ponds A12 and A18.

5. The ongoing harassment of all salt marsh harvest mice within 25 feet of the Ponds A9-A15 levees during levee operation and maintenance activities.

6. The annual harassment of all salt marsh harvest mice within perennial pepperweed treatment areas in Ponds A9-A15.

<u>Pacific Coast Population of the Western Snowy Plover</u>

The Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment of all western snowy plovers within 600 feet of the Alviso Segment of the FRM levee in Ponds A12 and A13, the Alviso impoundment, New Chicago Marsh, and Pond A16 during construction of the proposed project.

2. The harassment and harm of two (2) breeding pairs of western snowy plovers due to the loss of breeding habitat in the Alviso impoundment and northern New Chicago Marsh due to the raising and widening of the FRM levee.

3. The annual harassment of all of western snowy plovers within 600 feet of the FRM levee during levee operation and maintenance activities adjacent to Pond A16, New Chicago Marsh, and the Alviso impoundment.

Service-led Actions

1. The harassment and harm of five (5) breeding pairs of western snowy plovers after the permanent loss of 2,010 acres of potential salt pond nesting habitat within Ponds A9-A15.

2. The ongoing harassment by trail users of all western snowy plovers within 600 feet of the Bay Trail along the FRM levee adjacent to Pond A16, New Chicago Marsh, and the Alviso impoundment.

California Least Tern

The Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment of all foraging and roosting California least terns within 300 feet of construction activities at Pond A18 and the FRM levee.

2. The harassment and harm of two (2) individual California least terns after the permanent loss of 736 acres of salt pond foraging habitat within Pond A18.

Service-led Actions

1. The harassment of all foraging and roosting California least terns within 300 feet of construction activities at Ponds A9-A15.

2. The harassment and harm of four (4) individual California least terns after the permanent loss of 2,010 acres of salt pond foraging habitat within Ponds A9-A15.

3. The ongoing harassment of all foraging and roosting California least terns by trail users within 300 feet of the trails along Ponds A18, A12, A13, and A15 until these ponds are restored to tidal marsh.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, and California least tern.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measures are necessary and appropriate to minimize the effects of the proposed project on the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, and California least tern:

1. The Corps through the CSCC, City of San Jose, and SCVWD will minimize adverse effects to the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, and California least tern in the action area for the Corps-led actions by following the project description as modified by the terms and conditions.

2. The Refuge through the CSCC, City of San Jose, and SCVWD will minimize adverse effects to the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, and California least tern in the action area for the Service-led actions by following the project description as modified by the terms and conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and the Refuge shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These Terms and Conditions are nondiscretionary.

The following Term and Condition implements Reasonable and Prudent Measure Number One (1):

1. The Corps shall ensure that the CSCC, City of San Jose, and SCVWD minimize proposed project related effects of mobilization of methylmercury by minimizing the frequency and duration of methylization by minimizing the number of times mercury-contaminated soils are wetted and dried during construction of the proposed project (this measure does not apply to imported soils that meet contaminants screening criteria for mercury).

The following Term and Condition implements Reasonable and Prudent Measure Number Two (2):

1. The Refuge shall ensure that the CSCC, City of San Jose, and SCVWD minimize proposed project related effects of mobilization of methylmercury by minimizing the frequency and duration of methylization by minimizing the number of times mercury-contaminated soils are wetted and dried during construction of the proposed project (this measure does not apply to imported soils that meet contaminants screening criteria for mercury).

Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Corps and the Refuge shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Corps or the Refuge must reinitiate formal consultation as per 50 CFR 402.16.

1. The Service must be notified within one (1) working day of the finding of any injured or dead listed species or any unanticipated damage to its habitat associated with the proposed project. Notification will be made to the Coast/Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600, and must include the date, time, and precise location of the individual/incident clearly indicated on a U.S. Geological Survey 7.5 minute quadrangle or other maps at a finer scale, as requested by the Service, and any other pertinent information. When an injured or dead individual of the listed species is found, the Corps or the Refuge shall follow the steps outlined in the Disposition of Individuals Taken section below.

2. The Corps and/or the Refuge shall provide annual updates and interim progress reports to the Service on the status of the implementation of the proposed project, avoidance and minimization measures, predator management, monitoring of the tidal marsh restoration areas, monitoring of the Pond A16 western snowy plover nesting habitat enhancements, and adaptive management.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, avoidance and minimization measures implemented, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Coast/Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should develop, fund, and annually implement an avian and mammalian predator monitoring and management program within suitable habitat for the salt marsh harvest mouse, California clapper rail, western snowy plover, and California least tern around the Bay.

2. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should remove raptor nest and perch sites or install raptor perching deterrents within suitable habitat for the salt marsh harvest mouse, California clapper rail, western snowy plover, and California least tern around the Bay.

3. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should control invasive plant species (*e.g.*, perennial pepperweed) within suitable habitat for the salt marsh harvest mouse and California clapper rail.

4. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should import clean fill to raise the elevations of subsided salt ponds to accelerate the timeline of tidal marsh restoration.

5. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should install high-tide refugia islands planted with marsh gumplant for salt marsh harvest mice and California clapper rails within tidal marshes that lack sufficient high-tide refugia.

6. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should minimize the effects of atmospheric nitrogen deposition from nitrogen oxides emissions in construction vehicle traffic exhaust in facilitating the spread of invasive plant species into naturally nutrient-poor serpentine grassland habitat for the threatened Bay checkerspot butterfly and listed serpentine plants in the Santa Clara Valley by contributing funding to the management of invasive plant species in serpentine grassland habitat that supports these listed species.

7. The Corps and the Refuge should report sightings of any listed or sensitive animal species to the CNDDB of the CDFW. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposed South Bay Shoreline Phase 1 Study in Santa Clara County, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

If you have any questions regarding this biological opinion on the effects of the proposed South Bay Shoreline Phase 1 Study, please contact Joseph Terry, Senior Biologist, or Ryan Olah, Coast/Bay Division Chief, at the Sacramento Fish Wildlife Office at the letterhead address, telephone at (916) 414-6600, or via email (Joseph_Terry@fws.gov or Ryan_Olah@fws.gov). The Service contacts at the San Francisco Bay-Delta Fish and Wildlife Office are Armin Halston, Fish and Wildlife Biologist, or Kim Squires, Section 7 Coordinator, by telephone at (916) 930-5670 or via email (Armin_Halston@fws.gov or Kim_Squires@fws.gov).

Sincerely,

Jennifer M. Norris
Field Supervisor

cc:
Kim Squires, San Francisco Bay/Delta Fish and Wildlife Office, Sacramento, California
Brenda Blinn, California Department of Fish and Wildlife, Napa, California
Melisa Amato, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California
Johnathon Bishop, National Oceanic and Atmospheric Administration/National Marine Fisheries Service, Santa Rosa, California

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Appendix A: Walking In the Marsh:
Methods to Increase Safety and Reduce Impacts to Wildlife & Plants

December 15, 2004

I. Safety

A. *Before heading out into the marsh check the tides*: tides can affect your ability to move through the marsh. Be aware of how long you plan to be in the marsh, what channels you may have to cross, and how the tides will change while you are in the field.

B. *Plan your route through the marsh*: use existing aerial imagery and maps to identify channels and sloughs that may impede access. When available, use high points such as boardwalks or levees to scope out a route. Scoping a route can be especially important in scenarios where visibility across the marsh is low (*e.g.*, South Bay, Suisun). It may be necessary to flag stations and/or access corridors through the marsh prior to surveys. If more than one person is accessing the marsh, travel together along major access routes to avoid the development of multiple paths. At the end of the sampling period, persons furthest out should walk out first, meeting up with others along the major access route…this minimizes the potential of people getting lost and ensures that anyone who is injured will be found in a timely manner (before everyone else has left the marsh). The goal should be to plan a safe route into and out of the marsh while minimizing travel and pathways.

C. *Channels and sloughs*: Avoid jumping channels in locations where you cannot see through vegetation on the opposite bank. Thick vegetation (*e.g.*, pickleweed, gumplant) can obscure the edge of the bank. Considerations before jumping: depth of water/channel, steepness of the channel edges, tide levels. If you are not confident that you can make the jump and the edges have high dense vegetation that you cannot see through…..DO NOT JUMP.

D. *Getting stuck in the mud*: If you are sinking into mud, try to keep moving to avoid getting stuck further. If a leg gets stuck, try to twist your leg to break the suction while leaning your weight on your other leg or knee. Use whatever material you have available (e.g., clipboard, backpack) for leverage (*e.g.*, lean on those items).

E. *Other*: Besides general items such as water and food, it's a good idea to bring a flashlight and a phone (+GPS) in cases of an emergency. Let someone know what marsh area you will be in and when you plan to complete work for the day. Designate an end time and final meeting place when more than one person is out in the marsh at the same time.

II. Avoiding Impacts to Wildlife and Plants

A. *Movement through the Marsh.* While walking through the marsh, keep noise to a minimum. Avoid using multiple pathways through the marsh. Use trails if they exist. Plan and map your route to minimize environmental impacts and decrease running into hazards/barriers such as large channels. When looking for a suitable place to jump a channel, do not walk along the edge of the channel/slough because these areas provide nesting habitat for many species including the endangered California clapper rail. To find an alternate jump site, walk parallel to the channel at a distance where vegetation is lower in height and where visibility of the ground surface is greater. At all times, observe the environment you are walking through to avoid disturbance. Choose channel jump sites where vegetation is lower or you can clearly discern what you are jumping onto. In general, avoid walking adjacent and parallel to channels/sloughs.

B. *Avoiding nests and nest substrates.* Tidal marsh species have nests that are well concealed and therefore easy to disturb when walking through the marsh. To avoid stepping on a nest, do not walk through thick vegetation or areas where you cannot see through to the ground. Avoid walking on vegetation whenever possible since plants serve as nesting substrate for many species in the marsh. In general, be aware of the area you are walking through.

C. *Bird Behavior.* If a bird vocalizes or flushes within close range of where you are standing or walking (*e.g.*, < 10-m), it is possible that a nest or young are nearby. When these circumstances arise, stop whatever you are doing and leave the immediate area (be sure to watch where and what you are walking on). Choose an alternate route through the marsh, identify the new route and location of the sighting/occurrence on a map, and record coordinates of the location if possible. Be sure to pass this information on to others that may use the same route or are conducting surveys in the same area. Be very observant of where you walk as you leave the area. There exists the possibility that you could step on a nest or young, both of which can be concealed by vegetation and are cryptic. When alarmed, individuals may freeze in place (especially juveniles).

D. *Tidal lagoons/ponds.* Avoid walking along tidal lagoons and ponds in marsh interiors that support foraging, roosting, or nesting shorebirds and waterfowl. Be observant of the distance at which birds flush or become alarmed.

E. *Tides.* Avoid conducting surveys during high tides as much as possible. These are periods when many wildlife species are at greatest risk (*e.g.*, predation). If your surveys require a high tide, be aware of the increased risk you may cause for wildlife and take all precautions to reduce that risk (*e.g.*, avoiding areas where sensitive species are known to occur).

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In Reply Refer to:
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2012-F-0450-3

APR 2 7 2015

Memorandum

To: Refuge Complex Manager, San Francisco Bay National Wildlife Refuge Complex, Fremont, California

From: Field Supervisor, Sacramento Fish and Wildlife Office, Sacramento, California

Subject: Biological Opinion and Conference Opinion on the South San Francisco Bay (South Bay) Shoreline Phase 1 Study in Santa Clara County, California

This memorandum is in response to your December 11, 2014, request for intra-U.S. Fish and Wildlife Service (Service) consultation for the proposed South Bay Shoreline Phase 1 Study (proposed project) in Santa Clara County, California. Your request for intra-Service consultation was received in our office on December 22, 2014. The proposed project involves flood risk management, levee construction, upland transitional habitat (ecotone) berm construction along Ponds A12 and A18, tidal marsh restoration in Ponds A9-A15 and Pond A18, trail construction, and operation and maintenance activities on lands owned and managed by the City of San Jose and the Service's Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) in the South Bay. The U.S. Army Corps of Engineers (Corps) and the Service are each requesting the initiation of consultation for the Corps-led actions and Service-led actions of the proposed project, respectively. Your letter requested consultation on the endangered California clapper rail (*Rallus longirostris obsoletus*), endangered salt marsh harvest mouse (*Reithrodontomys raviventris*), threatened Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*), endangered California least tern (*Sternula antillarum browni*), and Federal candidate San Francisco Bay-Delta Distinct Population Segment (DPS) of the longfin smelt (*Spirinchus thaleichthys*). Critical habitat has been designated for the Pacific coast population of the western snowy plover but does not occur within the action area for the proposed project. This document is issued under the authority of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (Act), and in accordance with the policies governing intra-Service consultations (Service 1998), which call for candidate species like the San Francisco Bay-Delta DPS of the longfin smelt to be considered as if proposed for listing.

This document represents the Service's biological opinion on the effects of the proposed project on the California clapper rail, salt marsh harvest mouse, Pacific Coast population of the western snowy plover, and California least tern. The same biological opinion is being submitted to the Corps. Currently the biological opinion is to both the Corps and the Service because the Corps is not authorized to expend funds on ecosystem restoration on lands controlled by another Federal agency, but it can expend funds on flood control on such lands. However, it is a possibility that the Corps may implement the entire action and, therefore, all aspects of the proposed project will be implemented by the Corps except those that were addressed in the South Bay Salt Pond Restoration Project (SBSPRP) Phase 1 Actions (Service file number 81420-F-08-0621-1, Service 2008). This document also represents the Service's conference opinion on the effects of the proposed project on the San Francisco Bay-Delta DPS of the longfin smelt.

The following sources of information were used to develop this biological opinion and conference opinion: (1) your letter requesting consultation on the proposed project dated December 11, 2014; (2) the November 2014 *Draft South San Francisco Bay Shoreline Phase 1 Biological Assessment for the Salt Marsh Harvest Mouse, California Ridgway's Rail, Western Snowy Plover, California Least Tern, Central California Coast Steelhead, Green Sturgeon, and Longfin Smelt and Essential Fish Habitat Assessment* (Biological Assessment) (H.T. Harvey & Associates (HTH) 2014); (3) the August 2008 *Formal Endangered Species Consultation on the South Bay Salt Pond Restoration Project Long-term Plan and the Project-level Phase 1 Actions, Alameda, Santa Clara, and San Mateo Counties, California* (Programmatic Biological Opinion) (Service file number 81420-F-08-0621-1, Service 2008); (4) electronic mail and conversations among the Corps, the Refuge, HTH, California State Coastal Conservancy (CSCC), San Francisco Bay Conservation and Development Commission (BCDC), Santa Clara Valley Water District (SCVWD), the City of San Jose, California Department of Fish and Wildlife (CDFW), the National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NMFS), and the Service; and (5) other information available to the Service.

CONSULTATION HISTORY

August 12, 2008	The Service issued the Programmatic Biological Opinion for the SBSPRP Phase 1 Actions (Service file number 81420-F-08-0621-1, Service 2008).
2008 – 2014	The Service continued coordination with the Corps, the Refuge, HTH, CSCC, BCDC, SCVWD, the City of San Jose, and CDFW on the SBSPRP and the proposed project.
October 15, 2014	The Service received via electronic mail from the Corps, the Refuge, and CSCC the October 2014 Draft Biological Assessment for the proposed project.
October 17, 2014	The Service provided via electronic mail comments on the October 2014 Draft Biological Assessment for the proposed project to the Corps, the Refuge, HTH, CSCC, SCVWD, and the City of San Jose.
October 28, 2014	The Service participated in a conference call among the Corps, the Refuge, HTH, CSCC, SCVWD, and the City of San Jose discussing the Service's comments on the Draft Biological Assessment for the proposed project.
November 17, 2014	The Service received via electronic mail from the Refuge and the Corps the revised Biological Assessment for the proposed project (HTH 2014).
December 22, 2014	The Service received from the Corps and the Refuge the letter requesting the initiation of formal consultation on the proposed project.

April 9, 2015	The Service submitted the draft biological opinion for the proposed project at the request of the Corps.
April 17, 2015	The Service received via electronic mail from the Corps comments on the draft biological opinion for the proposed project.

BIOLOGICAL OPINION AND CONFERENCE OPINION

<u>Description of the Proposed Project</u>

Background

The Corps is conducting a flood risk management and ecosystem restoration study for the South Bay shoreline. Phase I of the study, known as the South Bay Shoreline Phase I Study (proposed project), involves increasing the height and width of certain levees in the Alviso area in northern Santa Clara County, California, and breaching of other levees to restore tidal habitats in existing managed ponds. The proposed project's "Study Area" (Figure 1) is bounded on the southwest by Alviso Slough; on the north by Coyote Slough, Ponds A16 and A17, the "Island Ponds" (Ponds A19, A20, and A21), and the Newby Island Landfill; on the east by the Coyote Creek levee; and on the south by State Route (SR) 237.

The proposed project consists of two main sets of actions:

1. <u>Corps-led actions</u>: these include flood risk management levee improvements and public access improvements funded by the Corps and SCVWD, which will occur on Refuge lands and lands of the City of San Jose, as well as tidal restoration actions on City of San Jose lands;

2. <u>Service-led actions</u>: these include tidal restoration and public access improvements proposed by the Service and SCVWD on Refuge lands.

Proposed project activities on Refuge lands were included in the intra-Service Programmatic Biological Opinion for the SBSPRP, which addressed flood control, public access, and habitat restoration and management (Service file number 81420-F-08-0621-1, Service 2008). As a result, the intra-Service consultation for the South Bay Shoreline Phase I Study Project will tier off the programmatic consultation for the SBSPRP. However, portions of the South Bay Shoreline Phase I Study Project on City of San Jose lands were not included in the action area for the Programmatic Biological Opinion. Also, the Programmatic Biological Opinion did not cover effects to the longfin smelt which is currently a candidate for Federal listing but was not in 2008.

<u>Flood Risk Management (FRM)</u>

The Study Area is at risk of tidal flooding due to having large areas of low-lying terrain that are bordered by pond levees originally designed and constructed for commercial salt pond purposes rather than for FRM. The proposed project will address this flooding risk by raising the heights of levees in key areas.

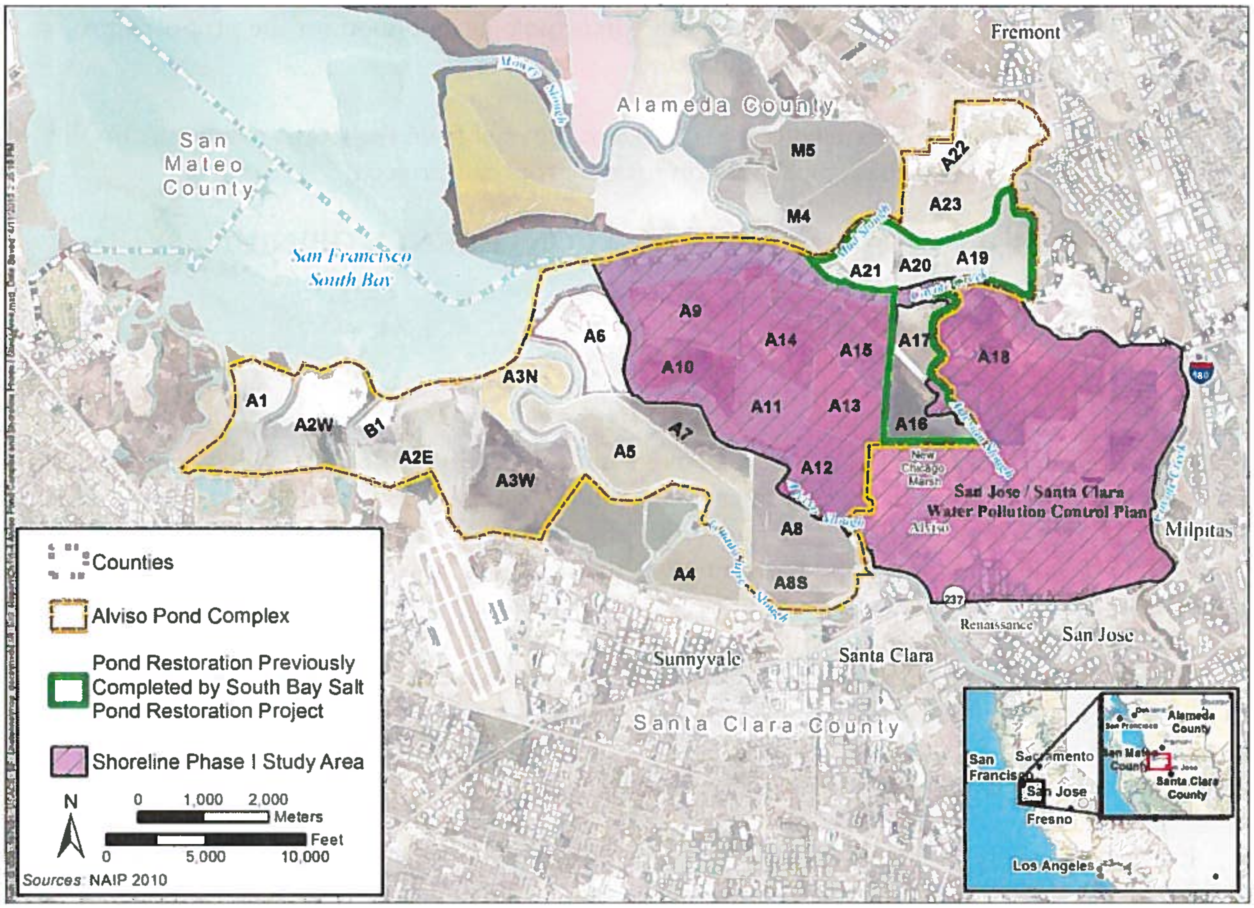

Figure 1. Map of the SBSPRP Phase 1 Actions and the Study Area for the South Bay Shoreline Phase I Study Project.

Ecosystem Restoration

Ecosystem restoration and FRM issues are inseparable in the Study Area because opening up ponds to tidal action changes the hydraulic behavior of the ponds under both normal and high-water conditions. Tidal restoration will alter both ecosystem conditions and potential flood risk to the surrounding areas. Engineered levees are necessary to replace the existing non-engineered pond levees, which were not intended to provide any FRM in order to address the potential change in flood risk.

Tidal salt marshes are in dynamic equilibrium with water levels in San Francisco Bay (Bay) and can keep pace with rising sea levels through accretion of sediment if restoration activities begin soon, based on current and projected sediment availability. In addition, a vegetated marsh plain can slow down tidal surge velocity and reduce wave heights as they traverse the marsh surface. Therefore, having an established marsh in front of FRM infrastructure would increase the resiliency of the shoreline relative to the projected impacts of sea level rise (HDR 2014).

Project Components

Overview

Figures 2 and 3 below depict the portions of the Study Area where long-term physical changes are expected to occur as a result of proposed project activities led by the Corps and the Service, respectively. As noted previously, the proposed project consists of two main sets of actions: tidal restoration and public access improvements proposed by the Service and SCVWD on the Refuge (Figure 3), and flood control levee improvements, public access improvements, and tidal restoration funded by the Corps and SCVWD, both on Refuge lands and lands of the City of San Jose (Figure 2). For the purposes of this biological opinion and conference opinion, the Corps-led actions and the Service-led actions are described separately because the Corps is not authorized to expend funds on ecosystem restoration on lands controlled by another Federal agency, but it can expend funds on flood control on such lands. As a result, the Corps-led actions include flood improvements and public access improvements on Refuge lands, but the Corps cannot fund ecosystem restoration activities on the Refuge. The Corps can, however, fund ecosystem restoration on City of San Jose-owned portions of the Study Area, and thus the tidal restoration and ecotone (upland transitional zone) activities in Pond A18 are part of the Corps-led actions.

Regardless of the source of funding for various proposed project actions or the ownership of the lands on which these actions occur, all the actions described in this biological opinion and conference opinion are interrelated and interdependent. Tidal restoration in the proposed project area necessitates improved tidal FRM, the nature of tidal FRM along levees depends on whether adjacent ponds are tidal or not (e.g., with higher and more robust levees needed if adjacent areas are tidal than if they are managed ponds), and public access and recreation opportunities differ depending on whether and where levee improvements and tidal restoration occur.

Project Schedule and Phasing

The construction-phasing schedule is illustrated in Figure 4 below. This schedule includes both Corps-led and Service-led activities and indicates the lead agency for each task. The South Bay Shoreline Phase I Study timeline includes a 50-year span (2017–2067).

Figure 4 and subsequent discussion regarding the sequence of proposed project activities reflect a scenario in which the first pond to be breached would be Pond A12; this is likely to be the case if the Corps is able to expend funds on restoration on Refuge lands. However, as noted above, the Corps is not currently authorized to expend funds on ecosystem restoration on lands controlled by another Federal agency. As a result, Pond A18 (which is not on Refuge lands) may be breached first, in which case the sequencing and timing of activities associated with A12 and A18 may be reversed. Resolution of the sequence will occur when the proposed project obtains interpretation of the Water Resources Reform and Development Act from Corps Headquarters.

Construction will commence in 2017 beginning with FRM levee construction; the ecotones at Ponds A12 and A18 will be constructed during the same period. Subsequently, Pond A12 will be prepared for breaching. The first breach is scheduled for 2020, followed by monitoring and adaptive management to inform the next potential phases of restoration. This period of monitoring and adaptive management will also be used to inform potential adjustments to Pond A12 and may extend beyond this four-year period. The second phase of ponds (Ponds A9-A11 and Pond A18)

Figure 2. Corps-led Actions in the South Bay Shoreline Phase 1 Study Project (copied from HTH 2014).

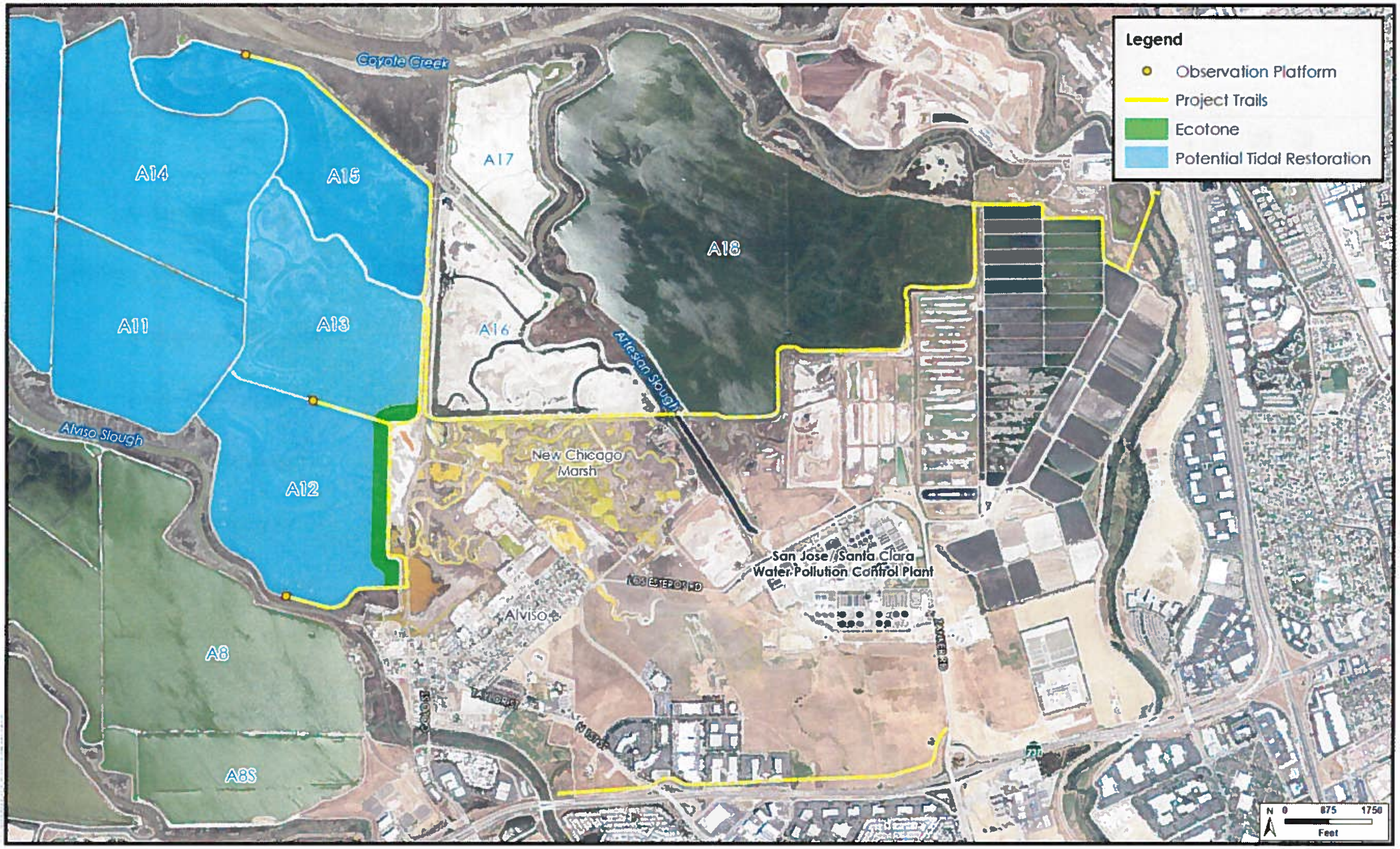

Figure 3. Service-led Actions in the South Bay Shoreline Phase 1 Study Project (copied from HTH 2014).

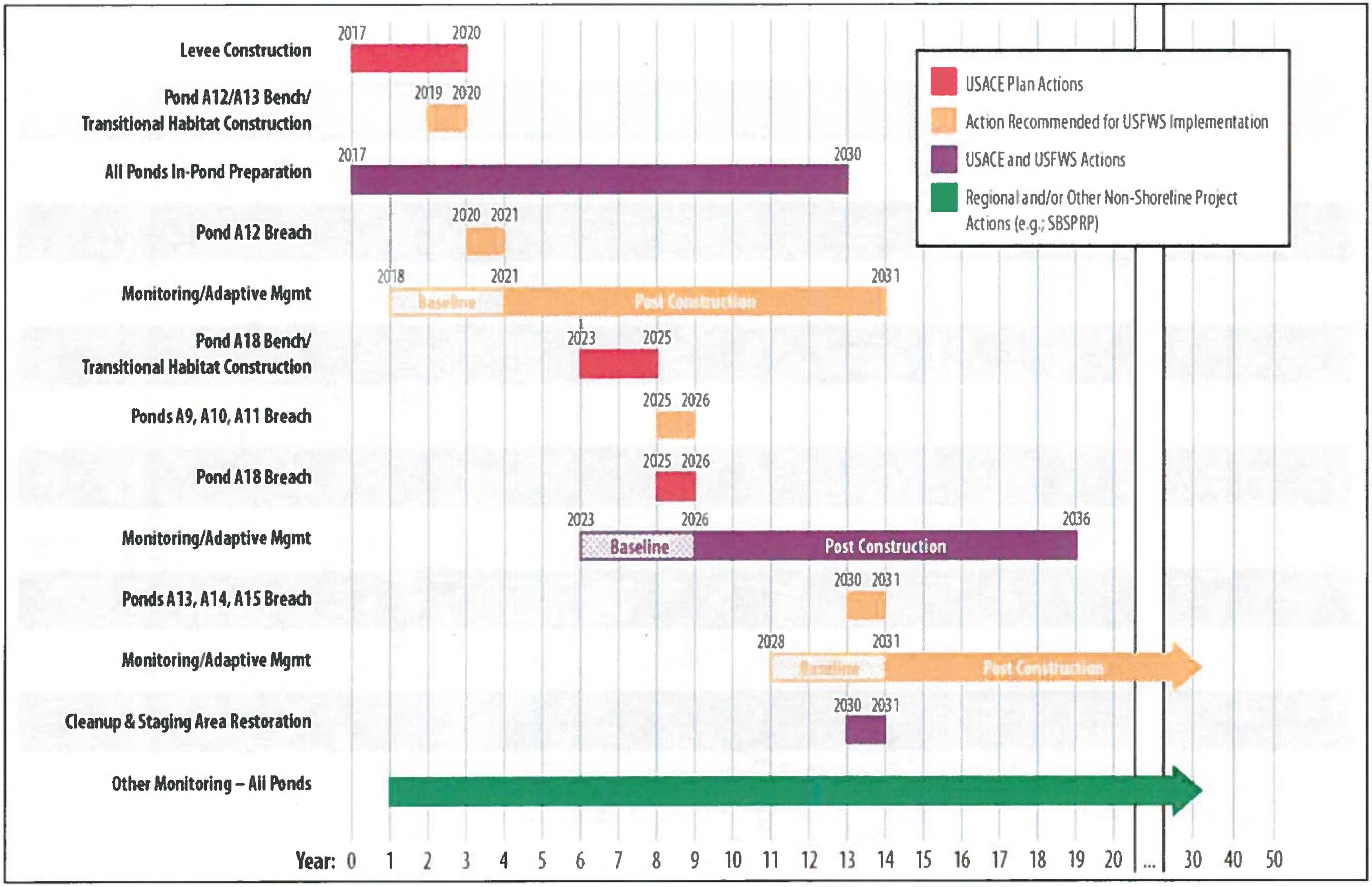

Figure 4. Construction Schedule for the South Bay Shoreline Phase 1 Study (copied from HTH 2014).

will be breached in 2025, assuming that monitoring results from the previous phase indicate that tidal marsh restoration should proceed, and will also be followed by a similar period of monitoring and adaptive management. The last phase of ponds will be breached in 2030 and will be followed by continued monitoring and adaptive management for all areas. Maintenance (e.g., of levees and trails) and management according to a long-term management plan (described in the "Conservation Measures" section below) will continue throughout the life of the proposed project.

For the ecotone at Ponds A12 and A18, separate time frames are identified to construct each of these features. Material for construction of the ecotone at both ponds is assumed to be available on site and free of charge. This material is provided through agreements that the Refuge makes with local construction companies to acquire materials excavated from other regional construction sites, and with the SCVWD to acquire sediment dredged for stream maintenance purposes. After the new FRM levees are constructed, the Refuge and/or SCVWD will use these materials to construct transitional habitat. The construction phasing strategy allows for the accumulation of material needed to build the 345-foot-wide ecotones with 30:1 side slopes at Ponds A12 and A18.

Monitoring will continue throughout the life of the proposed project.

Corps-led Actions

Flood Protection Actions

The Corps conducted an analysis of potential FRM actions in order to identify the proposed project activities. Details of the analysis, including potential actions that were considered but that are not proposed and potential alternatives to the proposed project, are discussed in the Integrated Document (HDR 2014).

Construction

The Corps will construct 3.1 miles of new levee from the Alviso Marina northeastward to the northwestern corner of the San Jose/Santa Clara Water Pollution Control Plant (WPCP) (Figure 2). The levee, which would provide FRM assuming a one percent Annual Chance of Exceedance, consists of the following three components:

1. The 1.7-mile Alviso Segment, which is located entirely on Refuge lands, will provide FRM for the community of Alviso. This segment follows the eastern border of Pond A12 and the southern border of Pond A16.

2. The Artesian Slough crossing will entail construction of a new tide gate across the slough to protect the WPCP from storm waters flooding the slough and backing up into the facility during extreme storm events. The proposed location of the tide gate will be at least 300 feet bayward of the existing WPCP outfall for treated water at Artesian Slough (the location shown in the Biological Assessment is approximate, and the actual location may be farther upstream along Artesian Slough). The gates will only be closed during extreme storm events. When the gates are closed, the WPCP will need to pump water outputs over the gate, or provide for internal excess water storage during a storm event. With or without the proposed project, the WPCP will develop a plan to pump or store waters during such events given increases in Bay water levels that correspond with future sea level rise scenarios. To

best meet the general operations requirements for the WPCP and allow for discharge during storm events, the tide gate will be designed in coordination with WPCP engineers.

3. The 2.1-mile WPCP Segment, which is located on City of San Jose lands, will provide FRM to the WPCP. It runs west to east in a stair-step pattern along the southern border of Pond A18, from the southwest corner of the pond to its northeast corner.

The engineered levee will be earthen. The proposed change in levee size from the existing levee (*e.g.*, along the southern edge of Pond A16) will be an increase of up to approximately 10 feet in height (after settlement) and about double in existing width. For example, the Alviso Segment levee along the southern edge of Pond A16 will increase in height from approximately 6 feet to 16 feet and increase in width at the toe from approximately 55 feet to 115 feet. The average width at the crown of the levee will be 16 feet, with 3:1 (horizontal: vertical) slopes except where ecotones having a 30:1 slope will be constructed (Figure 5). Along the east edge of Pond A12, the Alviso Segment levee will have an additional 345-foot-wide ecotone along its west side.

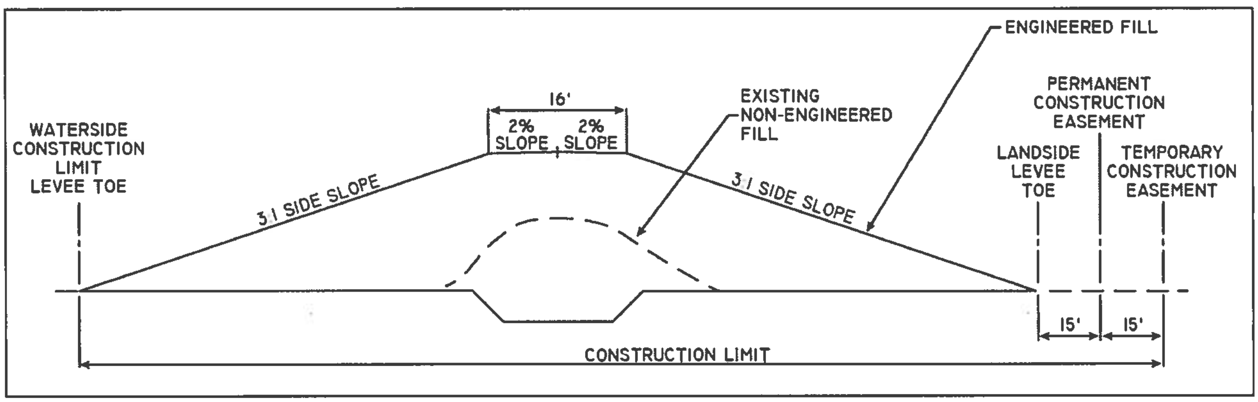

Figure 5. Example Cross-Section of Engineered FRM Levee.

Dredge material originating from areas outside the proposed project area that is used for ditch blocks, or for portions of the ecotone and FRM levee that will be in contact with tidal waters, will need to meet the contaminants screening criteria as described in the Biological Assessment (HTH 2014).

The levee design will include vegetation as erosion protection on the bayward and landward side slopes. Vegetation is anticipated to be continuous and able to provide erosion protection from overtopping of the levee. The vegetation that will be seeded or planted on the levee following construction will consist of marsh vegetation and peripheral halophytes at the toes of the levee and upland grasses at higher elevations. The combination of vegetation, buried stone, and/or transitional habitat fills (*i.e.*, planting berms) is proposed to balance requirements for levee safety with the need to limit disturbance from traditional maintenance activity (described below) such as regular mowing in/near habitat for sensitive species such as the salt marsh harvest mouse.

Proposed vegetation will include marsh species and peripheral halophytes, such as 12 to 18-inch tall pickleweed, from elevation 0 feet to 3 feet above the typical high water elevation. The high water elevation corresponds to approximately elevation 6 feet and 10 feet on the landward and bayward side slope, respectively. Upland grasses will occupy the side slopes between the levee crest and the pickleweed. Combinations of buried stone protection and buried gravel may be necessary to stunt the growth of native vegetation in lieu of regular mowing (i.e., to reduce the frequency of mowing) in an environmentally sensitive area, or to provide erosion protection where vegetation cannot be supported.

Where the FRM levee will cross the active railroad line just east of Pond A12, railroad floodgates will be installed. Concrete barriers will be installed on either side of the railroad right-of-way and will tie into the earthen levees. The metal floodgates will be connected to the barrier and will remain open during normal conditions and closed during flood conditions.

Certain locations may require special structures or treatment as follows:

1. Where the levee crosses an existing water feature such as a slough, structures will be installed to allow drainage during normal conditions and closure during flood conditions.

2. Where the levee crosses below-ground infrastructure (utilities, etc.), load-bearing structures may be needed to support the weight of levee materials.

Other materials such as geotextile fabric, stone column, foundation over-excavation, or replacement with stronger soil may also need to be included in the final FRM levee design.

Fill for the FRM levee will be imported from local sources and delivered by truck. Proposed staging areas and ingress/egress routes are shown on Figure 6 below. Potential staging areas #1 and #2 are both on WPCP land. Ingress and egress truck routes for these two areas are proposed on existing levee roads used currently by WPCP for materials hauling. Potential staging area #3 is on Zanker Landfill land and will be restricted in use for dirt stockpiling only.

The timing and duration of construction will be governed by both weather conditions and the need to avoid construction in sensitive areas during certain times of the year to avoid and minimize impacts to listed species. Types of construction equipment may include excavators, belly scrapers, front-end loaders, bulldozers, forklifts, vibratory rollers, dump trucks, and water trucks. Ancillary types of equipment that may be used include diesel generators, water pumps, and pile drivers. It is anticipated that dewatering and temporary installation of sheet piling will be necessary during the construction of water control structures such as tide gates. Dredge-locks or coffer dams may be constructed using earth levees or sheet piling to allow access for water-based equipment within a site. When possible, amphibious excavators, vibratory pile drivers, and other less-impacting equipment will be used.

Maintenance

Once construction of the Corps-led components is complete, the non-Federal sponsors (the CSCC, SCVWD, and City of San Jose) will be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of these components (*i.e.*, the Pond A18 tidal restoration and ecotone, as well as the entire levee both adjacent to Pond A18 and on Refuge property). An OMRR&R Manual will be prepared to describe these activities. It is anticipated that the following OMRR&R activities will be performed on the FRM levees:

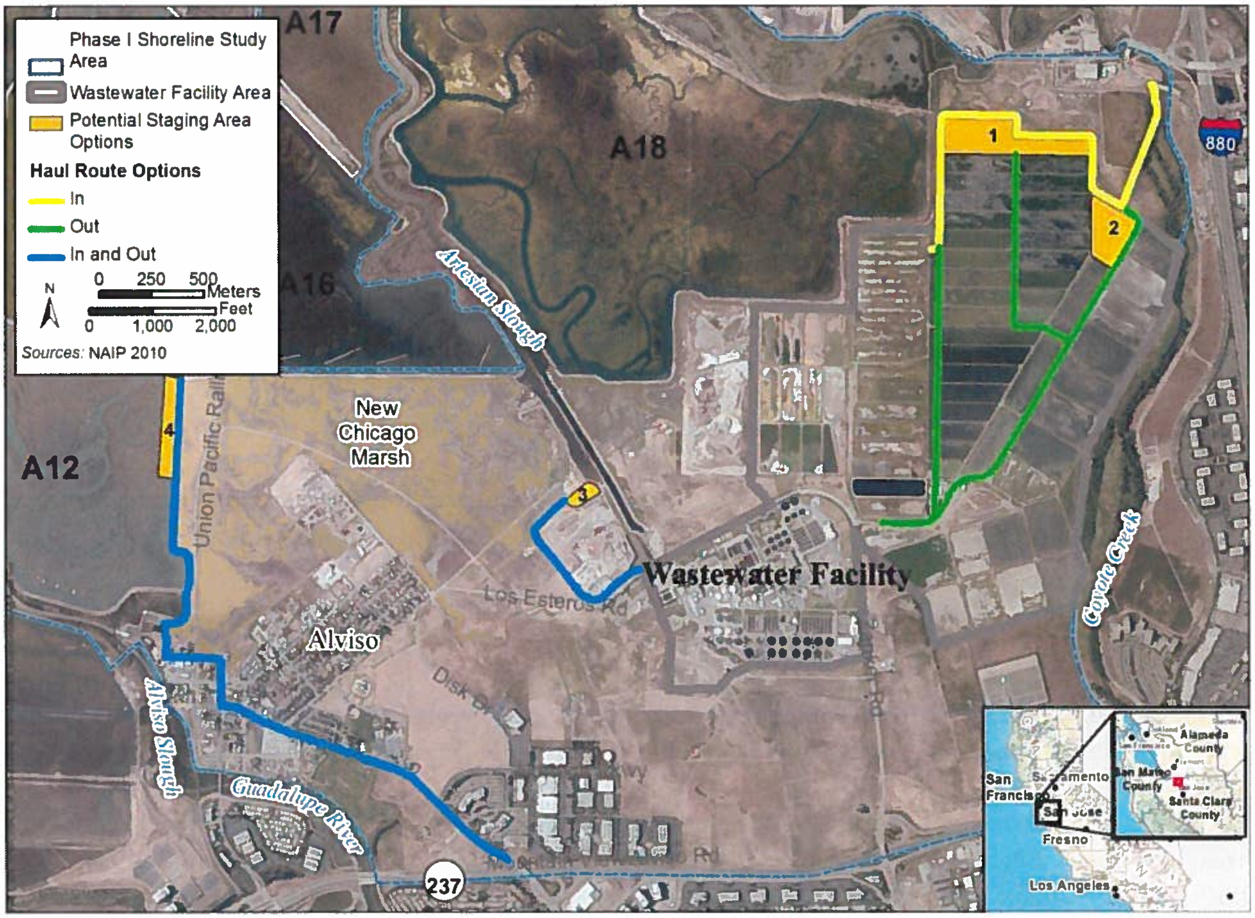

Figure 6. Proposed Access and Staging Areas.

1. Trash and anthropogenic debris removal along levee slopes and where it is causing obstruction in culverts or other problems.

2. Repairs on levee due to damage by small burrowing mammals, runoff/erosion, storm activities, or other factors.

3. Repairs along concrete flood wall structures (if included in plan) and other features, such as bridges and culverts.

4. Levee inspections conducted by SCVWD and the Corps.

5. Graffiti removal.

6. Access improvements and upkeep.

7. Vector monitoring (presence of mosquitoes and their larvae).

8. Vegetation management – As mentioned previously, the levee design will include vegetation as erosion protection on the bayward and landward side slopes.

a. Combinations of buried stone protection and buried gravel may be used to stunt the growth of native vegetation to reduce the frequency of mowing in this environmentally sensitive area, or to provide erosion protection where vegetation cannot be supported.

b. It is anticipated that a reduced need for regular mowing will still include annual mowing of the levee side slopes within 12 to 15 feet of the levee crown. Such a narrow swath of vegetation management will likely require only two or three passes of a mower, once per year, which would minimize the disturbance of sensitive species in adjacent areas. Mowing will proceed from the top (closest to the crown, where habitat is of lowest quality) downward toward higher-quality habitat so that if any wildlife is using the area to be mown, the noise and movement of the mower may encourage wildlife to move downslope into the higher-quality habitat and out of the impact area. This area of mowing will correspond to the area above elevation 9 feet on the levee side slopes and higher elevations in reaches with ecotone fills.

c. No woody plant species greater than two inches in diameter will be allowed to become established on the levees to prevent roots from damaging the structural integrity of the levee. Due to salinity levels in lower-elevation areas, there is a low likelihood of woody vegetation establishment in many areas. Any woody vegetation that germinates in the higher-elevation mowing zone will be managed by mowing. Below the mowing zone, any woody plant removal that becomes necessary will be performed by hand; such hand-removal is expected to be necessary very infrequently (*e.g.*, once every few years, at most).

9. Burrowing mammal management – California ground squirrels may burrow into levees deep enough to affect the structural integrity of the levees, and thus squirrel management may be necessary. Ground squirrels are uncommon along the existing levees in the proposed project area and are thus not expected to require frequent or intensive management efforts. If ground squirrel management becomes necessary, it will be implemented using live traps with screens that have holes large enough to allow small mammals such as salt marsh harvest mice to easily exit the traps. Any mammals caught during such trapping that are potential predators of the salt marsh harvest mouse or California clapper rail, such as rats, striped skunks, red foxes, feral cats, raccoons, or opossums will be lethally removed.

Ecosystem Restoration Actions

The ecosystem restoration strategy to be implemented by the Corps is the conversion of Pond A18, which is currently managed for migratory waterbirds, into vegetated tidal wetlands with goals of maximizing long-term habitat benefits, particularly in consideration of potential sea level rise. Ecosystem restoration also includes creation of a broad, gently sloping ecotone.

Tidal Habitat Restoration

The following ground preparation actions will be involved in converting Pond A18 to tidal marsh:

1. Drain the pond to the extent feasible. The pond will be drained passively, so it may take several months to dry out; pumping would expedite the process and may be considered.

Due to historic pond subsidence, some pond areas are not able to be completely dried. This step is also dependent on temporal proximity to the western snowy plover nesting season and/or if access to the area can be obtained without impacts to western snowy plovers, as dried pond areas may invite western snowy plover nesting.

2. Remove vegetation where needed (*i.e.*, around the breach locations) to discourage salt marsh harvest mice from using the impact areas.

3. Construct upland transitional habitat (described below).

4. Construct ditch blocks to inhibit flow through existing borrow ditches, promote scour and flow through the remnant historical channels, and provide some initial pickleweed habitat where located at the correct elevations. Without the construction of ditch blocks, the borrow ditches around the perimeter of the restored pond would capture the bulk of the flow, reducing the formation of complex dendritic channels in the restored marsh habitat.

5. Construct pilot channels on the outboard side of the A18 levee to facilitate flow between tidal sloughs and the restored tidal habitat in Pond A18. Three pilot channels will be constructed along Artesian Slough, and one will be constructed along South Coyote Slough. These pilot channels will be constructed at the locations of major historical tidal channels.

6. Breach the outboard levee in four locations along Artesian Slough and one location along South Coyote Slough. Breach size will be determined based on the hydrologic relationship between the tidal channel and marsh drainage area and on data from tidal channels in mature marshes throughout the Bay (ESA and Philip Williams & Associates, Ltd. 2012). Breaches are sized to long-term equilibrium dimensions to balance between excavation costs, scour potential, and tidal drainage consistent with *Design Guidelines for Tidal Wetland Restoration in San Francisco Bay* (Philip Williams & Associates, Ltd. and Faber 2004). Dimensions are adjusted to provide a cross-section with side slopes of 4:1 to 5:1 and a bottom width of approximately 10 feet. On the inboard side of the levee, the breach excavation will extend to the levee toe.

Pond A18 will be breached in five locations to facilitate flow of water into and through the pond, allow the tides to carry sediment into the pond, and allow for the retention of remnant channels in the pond bottom. Breaching of Pond A18 will restore approximately 736 acres of new tidal habitat (in addition to the upland transitional habitat discussed below). When Pond A18 is breached, its bottom elevation will be too low for vegetated marshes to form immediately. Several feet of sediment will need to be deposited by natural processes before the pond bottom reaches a sufficient elevation for marsh vegetation to grow. This sedimentation process is expected to proceed at rates determined in part by suspended solids concentrations as well as by factors causing re-suspension of sediment, such as wave action and tidal currents, in the breached pond (ESA and Philip Williams & Associates, Ltd. 2012). Because these factors cannot currently be predicted, it is not known how quickly vegetated marsh will form in Pond A18. Monitoring of the restoration process, and adaptive management if necessary to achieve vegetated tidal marsh, will occur per the *Shoreline Study Monitoring and Adaptive Management Plan* (MAMP) described previously. Once tidal marshes have begun to form in the former ponds, the rate of sedimentation will increase as the vegetation slows the water, catches sediment, and retains it. Eventually, with sufficient sediment, it is expected that Pond A18 will be largely vegetated, aside from tidal channels.

Because of the tidal flood protection functions currently provided by the outboard levees around Ponds A9-A15, tidal restoration within those ponds would not be feasible without enhancement of flood protection inboard from those ponds. As a result, the Service-led tidal restoration on Refuge lands described below could not occur but for the Corps-led construction of the levee and tide gate. Thus, tidal restoration on Refuge lands is dependent on Corps-led levee construction.

Upland Transitional Habitat Creation

Transitional habitat can attenuate waves and reduce wave run-up, increase habitat resiliency by providing space for marshes to retreat inland in the face of sea level rise, and provide refugia for animals such as the California clapper rail and salt marsh harvest mouse during very high tides, when the marsh plain is inundated. The upland transitional habitat adjacent to Pond A18 will be constructed along the interface between the new levee (along the southern and eastern edges of Pond A18) and the newly restored tidal habitat in the pond.

The non-Federal sponsors (the CSCC and SCVWD) recognize the enhanced value of having a gently sloped upland transitional habitat. As a result, the transitional habitat along Pond A18 will be constructed to incorporate a 30:1 slope, which will add up to 345 feet to the width of the bay side of the levee footprint. This ecotone will be constructed along approximately 14,000 linear feet of levee along Pond A18, for a total extent of 67 acres of new upland transitional habitat. Following construction of the ecotone area, it will be seeded and/or planted with native grasses, forbs, and low shrubs. Such an ecotone will provide substantial benefits for wildlife in the Study Area, as this sort of upland transitional habitat is not well represented in the South Bay. Vegetation allowed to establish in the upland transitional areas would be limited to non-woody and semi-woody plants (and possibly shallow-rooted shrubs) and would be otherwise unmanaged, except to control invasive plants from establishing. Figures 13 and 14 in the Biological Assessment (HTH 2014) depict cross-sectional views of how the upland transitional habitat will relate to restored tidal habitats (using Pond A12 as an example) at construction completion (2020) and as anticipated to evolve by 2067, respectively. Within a narrow (15 feet or less) strip of ecotone fill along the edge of the exposed levee surface, vegetation will be managed the same as on the levee (see "Maintenance" section above) to ensure compliance with the Corps' levee vegetation policy.

As indicated in Figure 4, the Pond A12 ecotone will be constructed concurrently with construction of the FRM levee, using the same staging areas and access routes as for levee construction. The Pond A18 ecotone will similarly be constructed simultaneously with levee construction.

Maintenance

Following the breaching of levees around Pond A18, the only management activities that might occur within the restored tidal habitats are predator management and, if necessary, invasive plant management, both of which would be performed on an as-needed basis. If monitoring determines that predator management is necessary to protect special-status and sensitive species, such as California clapper rails and salt marsh harvest mice, from predators such as California gulls, northern harriers, American crows, common ravens, red foxes, striped skunks, feral cats, and raccoons, then adaptive predator management would be implemented. Predator management would be focused on specific areas where predation problems are occurring (or areas, such as poles or towers, used as nesting sites or hunting perches by raptors), and culling would be limited to certain individuals; target mammalian predators that are captured would be lethally removed, while target avian predators would be either lethally removed (*e.g.*, crows and ravens) or relocated (*e.g.*, raptors). Because it is not currently known whether, and to what extent, predator management at Pond A18 will be needed, and habitat for the California clapper rail and salt marsh harvest mouse will take years to develop after A18 is breached, the local sponsor (*e.g.*, the SCVWD), rather than the Corps, will fund any necessary predator management. Invasive plant management will be needed for the first few years following construction of the ecotone to ensure that perennial pepperweed and other invasives do not become dominant. Otherwise, invasive plant management would be performed if monitoring indicates that particularly invasive species colonize Pond A18 in a way that would jeopardize the habitat enhancements achieved through tidal restoration.

Monitoring and Adaptive Management Actions

The Corps and/or local sponsors (*i.e.*, the SCVWD, CSCC, or the City of San Jose) will provide initial funding for monitoring and adaptive management (MAM) at Pond A18, whereas MAM at the other proposed project ponds will be funded by the Service, SCVWD, City of San Jose, or CSCC. Funding for maintenance and MAM provided by the SCVWD will take the form of an allocation in the SCVWD's annual budget. Given the stability of, and the public need for, the SCVWD, the commitment of long-term funding through the SCVWD's annual budget process will ensure the availability of adequate funding to meet its responsibilities to the proposed project. The entity that will manage Pond A18 in the long-term is not currently known. The City of San Jose and the Corps will identify an appropriate manager for Pond A18 after breaching occurs, and that manager will then be subject to Service approval. Funding for maintenance and MAM at Pond A18 will be provided by the SCVWD, CSCC, and/or City of San Jose. If in the future, Pond A18 is conveyed to the Refuge, an agreement between the City of San Jose, SCVWD, and the Refuge to provide funding for maintenance and MAM at Pond A18 would need to be reached.

MAM for the proposed project falls into three categories: (1) MAM associated with meeting ecosystem restoration objectives, (2) MAM associated with "adaptive implementation" (*i.e.*, decisions about whether to continue or halt the restoration of tidal marsh habitat depending on the monitoring of the effects of pond-to-marsh conversion), and (3) MAM associated with permit compliance. The Corps will cost-share activities associated with meeting ecosystem restoration objectives at Pond A18, for a period of 10 years; the non-Federal sponsors will provide funding for other required MAM. The MAMP includes a discussion of MAM's scientific basis and institutional structure, specific MAM activities, and cost estimates. Because the South Bay Shoreline Phase I Study Project includes a subset of ponds within the SBSPRP, the MAMP for the South Bay Shoreline Phase I Study Project draws heavily from the monitoring and applied studies being conducted by the larger SBSPRP. Monitoring activities to be funded by the Corps at Pond A18 include the following:

1. Water levels, sediment accretion rates, and suspended sediment concentrations;

2. Tidal marsh habitat acreage;

3. Presence and abundance of California clapper rails and salt marsh harvest mice in newly established tidal habitat; given the length of time that may be required for suitable habitat for these species to become established in Pond A18, it is possible that this monitoring may not occur within the 10-year period of Corps cost-shared monitoring, although salt marsh harvest mice may occupy the ecotone within 10 years;

4. Abundance and health of estuarine fish;

5. Count of migrating salmonids;

6. Abundance of non-native plants;

7. Plant species composition in upland transition zones; and

8. Mammalian and avian predators of California clapper rails and salt marsh harvest mice.

Recreation Actions

The only specific recreation-related action that will be funded by the Corps is the construction of a pedestrian bridge over Artesian Slough. This bridge will be constructed to link the multi-use trails on top of the new FRM levee (construction of the trails will not be Corps-funded). The bridge would span the slough atop sets of four parallel piles spaced every 50 feet. This would result in the installation of a total of forty 12-inch-thick steel piles that would form the pedestrian bridge piers. A barge-mounted pile driver/crane or an in-water excavator with a vibratory hammer would be used to drive the 12-inch-thick steel piles.

Service-led Actions

Ecosystem Restoration Actions

The activities involved in tidal restoration in Ponds A9-A15, and ecotone construction along the eastern edge of Pond A12, are similar to those described in above for Pond A18. However, there is an additional activity that will occur in Ponds A9-A15 that will not be necessary in Pond A18 because A18 has no internal berms. For restoration of Ponds A9-A15, breaches in the internal berms will be necessary to reconnect historical channels and restore the hydrologic connections to the innermost ponds in the proposed project footprint. Breach excavations will be sized in a similar manner to those applied to the outboard levees and will extend beyond the levee into the remnant historical channels. Existing internal berms may be lowered in some areas during the breach excavation to create wave breaks to limit wave action, enhance sedimentation, and create vegetated marsh habitat on the berm crests in the short term while the ponds develop from mudflat to vegetated marsh. As Ponds A9-A15 are breached in a phased manner, berms in adjacent ponds not yet being breached will be temporarily raised to provide increased FRM inboard of the current pond breaching actions.

Pond A12 has experienced the greatest degree of subsidence and is proposed for the first phase of restoration (though see above for a discussion of the possibility that Pond A18 may be breached first). By limiting new tidal exchange to this pond (rather than breaching multiple ponds in the first phase), Pond A12 can undergo maximum tidal interaction and sediment deposition, thus helping to raise its bottom elevation to a point where colonization by marsh vegetation will occur. During the first three years (2017–2019), Pond A12 will be prepared for breaching and inundation through excavation of pilot channels in two locations along Alviso Slough and construction of borrow ditch blocks. Berms between Pond A12 and Ponds A11 and A13 will be temporarily (*i.e.*, until tidal restoration in A11 and A13) raised to provide flood protection for A11 and A13. Surplus material excavated from pond preparation will be used to contribute to other in-pond construction activities requiring material, such as raising of internal levees, if determined suitable by Refuge staff. Subsequently, levee breaches will be implemented in Pond A12 to introduce tidal flow.

Following restoration of tidal flow to Pond A12, monitoring will be conducted to measure the effectiveness of tidal function equilibrium and restorative values. If necessary, corrective measures will be implemented. A period of approximately four years has been established for MAM associated with Pond A12.

Pond preparation for Ponds A9, A10, A11, and A18 would potentially be implemented based on the lessons learned as a result of MAM conducted for Pond A18, including whether to breach these ponds and restore them to tidal marsh. As described previously, this decision will be made according to the MAMP, which includes a series of decisions (based on those in the SBSPRP MAMP) regarding whether to continue breaching that involve monitoring of populations of pond-associated birds, monitoring of sediment accretion in the South Bay, and other factors. If the decision is made to breach these ponds, borrow ditch blocks and pilot channels will be constructed. Pond A11 will be connected to Ponds A10 and A12 with inboard berm breaches, but it will not be breached directly to Alviso Slough. Two breaches to Alviso Slough are planned in Pond A10, and one breach each to Alviso Slough and Coyote Slough are planned for Pond A9. Internal berms between Ponds A9-A11 and Ponds A13-A14 will be temporarily (*i.e.*, until tidal restoration in A13 and A14) raised to provide flood protection for A13 and A14. Levee breaches for Ponds A9-A11 will be implemented in Year 8 (2025) of the proposed project.

Pond preparation for Ponds A13, A14, and A15 will potentially be implemented based on the lessons learned as a result of MAM conducted for previous ponds, including whether to breach these ponds and restore them to tidal marsh. If the decision is made to breach these ponds, borrow ditch blocks and a pilot channel will be constructed. Only one outboard breach will occur for tidal restoration in these three ponds; this breach will connect Pond A15 to Coyote Slough along a major historical channel. Inboard berm breaches at the locations of historical sloughs will connect Ponds A13 and A14 to surrounding ponds (A9, A11, A15, and A12) to provide tidal flows to A13 and A14. Levee breaches will be implemented in Year 13 (2030) of the proposed project.

Ecotone habitat will be created along approximately 4,000 linear feet of levee on the east side of Pond A12. Approximately 30 acres of new upland transitional habitat will be created in this area. Following construction of the ecotone area, it will be seeded with native grasses, forbs, and low shrubs.

Breaching of Ponds A9-A15 would restore up to 2,010 acres of new tidal habitat (including the upland transitional habitat discussed below). As discussed for Pond A18 above, sediment accretion will need to occur within these ponds in order to raise pond bottoms to elevations that will support marsh vegetation. Once tidal marshes have begun to form in the former ponds, the rate of sedimentation will increase as the vegetation slows the water, catches sediment, and retains it. Eventually, with sufficient sediment, it is expected that, if breached, Ponds A9-A15 will be largely vegetated, aside from tidal sloughs. The considerable increase in tidal prism that will occur once these ponds are breached is expected to draw saline water from the Bay into these ponds, resulting in dominance of restored marsh by salt marsh species. An analysis performed by HTH (2012) predicted that the majority of the Pond A9-A15 system will be dominated by salt marsh vegetation. In addition, this increase in tidal prism will draw more saline water into and around the marshes downstream, thus converting some existing brackish marsh along Alviso and Coyote Sloughs to salt marsh habitat.

Maintenance

Following the breaching of levees around Ponds A9-A15, the only management activities that might occur within the restored tidal habitats are predator management and invasive plant management, as discussed previously. Predator management currently performed according to the Refuge's predator management plan (Foerster and Takekawa 1991, as updated in Service 2012a; Refuge 2012) will continue to be implemented on Refuge lands.

Recreation Actions

Recreation activities were incorporated into the proposed project to replace the loss of public access as the ponds in the Service-managed Refuge are breached and restored to tidal marsh. The proposed recreation measures associated with Service-led actions are multi-use trails on top of the new FRM levee, with connections to the Bay Trail network, along with viewing platforms, and trail upgrades to be made to an existing segment of the Bay Trail system along SR 237 (Figure 3).

Under existing conditions, a loop trail extends around Ponds A9 through A15, with an interior trail also existing between A15 and A13/14. These trails can be accessed from the Alviso Marina or via a spur that crosses the railroad tracks between Ponds A16 and A15. Restoration of tidal action to Ponds A9 through A15 will involve breaches in the outboard levees, thus interrupting the perimeter trail. Around Ponds A9-A15, the only trails that would remain following the completion of tidal restoration would consist of short segments in the eastern part of this group of ponds, as shown on Figure 3 (see also Figure 18 in the Biological Assessment (HTH 2014)).

The proposed project includes a new section of maintenance trail along the crest of the new WPCP Segment, which will be available for pedestrian traffic. Consistent with the WPCP Master Plan, the eastern extent of the levee maintenance trail will connect to a designated route at the existing bridge at McCarthy Boulevard. The existing pedestrian walkway on the bridge will take recreationists to the Coyote Creek Trail that runs along the east bank of the creek. This proposed trail connection will be refined in final design with consideration of both public safety and the addition of features (*e.g.*, fencing) to limit public access to sensitive wildlife areas. In addition, because the westernmost extent of the proposed levee's maintenance trail will end (with the levee itself) at existing high ground adjacent to the Alviso Marina, this will facilitate another connection to the Bay Trail if the City of San Jose's proposed plans to connect the Alviso Marina to the larger trail network are realized. In addition, the proposed project will construct a trail segment along the north side of SR 237 between the Guadalupe River and Zanker Road (see Figure 18 in the Biological Assessment (HTH 2014)).

<u>Construction Equipment/Activities for Recreation Components</u>

Construction of the recreation and public access components may consist of the following activities:

1. Grading and, for all-weather trails, gravel application. Equipment required for trail construction may include small, Bobcat-sized equipment, backhoes or front-end loaders, graders, bulldozers, asphalt placement equipment, and dump trucks.

2. Constructing trails, including some trails designed to accommodate vehicular use, trails to provide access to a staging area, and trails for disabled access.

3. Constructing interpretive stations of varying size and scope, which will include interactive features that can operate independently or can be enhanced with the assistance of docents.

4. Constructing viewing platforms at vista points where important information about the landscape can be described. Viewing platforms will be made of wood, metal, or plastic material and assembled in-place using a backhoe or excavator and hand tools. Interpretive stations will be built on-site, or will be prefabricated structures. Assembly and installation will require a backhoe or excavator and hand tools.

Maintenance of Recreation Components

Once construction of the recreation components is complete, the SCVWD, likely in a cooperative agreement with the City of San Jose, will be responsible for their operation, maintenance, repair, replacement, and rehabilitation. It is anticipated that the following operations and maintenance activities will be performed on the trails and the Artesian Slough pedestrian bridge:

1. Trash and anthropogenic debris removal;

2. Repairs due to damage by people, small mammals, storm activities, or other factors;

3. Trail and bridge inspections;

4. Graffiti removal;

5. Access improvements and upkeep;

6. Predator and invasive species management;

7. Enforcement of conservation measures; and

8. A long-term management plan will be prepared to describe the implementation of these activities.

Monitoring and Adaptive Management Actions

MAM will be implemented in Ponds A9-A15 as described previously for Pond A18. The MAMP includes a discussion of the scientific basis and institutional structure for implementation, specific MAM activities, and cost estimates. Monitoring activities to be performed for the restoration activities at Ponds A9-A15 include those listed previously. Other monitoring of more regional issues, such as regional changes in mudflat and tidal marsh acreages, changes in bird populations (including sensitive species and predators such as gulls), and mercury bioavailability, will continue to occur through the SBSPRP as it currently does.

Conservation Measures

The operational implementation of proposed project activities incorporates a number of measures, including general and species-specific measures, to avoid and minimize impacts during construction. All of these measures apply both to Corps-led and Service-led activities. Residual impacts remaining after implementation of the general and species-specific avoidance and minimization measures are addressed through compensatory conservation measures. These conservation measures are further described below.

General Avoidance and Minimization Measures

Below, the general conservation measures that will be implemented during proposed project activities to avoid and minimize adverse effects on sensitive species and habitats are described, followed by conservation measures specific to individual special-status species. Additional details and measures are provided in the proposed project's *Integrated Document* (HDR 2014). All permit conditions, legal requirements, and appropriate excavation and engineering practices shall be followed to avoid and minimize environmental impacts associated with the proposed project. The term "project site" below refers to any of the potential work locations related to FRM and restoration activities that will occur throughout the proposed project's action area.

1. Earthen materials (*e.g.*, existing levees) will be reused to the extent feasible to reduce the amount of imported material and stockpile and landfill material.

2. Staging, access, and parking areas will be located outside of sensitive habitats to the extent feasible.

3. Areas of disturbance will be limited to the smallest footprint necessary.

4. All equipment will be maintained free of petroleum leaks. All vehicles operated within 150 feet of any water body will be inspected daily for leaks and, if necessary, repaired before leaving the staging area. Inspections will be documented in a record that is available for review on request.

5. Spill prevention kits will always be in close proximity to construction activities (*e.g.*, crew trucks and other logical locations) when using hazardous materials. Feasible measures will be implemented to ensure that hazardous materials are properly handled and the quality of aquatic resources is protected.

6. No fueling will be performed in wetland or aquatic habitats unless equipment stationed in these locations is not readily relocated (*e.g.*, Aquamog, pumps, generators, dredge barges). For stationary equipment that must be fueled on site, containment will be provided in such a manner that any accidental spill of fuel will not be able to enter the water or contaminate sediments that may come in contact with water.

7. A hazardous materials management/fuel spill containment plan will be developed and implemented by the construction contractor and given to all contractors and biological monitors working on the proposed project, with at least one copy of the plan located onsite at all times. The purpose of the plan is to provide onsite construction managers,

environmental compliance monitors, and regulatory agencies with a detailed description of hazardous materials management, spill prevention, and spill response/cleanup measures associated with the construction of the proposed project elements. The primary objective of the plan is to prevent a spill of hazardous materials. Elements of the plan include, but are not limited to the following:

a. A discussion of hazardous materials management, including delineation of hazardous material and hazardous waste storage area, access and egress routes, waterways, emergency assembly areas, and temporary hazardous waste storage areas;

b. Materials Safety Data Sheets for all chemicals used and stored on site;

c. An inventory list of emergency equipment;

d. Spill control and countermeasures including employee spill prevention/response training;

e. Notification and documentation procedures; and

f. Monthly reporting plan.

8. Vehicles will be washed only at an approved area. No washing of vehicles will occur at job sites.

9. A berm or other sediment-control devise will be installed around stockpiled soil material to prevent runoff from transporting sediment into sensitive habitats.

10. Any large wood or weed-free topsoil displaced by construction will be stockpiled for use during site restoration. Native vegetation displaced by construction will be stockpiled if it would be useful during site restoration.

11. The work site, areas adjacent to the work site, and access roads will be maintained in an orderly condition, free and clear from debris and discarded materials. Personnel will not sweep, grade, or flush surplus materials, rubbish, debris, or dust into storm drains, water bodies, or waterways. Upon completion of work, all building materials, debris, unused materials, concrete forms, and other construction-related materials will be removed from the work site.

12. A stormwater management plan will be developed to ensure that, during rain events, construction activities do not increase the levels of erosion and sedimentation. This plan will include the use of erosion-control materials (*e.g.*, baffles, fiber rolls, or hay bales; temporary containment berms) and erosion-control measures such as straw application or hydroseeding with native grasses on disturbed slopes; and floating sediment booms and/or curtains to minimize any impacts that may occur due to increased mobilization of sediments. Suitable erosion control, sediment control, source control, treatment control, material management, and non-stormwater management best management practices will be implemented consistent with the latest edition of the California Stormwater Quality Association

"Stormwater Best Management Practices Handbook," available at www.capmphandbooks.com.

13. All disturbed areas will be stabilized within 12 hours of any break in work unless construction will resume work within seven days. Earthwork will be completed as quickly as possible, and site restoration will occur immediately following use.

14. For each activity, the supervising construction personnel will participate in a Service-approved worker environmental awareness program. Under this program, construction personnel will be informed about the presence of listed species and habitats associated with the species and that unlawful take of the animal or destruction of its habitat is a violation of the Act. Prior to construction activities, a qualified biologist approved by the Service will instruct all construction personnel about: (1) the description and status of the species; (2) the importance of their associated habitats; and (3) a list of measures being taken to reduce impacts on these species during proposed project construction and implementation. The awareness program will apply to construction occurring within or adjacent to tidal marsh or slough habitat and within or adjacent to managed pond habitat. A fact sheet conveying this information will be prepared for distribution to the construction crew and anyone else who enters the proposed project site. A Service representative will be appointed who will be the contact source for any employee or contractor who might encounter a listed species. The representative(s) will be identified during the environmental awareness program. The representative's name and telephone number will be provided to the Service prior to the initiation of any activities.

15. No firearms (except for Federal, State, or local law enforcement officers and security personnel) will be permitted at the proposed project site to avoid harassment, killing, or injuring of wildlife, with the exception of hunters who are authorized by the Service to pass through an area to access hunting areas.

16. No animals (*e.g.*, dogs or cats) will be brought to the proposed project site to avoid harassment, killing, or injuring of wildlife.

17. Ingress and egress points will be clearly identified in the field using orange construction fence. Work will not be conducted outside the designated work area.

18. In order to minimize the spread of invasive plants, all equipment (including personal gear) will be cleaned of soil, seeds, and plant material prior to arriving on the proposed project site to prevent introduction of undesirable plant species.

19. The proposed project site will be maintained trash-free, and food refuse will be contained in secure bins and removed daily during construction.

20. Nighttime work near tidal marsh habitat will be avoided to the extent feasible. If nighttime work cannot be avoided, lighting will be directed to the work area and away from habitat for the salt marsh harvest mouse, California clapper rail, and western snowy plover.

21. Interpretive signage prohibiting access to areas that are closed to the public, and indicating the importance of protection of sensitive biological resources, will be placed in key locations, such as along trails near sensitive habitats.

22. Prior to construction, all high-quality habitat for listed species will be mapped and provided to the Service. Vehicles driving on levees adjacent to such habitat for construction or monitoring activities will then travel at speeds no greater than 10 miles per hour to minimize noise and dust disturbance.

23. All clean fill material proposed for upland and wetland placement will meet the qualifications set forth in the Regional Water Quality Control Board's (RWQCB's) waste discharge requirements (Tentative Order), and will meet the screening criteria listed in the Biological Assessment (HTH 2014). If the above-mentioned thresholds are not attained but the material is approved for use by the RWQCB, consultation will be reinitiated to analyze the potential effects of the contaminated material to listed species.

24. The restored tidal marsh wetlands will be monitored for possible infestation by non-native cordgrass, perennial pepperweed, and other invasive, non-native plant species that could result in a substantial reduction in the ecological value of the tidal restoration and ecotone construction. It is expected that some non-natives that are not particularly invasive will colonize the ecotones, but if any particularly invasive plant species are found, a qualified botanist will recommend specific measures to control the spread of non-native plant species. All infestations of non-native cordgrass within the restored tidal marsh wetlands will be controlled and removed in coordination with the San Francisco Estuary Invasive *Spartina* Project without substantially hindering or harming the establishment of native vegetation in the restored wetlands. If perennial pepperweed control is necessary, spraying with glyphosate or imazapyr formulated for aquatic use may be necessary, as described by Hogle *et al.* (2007) for the San Pablo Bay National Wildlife Refuge. Otherwise, preferred vegetation management will involve non-mechanized methods of removal including hand-pulling, saline spray, pond flooding (during non-breeding seasons), and substrate-based controls. Aside from glyphosate and imazapyr for pepperweed control, the use of any herbicides will be subject to Service and NMFS approval.

25. If spraying for perennial pepperweed is necessary, the following general conservation measures will be implemented (measures specific to the California clapper rail are described below):

    a. Herbicides will be applied by a certified applicator and in accordance with application guidelines and the manufacturer label.

    b. Herbicide applications would be timed to coincide with ebbing tides to protect non-target vegetation, to allow a minimum of six hours dry time for glyphosate/imazapyr mixture applications, and at least one-hour dry time for imazapyr applications.

    c. Herbicides will be applied directly to perennial pepperweed plants and at low or receding tide to minimize the potential application of herbicide directly on the water surface.

d. All certified applicators will be trained to correctly identify perennial pepperweed, to distinguish this species from native species in the action area, and to adhere to the conservation measures in this biological opinion and conference opinion.

26. Long-term maintenance and monitoring will be performed outside of peak migration periods of, and breeding seasons of, sensitive wildlife species to the maximum extent feasible.

27. A Service-approved biological monitor will be present during all work activities in or immediately adjacent to habitat that could be occupied by federally listed species to look for individuals that may be impacted by construction; activities are considered "immediately adjacent" to sensitive habitat if those activities could result in the physical disturbance of the habitat (*e.g.*, as a result of mobilization of sediment into the habitat) or if individual listed species could move from that habitat into the proposed project area (*e.g.*, seeking refuge under construction equipment). The biologist will have stop-work authority if any individual of a federally listed species is detected in an area where it may be injured or killed by construction activities.

28. Any fencing near habitat for the salt marsh harvest mouse, California clapper rail, or western snowy plover will incorporate raptor perch deterrents to minimize raptor predation on listed species.

29. To avoid the loss of individual California clapper rails and salt marsh harvest mice, construction, maintenance, and management activities (including mowing) within or adjacent to habitat for these species will not occur within two hours before or after extreme high tides (6.5 feet or above, as measured at the Golden Gate Bridge and adjusted to the timing of local high tides), when the marsh plain is inundated, because protective cover for these species is limited and activities could prevent them from reaching available cover.

30. No dogs will be allowed on trails (or elsewhere) on Refuge lands. On City of San Jose lands, all dogs must be on leashes and must remain on established trails.

31. Long-term Predator Management and Invasive Plant Species Control Plans: A long-term management plan will be prepared to describe predator management, invasive plant species control, litter cleanup, and patrols/enforcement along the trails in the proposed project area. This plan will be implemented under a cooperative agreement between the SCVWD, the Refuge, and the City of San Jose, and it will be funded by the SCVWD.

Avoidance and Minimization Measures for the California Clapper Rail

The following measures will be implemented to avoid and minimize effects on California clapper rails:

1. To avoid causing the abandonment of an active California clapper rail nest, activities (including construction and maintenance activities) within 700 feet of vegetated tidal marsh providing suitable breeding habitat for California clapper rails will be avoided during the rail's breeding season from February 1 through August 31 unless protocol-level surveys are conducted by a Service-approved biologist to determine California clapper rail locations and territories. If breeding California clapper rails are determined to be present, activities will

not occur within 700 feet of an identified calling center. If the intervening distance across a major slough channel (*e.g.*, Alviso, Coyote, or Artesian Sloughs) or across a substantial barrier between the California clapper rail calling center and any activity area is greater than 200 feet, then work may proceed at that location within the breeding season. Aside from continued use of recreational trails established prior to the start of the breeding season (which may continue), only inspection, maintenance, research, or monitoring activities that have little potential for effects on California clapper rails due to their short durations, distance from rail habitat, or low-magnitude effects may be performed during the California clapper rail's breeding season in areas within or adjacent to California clapper rail breeding habitat, with approval of the Service under the supervision of a qualified biologist. Otherwise, with Service approval on a case-by-case basis, construction activities may take place after July 15 in a given area if the activity is thought to be minimally disturbing to breeding California clapper rails.

2. To be effective, perennial pepperweed control has to occur when the plant is in bud (May-July), during the California clapper rail breeding season. If perennial pepperweed control must be performed in California clapper rail habitat, the following measures will be implemented to minimize impacts on rails:

    a. Vehicle and foot access pathways to perennial pepperweed through tidal marsh will be minimized and use of existing roads and trails for control work will be maximized. Shortest possible access paths through the marsh to treatment patches will be identified prior to marsh access. Control methods to be used in each area will be selected to minimize potential impacts to marsh habitat and listed species from control operations.

    b. If breeding California clapper rails are determined to be present in a marsh, marsh access using aquatic-tracked vehicles (ARGOs) will not be allowed in contiguous marsh areas within 700 feet of an identified California clapper rail calling center (also referred to as the "700-ft Buffer Area") to avoid nest destruction, nest abandonment, and harassment of breeding California clapper rails. If the intervening distance across a major slough channel or across a substantial physical barrier between the California clapper rail calling center and the proposed access area is greater than 200 feet, then access may proceed within the breeding season.

    c. ARGOs will not travel within 50 feet of slough channels to avoid crushing high vegetation, such as gumplant, that grows along channels.

    d. Boats will be used to access marsh areas (where feasible) to treat large areas of perennial pepperweed along slough edges (*e.g.*, use of intelli-sprayer with 300 feet of hoseline) to further reduce the necessity of walking long distances through the marsh.

    e. Crews will be instructed to walk carefully through the marsh, avoiding high pickleweed cover (*e.g.*, greater than one foot) and wrack where salt marsh harvest mice are likely to nest or find cover.

f. All personnel entering the marsh will be trained to identify and avoid direct and indirect disturbance to listed species and associated habitats. Training material will include taped recordings of California clapper rail calls and the "Walking in the Marsh" protocol (see Appendix A of this biological opinion) which addresses potential disturbance effects to California clapper rails and salt marsh harvest mice.

g. Before spray operations commence each year, a qualified California clapper rail biologist familiar with the project area will familiarize the spray crew with the area and ensure that all crew members know the location of each "700-ft Buffer Area" for protection of nesting California clapper rails. Crews will be instructed to avoid these areas unless accompanied by a qualified California clapper rail biologist.

h. During the California clapper rail breeding season, before crews are allowed to enter a California clapper rail "700-ft Buffer Area" to conduct control work, the Refuge Biologist, or designee, will work with other qualified California clapper rail biologists and the spray crew to develop a strategy for control that will minimize the amount of time the crew spends in each "700-ft Buffer Area" while conducting control. This planning session will include use of detailed maps showing perennial pepperweed locations within each "700-ft Buffer Area".

i. During the California clapper rail breeding season, a qualified California clapper rail biologist such as a Refuge Biologist, will accompany spray crews into "700-ft Buffer Areas" and will supervise and guide control operations within these areas.

j. Crews will limit time within a California clapper rail nesting area (call center + 700-ft Buffer Area) to 30 minutes or less to minimize disturbance to adult rails and to avoid potential nest destruction or nest abandonment.

k. If California clapper rail nests are encountered during control work, observers will immediately leave the vicinity of the nest and report findings to the Service.

l. If California clapper rail adults are encountered during control work, observers will move away from the birds if they are giving alarm calls or otherwise appear agitated.

Avoidance and Minimization Measures for the Salt Marsh Harvest Mouse

To minimize potential effects on the salt marsh harvest mouse, the following measures (in addition to those described above for the California clapper rail during perennial pepperweed control) will be implemented:

1. To avoid the loss of individual salt marsh harvest mice from any excavation, fill, or construction activities in suitable habitat, vegetation removal will be limited to the minimum amount necessary to permit the activity to occur. Wherever feasible, sufficient pickleweed habitat, as determined by a Service-approved biologist, will remain adjacent to the activity area to provide refugia for displaced individuals.

2. Within areas where vegetation potentially supporting salt marsh harvest mice will be impacted, vegetation and debris that could provide cover for salt marsh harvest mice will be

removed using only hand tools at least three weeks prior to the commencement of construction activities. Vegetation removal will occur under the supervision of a Service-approved biologist. This vegetation will be removed on a progressive basis, such that the advancing front of vegetation removal moves toward vegetation that would not be disturbed. In some cases, temporary berms may need to be constructed over borrow ditches to enable suitable escape routes, or temporary shelter consisting of dead vegetation may be positioned to provide escape routes to suitable habitat. A Service-approved biologist will monitor the vegetation removal and make specific recommendations with respect to the rate of vegetation removal (to ensure that any salt marsh harvest mice present are able to escape to cover that will not be impacted), whether vegetation needs to remain in a certain area temporarily to facilitate dispersal of salt marsh harvest mice into habitat outside the impact area, and whether any berms are necessary to allow salt marsh harvest mice to disperse across channels.

3. Following the hand-removal of vegetation, exclusion fencing will be erected as needed between construction areas and salt marsh harvest mouse habitat that is to remain unimpacted to define and isolate protected salt marsh harvest mouse habitat. This fencing will consist of heavy plastic sheeting or metal material that cannot be climbed by salt marsh harvest mice, buried at least four inches below the ground's surface, and with at least one foot (but no more than four feet) above the ground. All supports for the fencing will be placed on the inside of the work area. A four-foot buffer will be maintained free of vegetation around the outside of the exclusion fencing. The fencing will be inspected daily during construction, and any necessary repairs will be made within 24 hours of when they are found. If any breaks in the fencing are found, the Service-approved biologist will inspect the work area for salt marsh harvest mice.

4. Although individual salt marsh harvest mice cannot be handled on non-Federal land, because the species is fully protected according to the California Fish and Game Code, individuals can be handled on Federal land (*i.e.*, the Refuge). If any individual salt marsh harvest mice are found within the impact footprint on Refuge land, and they do not move on their own to vegetated areas outside the impact footprint, they will be relocated by hand to suitable habitat outside the impact zone by a qualified biologist.

5. During construction, a Service-approved biologist will check underneath vehicles and equipment for salt marsh harvest mice before such equipment is moved, unless the equipment is surrounded by salt marsh harvest mouse-proof exclusion fencing.

6. During mowing of vegetation along the FRM levee, mowing will start from the top (the area of least suitable habitat) and proceed downslope toward more suitable habitat so any salt marsh harvest mice present in the narrow swath to be mown can move away from the disturbance of the mower and out of the mowing area.

7. Below the zone at the top of the levee that will be mown, any woody plant removal that becomes necessary will be performed by hand; such hand-removal is expected to be necessary very infrequently (*e.g.*, once every few years, at most).

Avoidance and Minimization Measures for the Western Snowy Plover

The following measures will be implemented to avoid and minimize effects on western snowy plovers:

1. No activities will be performed within 600 feet of an active western snowy plover nest during the western snowy plover's breeding season, March 1 through September 14 (or as determined through surveys). Vehicles driving on levees and pedestrians walking on recreational trails established prior to the start of the breeding season (which may continue) will remain at least 300 feet away from western snowy plover nests and broods to the extent feasible, although because these trails are already accessible to the public, nesting western plovers are expected to continue to adjust the location of nesting based on their tolerance of distance from these trails. If necessary, signage, temporary fencing such as roped-off areas, or other markers will indicate areas that vehicles and pedestrians should avoid to protect nesting western snowy plovers, and Refuge staff will enforce these closures. In addition, personnel that must stop at a specific site for brief inspections, maintenance, or monitoring activities will remain 600 feet away from western snowy plover nests and broods. *Exception*: Only inspection, minor maintenance (such as water level management within a pond), research, or monitoring activities may be performed during the western snowy plover breeding season in areas within or adjacent to western snowy plover breeding habitat with approval of the Service under the supervision of a qualified biologist. If western snowy plover chicks are present and are foraging along any levee that will be accessed by vehicles (*e.g.*, for construction, inspection, or access), vehicle use will be under the supervision of a qualified biologist (to ensure that no chicks are present within the path of the vehicle).

2. Breaching of ponds that contain suitable western snowy plover habitat will not be performed during the breeding season (March 1 through September 14) unless surveys have documented that no active nests or unfledged chicks are present within the ponds to be flooded by breaching.

3. Viewing platforms, kiosks, benches, interpretive displays, and other focal areas for public use will be located a minimum of 600 feet from suitable western snowy plover nesting habitat.

Avoidance and Minimization Measures for the California Least Tern

Although California least terns are not known or expected to nest in or very near the action area, the following measures required by the Service's biological opinion for the SBSPRP are incorporated into the proposed project:

1. No activities will be performed within 300 feet of an active California least tern nest during the California least tern's breeding season, which is April 15 to August 15 (or as determined through surveys). *Exception*: Only inspection, maintenance, research, or monitoring activities may be performed during the California least tern's breeding season in areas within or adjacent to California least tern breeding habitat with approval of the Service under the supervision of a qualified biologist.

2. Breaching of ponds that contain suitable California least tern nesting habitat will not be performed during the breeding season unless surveys have documented that no active nests or unfledged chicks are present within the ponds to be flooded by breaching.

3. To avoid or minimize potential adverse effects from public access and recreation features constructed near tidal marsh, trails adjacent to some nesting areas for sensitive bird species will be closed during the breeding season. Public trails within 300 feet of suitable California least tern nesting habitat will be closed during the breeding season. In addition, if trails are to be open during the breeding season of this species, viewing platforms, kiosks, benches, interpretive displays, and other focal areas for public use will be located a minimum of 600 feet from suitable nesting habitat. The locations of trail segments to be closed, and the periods of closure will depend on whether sensitive bird species, such as California least terns, are nesting in certain areas in a given year and whether nesting areas are located in close proximity to the trails. Decisions about whether to close a particular trail segment will be made early in the breeding season (and possibly later in the season as conditions change) following surveys for nesting birds within a given pond adjacent to a trail.

Avoidance and Minimization Measures for the Longfin Smelt and Other Special-Status Fish Species

To minimize potential effects on the longfin smelt and other special-status fish species managed according to the Fishery Management Plans, the following measures will be implemented:

1. Construction activities in, or directly adjacent to, waters where Central California Coast steelhead and longfin smelt are likely to be present will be performed between June 1 and November 30.

2. Levee breaching will not occur between February 1 and May 31 for the protection of out-migrating juvenile steelhead in, or directly adjacent to, waters where steelhead are likely to be present.

3. Activities that extend into the waters where listed fish and fish species managed according to Fishery Management Plans may be present, such as pilot channel excavation, will be performed at low tide and/or under de-watered conditions, to the extent practicable.

4. Cofferdams will be used to the extent feasible during construction and maintenance activities, as well as during implementation of any adaptive management actions, that could potentially result in substantial siltation of protected fish habitat.

5. All pumps used for dewatering where salmonids may be present will be screened according to NMFS and CDFW criteria for juvenile salmonids.

6. During tide gate construction on Artesian Slough, all pile driving will be performed using a vibratory hammer to minimize the potential effects of noise and pressure-waves on fish.

7. NMFS personnel will be immediately notified of any observed fish mortality events.

8. Tidally restored ponds will contain channels that are adequate for the ingress and egress of fish with tidal circulation. Inspections will be documented in a record that is available for review on request.

9. Treated wood will not be used in structures that may come into contact with water.

Western Snowy Plover Compensatory Conservation Measures

The Corps will implement the following compensatory mitigation for effects to western snowy plovers from levee construction:

1. Breeding habitat for the western snowy plover will be enhanced on an island in Pond A16. Islands were constructed in Pond A16 in 2012 and 2013 as part of Phase I activities of the SBSPRP, for the purpose of providing nesting, roosting, and foraging habitat for a variety of pond-associated bird species, including western snowy plovers. Western snowy plovers nested on one of these islands in 2013. However, the dark substrate of the islands, and their relatively homogeneous surfaces, could make western snowy plovers on the islands relatively conspicuous to predators. The South Bay Shoreline Phase I Study Project will provide small gravel (or other appropriate substrate) that will be distributed in patches on one of the islands in A16 (with the island to be selected by the Refuge), and the proposed project will fund the maintenance of this gravel. Pea gravel has been intentionally provided in some areas as a substrate for use by nesting western snowy plovers (Paton and Bachman 1996, Sexson and Farley 2012), and in the Bay, some western snowy plovers at the Eden Landing Ecological Reserve nest in fine gravel along roads.

2. Predator management is currently performed on Refuge lands, but as partial compensation for adverse proposed project effects on western snowy plovers, the intensity of this management will be increased in Pond A16 and New Chicago Marsh during the western snowy plover breeding season. This enhanced predator management will include more frequent monitoring for predators nesting (*e.g.*, gulls and corvids), roosting, or foraging in these areas islands; more frequent trapping of mammalian predators in New Chicago Marsh and along Artesian Slough; and ongoing identification and implementation of deterrence or removal measures for those predators. This measure will consist of funding a predator management technician for an additional 10 hours per week during the period March 1 through September 14 (approximately 28 weeks).

The Corps will fund the initial enhancement of nesting islands in Pond A16 with gravel. The SCVWD will fund the long-term maintenance of the gravel substrate on those islands and the incremental increase in predator management in Pond A16 and New Chicago Marsh. This funding will take the form of annual allocations in the SCVWD's budget specifically for these purposes.

Action Area

The action area is defined in 50 CFR § 402.02, as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." The "effects of the action" to be analyzed in this biological opinion and conference opinion are defined as the direct and indirect effects of the action, together with the effects of other activities that are interrelated or interdependent with that action (such as activities implemented or funded by the local sponsors, the

CSCC and SCVWD, in conjunction with the Corps' and Service's activities). The action area includes the construction footprints for FRM and recreational access activities; the entirety of Ponds A9 through A15 and A18; portions of Pond A16 adjacent to the proposed project footprint and on the island where western snowy plover habitat enhancement will occur; the northern and western boundaries of New Chicago Marsh; areas on the outboard (bayward) sides of those ponds where pilot channel excavation will occur; all staging, stockpiling, and access areas; the portions of Alviso Slough, Coyote Slough, South Coyote Slough, and Artesian Slough downstream from proposed levee breaches that may be subject to additional scour from increased tidal prism or temporarily increased sedimentation during construction; and areas surrounding the construction footprint and trails where indirect effects such as disturbance (*e.g.*, areas within 600 feet for nesting western snowy plovers and 700 feet for nesting California clapper rails) may occur.

Analytical Framework for the Jeopardy Analysis

In accordance with policy and regulation, the jeopardy analyses in this biological opinion and conference opinion relies on four components: (1) the *Status of the Species*, which evaluates the California clapper rail's, salt marsh harvest mouse's, western snowy plover's, California least tern's, and longfin smelt's range-wide condition, the factors responsible for that condition, and their survival and recovery needs; (2) the *Environmental Baseline*, which evaluates the condition of these species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of these listed species; (3) the *Effects of the Action*, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the California clapper rail, salt marsh harvest mouse, western snowy plover, California least tern, and longfin smelt; and (4) *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on these species.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the California clapper rail's, salt marsh harvest mouse's, western snowy plover's, California least tern's, and longfin smelt's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of these species in the wild.

The jeopardy analysis in this biological opinion and conference opinion places an emphasis on consideration of the range-wide survival and recovery needs of the California clapper rail, salt marsh harvest mouse, western snowy plover, California least tern, and longfin smelt and the role of the action area in the survival and recovery of the California clapper rail, salt marsh harvest mouse, western snowy plover, California least tern, and longfin smelt as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

Status of the Species

California Clapper Rail

The status of the California clapper rail and information about its biology, ecology, distribution, and current threats is available in the *Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Recovery Plan; http://www.fws.gov/sacramento/es/Recovery-Planning/Tidal-

Marsh/es_recovery_tidal-marsh-recovery.htm; Service 2013). Critical habitat has not been designated for this species. Recent genetic analyses of rail species resulted in a change in the common name and taxonomy of the large, "clapper-type" rails (*Rallus longirostris*) of the west coast of North America to Ridgway's rail (*Rallus obsoletus*) (Maley and Brumfield 2013, Chesser *et al.* 2014). Thus the California clapper rail is now referred to in the scientific community as the California Ridgway's rail (*Rallus obsoletus obsoletus*). The change in the common name and taxonomy of the California clapper rail, however, does not change the listing status of the species.

Salt Marsh Harvest Mouse

There are two subspecies of the salt marsh harvest mouse: the northern subspecies (*R. r. halicoetes*) and the southern subspecies (*R. r. raviventris*). Both subspecies are listed as endangered. The status of the salt marsh harvest mouse and information about its biology, ecology, distribution, and current threats is available in the Recovery Plan (http://www.fws.gov/sacramento/es/Recovery-Planning/Tidal-Marsh/es_recovery_tidal-marsh-recovery.htm; Service 2013). Critical habitat has not been designated for this species.

Pacific Coast Population of the Western Snowy Plover

The status of the Pacific coast population of the western snowy plover and information about its biology, ecology, distribution, and current threats is available in the *Recovery Plan for the Pacific Coast Population of the Western Snowy Plover (Charadrius alexandrinus nivosus)* (http://ecos.fws.gov/docs/recovery_plan/070924_2.pdf, Service 2007).

California Least Tern

The status of the California least tern and information about its biology, ecology, distribution, and current threats is available in the five-year review (http://ecos.fws.gov/docs/five_year_review/doc775.pdf, Service 2006).

San Francisco Bay-Delta DPS of the Longfin Smelt

The status of the San Francisco Bay-Delta DPS of the longfin smelt and information about its biology, ecology, distribution, and current threats is available in the 12-month finding (http://www.fws.gov/sfbaydelta/species/longfin_smelt.cfm, 77 FR 19756, Service 2012b) and the 2014 annual Candidate Notice of Review (79 FR 72449, Service 2014a).

Environmental Baseline

<u>Proposed Project Location and Existing Conditions</u>

The proposed project is located in the community of Alviso, part of the City of San Jose, Santa Clara County, California. The Study Area is bounded on the southwest by Alviso Slough; on the north by Coyote Slough, Ponds A16 and A17, the "Island Ponds" (Ponds A19, A20, and A21), and the Newby Island Landfill; on the east by the Coyote Creek levee; and on the south by SR 237 (Figure 1).

Figure 1 depicts the Study Area in relation to the Alviso complex of the SBSPRP (on Refuge lands). The Alviso pond complex of the SBSPRP area bisects the Study Area, with managed ponds A9 through A17, Alviso Slough, and portions of Coyote Slough within the SBSPRP's Alviso complex, and Pond A18, New Chicago Marsh, and the WPCP being outside the SBSPRP's Alviso complex. However, the entire Study Area is within the action area for the SBSPRP's section 7 consultation (Service 2008).

Tidal marshes along both Alviso Slough and Coyote Slough are fresh/brackish in their upper reaches, where they are dominated by California bulrush, alkali bulrush, cattails, and invasive perennial pepperweed, but this vegetation transitions into salt marsh species such as Pacific cordgrass, pickleweed, and marsh gumplant toward the downstream portions of these sloughs. Artesian Slough, into which the WPCP discharges treated wastewater, is dominated primarily by freshwater marsh, which transitions to brackish marsh toward its confluence with Coyote Slough. Marshes along all three of these sloughs are relatively narrow and thus, in most places, lack the extensive channel networks that characterize larger marshes. Pond A17 has only recently been opened to tidal action, and thus rather than being vegetated, is inundated during the higher portion of the tidal cycle and consists mostly of mudflat at low tide; eventually, it is expected and intended that A17 will be dominated by tidal marsh. New Chicago Marsh is a diked, muted tidal salt marsh dominated by pickleweed, saltgrass, jaumea, and other halophytes in some areas, but with extensive open water and salt panne habitat as well.

Ponds A9, A10, A11, A14, A16, and A18 are managed ponds, with varying water depths and salinities similar to or slightly higher than Bay salinities. Ponds A9, A10, A11, and A14 are joined by breaches in their levees; water control structures along Alviso Slough at Pond A9 and Coyote Slough at Pond A14 allow water to enter these ponds. Ponds A12, A13, and A15 are also managed ponds, but are referred to as "batch ponds", because they are managed for higher salinities. Pond A16, which will be a managed pond under the SBSPRP, receives water from Pond A17 through a control structure, and water flows out of A16 through another structure in its southeastern corner; a structure along the southern edge of Pond A16 allows water to discharge into New Chicago Marsh as well. Pond A18 is not managed in concert with the other ponds; water in this pond is managed via two control structures, one in the northwest and one in the southwest portion of the pond. Currently, all managed and batch ponds on Refuge lands (A9-A15) are managed primarily as habitat for pond-associated waterbirds; Pond A18 is managed to maintain ambient conditions, with ancillary benefits to waterbirds. The Study Area also includes developed areas associated with the community of Alviso and an electrical generation plant, landfills, the WPCP water/sewage treatment areas, and upland grassland/ruderal habitat in the WPCP buffer lands.

The South Bay Shoreline Study is closely interrelated, and in some cases overlaps, with the ongoing implementation of the SBSPRP. The planning process for the South Bay Shoreline Phase I Study is being coordinated with the SBSPRP actions, as both efforts have similar FRM, ecosystem restoration, and recreation objectives. A final SPSPRP Environmental Impact Statement/ Environmental Impact Report, including both programmatic and project-specific actions, was released in December 2007 (EDAW *et al.* 2007). The total SBSPRP area consists of 15,100 acres of former salt ponds and adjacent habitats in the South Bay that the Service and CDFW acquired from Cargill, Inc. in 2003. The SBSPRP area includes the Eden Landing pond complex in the cities of Hayward and Fremont, Alameda County; the Ravenswood pond complex in the City of Menlo Park, San Mateo County; and the Alviso pond complex, which extends from the City of Mountain View southeastward to the Alviso area in Santa Clara County. The SBSPRP also includes ponds A22 and A23 in the City of Fremont, Alameda County, and the aforementioned Island Ponds (Figure 1).

The Refuge owns and manages the 8,000-acre Alviso pond complex, within which are located New Chicago Marsh and 2,100 acres of ponds included in the current South Bay Shoreline Phase I Study Area. Pond A18 (about 856 acres), owned by the City of San Jose, is also included in the South Bay Shoreline Phase I Study Area, although it is not included in the SBSPRP Study Area and was not covered by the SBSPRP's section 7 consultations. Although Pond A18 was not considered in the SBSPRP, primarily due to not being a Service-managed property, the actions being proposed for the pond are similar to those proposed for the rest of the Alviso complex ponds, and the addition of Pond A18 to the South Bay Shoreline Phase I Study Area is consistent with the goals for the greater South Bay tidal restoration.

SBSPRP Phase I construction started in 2008; the final SBSPRP Phase I restoration actions were initiated in 2011 at Alviso Complex Ponds A16 and A17. Because both Ponds A16 and A17 were restored or reconfigured as part of SBSPRP Phase I implementation, no focused South Bay Shoreline Phase I restoration actions are proposed for these two ponds (although one of the islands in A16 will be enhanced for use by western snowy plovers).

<u>California Clapper Rail</u>

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the California clapper rail (Service 2013). The Central/South San Francisco Bay Recovery Unit supports the majority of California clapper rail populations. Populations in this unit are widely separated from northern ones, but there may be occasional dispersal between these areas. Predation by mammalian and avian predators is one of the primary threats to California clapper rails in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2013, Overton *et al.* 2014). Overton *et al.* (2014) tracked 108 radio-marked California clapper rails at four marshes within the Central/South San Francisco Bay Recovery Unit (*i.e.*, Colma Marsh, Arrowhead Marsh, Laumeister Marsh, and Cogswell Marsh) and estimated survival rates over 166 weeks between 2007 and 2009. Overton *et al.* (2014) found that most of the California clapper rails (53 percent) died due to predation with raptors depredating 30 individual California clapper rails (28 percent) and mammals depredating 27 individual California clapper rails (25 percent). The annual survival rate for California clapper rails at Laumeister Marsh, a native tidal marsh managed by the Refuge near the City of East Palo Alto, San Mateo County, was 0.227 (Overton *et al.* 2014). The Refuge intermittently conducts mammal predator management on some Refuge lands within the Central/South San Francisco Bay Recovery Unit; however, the extent of mammal predator management implemented at the Refuge is limited by the lack of funding. The Refuge recently finalized an avian predator management plan to control avian predators of the California clapper rail on Refuge lands within the Central/South San Francisco Bay Recovery Unit; however, the Refuge lacks the resources to adequately monitor and control avian predators at the Refuge.

Breeding-season surveys of South Bay marshes for California clapper rails through the early 1990s, summarized by Foin *et al.* (1997), indicated that the most substantial populations of California clapper rails in the South Bay were, predictably, in the largest sections of tidal salt marsh at: Mowry Marsh and Dumbarton Marsh (in the eastern Bay between the Dumbarton Bridge and Mowry

Slough in Alameda County), the Faber/Laumeister Tracts and other marshes in the Palo Alto/East Palo Alto area in San Mateo and Santa Clara counties, and Greco Island in the City of Redwood City, San Mateo County. California clapper rails occurred in many other marshes as well, including Ideal Marsh, La Riviera Marsh, and Calaveras Marsh in the City of Fremont, Alameda County, and Triangle Marsh in the community of Alviso, Santa Clara County. Surveys by HTH and others since the early 1990s, as well as observation by birders (including HTH staff), have documented California clapper rails in a number of areas in the far South Bay, including lower San Francisquito Creek; the Palo Alto Baylands; Hook's Isle; the mouth of Charleston Slough; lower Permanente and Stevens creeks; Guadalupe Slough (primarily from its confluence with Moffett Channel downstream); Alviso Slough; a number of locations along Coyote Slough, extending upstream through the reach of the slough between Newby Island Landfill and the WPCP (known as South Coyote Slough or the lower Coyote Creek Bypass); and in the Warm Springs marshes. Although site-specific surveys have not been conducted in all suitable habitat for California clapper rails in the South Bay, this species is likely to occur in tidal salt marsh habitats in a number of additional areas as well.

Habitats and Occurrences within the Action Area

Within the action area, California clapper rails are most likely to occur in tidal salt marsh and brackish marsh along the lower and middle reaches of Alviso Slough (*e.g.*, from the northwest corner of Pond A12 downstream) and Coyote Slough (*e.g.*, from the vicinity of the Artesian Slough confluence downstream), and near the mouth of Artesian Slough. Although California clapper rails are known to be present in the downstream reaches of these sloughs, where the tidal marsh is dominated by salt-marsh plant species, they are less likely to occur in areas dominated by freshwater vegetation (*e.g.*, California bulrush and cattail) along the upper portions of Coyote, Artesian, and Alviso sloughs. In recent years, few surveys for California clapper rails have been conducted along the upper reaches of Alviso Slough, or anywhere in Artesian Slough or along upper Coyote Slough (upstream from its confluence with Artesian Slough).

In 2007, PRBO Conservation Science conducted surveys for California clapper rails along the middle and lower reaches of Guadalupe and Alviso sloughs (L. Liu, PRBO Conservation Science, pers. comm. cited in HTH 2013). Single California clapper rails were detected near the mouths of these sloughs (*i.e.*, along Guadalupe Slough near the Pond A5/A6 levee and along Alviso Slough east of Pond A6), but none were heard farther upstream.

More recently, surveys for the Invasive *Spartina* Project have been conducted along Alviso Slough from Pond A11 downstream to its confluence with Coyote Slough, and along Coyote Slough from the vicinity of the railroad tracks downstream along Ponds A12, A14, and A9 (data provided by Olofson Environmental, Inc.). From 2010 through 2014, all California clapper rail detections along Alviso Slough were at its mouth, near the northwest corner of Pond A9: between nine and 10 California clapper rails were detected in 2010, between four and six were detected in 2011, between one and two were detected in 2012, and between two and four California clapper rails were detected in 2014 near the mouth of Alviso Slough (Olofson Environmental, Inc. 2012, 2014).

On one occasion, a California clapper rail was recorded in brackish/freshwater transition marsh along upper Alviso Slough between the Alviso Marina and the Gold Street Bridge (February 14, 1997; Scott B. Terrill, pers. obs.). Earlier (approximately 1989) an individual California clapper rails was detected in the Alviso Marina (Ron Duke, pers. obs. cited in HTH 2013). However, no California clapper rails have been observed along upper Alviso Slough within recent years. For example, surveys conducted by the San Francisco Bay Bird Observatory at the Alviso Marina found no California clapper rails during early spring 2003 and 2004 (C. Strong, Refuge, pers. comm. 2012). Also, pre-construction California clapper rail surveys conducted by the Refuge prior to Pond A8 notch construction in 2010 did not find any California clapper rails in this reach of upper Alviso Slough (C. Strong, Refuge, pers. comm. 2012). Therefore, any occurrence of California clapper rails in upper Alviso Slough would likely be by occasional non-breeding birds.

California clapper rails have also been detected along Guadalupe Slough as far as the nontidal freshwater ponds between Calabazas and San Tomas Aquino Creeks north of SR 237 (16 August 1998; Steve Rottenborn, HTH, pers. obs.). Between one and two California clapper rails were detected along upper Guadalupe Slough again in 2012 near the Moffett Channel (Olofson Environmental, Inc. 2012). However, such rails are likely wandering and foraging individuals, and their occurrence in these areas is expected to be sporadic.

Along Coyote Slough, all California clapper rails detections since 2010 have been from Triangle Marsh (north of Pond A15) downstream to Pond A9 except for a single detection near the northwest corner of Pond A18, at the Coyote Slough/Artesian Slough confluence. Call count surveys along South Coyote Slough detected between nine and 10 California clapper rails in 2011, between six and 10 rails in 2012, and between eight and 10 rails in 2014 between Pond A15 and Triangle Marsh (Olofson Environmental, Inc. 2012, 2014).

Therefore, based on the known occurrences of the California clapper rail within the action area, the Service believes the California clapper rail is likely to occur within the action area in all suitable tidal salt marsh and tidal brackish marsh habitat along Alviso Slough, Artesian Slough, Coyote Slough, and South Coyote Slough.

<u>Salt Marsh Harvest Mouse</u>

Central/South San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the Recovery Plan's Central/South San Francisco Bay Recovery Unit for the salt marsh harvest mouse (Service 2013). The Central/South San Francisco Bay Recovery Unit is within the range of the southern subspecies of the salt marsh harvest mouse (*R. r. raviventris*) (Service 2013). The population status of the southern subspecies is more precarious than that of the northern subspecies (*R. r. halicoetes*). Few major, resilient, or secure populations of the southern subspecies of the salt marsh harvest mouse persist within the Central/ South San Francisco Bay Recovery Unit. The current populations within this recovery unit are very small and isolated compared with the historical pattern of distribution and abundance of the subspecies. All major population centers of the southern subspecies are remote from one another based on dispersal distances known for the species. Predation by mammalian and avian predators and spread of invasive plant species (*e.g.,* perennial pepperweed) are major threats to salt marsh harvest mice in the Central/South San Francisco Bay Recovery Unit (Albertson 1995, Service 2010, Service 2013).

Occurrences near the Action Area

The salt marsh harvest mouse has been detected during trapping studies in a number of locations within and near the action area, including Alviso Slough near the northwest corner of Pond A12, Triangle Marsh, New Chicago Marsh, the mitigation wetlands on the south side of Pond A18, the Coyote Creek Bypass area, and Guadalupe Slough (San Francisco Estuary Institute, http://www.sfei.org/content/salt-marsh-harvest-mouse-database-and-maps, site numbers 21, 57, 249, and 306; California Natural Diversity Database (CNDDB) occurrence numbers 91, 92, 115, 116, 147, 132, and 133; CDFW 2014). The highest-quality habitat for this species within the action area occurs in tidal salt marsh along the lower reaches of Alviso and Coyote Sloughs, and at the mouth of Artesian Slough, as well as in diked salt marsh within New Chicago Marsh and within the mitigation wetlands on the south side of Pond A18. Brackish marshes farther upstream along Alviso, Coyote, and Artesian Sloughs represent lower-quality habitat, and salt marsh harvest mice have a lower probability of occurrence (and if present, likely occur in lower densities) in such brackish marshes. However, as a result of this species' detection in brackish marshes in the Warm Springs area in 2006 (HTH 2007), it could occur in at least small numbers in brackish marshes. The freshwater marshes in the upper reaches of Alviso Slough (*i.e.*, from the southwestern part of Pond A12 upstream to the Alviso Marina and above) and Artesian Slough (*i.e.*, from the vicinity of the southeastern corner of Pond A17 upstream), as well as those in the South Coyote Slough area north of the northeastern corner of Pond A18, are less suitable habitat for the species.

There is no recent survey data available for salt marsh harvest mice within or near the action area. However, based on known occurrences of the salt marsh harvest mouse within and near the action area and the occurrence of suitable habitat within the action area, the Service believes that the salt marsh harvest mouse is likely to occur within all suitable tidal salt and brackish marshes, diked salt and brackish marshes, and adjacent upland habitats (*e.g.*, contiguous grassland habitat within 328 feet of suitable marsh habitat (Service 2010, 2013)) throughout the action area.

Pacific Coast Population of the Western Snowy Plover

San Francisco Bay Recovery Unit

The action area for the proposed project occurs within the San Francisco Bay Recovery Unit for the Pacific coast population of the western snowy plover (http://ecos.fws.gov/docs/recovery_plan/070924_2.pdf, Service 2007). One of the delisting criteria for the Pacific coast population of the western snowy plover is for the maintenance of 500 individual breeding western snowy plovers within the San Francisco Bay Recovery Unit (Service 2007). The SBSPRP has committed to the maintenance of at least 250 individual breeding western snowy plovers in the South Bay through adaptive management of salt pond breeding habitat and predator management within the SBSPRP area. The Refuge intermittently conducts avian and mammal predator management within some of the larger western snowy plover nesting populations in the South Bay.

In the South Bay, the highest numbers of nesting western snowy plovers occur in portions of Alameda and San Mateo counties outside the action area. Nearly all of the Bay nesting occurs south of State Route 92 (San Mateo Bridge) in the South Bay (Page and Stenzel 1981, Page *et al.* 1991, Service 2007). Abundance of western snowy plovers during surveys around the Bay may vary considerably from year to year. Summer window-survey data for the years 2009-2014 detected 147, 275, 249, 147, 202, and 178 individual western snowy plovers within the San Francisco Bay Recovery Unit during those six years (http://www.fws.gov/arcata/es/birds/WSP/plover.html, Service 2014b).

Habitats and Occurrences within the Action Area

Western snowy plover summer window-survey data for the years 2009-2014 detected eight, zero, 11, 20, 10, and zero individual western snowy plovers during those six years in the Alviso area of northern Santa Clara County (http://www.fws.gov/arcata/es/birds/WSP/plover.html, Service 2014b). In the action area itself, western snowy plovers have nested recently (*i.e.*, 2012-2014) in New Chicago Marsh, Ponds A9, A12, A13, and A16, and in the impoundment between Pond A12 and the railroad tracks (just north of the old Alviso Marina; hereafter "Alviso impoundment"). Of 13 western snowy plover nests in 2012, four each were in Ponds A16 and A17, which were being dried out for construction of islands in A16 and tidal restoration in A17 (Donehower *et al.* 2012). The other five western snowy plover nests were in Pond A13. Of the 10 western snowy plover nests in the vicinity of the action area in 2013, six were in Pond A16; one was on a recently constructed island and five were on the dried-out pond bottom when the pond was drawn down for island creation, but this area was eventually re-flooded (Robinson-Nilsen *et al.* 2013). The others included single western snowy plover nests in New Chicago Marsh and the Alviso impoundment, and two in Pond A9. In 2014, western snowy plovers have been documented nesting in Pond A9 (one nest that was flooded) and A13 (two nests that hatched young). Due to variability in water level management in Ponds A9-A15, the suitability of habitat for nesting in these ponds has varied from year to year, and Pond A12 has provided nesting habitat in some years. Western snowy plovers have never been known or suspected to breed in the action area east of Artesian Slough (*i.e.*, in the vicinity of Pond A18).

California Least Tern

In the Bay, the primary California least tern breeding colonies are at Alameda Point in the City of Alameda and Hayward Regional Shoreline in Alameda County, and at the Montezuma Wetlands near Suisun City, Solano County. California least terns also nested in 2000 and 2001 in the City of Albany (near Alameda), Alameda County, with up to 12 pairs in 2000. In the City of Pittsburg, Contra Costa County on Suisun Bay, 13 pairs nested in 2001 and eight pairs nested in 2003. Historically, small numbers of birds have nested at the Oakland International Airport (last reported in 1995), Bay Farm Island (last reported 1975), Bair Island (last reported 1984), Port Chicago (last reported in 1988), the Bay Bridge Sand Spit (one-time attempt in 1985), and Tern Island (one-time attempt in 1990, U.S. Geological Survey preliminary data, unpubl.)

California least terns have never been recorded nesting in the vicinity of the South Bay Shoreline Phase I Study Project's action area, or anywhere else in Santa Clara County or nearby areas of Alameda County. In recent years, the main post-breeding staging area for California least terns in the South Bay has been in the complex of ponds immediately north of Moffett Field (Ponds AB1, A2E, and AB2), which are located approximately two miles west of the action area. These areas are used for roosting and foraging by adults and juveniles in July and August every year, with typical counts of 20 to 100 California least terns, although 276 were observed there in July 2004 (S. Rottenborn, HTH, pers. obs.). California least terns have also been recorded foraging or roosting at other South Bay ponds, including A1, A2E, A3N, A3W, A4, A5, A7, A9, A10, A11, and A14 (Marschalek 2006; J. Krause, CDFW, pers. comm.; U.S. Geological Survey preliminary data, unpubl.). Ravenswood ponds in San Mateo County are also used occasionally for foraging and roosting, with counts of 96 California least terns in July 2002, 42 in July 2003, and 110 in July 2004 (U.S. Geological Survey preliminary data, unpubl.). Eden Landing ponds in Alameda County are used irregularly for foraging including E2, E4, E5, E8A, E9, E10, and E11. California least terns do not generally forage in smaller sloughs or channels adjacent to managed ponds but rather prefer more open waters, including the Bay waters; 50 of 58 California least terns observed foraging at one South Bay location in July 2004 were doing so over the open waters of the Bay while the other eight were foraging in ponds (S. Rottenborn, HTH, pers. obs.).

California least terns are not known to nest in the action area. California least terns have been observed foraging in the action area's ponds (A9, A11, and A14) only rarely, and they have not been observed foraging in Pond A18, despite occasional visits by birders and biologists to A18 and birder coverage of A18 (using spotting scopes) from the Pond A16 levee. Although California least terns could potentially forage in any of these ponds that contain fish, survey data collected for the SBSPRP and incidental observations by birders indicate that California least terns visit the action area (as a post-breeding forager) irregularly and in low numbers.

San Francisco Bay-Delta DPS of the Longfin Smelt

Longfin smelt larvae and juveniles are found throughout the San Francisco Bay Estuary, including the South Bay during wet years (Rosenfield 2009 and California Department of Fish and Game 2009). Longfin smelt are known to be located in the action area from several different surveys. Surveys conducted in 1982 and 1983 found adults followed by larvae in Coyote Slough, mostly likely indicating that spawning had likely occurred there (Robinson and Greenfield 2011). Longfin smelt have also been collected inside the Island Ponds following breaching to restore tidal action (EDAW Inc. 2007, Robinson and Greenfield 2011, Hobbs *et al.* 2012). Fish surveys conducted during 2010 through 2012 for the SBSPRP by Hobbs *et al.* (2012), which included otter trawls in sloughs and bay waters, between the months of October through March detected longfin smelt in the Alviso pond complex. During these trawls longfin smelt was the seventh most abundant species and were captured in all major sloughs and tributaries. The species was not detected during other surveys conducted from 2010 to 2012, which were at least monthly, indicating absence between the months of May and September.

The action area is located downstream from the Bay's largest source of toxic mercury, the historical Almaden Quicksilver mine in the hills above San Jose. Recent biosentinel sampling in South Bay managed ponds and marshes indicates that mercury concentrations in fish are above the Bay mercury total maximum daily load of 0.03 microgram/gram for small fish (San Francisco Bay Regional Water Quality Control Board 2006).

Effects of the Proposed Project

The footprint of ground disturbance from the proposed project consists of a total of approximately 165 acres. Table 1 below lists the acreages of each of habitat type that will be disturbed by the proposed Corps-led actions (*e.g.*, construction of the levees, the Artesian Slough tide gate, the pedestrian bridge, and the Pond A18 ecotone and tidal restoration activities) and Service-led actions (e.g., construction of the Pond A12 ecotone and Ponds A9-A15 tidal restoration activities). Construction of trails and other recreational facilities, which is a Service-led activity, will occur entirely on existing levees and berms, or in ruderal grassland along SR 237, and thus the acreage of such habitat disturbance from trail construction is not included in Table 1.

In the following sections discussing effects on individual listed species, effects are separated for Corps-led and Service-led activities as appropriate. Because of the tidal flood protection functions currently provided by the outboard levees around Ponds A9-A15, tidal restoration within those ponds would not be feasible without enhancement of flood protection inboard from those ponds. As a result, the effects of Service-led tidal restoration on Refuge lands could not occur but for the Corps-led construction of the levee and tide gate, and thus, the benefits that accrue from tidal restoration on Refuge lands are dependent on Corps-led levee construction.

Table 1. Habitat Disturbance from the Proposed Project.

Habitat Type	Impacts of Corps-Led Actions (acres)		Impacts of Service-Led Actions (acres)	Total Habitat Disturbance (acres)
	Levee/Tide Gate/ Bridge Construction	A18 Ecotone/ Tidal Restoration	A12 Ecotone/ Tidal Restoration	
Brackish marsh	0.20	0.07	0.03	0.3
Freshwater marsh	1.04	0.06	<0.01	1.1
Muted tidal/diked marsh	1.80	0.00	0.00	1.8
Tidal salt marsh	1.64	0.03	0.03	1.7
Non-tidal salt marsh	8.20	0.00	0.00	8.2
Seasonal wetland	3.65	0.00	0.05	3.7
Mudflat	0.59	0.01	0.00	0.6
Batch pond	3.60	0.00	29.00	32.6
Managed pond	12.07	66.13	0.00	78.2
Open water	9.40	0.00	0.00	9.4
Upland vegetation	1.00	0.00	0.00	1.0
Water/sewage treatment	0.10	0.00	0.00	0.1
Levee	18.49	0.33	0.88	19.7
Developed	6.15	0.24	0.01	6.4
TOTAL	67.93	66.87	30.00	164.8

California Clapper Rail and Salt Marsh Harvest Mouse

Habitat Restoration

Effects of Corps-led Actions

The highest-quality habitat for the California clapper rail and salt marsh harvest mouse consists of tidal salt marsh, although these species will also use tidal brackish marshes to some extent. Tidal restoration in Pond A18 is expected to result in the creation of approximately 119 acres of tidal salt marsh and 398 acres of brackish marsh habitat for the California clapper rail and salt marsh harvest mouse (HTH 2012). In addition, approximately 67 acres of ecotone habitat will be created along the southern and eastern edges of Pond A18. The ecotone created along the southern and eastern edges of Pond A18 will provide high quality extreme high tide refugia cover for California clapper rails and salt marsh harvest mice which will reduce the risk of predation. The grassland habitat along the ecotone will also provide foraging and dispersal habitat for salt marsh harvest mice. The ecotone will also allow for the landward transgression of the tidal marsh in the face of sea level rise and provide a buffer between the marsh and developed areas. This ecotone habitat is expected to develop more quickly than the tidal marsh in A18, which will not become vegetated until sedimentation has elevated the former pond bottom to the point where vegetation can colonize it. Within a few years, it is expected that vegetation along the ecotone will provide habitat that is of higher quality for salt marsh harvest mice than the narrow strip of vegetation that is currently present along the southern and eastern edges of Pond A18.

Effects of Service-led Actions

Assuming that all of Ponds A9-A15 are eventually restored to tidal action, approximately 2,010 acres of new tidal marsh will be restored within these ponds. All of this restored tidal marsh is predicted to be salt marsh (HTH 2012). In addition, 30 acres of ecotone habitat will be created along the eastern edge of Pond A12; habitat along the ecotone is expected to become suitable for use by salt marsh harvest mice within a few years after seeding and planting occur. If only Ponds A12 and A18 are restored, then approximately 300 acres of suitable tidal marsh will be restored in A12 and 517 acres of suitable tidal/brackish marsh habitat will be restored in A18. The ecotone habitat created along the eastern edge of the restored tidal marsh in Pond A12 will benefit the California clapper rail and salt marsh harvest mouse by providing transitional habitat for the rail and the mouse to utilize as cover during extreme high tide and flooding events which will reduce the risk of predation. The ecotone will also provide foraging and dispersal habitat for the salt marsh harvest mouse. The ecotone will also allow for the landward transgression of the tidal marsh in the face of sea level rise and provide a buffer between the marsh and developed areas.

Habitat Restoration Effects Common to Corps-led and Service-led Actions

All of these marshes (in Pond A18 and A9-A15) will support complex channel networks. These channels will provide extensive foraging habitat for California clapper rails, and the larger channels will provide natural levees supporting taller cordgrass and gumplant, which serve as rail nesting habitat and high-tide refugia.

Because the rate of evolution of tidal habitats is dependent largely on sediment availability, which is difficult to predict, the precise rates of evolution of these marshes are unknown. However, the following general timeline of expected marsh evolution predicted for restored South Bay marshes by the SBSPRP indicates the likely habitat progression expected over the 50-year timeline of the South Bay Shoreline Phase I Study Project.

Habitat restoration in the action area described above for California clapper rail will result in similar benefits for the salt marsh harvest mouse. Because salt marsh harvest mice reach their highest densities in mature marshes with pickleweed, which form in the highest marshes, the evolution of suitable habitat for salt marsh harvest mice within restored marshes will be slower than for California clapper rails, as it will take longer for marsh elevations to reach elevations appropriate for pickleweed dominance. However, development of suitable habitat for salt marsh harvest mice in the ecotones will be relatively rapid. Once suitable habitat is restored, the high fecundity of salt marsh harvest mice will ensure that this species will rapidly colonize and spread throughout the restored pickleweed marshes from occupied habitat along Coyote or Alviso sloughs or other suitable habitat.

The amount of habitat for the California clapper rail and salt marsh harvest mouse that will be restored by both the Corps-led and Service-led actions is expected to substantially increase South Bay populations of these species, and contribute greatly to their survival and recovery. In addition, the restoration of ecotones in Ponds A18 and A12 will provide high-quality refugia during extreme high tides that inundate the rest of the marsh plain, thus helping to improve winter survival rates. The ecotones will also provide seasonal foraging and dispersal habitat for the salt marsh harvest mouse in addition to providing some residence habitat for this species.

Estimated Timeline for Tidal Marsh Establishment

In 2020, Pond A12 will be breached, restoring full tidal action to approximately 300 acres of salt pond (though see the previous discussion of the possibility that Pond A18 may be breached first). By Year 10 (2027), enough sediment is expected to have accumulated in other areas of this former pond that low tidal marsh vegetation dominated by Pacific cordgrass will start to become established. Use of the restored marshes by California clapper rails is expected to occur as soon as enough vegetation is present to provide cover for foraging California clapper rails. Even though this vegetation may not be dense and/or extensive enough to provide nesting habitat by Year 10, California clapper rails are expected to forage on intertidal mudflats near vegetative cover, which may occur near the breach locations.

In 2023, the Pond A18 ecotone will be constructed and seeded providing suitable habitat for colonization by salt marsh harvest mice from nearby areas. In 2025, additional breaching may restore tidal action to approximately 875 acres in Ponds A9, A10, A11, and 736 acres in Pond A18. By 2027, tidal marsh vegetation will begin to colonize the edges of levees and berms, but by the end of Year 10 (2027), the bottoms of Ponds A9, A10, A11, and A18 may still be too low for substantial vegetation establishment.

As sediment continues to accumulate in the restored ponds, bottom elevations will be raised, and the areas at elevations suitable for colonization by tidal marsh vegetation will increase. By Year 20 (2037), vegetation will be expanding outward from the ecotone area and the edges of other levees and berms, and it is expected that sufficient sediment will have accumulated in other portions of Ponds A9-A12 and A18 that low marsh suitable for use by California clapper rails for nesting and foraging will have developed.

In 2030, an additional 850 acres of tidal restoration may occur via breaching of Ponds A13, A14, and A15. Thus, by Year 13 (2030), approximately 2,010 acres of new tidal habitat in Ponds A9-A15 and 736 acres in Pond A18 will have been restored. Evolution of marshes within Ponds A13-A15 will occur gradually as described above for other ponds.

In Years 20-50 (2037-2067), vegetated marsh will continue to expand in area and increase in elevation as sediment accumulates. Although sea level rise will raise the elevation of water within the restored marshes, thus restricting the rate of marsh development to some extent, it is predicted that the rate of sediment accumulation will outpace sea level rise, so that vegetated marshes will colonize all but the lowest-elevation areas such as tidal sloughs and channels (ESA and Philip Williams & Associates, Ltd. 2012, HTH 2012). Suitable nesting habitat and cover for the California clapper rail and salt marsh harvest mouse will continue to expand, and higher-marsh areas that form on natural levees along the larger tidal sloughs will provide high-tide refugia. By Year 50, it is expected that approximately 2,130 acres of restored tidal salt marsh and 398 acres of restored brackish marsh suitable for use by California clapper rails and salt marsh harvest mice will have been restored.

Increased Salinity and Beneficial Marsh-Type Conversion

Effects of Corps-led Actions

Breaching of Pond A18 will result in an increased tidal prism and salinization of brackish and fresh marshes throughout all of Artesian Slough and Coyote Slough, thus resulting in the expansion and enhancement of California clapper rail and salt marsh harvest mouse habitat over large areas of existing brackish and freshwater marsh along these sloughs. In addition, this change in the tidal gradient will result in the development of higher-quality habitat in already-breached Pond A17 and the Island Ponds than would develop in the absence of breaching of A18. The effects on salinities within existing marshes would be immediate, and within a period of just a few years, it is expected that considerable expanses of brackish marshes dominated by bulrush and pepperweed will have begun conversion to marshes dominated by Pacific cordgrass, pickleweed, and gumplant.

Effects of Service-led Actions

Restoration of tidal action to Ponds A9-A15 will result in an increased tidal prism and salinization of brackish and fresh marshes along Alviso Slough upstream to Pond A12 and along lower Coyote Slough, thus resulting in the expansion and enhancement of California clapper rail and salt marsh harvest mouse habitat in these areas. In addition, this change in the tidal gradient will result in the development of higher-quality habitat in already-breached Pond A6 and the Island Ponds than would develop in the absence of breaching of Ponds A9-A15. These effects are expected to occur rapidly.

Increased Salinization Effects Common to Corps-led and Service-led Actions

As levees are breached and ponds are subjected to tidal action, these ponds will draw considerable amounts of water through the breaches on rising tides. As a result, the rate of water flowing "upstream" along Alviso, Artesian, and Coyote sloughs, from the Bay into the breached ponds, on rising tides will be considerably higher than it currently is. This will result in the transportation of more saline Bay water upstream, and higher upstream, along these sloughs than currently occurs. The effect of this change in tidal prism and the upstream migration of the salinity gradient will be the salinization of marshes along these sloughs that are currently brackish and fresh marshes due to the inputs of freshwater from Coyote Creek, the Guadalupe River, and WPCP effluent. Because outboard levee breaches will be located high up these sloughs, such as at Pond A12 along Alviso Slough, in the southwest corner of Pond A18 along Artesian Slough, and in the northeast corner of Pond A18 along Coyote Slough, more saline water will be drawn far up these sloughs, and this salinization will affect the plant species composition of marshes on a very large scale. The result will be the conversion of extensive areas of brackish marsh to salt marsh and conversion of extensive areas of freshwater marsh to brackish marsh. As a result, habitat conditions within existing brackish and fresh marshes along Alviso Slough, Artesian Slough, and Coyote Slough will become much more suitable for California clapper rails and salt marsh harvest mice. Furthermore, the upstream migration of the salinity gradient will result in higher-salinity marshes in recently restored areas such as the Island Ponds, Pond A6, and Pond A17, thus helping to enhance habitat for California clapper rails and salt marsh harvest mice beyond the conditions that would be created in the absence of the South Bay Shoreline Phase I Study Project.

In particular, given the vast extent of brackish and freshwater marsh along Coyote Slough, the breaching of Pond A18 will result in considerable expansion of California clapper rail and salt marsh harvest mouse habitat up Coyote Slough and much higher-quality rail and mouse habitat in Pond A17 and the Island Ponds. Marsh evolution predictions for the proposed project took the increased tidal prism along Coyote Slough, resulting from Pond A18 breaching into account when predicting that the entirety of restored tidal habitat in Ponds A9-A15 would be salt marsh instead of brackish marsh (HTH 2012). Thus, the increase in California clapper rail and salt marsh harvest mouse habitat and enhancement of rail and mouse habitat quality as a result of both the Corps-led and Service-led actions will be far greater than just the increase in tidal marsh within the ponds to be breached.

The salinization of tidal marsh that will result from the proposed project will also expedite project benefits to the California clapper rail and salt marsh harvest mouse. As described previously, there will be a lag between breaching of levees and development of California clapper rail and salt marsh harvest mouse habitat due to the need for sediment accumulation to elevate pond bottoms enough that vegetation can colonize the restored habitat. In the case of increased salinization, however, the effects on salinities within existing marshes would be immediate, and within a period of just a few years, it is expected that considerable expanses of brackish marshes dominated by bulrush and pepperweed will have begun the conversion to marshes dominated by Pacific cordgrass, pickleweed, and gumplant.

Loss of Habitat

Effects of Corps-led Actions

Artesian Slough Tide Gate and Pedestrian Bridge

Construction of the Artesian Slough tide gate and Artesian Slough pedestrian bridge will result in the loss of suitable habitat for the California clapper rail and salt marsh harvest mouse through the placement of fill in salt and brackish marsh habitat, but no suitable nesting habitat for California clapper rails will be directly affected. Construction of the tide gate and pedestrian bridge in Artesian Slough will result in the direct disturbance of about 1.04 acres of non-breeding tidal freshwater marsh habitat that may be occasionally utilized by a low number of foraging and dispersing California clapper rails and salt marsh harvest mice. As indicated in Table 1, 1.64 acres of tidal salt marsh will be disturbed; however, this marsh is located in a narrow strip along the Alviso impoundment and is not truly tidal, receiving tidal inflow only during the highest tides. As a result, the disturbance of muted tidal marsh along the Alviso impoundment will disturb potential habitat for the salt marsh harvest mouse but not the California clapper rail.

Excavation of Pilot Channels and Pond A18 Breaches

Excavation of pilot channels in the outboard marsh around Pond A18 will occur in five locations, four along Artesian Slough and one at South Coyote Slough. The marsh vegetation at these breach locations consists of brackish marsh at three locations and freshwater marsh at two locations. Excavation of pilot channels and breaching will result in the direct disturbance of about 0.07 acre of brackish marsh and 0.04 acre of tidal salt marsh that could potentially support low densities of California clapper rails and salt marsh harvest mice. It is possible that the salt and brackish marsh provides suitable nesting and foraging habitat for California clapper rail. However, given the paucity of California clapper rail occurrences along Artesian Slough and the extreme eastern end of South Coyote Slough in recent years, it is likely that very few rails use this habitat, and then only occasionally (and likely only during the non-breeding season).

FRM Levee Construction

Construction of the FRM levee will result in the loss of non-tidal salt and brackish marsh habitat and adjacent upland habitat along the edges of Ponds A16 and A18 and New Chicago Marsh that are suitable habitat for the salt marsh harvest mouse but not the California clapper rail. Areas with vegetation that potentially supports the salt marsh harvest mouse, and that will be disturbed by fill placed for the levee, include non-tidal and muted tidal/diked salt marsh along the southern, western, and northern edges of the Alviso impoundment; the northern edge of New Chicago Marsh, adjacent to the southern levee of Pond A16; and both the northern and southern sides of the existing Pond A18 levee. The loss of suitable salt marsh harvest mouse habitat will result from the widening of the levee, relative to its existing footprint, and will affect a total of about 13.65 acres of vegetation dominated by pickleweed, alkali heath, grasses, and non-native weedy species that provide at least marginal-quality habitat for salt marsh harvest mice. No suitable California clapper rail habitat will be disturbed by the widening of the levee footprint because the marshes along the existing levee are non-tidal and thus not likely to support the rail.

No high-quality salt marsh harvest mouse habitat will be impacted by widening of the levee. The habitat that will be disturbed consists of narrow strips of vegetation located between the existing bare levee and either bare salt panne/mud (along the Alviso impoundment), the waters of Ponds A16 and A18, or a borrow ditch (on the south side of the levee at Ponds A16 and A18). The impacted habitat is very narrow, which increases the risk of predation on any salt marsh harvest mice that might be present in those strips of vegetation, and is separated by unsuitable habitat (*e.g.*, open ground without vegetation or open water) from more extensive, higher-quality expanses of habitat, such as that in New Chicago Marsh and in the wetlands south of Pond A18 and east of Artesian Slough. Even along the southern edge of the Pond A16 levee, the strip of pickleweed and other vegetation between the levee and New Chicago Marsh is narrow, includes much dead and sparse vegetation, and supports only a patchy distribution of dense, tall, high-quality pickleweed. As a result, the quality of habitat, and the expected density of salt marsh harvest mice within the habitat to be impacted, is low, and the effects on salt marsh harvest mouse populations from the loss of these narrow strips of vegetation will be low.

Furthermore, these narrow strips of vegetation do not provide high-quality dispersal habitat for the salt marsh harvest mouse. The strips on the outboard (northern) side of the Pond A18 levee are separated by the bare levee itself from potential source populations of salt marsh harvest mice in New Chicago Marsh, the wetlands east of Artesian Slough, or the Coyote Creek Bypass. Open, unvegetated areas may act as barriers to movement of salt marsh harvest mice (Shellhammer 1978, Geissel *et al.* 1988), and thus salt marsh harvest mice likely cross the levee to and from this habitat very infrequently. In order for this vegetation to serve an important dispersal function, salt marsh harvest mice would have to cross bare levees from one source population, move long distances through the narrow strip of vegetation (or survive over generations within that narrow strip so that progeny eventually disperse long distances over time), and cross the bare levee again to reach another high-quality habitat area. Such occurrences are unlikely, or happen very infrequently. The narrow strip of vegetation along the western edge of the Alviso impoundment is even further removed from high-quality habitat, being separated from New Chicago Marsh by a broad salt panne and the railroad tracks.

Following levee construction, unimpacted pickleweed-vegetated areas between the Zanker Landfills/WPCP and the new levee will continue to provide suitable dispersal and residence habitat for salt marsh harvest mice. More importantly, a broad ecotone along the southern and eastern sides of A18 will be constructed. This ecotone will provide much higher-quality residence and dispersal habitat than what will be impacted. This 345-foot-wide ecotone will extend from the levee top downslope to Pond A18. The native plants that will be seeded or planted on this ecotone area will provide suitable dispersal habitat for salt marsh harvest mice, and wetland vegetation and peripheral halophytes near the lower edge of the ecotone area will provide residence habitat for the salt marsh harvest mouse that is at least as suitable (or of much higher quality) as what will be impacted. This ecotone will thus compensate (and more) for any loss of habitat along Pond A18, both in terms of the acreage of habitat impacted and linearly, replacing low-quality habitat with higher-quality habitat in the same areas linearly along the levee. Although no broad ecotone habitat is proposed at Pond A16 to replace the narrow strips of vegetation lost due to levee widening, the lower slopes of the levee will be allowed to be vegetated, and pickleweed of similar quality and extent to that currently present is expected to colonize these lower slopes. This pickleweed will not be mowed, as mowing would occur only on the higher portions of the levee. Along the eastern edge of Pond A12, the vegetation to be lost (*i.e.*, between the A12 levee and the Alviso impoundment) is so narrow that it likely serves little function, either as residence or dispersal habitat, for salt marsh harvest mice. As a result, the loss of this habitat to FRM levee construction does not warrant immediate compensation in situ by the Corps. Rather, the broad ecotone to be constructed by the Service and local sponsors on the west side of the FRM levee at Pond A12 will more than compensate for any lost salt marsh harvest mouse habitat in the A12 vicinity. Although the construction of the Pond A12 ecotone is a Service-led activity, it would not be feasible but for the construction of the FRM levee by the Corps, and thus the Corps' levee construction is enabling that important habitat restoration component.

Construction of the FRM levee on the existing Pond A18 levee footprint will modify the structures that convey water in and out of the non-tidal wetlands east of Artesian Slough and south of Pond A18. These wetlands contain extensive pickleweed and are thus expected to support resident salt marsh harvest mice. The proposed project will replace any modified or removed water control structures so that flow in and out of these wetlands can continue and existing conditions within the wetlands will be maintained.

Scour of Tidal Marsh Habitat

Following breaching of Pond A18, the increased tidal prism will result in the scour of sediment, and some vegetated marsh, from channels leading between the Bay and the breach locations. As a result, some loss of existing fringe marsh for the California clapper rail and salt marsh harvest mouse will occur along Artesian and Coyote sloughs. This marsh will consist primarily of brackish and freshwater marsh, but some salt marsh along lower Coyote Slough will be lost to scour as well. The acreage of marsh expected to be lost due to scour resulting from the breaching of Pond A18 is unknown. The SBSPRP predicted that 220-250 acres of marsh loss to scour would occur over a 50-year period resulting from restoration of tidal action to as much as 11,500 acres for the entire

SBSPRP (*i.e.*, scour of about 2 percent of the marsh restored). Given the 736 acres of tidal restoration proposed at Pond A18, the extent of marsh loss for the California clapper rail and salt marsh harvest mouse due to scour might be roughly estimated at 17 acres. Such marsh loss would be gradual, and this total represents the total loss due to scour over the 50-year proposed project period.

The fringe marshes of the South Bay, which will be the marshes adversely affected by this scour, often provide the only habitat connecting the larger patches of marsh habitat that contain the "core" populations of salt marsh harvest mice. The loss of these marshes in the short term, before the restored marshes have matured to vegetated high marsh, could temporarily reduce the connectivity between the salt marsh harvest mouse populations of the South Bay. However, the short-term loss of salt marsh harvest mouse habitat and connectivity from fringe marsh scour will be offset by an order of magnitude when the restored marsh matures to a point that it can support salt marsh harvest mice. In the meantime, the marsh loss due to scour will be far less than the expected extent of marsh-type conversion (*i.e.*, from fresh or brackish marsh to salt marsh) due to increased salinization related to increased tidal prism. As a result, the enhancement of California clapper rail and salt marsh harvest mouse habitat from increased salinization will outpace any adverse effects of marsh loss due to levee construction, breaching, and localized scour while new tidal salt marsh is developing within restored Pond A18. The short-term nature of any reduction in connectivity from construction and scour suggests that it will not adversely affect the metapopulation dynamics or genetic diversity of the salt marsh harvest mouse in the South Bay.

To put the loss of marsh from excavation of pilot channels and downstream scour of fringing marsh into perspective, this 17 acres of marsh loss is far less than the expected extent of marsh-type conversion (*i.e.*, fresh or brackish marsh to salt marsh) due to increased salinization related to increased tidal prism. As a result, the beneficial effects on California clapper rail and salt marsh harvest mouse populations due to enhancement of habitat resulting from increased salinization will outpace any adverse effects of marsh loss due to breaching and localized scour in the near term while the much more extensive tidal salt and brackish marsh is developing within restored Pond A18.

During any construction or excavation activities that may result in impacts to tidal marsh habitat, the limits of work will be clearly delineated to limit effects to existing California clapper rail and salt marsh harvest mouse habitat. Side-casting of dredged materials into tidal marsh habitat (*e.g.*, during excavation) will be limited so that a minimum amount of marsh is filled. Conservation measures incorporated into the proposed project will minimize effects of human activity within marshes on California clapper rail and salt marsh harvest mouse habitat.

Effects of Service-led Actions

The only Service-led activities that could result in the loss of existing California clapper rail and salt marsh harvest mouse habitat will occur as a result of tidal restoration at Ponds A9-A15. Excavation of pilot channels in the outboard tidal marsh around these ponds will disturb about 0.03 acre of salt marsh, 0.03 acre of brackish marsh, and <0.01 acre of freshwater marsh at five breach locations along Alviso Slough and one breach location along Coyote Slough. Because recent surveys for California clapper rails conducted for the Invasive *Spartina* Project along Alviso Slough have only detected California clapper rails at the mouth of the slough, pilot channel construction and breaching at the four breach locations on Ponds A10 and A12 are likely to have little effect on habitat that is used by nesting California clapper rails; rather, this habitat is likely used only by occasional, foraging, non-breeding individuals. The breach in the northwest corner of Pond A9 is closer to areas where California clapper rails have been recently detected, but it is located at an existing tide gate where the marsh along Alviso Slough is extremely narrow, too narrow to provide suitable nesting habitat or high-quality foraging habitat for California clapper rails. The only location where pilot channel excavation could affect habitat that has any likelihood of being used by breeding California clapper rails is in the northeastern corner of Pond A9, where the pilot channel will be excavated out to Coyote Slough. It is likely that salt marsh harvest mouse abundance in most of the breach locations is low owing to the brackish and/or very narrow nature of the marshes at these locations. However, the breach in the northeast corner of Pond A9 is located in tidal salt marsh that is more suitable for this species. Vegetation is almost completely absent from the internal berms within the Ponds A9-A15 system, and thus within-pond preparation activities for tidal breaching will not disturb any suitable salt marsh harvest mouse habitat.

Prior to or concurrent with restoration of tidal action in Ponds A9, A10, and A11, the berm between Ponds A11 and A12 will be breached. If California clapper rail and salt marsh harvest mouse habitat has developed within Pond A12 by that time, there may be a temporary loss of habitat due to breaching. However, that habitat will be quickly offset by continued marsh development. Similarly, berms between A14 and A9/A11, and between A13 and A12, will be breached prior to or concurrent with restoration of tidal action in Ponds A13-A15, potentially resulting in temporary losses of California clapper rail and salt marsh harvest mouse habitat. Again, any such losses will quickly self-restore.

As mentioned above, the increased tidal prism resulting from restoration of tidal action to Ponds A9-A15 will cause the scour of sediment, and some vegetated marsh, from channels leading between the Bay and the breach locations. As a result, some loss of fringe marsh along Alviso Slough and Coyote Slough will occur. Such scour will reduce habitat for the California clapper rail and salt marsh harvest mouse and may limit dispersal of salt marsh harvest mice along these sloughs to some extent in the short term. Assuming that the loss of marsh to scour might comprise approximately 2 percent of that restored, up to 40 acres of tidal marsh might be lost to scour over the 50-year proposed project period. This marsh would be limited to Alviso Slough downstream from Pond A12 and a small area of Coyote Slough from the northwest corner of Pond A9 downstream. Such marsh loss will occur gradually due to the phasing of breaching at these ponds (Pond A12 in 2020, A9-11 in 2025, and A13-15 in 2030). However, the beneficial effects on California clapper rail and salt marsh harvest mouse populations due to enhancement of habitat resulting from increased salinization are expected to outpace any adverse effects of marsh loss due to breaching and localized scour while new tidal salt and brackish marsh is developing within the restored marshes in Ponds A9-A15. Once cordgrass and pickleweed-dominated habitat colonizes the restored marsh within these former ponds, California clapper rail and salt marsh harvest mouse habitat will be expanded by orders of magnitude.

Small-scale, localized disturbance of habitat for the California clapper rail and salt marsh harvest mouse may also occur from walking through marshes or grounding boats in marshes during monitoring, research, or predator management efforts. Such disturbance would be very limited, particularly with implementation of proposed conservation measures (*e.g.*, for perennial pepperweed control). Effects to California clapper rails and salt marsh harvest mice resulting from monitoring, research, and predator management on the Refuge will be covered by the existing biological opinion for the SBSPRP and a future biological opinion for the Refuge's Comprehensive Conservation Plan.

Effects to California clapper rails and salt marsh harvest mice resulting from perennial pepperweed control are discussed below under the "Perennial Pepperweed Control" section."

Direct Effects to Individuals

Effects of Corps-led Actions

California Clapper Rail

Construction of the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge has the potential to disturb areas where California clapper rails are occurring only at Artesian Slough. Due to the low quality of this freshwater marsh for use by California clapper rails, there is a very low probability that a rail would be anywhere in the vicinity of the tide gate/pedestrian bridge construction area when activities are occurring in the tidal marsh. Furthermore, because the freshwater habitat in that location is not suitable for use by breeding California clapper rails, no nests, eggs, or young would be affected by activities at that location, and any California clapper rail present in the vicinity would move away from construction activities long before it could be physically injured or killed. Therefore, no loss of individuals, nests, eggs, or young will occur from construction of the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge.

Excavation of pilot channels in the outboard marsh around Pond A18 is also unlikely to result in the loss of any California clapper rails. The brackish marsh habitat at three of the pilot channel locations does not provide high-quality nesting habitat, due both to its brackish nature and the narrow nature of the marsh at those locations, and there is a low probability that California clapper rails would be breeding in those areas. Further, if pilot channel excavation in brackish or salt marsh habitat is conducted during the breeding season (February 1 – August 31), surveys for California clapper rails will be conducted prior to proposed project activities to determine whether nesting California clapper rails are present in the vicinity. If California clapper rails are detected, buffers between rail activity centers and construction will be followed. During any construction or excavation activities that may result in effects to California clapper rails, the limits of work will be clearly delineated to limit effects to this species. These conservation measures will minimize effects of human activity within marshes on California clapper rails.

Disturbance such as loud noise or the presence and movement of people and heavy equipment in or near California clapper rail habitat may alter bird behavior in ways that result in altered foraging or sheltering behavior and reduced nesting success. Such disturbance could result in temporary or permanent habitat loss due to California clapper rail avoidance of areas that have suitable habitat but intolerable levels of disturbance; abandonment of nests, eggs, or young by nesting pairs; a reduction in foraging efficiency if high-quality foraging areas are impacted; and increased movement or flushing from cover, or altered activity patterns, that reduce energy reserves and increase predation risk. The potential for disturbing breeding California clapper rails will be avoided by delaying construction activities within suitable California clapper rail breeding habitat until after the breeding season unless protocol-level surveys determine California clapper rails are absent from a 700-foot-buffer around the proposed work area. The level of disturbance of California clapper rails will also be minimized by having a Service-approved biological monitor supervise the work.

Loss of individual California clapper rails due to predation could be exacerbated by the proposed project. The restoration of tidal marsh habitat will increase habitat for northern harriers, which may prey on California clapper rails (especially chicks). However, because habitat for northern harriers is suitable for California clapper rails as well, the increase in California clapper rail populations due to habitat restoration in a given area is expected to outpace any adverse effects of predation by northern harriers. Local increases in predation on California clapper rails may occur due to marsh restoration in close proximity to areas frequented by California gulls, such as the Newby Island Landfill, Pond A16, and New Chicago Marsh; electrical towers within Pond A18 that provide known nesting sites for common ravens and red-tailed hawks, and perches for peregrine falcons; and upland areas providing sources of predators such as cats, rats, foxes, raccoons, white-tailed kites, and American crows. Although terrestrial pathways used by mammalian predators to access marshes will be reduced through the breaching of levees in some areas, marshes that abut upland areas will be subject to predation by land-based predators. In addition, rock at the bridge abutments and surrounding electrical towers in Pond A18 may provide refugia for rats that may prey on California clapper rail eggs. The risk of predation on California clapper rails will be reduced by the implementation of a Service-approved long-term predator management and litter cleanup program under a cooperative agreement among the SCVWD, the Refuge, and the City of San Jose that will be funded by the SCVWD.

Maintenance activities along the FRM levee have the potential to disturb California clapper rails in Ponds A12, A13, and A18 after tidal restoration has occurred and rail habitat has developed within those former ponds. Recreational use of the Bay Trail segment atop the levee will affect California clapper rails in adjacent areas to the point that rails present in those restored marshes during levee maintenance activities will already be habituated to some level of human activity on the levee. In addition, the 345-foot wide ecotones will limit the potential for levee maintenance activities to adversely affect California clapper rails. As a result, routine inspections and minor maintenance activities are not expected to result in an increase in California clapper rail disturbance, relative to other types of levee use. Even mowing along the levee tops is unlikely to cause substantial disturbance of California clapper rails given the very narrow swaths to be mown, the brevity of mowing operations, and the distance (330 feet or more) between mowing and California clapper rail habitat. However, maintenance activities involving heavy equipment would be conducted outside of the California clapper rail's nesting season to the extent practicable, and if seasonal avoidance is not possible, pre-construction surveys would be conducted for nesting California clapper rails, and appropriate buffers would be implemented between proposed project activities and nesting rails as necessary.

Salt Marsh Harvest Mouse

Construction of the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge will result in fill of vegetated areas that could potentially support small numbers of salt marsh harvest mice. Excavation of pilot channels in the outboard marsh around Pond A18 will also result in removal of brackish marsh that could potentially support low densities of salt marsh harvest mice. Although the number of individual salt marsh harvest mice that may be present in habitat to be impacted by levee construction and pilot channel excavation is low, individual salt marsh harvest mice could potentially be injured or killed by crushing or smothering during the placement of sediment or other materials in suitable habitat, or by excavation of habitat. Conservation measures such as hand-removal of vegetation in potential salt marsh harvest mouse habitat under the supervision of a Service-approved biologist, measures to ensure that salt marsh harvest mice leave areas prior to impacts, and salt marsh harvest mouse exclusion fencing will be implemented to minimize the potential for injury and mortality of individual salt marsh harvest mice.

Disturbance such as loud noise or the presence and movement of people and heavy equipment in or near salt marsh harvest mouse habitat may alter mouse behavior in ways that result in alteration of foraging and sheltering activities or reduced breeding success. Disturbance may result in displacement of salt marsh harvest mice from protective cover and their territories/home ranges (through noise and vibrations) and/or direct injury or mortality (through crushing). These disturbances are likely to disrupt normal behavior patterns of breeding, foraging, sheltering, and dispersal, and are likely to result in the displacement of salt marsh harvest mice from their territory/home range in the areas where their habitat is destroyed. Displaced salt marsh harvest mice may have to compete for resources in occupied habitat, and may be more vulnerable to predators. Disturbance of female salt marsh harvest mice, particularly during the period of March through November, may cause abandonment or failure of the current litter. Thus, displaced salt marsh harvest mice may suffer from increased predation, competition, mortality, and reduced reproductive success.

Noise from construction activities associated with the FRM levee, Artesian Slough tide gate, and Artesian Slough pedestrian bridge close to suitable salt marsh harvest mouse habitat may alter mouse breeding, foraging, and sheltering behavior. Salt marsh harvest mice may be similarly disturbed during excavation of pilot channels, preparation of ponds for breaching (*e.g.*, construction of ditch blocks), and access of construction areas by heavy equipment along existing levee roads.

Loss of individual salt marsh harvest mice due to predation could be exacerbated by the proposed project, at least in localized areas, as described for California clapper rail. Predator management and MAM performed by the Refuge and the SBSPRP will help to minimize the risk of predation.

Vegetation management along the levees has some potential to result in the injury or mortality of individual salt marsh harvest mice and the disturbance of foraging, sheltering, and dispersal activities. However, the potential for take and number of individuals that could be taken is very low, for several reasons. First, the strip of vegetation that will be mowed along the levee top will be very narrow (expected to be 15 feet or less). Only ruderal grassland foraging/dispersal habitat and no suitable pickleweed breeding habitat will be mowed; therefore, the potential for disturbing breeding salt marsh harvest mice or a salt marsh harvest mouse nest will be avoided because breeding mice will not be present in these areas. Mowing from the levee top downslope will result in slight disturbance of downslope areas that might encourage salt marsh harvest mice to move downslope, away from the mowing activity. In addition, vegetation along the levee top is not expected to be particularly dense, especially in comparison to vegetation lower on the levee/ecotone slopes. As a result, it is possible that salt marsh harvest mice will make little use, if any, of the vegetation that needs to be mown. Maintenance such as mowing in or adjacent to salt marsh harvest mouse habitat will also be avoided during extreme high tides when salt marsh harvest mouse are most likely to approach the levee top to escape the flooding marsh. If trapping of California ground squirrels is necessary to control burrows within the levees, live traps with openings large enough to allow salt marsh harvest mice to exit the traps will be used.

Disturbance of salt marsh harvest mice from recreational trail use may occur, due to the expected occurrence of salt marsh harvest mice in ecotones and vegetated lower levee slopes and in the salt marsh harvest mouse habitat adjacent to lower Coyote Creek, where the levee trail connection to the existing Bay Trail segment will be provided. However, such disturbance will be minimized by the physical separation of the bare-topped trail and the vegetated slopes where salt marsh harvest mice may occur. Trail use may also result in indirect effects, such as increased trash (which may attract predators) and increased invasive plants, which may adversely affect habitat quality. Predator management and invasive plant species control implemented along the trails will minimize these adverse effects.

Effects of Service-led Actions

California Clapper Rail

Excavation of pilot channels in the outboard marsh around Ponds A9-A15 has the potential to affect individual California clapper rails, including nests, eggs, and young, directly. Such effects are most likely along the pilot channel excavation area near the northeast corner of Pond A9, which provides suitable nesting habitat for California clapper rails. As noted above, the probability of nesting California clapper rails is low in the brackish marsh and narrow areas of salt marsh where breaches and pilot channels are proposed along Alviso Slough.

As mentioned previously, prior to or concurrent with restoration of tidal action in Ponds A9, A10, and A11, the berm between Ponds A11 and A12 will be breached. If California clapper rail habitat has developed within Pond A12 by that time, there is some potential for effects to individuals or nests due to breaching. Similarly, berms between A14 and A9/A11, and between A13 and A12, will be breached prior to or concurrent with restoration of tidal action in Ponds A13-A15, potentially resulting in effects to individual California clapper rails.

If pilot channel excavation in brackish or salt marsh habitat, or breaching of berms for Phases 2 and 3 near suitable California clapper rail habitat, is conducted during the breeding season, protocol-level surveys for California clapper rails will be conducted prior to proposed project activities to determine whether nesting rails are present in the vicinity. If any California clapper rails are detected, 700-foot buffers between rail activity centers and construction will be followed. During any construction or excavation activities that may result in effects to California clapper rails, the limits of work will be clearly delineated to limit effects to this species. These conservation measures will minimize effects of human activity within marshes on California clapper rails.

As noted previously, tidal restoration will result in an increase in the abundance of marsh-associated predators such as northern harriers. However, mammalian predators will have less access to these restored marshes due to the breaching of levees and the presence of Alviso and Coyote sloughs on two sides of the A9-A15 complex. Further, because no high-tension powerlines run through these ponds, perch sites for most predatory raptors will be limited.

A large colony of California gulls nests on the interior berms separating Ponds A9, A10, and A14. Tidal restoration would result in the intentional lowering of these berms or eventual erosion of these berms through tidal action, thus causing these gulls to move elsewhere to nest. These displaced gulls may select nesting sites in close proximity to California clapper rail habitat elsewhere. The displacement of gulls from areas of lower quality California clapper rail habitat to areas of higher quality habitat could result in increased predation pressure by gulls on the rail. Predator management and MAM performed by the Refuge and the SBSPRP will help to minimize the risk of predation.

Monitoring, research, and predator management efforts involving people walking through tidal marshes or boats grounding on marshes could result in effects to individual California clapper rails. Adult California clapper rails are unlikely to be injured or killed during such activities, as they are expected to flee an area subject to such activities before injury or mortality occurs. However, these activities could destroy or damage California clapper rail nests or eggs, or result in the injury or mortality of less mobile young California clapper rails. Such activities are expected to be very localized, and implementation of conservation measures (such as minimizing such activities during the California clapper rail's breeding season) will minimize the potential for such effects.

Following complete restoration of Ponds A9-A15, the extent of trails at these ponds will be limited to a trail along the eastern edges of Ponds A12, A13, and A15, with shorter spurs in three areas. Observation platforms would be constructed at the ends of these spurs. Human activity use may increase in areas where trails and observation platforms are to be opened or improved. Use of the trail along the new FRM levee is likely to increase once this levee is connected to other Bay Trail segments at its northeast end, but the removal of a loop trail in the A9-A15 complex may tend to reduce trail use. Management of potential disturbances in adjacent habitat areas from recreational human activity may not be effectively regulated or controlled, even with the proposed conservation measures to maintain public use and activities along the developed trails.

Increased recreational trail use in areas where existing trails occur adjacent to California clapper rail habitat could result in the flushing of California clapper rails at high tides, increasing predation risk. No new trails are proposed to be opened adjacent to existing California clapper rail habitat, but rails that colonize the restored tidal marshes in Ponds A12, A13, A15, and A18 would be subjected to human disturbance from trail users. The breadth of the ecotone (345 feet) will limit disturbance of California clapper rails by people using the new FRM levee along eastern Pond A12 and southern Pond A18, as humans on the top of the levee will be far removed from suitable rail habitat. People using the spur trails and the levee trail along the southern Pond A12 levee, the Pond A12/A13 levee, and the northern Pond A15 levee will be closer to California clapper rail habitat, however, due to the absence of a constructed ecotone.

Interpretive signage will be installed at the edges of sensitive California clapper rail habitat areas discouraging human entry into those areas. If monitoring indicates that disturbance of California clapper rails by humans is adversely affecting rail populations, seasonal closures of portions of these trails would be considered as an adaptive management measure.

Salt Marsh Harvest Mouse

Excavation of pilot channels in the outboard marsh around Ponds A9-A15 has the potential to injure or kill salt marsh harvest mice by crushing or smothering them during the placement of sediment or other materials in suitable habitat, or by excavation of habitat. Such effects are most likely along the pilot channel excavation area near the northeast corner of Pond A9, which provides the highest-quality habitat for this species of all the breach locations. Abundance of salt marsh harvest mice is low in the brackish marsh and narrow areas of salt marsh where breaches and pilot channels are proposed along Alviso Slough. As mentioned previously, prior to or concurrent with restoration of tidal action in Ponds A9, A10, and A11, the berm between Ponds A11 and A12 will be breached. If salt marsh harvest mouse habitat has developed within Pond A12 by that time, there is some potential for effects to individuals due to breaching. Similarly, berms between A14 and A9/A11, and between A13 and A12, will be breached prior to or concurrent with restoration of tidal action in Ponds A13-A15, potentially resulting in effects to salt marsh harvest mice. Conservation measures will be implemented to minimize the potential for impacts to individual salt marsh harvest mice.

Disturbance of salt marsh harvest mice from pilot channel excavation, ditch block construction, breaching of berms prior to second or third phase breaching, and equipment access for these restoration-related activities would be similar to that described above. Disturbance of salt marsh harvest mice from recreational trail use would be similar to that described for California clapper rail above.

As described for California clapper rail, loss of individual salt marsh harvest mice due to predation could be exacerbated by the proposed project, at least in localized areas, and displacement of the California gull colony from the interior berms separating Ponds A9, A10, and A14 could cause these gulls to relocate in areas where they may be more likely to prey on salt marsh harvest mice.

Monitoring, research, and predator management efforts involving people walking through tidal marshes or boats grounding on marshes could also result in injury or mortality of salt marsh harvest mice or disturbance of breeding, foraging, and sheltering activities. Such activities are expected to be very localized. Effects to salt marsh harvest mice resulting from monitoring, research, and predator management on the Refuge will be covered by the existing biological opinion for the SBSPRP and a future biological opinion for the Refuge's Comprehensive Conservation Plan. Effects to salt marsh harvest mice resulting from perennial pepperweed control are discussed below under the "Perennial Pepperweed Control" section.

<u>Effects Due to an Increase in Mercury Exposure</u>

Effects of Corps-led Actions

It is well known that the Guadalupe River system, including Alviso Slough, has a relatively high concentration of mercury resulting from sediments washed from historical mercury mines in the upper watershed. Recent testing in Artesian Slough has revealed high mercury concentrations there as well, with total mercury being lower but methylmercury, the bioavailable form, being higher in Artesian Slough than Alviso Slough (City of San Jose 2013). Such mercury may be mobilized when pilot channels are excavated in outboard marshes along Artesian Slough prior to breaching, and the tidal action through those channels, as well as the increase in tidal prism and associated scour of sediments in Artesian Slough, could mobilize mercury-laden sediment from the slough.

Although the abundance of California clapper rails in the immediate vicinity of Artesian Slough is currently very low, mercury could be mobilized downstream into and along Coyote Slough. Mercury accumulation in eggs is known to affect California clapper rails in the Bay Estuary, with the South Bay containing the highest mercury levels. Although intake is generally not acute enough to result in lethal toxosis of adults or young, mercury is extremely toxic to embryos and thus results in low levels of egg viability, and reduced California clapper rail fecundity. Schwarzbach *et al.* (2006) found high mercury levels and low hatching success (due both to predation and, presumably, mercury) in California clapper rail eggs throughout the Bay. They also suggested that mercury exposure could slow or stunt development of young, possibly increasing predation risk. Mercury exposure has been also linked to reduced body condition in California clapper rails (Ackerman *et al.* 2011), suggesting there are potential detrimental effects on survivorship of adult birds as well. Mean mercury concentrations in captured California clapper rail blood samples were 0.56 micrograms/gram (μg/g; or parts per million), 9.87 μg/g in head feathers, and 9.04 μg/g in breast feathers (Ackerman *et al.* 2011). Birds with mercury concentrations in blood over 1.0 μg/g and 9.0 μg/g in feathers are considered at risk for impaired reproduction (Evers *et al.* 2004, Burger and Gochfeld 1997), and several individuals captured in that study had mercury levels above those thresholds. The mercury concentrations in both head and breast feathers in the Ackerman study suggest that rails were exposed to mercury over long periods of time, as those two feather tracts are grown in different stages of molt. This suggests that mercury exposure was chronic and accumulated over time.

Mercury is taken in by California clapper rails primarily through contaminated prey in the form of methylmercury. Methylmercury, unlike elemental mercury, is bioavailable in that it readily binds to living tissue and accumulates in aquatic food webs. For instance, in failed-to-hatch California clapper rail eggs in the Schwarzbach *et al.* (2006) study, methylmercury accounted for 95 percent of total mercury in those eggs, and this ratio of elemental to methylmercury has been found in previous studies as well (see Ackerman *et al.* 2011). In addition to reproductive failure, studies have shown that captive egrets fed doses of 0.5 milligrams of methylmercury were less motivated to hunt food, and had a reduced appetite (Bouton *et al.* 1999, Spalding *et al.* 2000). These effects may be related to reduced body condition, which could ultimately lower survivorship.

Inorganic mercury tends to be converted to methylmercury, primarily under somewhat anoxic conditions (Marvin-DiPasquale *et al.* 2003). California clapper rails are currently exposed to methylmercury when foraging on mudflats and in sloughs with high levels of mercury contamination. The proposed project has the potential to increase the exposure of California clapper rails to mercury by stirring up sediments during vegetation removal and dredging activities. Methylmercury may also be mobilized by the frequent wetting and drying of mercury-contaminated sediments during construction activities. Mercury-contaminated sediments that are currently buried too deep to adversely affect California clapper rails and other species could be mobilized by these activities, thus entering the food chain. The extent to which excavation of pilot channels and scour of sediments in Artesian Slough will release mercury such that it may be more bioavailable to California clapper rails, and to which any increased level of bioavailable mercury affects California clapper rails, is difficult to quantify.

Compared to a managed pond environment, mercury deposited in well-oxygenated marsh plains is not expected to methylate as readily (Grenier *et al.* 2010). Also, it is likely that there will be a relatively low temporal exposure after breaching occurs for mercury to circulate in the slough or restored ponds, methylate, and be incorporated into the food web. Therefore, if there is an increase in methylmercury, it will likely occur for only a short duration. Preliminary data collected for SBSPRP mercury monitoring suggest this is the case. Mercury levels in fish collected in Alviso Slough increased after the Pond A8 notch was opened in June 2011 but had already decreased by October 2011 (SBSPRP 2013). The increase in mercury levels was more pronounced around the notch than at downstream sampling locations, suggesting the effect was localized. Therefore, the loss of individual California clapper rails or reduction in reproductive success of rails is not expected to occur as a result of increased mercury exposure associated with the proposed project.

The effects of mercury on salt marsh harvest mice are largely unknown. However, this species is likely exposed to methylmercury through the tidal marsh food web and mercury concentrations in tidal marshes. Although Artesian Slough methylmercury concentrations are high, tidal marshes show no evidence of increased bioaccumulation of mercury compared to other South Bay tidal marshes, possibly due to a paucity of organic material in the sediment (Grenier *et al.* 2010). For example, resident songbirds captured in tidal marshes in Alviso Slough showed similar bioaccumulation of mercury as other South Bay marshes (Grenier *et al.* 2010). Because increases in mercury availability are expected to be short-term, as described for the California clapper rail, the potential for increased salt marsh harvest mouse exposure to mercury is relatively low. Therefore, salt marsh harvest mice are not expected to be affected by an increase in mercury exposure related to pilot channel excavation and sediment scour.

Effects of Service-led Actions

Because of the mercury contamination of the Guadalupe River from the New Almaden mine, some of the sediment in Alviso Slough may contain high concentrations of mercury. Such mercury may be mobilized when pilot channels are excavated in outboard marshes along Alviso Slough prior to breaching, and the tidal action through those channels, as well as the increase in tidal prism and associated scour of sediments in Alviso Slough, could mobilize mercury-laden sediment from Alviso Slough and Ponds A9-A15. Effects of this mercury mobilization on California clapper rails would be as described above for Corps-led activities. The effects of mercury mobilization on salt marsh harvest mice from Service-led activities are expected to be relatively low similar to those described above for Corps-led activities.

<u>Perennial Pepperweed Control</u>

Effects of Corps-led and Service-led Actions

Potential effects on California clapper rail and salt marsh harvest mouse foraging and nesting due to perennial pepperweed control could result from habitat alterations (*e.g.*, native plant mortality) and marsh access through California clapper rail and salt marsh harvest mouse habitat for treatment/ eradication, monitoring, or re-vegetation activities. Ground based spraying via foot or ARGOs and post-treatment monitoring requires access through the marsh and may result in vegetation trampling or salt marsh harvest mouse nest disturbance. Use of ARGOs for control will cause temporary disturbance of marsh vegetation. All treatment crew members will be supervised by a qualified biologist and will be trained to follow the guidelines presented in the "Walking In the Marsh: Methods to Increase Safety and Reduce Impacts to Wildlife & Plants" protocol (Appendix A), thereby minimizing disturbance of California clapper rails, salt marsh harvest mice, and their habitats.

Disturbance of the marsh by field crews on-foot will be minimal because crews will be traversing through the marsh only once or twice per year to conduct treatment and monitoring, trails will not be established through the marsh, and no residual effects on marsh habitat quality are anticipated. Field crews will not crush any salt marsh harvest mice or their nests because they will be supervised by a qualified biologist and will avoid walking on high pickleweed vegetation and on wrack, where salt marsh harvest mice are likely to forage or nest. In addition, since crews will be walking slowly, any salt marsh harvest mice present will be able to move out of the immediate area. Due to the minimal amount of habitat disturbance caused by field crews and avoidance of direct impacts to salt marsh harvest mice, access of marshes by field crews on-foot for perennial pepperweed control will avoid the injury and mortality of salt marsh harvest mice and minimize the level of disturbance.

Field crews accessing the marsh via ARGOs for perennial pepperweed control may result in the temporary disturbance of marsh vegetation (habitat degradation) or crushing of individual salt marsh harvest mice or their nests beneath the ARGOs. These vehicles are designed to operate with low ground pressure (about 0.67 pounds per square inch) and distribute weight on specialized tracks. ARGOs exert a ground pressure approximately five times less than that of humans; however, a greater area of marsh vegetation would be disturbed by fields crews on ARGOs than on-foot.

ARGOs may crush and cause dieback of marsh vegetation, particularly sub-shrubby vegetation with brittle stems, such as pickleweed, the primary habitat of the salt marsh harvest mouse. Due to this identified impact, the quantity of suitable California clapper rail and salt marsh harvest mouse habitat directly affected by ARGOs is calculated by the distance within tidal marsh they will be driven to access and treat perennial pepperweed patches. There is a five-foot wide "track impact" from an ARGO traveling through the marsh. This impact would consist of temporary compaction or crushing of pickleweed and other marsh plants, with the vegetation expected to recover fully within a few months of impact. The travel path of ARGOs will be planned to minimize the amount of impact to California clapper rail and salt marsh harvest mouse habitat by traveling in mudflats whenever feasible.

The only perennial pepperweed control action that may temporarily disturb nesting California clapper rails is a portion of the marsh access for eradication activities. Backpack spraying will be used to treat perennial pepperweed within "700-ft Buffer Areas", and disturbance will be localized and very temporary (usually less than 30 minutes). California clapper rails may be harassed by treatment access within "700-ft Buffer Areas" where there is greater than one acre of infested perennial pepperweed and where treatment is likely to exceed 30 minutes. Boat-mounted spraying will be used to treat relatively larger clones along slough edges and may result in a larger scale disturbance (noise), but little immediate habitat destruction. ARGOs will not be used in "700-ft Buffer Areas" for California clapper rails. It is expected that control activities in areas with large acreages targeted for control will result in relatively more disturbance than in those areas with small acreages, given similar California clapper rail densities.

Any ARGOs used in control activities will stay 700 feet from known California clapper rail calling centers and will stay at least 50 feet from channel edges, thereby avoiding rail nest destruction or rail disturbance. However, if the intervening distance across a major slough channel or across a substantial physical barrier between the California clapper rail calling center and the proposed access area is greater than 200 feet, then access may proceed within the breeding season.

Areas where California clapper rails have been detected contain channels and low marsh vegetation used for mating, foraging, and nesting. The majority of perennial pepperweed patches occur in the transition zone and along channel edges dominated by gumplant. Perennial pepperweed patches also occur adjacent to *Spartina foliosa* patches of low marsh tidal deposition areas (wrack lines). Sensitive eradication areas include channel edges and areas where low marsh (*S. foliosa*-dominated) interfaces the pickleweed plain. Herbicide applications are not expected to cause direct mortality of *S. foliosa* and other native plant species if conservation measures are implemented to reduce herbicide spray drift and subsequent mortality of non-target plants. The eradication of perennial pepperweed is not likely to harm California clapper rails as a result of habitat loss because: (1) California clapper rails are not known to use perennial pepperweed as a habitat component, and (2) conservation measures will be implemented that avoid non-target plant eradication.

The herbicides, adjuvants, and dyes proposed for eradication of perennial pepperweed within the action area are also being used to eradicate invasive *Spartina* species in other parts of the Bay Estuary. The herbicides proposed were determined not to have any direct toxic effects to California clapper rails (California State Coastal Conservancy and Service 2003, California State Coastal Conservancy 2005). Direct toxicity of herbicide, surfactant, and colorant applications is unlikely to have significant toxic effects to California clapper rails since herbicides are directed to the upper portion of the plant and dry quickly on the plant leaf surface (usually within a few minutes of application), and exposure of rails to spray solutions would be very temporary. Even if California clapper rails are exposed to small amounts of spray solutions, they will not be injured since these chemicals are considered practically non-toxic to birds (California State Coastal Conservancy and Service 2003). The chemical treatment of perennial pepperweed will reduce expansion and formation of perennial pepperweed monocultures which alter soil conditions and crowd out native plant species used by California clapper rails for nesting and sheltering.

Salt marsh harvest mice are unlikely to come into contact with spray solutions applied to perennial pepperweed since the mice primarily inhabit pickleweed and other high marsh vegetation not targeted for control. Even if salt marsh harvest mice are exposed to small amounts of imazapyr, glyphosate, surfactants, or colorants used in the spray solutions, they would not likely be harmed since these chemicals are considered non-toxic to mammals (California State Coastal Conservancy and Service 2003, California State Coastal Conservancy 2005).

California clapper rails and salt marsh harvest mice will not lose habitat when perennial pepperweed is removed, since the rail and the mouse are not known to utilize perennial pepperweed. Removal of invasive perennial pepperweed and revegetation of the marsh-upland transition zone will provide high quality high tide refugia, a critical component of the habitat for the California clapper rail and salt marsh harvest mouse. Non-native perennial pepperweed threatens the transition zone refugia and tidal marsh habitat for the California clapper rail and salt marsh harvest mouse. Perennial pepperweed displaces higher quality tidal marsh vegetation including marsh gumplant and pickleweed. Perennial pepperweed also provides poor quality high tide refugia cover for the California clapper rail and salt marsh harvest mouse because it is leafless in the winter when the rail and the mouse are in most need of suitable upland cover during the frequent winter extreme high tide and storm events. Without suitable cover, the California clapper rail and salt marsh harvest mouse are vulnerable to predation during extreme high tide events. Therefore, perennial pepperweed control will provide a long-term benefit to the California clapper rail and salt marsh harvest mouse.

Revegetation will occur within the transition zone. Revegetation is not expected to disturb breeding California clapper rails because this activity will occur outside of the rail's breeding season. The transition zone is used by California clapper rails and salt marsh harvest mice primarily during extreme high tide events; therefore, restricting revegetation of the transition zone to low tides will minimize the potential for disturbing any California clapper rails and salt marsh harvest mice. The restoration of native plants within the transition zone will provide California clapper rails and salt marsh harvest mice with high quality high tide refugia, a critical component of population recovery for the rails and the mice.

Pacific Coast Population of the Western Snowy Plover

Loss of Habitat

Effects of Corps-led Actions

Western snowy plovers are not known or expected to nest or forage along the WPCP segment of the FRM levee or in or around Pond A18 under current conditions. As a result, construction and restoration east of Artesian Slough will not result in a net loss of western snowy plover habitat. However, prior to breaching, Pond A18 may be drawn down to facilitate within-pond preparations such as construction of ditch blocks. When Ponds A16 and A17 were drawn down prior to SBSPRP Phase I activities, western snowy plovers used the dried-out pond bottoms for nesting. If Pond A18 is drawn down prior to breaching, then the dried-out pond bottom is likely to attract nesting western snowy plovers. As a result, breaching will flood this temporarily created western snowy plover habitat.

Aside from impacts to temporarily created habitat if Pond A18 is drawn down, construction of the FRM levee will not directly affect any suitable nesting habitat for the western snowy plover. Although this species has nested in the Alviso impoundment, in Ponds A12, A13, and A16, and in New Chicago Marsh, portions of which will be directly impacted by levee construction, the western snowy plover does not nest near the existing non-engineered levees that occur within the proposed construction footprint. Rather, western snowy plovers nest farther from levees, apparently due to the disturbance associated with human use of the levees, use of levees by predatory mammals, and the species' inability to see over levees (and thus detect approaching predators) if the nest is placed too close to the levee. Thus, even under existing conditions, there is a zone close to the levees that has not been used for nesting by western snowy plovers.

However, for these same reasons, FRM levee construction could result in indirect effects to western snowy plovers by causing plovers to avoid using habitat that is otherwise suitable. The ultimate height of the FRM levee is expected to be approximately 10 feet higher than the existing levee on the south side of Pond A16, and the very low levee along the eastern side of A12 is likely to be raised even more, relative to its existing height. The levees may initially be built even higher, as some subsidence is expected over time as materials settle. As a result, the FRM levee will be substantially taller and wider than the existing levees. Western snowy plovers are unlikely to nest very close to the levee for the reasons discussed above, especially when the Bay Trail is developed atop the levee and human activity is even greater than it currently is. As a result, the zone near levees that western snowy plovers avoid for nesting would shift farther from the levee.

The extent of this indirect effect (*i.e.*, the amount of otherwise suitable nesting habitat that will no longer be used by nesting western snowy plovers) is unknown. Western snowy plovers nesting in New Chicago Marsh, on islands in Pond A16, and in Ponds A12 and A13 tend to nest well away from the Pond A16 levee. As a result, it is possible that they nest so far from the levee already that an increase in height of, and human activity along, the levee would have no effect on the plovers' perception of suitable habitat availability. In addition, tidal restoration in Ponds A12 and A13 would make those ponds completely unsuitable for use by nesting western snowy plovers. However, it is possible that increasing the height of the levee would cause plovers to retreat even farther from the levee. It is unknown whether western snowy plovers would continue to nest in the Alviso impoundment after FRM levee construction, and it is possible that plovers might view the entire impoundment as being no longer suitable due to the taller, wider levee. Use of this impoundment by nesting western snowy plovers has been sporadic (*i.e.*, less than annual), and usually by only a single pair when it is used at all.

Although the number of pairs of western snowy plovers that may no longer nest in the vicinity of the action area as a result of raising the height of the levee is unknown, it is likely that no more than one or two pairs would be affected because areas near the action area levees have been inconsistently used by few plovers in the past. The proposed project will implement compensatory conservation measures by distributing pea gravel or other appropriate substrate on an island in Pond A16, maintaining this island for use by nesting western snowy plovers, and increasing the intensity of predator management in the vicinity. Gravel may make it more difficult for predators such as California gulls and northern harriers to detect western snowy plovers due to camouflage (*e.g.*, plovers may be difficult to distinguish within the gravel from a distance) and increased topographic relief associated with the gravel and footprints left by people distributing the gravel. As a result, predation rates on both western snowy plover eggs and chicks are likely to be lower in areas with such gravel, and more plovers may be attracted to nest in areas with gravel. Providing gravel on an island in Pond A16 is expected to increase western snowy plover nesting abundance, and possibly nesting success, thus compensating for the adverse effects of other proposed project activities on nesting western snowy plovers. These measures are expected to minimize any adverse effects of Corps-led actions on the availability of suitable western snowy plover habitat, or western snowy plover abundance or productivity.

Expansion of the FRM levee into pond, seasonal wetland, and muted tidal/diked marsh habitat will result in filling of ostensibly suitable foraging habitat and, as discussed above, the possible avoidance of foraging habitat that is otherwise suitable but would be too close to the levee following construction. However, western snowy plovers are very rarely seen foraging close to the eastern edges of Ponds A12 and A13, the southern edge of Pond A16, or the northern edge of New Chicago Marsh. As a result, effects of levee construction on western snowy plover foraging habitat are likely limited to reduced use of the Alviso impoundment. As foraging habitat in the vicinity is not likely limiting western snowy plover populations (based on the expanses of suitable foraging habitat present in managed ponds and New Chicago Marsh that is unoccupied at any given time, as well as the abundance of prey in these area), the effects of Corps-led actions on western snowy plover foraging habitat are unlikely to have a substantive effect on western snowy plover populations.

Effects of Service-led Actions

Service-led tidal restoration will result in the loss of all western snowy plover nesting habitat in Ponds A9-A15, as western snowy plovers do not nest in tidal habitats. Further, because this species forages infrequently on tidal mudflats, western snowy plovers are expected to make little use of Ponds A9-A15, even for foraging, once they are restored to tidal action. Based on data from 2012, when five of 13 nests in the proposed project vicinity were in Pond A13 (Donehower *et al.* 2012), and 2013, when two of 10 nests in the proposed project vicinity were in Pond A9 (Robinson-Nilsen *et al.* 2013), up to five pairs of western snowy plovers may be displaced by tidal restoration. Because restoration will be phased, some western snowy plover nesting habitat is expected to be present in Ponds A9-A15 until 2030, when the last of these ponds may be breached.

As discussed previously, the MAM for the SBSPRP will help to achieve the goal of supporting at least 250 individual breeding western snowy plovers in the SBSPRP area, which is half of the number of breeding western snowy plovers required within the San Francisco Bay Recovery Unit for delisting (Service 2007). The SBSPRP will implement adaptive management measures, such as more intensive management of certain ponds for western snowy plovers, as necessary to achieve that goal. The MAM associated with the SBSPRP would therefore assist in compensating for impacts to western snowy plovers from loss of nesting habitat in Ponds A9-A15 by helping to manage for plovers in other SBSPRP ponds. Because some western snowy plover nesting habitat will remain in the Ponds A9-A15 complex until 2030, there is ample time for the MAM associated with the SBSPRP to determine how to increase western snowy plover densities elsewhere prior to complete loss of plover nesting habitat from Ponds A9-A15. As described in previous sections, if the MAM indicates impacts to waterbirds (including western snowy plovers) are too severe, then fewer ponds will be restored to tidal action.

Development of a Bay Trail segment on the FRM levee, which is a Service-led activity, will increase recreational use of the levee top. This will contribute to disturbance of western snowy plovers nesting in adjacent areas, leading to an effective loss of habitat use. Research shows that nesting western snowy plovers within the South Bay are very sensitive to disturbance by recreational trail users and construction activities within 600 feet of their nests (Robinson 2008, San Francisco Bay Bird Observatory and Service 2010).

<u>Direct Effects to Individuals</u>

Effects of Corps-led Actions

As described for California clapper rail above, disturbance such as loud noise or the presence and movement of people, and heavy equipment near western snowy plover habitat may alter bird behavior in ways that result in injury, mortality, or reduced nesting success. Such disturbance could result in temporary or permanent habitat loss due to western snowy plover avoidance of areas that have suitable habitat but intolerable levels of disturbance; abandonment of nests, eggs, or young by nesting pairs; a reduction in foraging efficiency if high-quality foraging areas are impacted; and increased movement or flushing, or altered activity patterns, that reduce energy reserves and increase predation risk. Construction of the Alviso Segment of the FRM levee near western snowy plover habitat in Ponds A12 and A13, the Alviso impoundment, New Chicago Marsh, and A16 could result in disturbance of nesting and foraging plovers in those areas. However, moderate to fairly heavy human use already exists along the levees adjacent to western snowy plover habitat in the proposed project area. Numerous pedestrians and cyclists use the levees around the Ponds A9-A15 complex, between Ponds A15 and A13/A14, and between A16 and New Chicago Marsh on a daily basis. As a result, the western snowy plovers that use habitat adjacent to these levees (a) tend to avoid areas close to the levees used by humans, and (b) are already habituated to the use of humans along those levees. This reduces the extent to which western snowy plovers will be disturbed by levee construction and use of the levees by humans following levee completion.

Nevertheless, to minimize such impacts, work in and adjacent to potential western snowy plover nesting habitat would be conducted outside of the nesting season to the extent practicable. If seasonal avoidance is not possible, surveys before and during construction would be conducted for nesting western snowy plovers, and appropriate buffers (*i.e.*, 600 feet during construction activities) would be implemented between proposed project activities and nesting western snowy plovers.

Because western snowy plovers are not known or expected to nest very close to the existing levees, no western snowy plover nests or eggs would be located within the footprint of FRM levee construction. If nesting has occurred in areas adjacent to the levees, such as the Alviso impoundment, it is possible that young western snowy plovers could move into the construction footprint. However, if nesting occurs in the construction zone, then a Service-approved biologist will need to clear the area before construction can continue.

If Pond A18 is drawn down prior to breaching, as described previously, then breeding western snowy plovers could be nesting in the pond when construction of ditch blocks and breaching occurs. While adult breeding western snowy plovers would not be injured or killed by restoration-related construction activities or breaching, as they would flee the vicinity of any such activities, their nests, eggs, or young could be crushed, trampled, buried, or lost to flooding as a result of displacement of sediment into nesting habitat during construction of ditch blocks, or levee breaching and flooding of occupied habitat. For example, in 2010, two western snowy plovers nests at Ravenswood Pond SF2 were depredated when construction crews for the SBSPRP were working within 600 feet of the nests (San Francisco Bay Bird Observatory and Service 2010). Therefore, there is the potential for construction activities within 600 feet of a western snowy plover nest to flush the western snowy plover from its nest exposing the nest to depredation. To minimize such impacts, work in and adjacent to potential breeding western snowy plover nesting habitat would be conducted outside of the nesting season to the extent practicable. If seasonal avoidance is not possible, surveys prior to and during construction would be conducted for nesting breeding western snowy plovers, and appropriate buffers (*i.e.*, 600 feet during construction activities) would be implemented between proposed project activities and nesting western snowy plovers.

Loss of individual western snowy plovers (including eggs and chicks) due to predation could be exacerbated by the proposed project, at least in localized areas. The restoration of tidal marsh habitat will increase habitat for northern harriers, which are known to prey on western snowy plovers. Compensatory mitigation involving an increase in predator management in the New Chicago Marsh/A16 vicinity will reduce any increase in predation resulting from increased northern harrier populations from Corps-led activities.

Maintenance activities along the FRM levee have the potential to disturb nesting and foraging western snowy plovers as well. Recreational use of the Bay Trail segment atop the levee will affect western snowy plovers in adjacent areas to the point that plovers present in areas such as Pond A16 or New Chicago Marsh during levee maintenance activities will already be habituated to some level of human activity on the levee. As a result, routine inspections and minor maintenance activities are not expected to result in an increase in western snowy plover disturbance, relative to other types of levee use. Even mowing along the levee tops is unlikely to cause substantial disturbance of western snowy plovers given the very narrow swaths to be mowed, the brevity of mowing operations, and the distance (330 feet or more) between mowing and western snowy plover habitat. Other maintenance activities involving heavy equipment would be conducted outside of the nesting season to the extent practicable, and if seasonal avoidance is not possible, pre-construction surveys would be conducted for nesting western snowy plovers, and appropriate buffers would be implemented between proposed project activities and nesting western snowy plovers as necessary.
Even with the implementation of conservation measures to minimize disturbance of nesting western snowy plovers, snowy plovers that disperse away from disturbance may not successfully establish new breeding territories and breed. Plovers forced to disperse would need to either maintain existing pair bonds or develop new pair bonds and establish new breeding territories in other

suitable habitat areas. Disturbance that occurs during the non-breeding season could also result in injury, mortality, or the disturbance of western snowy plover foraging and sheltering activities. Displaced individuals could be subjected to injury or mortality from starvation, physiological stress, and increased predation.

Effects of Service-led Actions

Disturbance of western snowy plovers using Ponds A9-A15 may occur due to pilot channel excavation, ditch block construction, and equipment access for these restoration-related activities. The effects of such disturbance would be similar to that described above.

If drawdown of Ponds A9-A15 occurs to facilitate within-pond preparations, western snowy plovers are expected to nest in at least some of these ponds. While adult western snowy plovers would not be injured or killed by restoration-related construction activities, as they would flee the vicinity of any such activities, their nests, eggs, or young could be crushed, trampled, buried, or lost to flooding as a result of displacement of sediment into nesting habitat during berm lowering or construction of ditch blocks, or levee breaching and flooding of occupied habitat. To minimize such impacts, work in and adjacent to potential western snowy plover nesting habitat would be conducted outside of the nesting season to the extent practicable. If seasonal avoidance is not possible, pre-and during construction surveys would be conducted for nesting western snowy plovers, and appropriate buffers would be implemented between proposed project activities and nesting western snowy plovers.

As described for California clapper rail above, loss of individual western snowy plovers, eggs, and young may increase as a result of predation. An increase in tidal marsh habitat will result in an increase in northern harrier populations, and displacement of the California gull colony on the interior berms separating Ponds A9, A10, and A14 may cause gulls to relocate to areas closer to high densities of nesting western snowy plovers. Both the northern harrier and California gull are important predators of western snowy plovers in the South Bay. Predator management and MAM performed by the Refuge and the SBSPRP will help to minimize the risk of predation on western snowy plovers.

Service-led activities include the provision of recreational trails. Human activity may increase in areas where trails and observation platforms are to be opened or improved. Studies of the effects of recreational trail use in the South Bay on western snowy plovers showed that trail users caused western snowy plovers to flush from their nests when walkers approached on average within 538 feet when approached directly or 478 feet when passed tangentially (Robinson 2008). Use of the trail along the new FRM levee is likely to increase once this levee is connected to other Bay Trail segments at its northeast end, but the removal of a loop trail in the A9-A15 complex may tend to reduce trail use. Management of potential disturbances in adjacent habitat areas (such as Ponds A9-A15 that have not yet been converted to tidal habitats) from recreational human activity may not be effectively regulated or controlled, even with the proposed conservation measures to maintain public use and activities along the developed trails. Increased recreational trail use adjacent to western snowy plover habitat could have the same disturbance effects as described above.
Interpretive signage will be installed at the edges of sensitive habitat areas discouraging human entry into those areas. If monitoring indicates that disturbance of western snowy plovers by humans is adversely affecting plover populations, seasonal closures of portions of these trails would be considered as an adaptive management measure.

Effects Due to an Increase in Mercury Exposure

Effects of Corps-led Actions

Studies in San Diego County (Hothem and Powell 2000), at Point Reyes (Schwarzbach *et al.* 2005), and in the South Bay (Schwarzbach and Adelsbach 2003) have found elevated mercury levels in western snowy plover eggs. At Point Reyes, high levels of mercury in unhatched eggs were thought to be a possible reason for the inviability of these eggs. In the San Diego County and South Bay studies, however, concentrations of mercury in western snowy plover eggs were below known embyrotoxic thresholds established for other species.

Western snowy plovers are currently exposed to mercury in ponds containing mercury-contaminated water or sediment. Proposed tidal restoration activities that stir up contaminated sediments, such as pilot channel excavation, construction of ditch blocks, and scour due to increased tidal prism would all occur just prior to, or as a result of, tidal restoration. Although western snowy plovers foraging on intertidal mudflats may be affected by increased mercury mobilization resulting from these activities, activities that stir up mercury-laden sediments in tidal habitats are expected to have little effect on snowy plovers due to the infrequency with which snowy plovers forage in intertidal habitats in the proposed project area. Furthermore, western snowy plovers are not known to use the Pond A18 area under existing conditions, and proposed project activities are not expected to enhance conditions for western snowy plovers in A18 after proposed project completion.

Effects of Service-led Actions

Potential effects of mercury mobilization and exposure on western snowy plovers, resulting from Service-led activities, are expected to be similar to those described above for the Corps-led activities.

California Least Tern

California least terns do not nest in the action area, and thus the proposed project is not expected to result in in any effects to nesting California least terns. California least terns have been observed foraging in the action area's ponds (A9, A11, and A14) only rarely, and they have not been observed foraging in Pond A18. Although they could potentially forage in any of these ponds that contain fish, survey data collected for the SBSPRP and incidental observations by birders indicate that California least terns visit the action area (as a post-breeding forager) only irregularly and in low numbers.

Habitat Modification

Effects of Corps-led Actions

Construction of the FRM levee and the tide gate and pedestrian bridge in Artesian Slough will not affect California least tern foraging or roosting habitat. Although California least terns have not been recorded foraging in Pond A18, they could potentially forage there (albeit irregularly and in low numbers, given the lack of records). Drawing down Pond A18 prior to breaching would eliminate California least tern foraging habitat in the pond in the short term, and restoration of Pond A18 to tidal habitats would reduce the extent of suitable foraging habitat available to California least terns in the longer term. However, tidal marsh restoration is expected to benefit fish populations considerably by providing nursery habitat in the extensive channel networks that will be restored and by exporting organic material to aquatic habitats outside the restored habitat. As a result, tidal restoration is expected to increase fish abundance (through improved water quality, food resources, and spawning and rearing habitat) in the open waters of the Bay where California least terns also forage (in addition to foraging in managed ponds), thus increasing prey availability in the South Bay for California least terns. Due to the low level of California least tern use of Pond A18 and the benefits of tidal restoration to prey fish populations, Corps-led actions will not have a substantive adverse effect on California least tern habitat and prey, and they may have a beneficial effect.

Effects of Service-led Actions

Service-led tidal restoration will result in the conversion of managed pond habitat in Ponds A9-A15 to tidal habitats. Drawing down these ponds prior to breaching would eliminate California least tern foraging habitat in the ponds in the short term, and in the longer term, there would be a net reduction in potential foraging habitat for the California least tern due to the conversion of aquatic habitat within these ponds to mostly vegetated habitats. However, California least terns have only been recorded foraging in Ponds A9-A15 infrequently and in low numbers. Also, as noted previously, tidal restoration is expected to have substantial beneficial effects on South Bay fish populations. Due to the low level of California least tern use of Ponds A9-A15 and the benefits of tidal restoration to prey fish populations, Service-led restoration activities will not have a substantive adverse effect on California least tern habitat and prey, and they may have a beneficial effect.

Disturbance of Foraging Individuals

Effects of Corps-led Actions

Because California least terns have not been recorded using Pond A18 or any of the other ponds near the FRM levee (*i.e.*, A12, A13, or A16), there is little potential for disturbance of foraging California least terns from Corps-led actions. If individuals were to forage in these ponds during FRM levee construction and they were disturbed by construction activities, they would simply move away to other, more traditionally used foraging areas.

Effects of Service-led Actions

Disturbance such as loud noise or the presence and movement of people and heavy equipment near California least tern foraging habitat may alter the tern's foraging behavior. Such disturbance could result in temporary or permanent habitat loss due to California least tern avoidance of areas that have suitable habitat but intolerable levels of disturbance; a reduction in foraging efficiency if high-quality foraging areas are impacted; and increased movement or altered activity patterns that reduce energy reserves and increase predation risk.

Because California least terns have been recorded using Ponds A9-A15 for foraging infrequently and in low numbers, the number of individuals that could be disturbed by Service-led construction or recreational activities is very low. If individuals were to forage in these ponds during restoration-related construction or breaching activities, or during high levels of recreation-related activity, and they were disturbed by those activities, they would simply move away to other, more traditionally used foraging areas.

Effects Due to an Increase in Mercury Exposure

Effects of Corps-led Actions

Because fish bio-accumulate methylmercury, and California least terns eat almost exclusively small fish, there is some potential for mercury mobilized by Corps-led restoration activities (as described above for California clapper rail) to adversely affect California least terns. California least terns are currently exposed to mercury in the South Bay by foraging on fish in contaminated tidal habitats containing mercury-contaminated water or sediment during their post-breeding period. Restoration activities in Pond A18 will mobilize contaminated sediments, and therefore there is the potential to increase California least terns' exposure to mercury. Methylmercury may also be mobilized by the frequent wetting and drying of mercury-contaminated sediments during construction activities. Such exposure could potentially affect the development of juveniles that ingest mercury in food taken during the post-breeding period and may affect fecundity in adults that ingest contaminated fish.

Recent biosentinel sampling in South Bay managed ponds and marshes indicates that mercury concentrations in fish are above the Bay mercury total maximum daily load of 0.03 μg/g for small fish (San Francisco Bay Regional Water Quality Control Board 2006). Mean mercury levels of longjaw mudsuckers and threespine sticklebacks in Alviso Slough fringe marshes were 0.11 μg/g and 0.16 μg/g, respectively (Grenier *et al.* 2010). These levels were higher (but not significantly) than in other South Bay reference sites (mudsuckers: 0.08 μg/g, stickleback: 0.11 μg/g). Based on this information, California least terns foraging in the South Bay could be exposed to mercury levels that are detrimental to piscivorous birds even in the absence of the proposed project. This is evident in Forster's terns (*Sterna forsteri*), a better-studied tern species that breeds in the South Bay, and thus has higher exposure to mercury than California least terns. In a contaminants study of Forster's terns, approximately 50 percent of captured terns were considered at or above moderate risk (> 1.0 μg/g), 13 percent were at or above high risk (>3.0 μg/g), and 9 percent were at or above extra-high risk (>4.0 μg/g) for impaired reproduction based on their blood mercury concentrations (Ackerman *et al.* 2008a). Blood sampling over time (between pre-breeding and breeding stages), suggests that breeding terns were at higher risk due to mercury increasing in their blood, suggesting terns' mercury concentrations increased with the time they spent foraging while in the Bay (Ackerman *et al.* 2008a). Blood mercury concentrations were highest in terns captured in the southernmost portions of the Bay, in the Alviso salt pond complex, including Pond A8 (Ackerman *et al.* 2008a). Unexpectedly, blood mercury concentrations in Forster's terns were substantially higher approximately two months after arriving in the Bay (*i.e.*, the period between pre-breeding and breeding) than observed in Caspian terns (*Hydroprogne caspia*) during the same time period (Eagles-Smith *et al.* 2009). Caspian terns had much higher mercury levels upon arriving, but Forster's terns mercury levels were soon elevated beyond those of Caspian terns, despite the fact that Caspian terns forage on larger prey (*i.e.*, at higher trophic levels). This was likely due to differences in foraging ecology, as Caspian terns tend to forage in the open bay waters or at inland reservoirs and Forster's terns forage mainly in ponds and tidal marsh channels (Ackerman *et al.* 2008b). As noted above, open waters in the Bay are less likely to methylate mercury than tidal marsh areas (Marvin-DiPasquale *et al.* 2003), and ponds have the potential to methylate mercury due to high levels of degradable organic matter (Grenier *et al.* 2010). Therefore, terns that forage in ponds are much more likely to be exposed to mercury than those foraging in open bay waters.

Although mercury concentrations in post-breeding California least terns in the South Bay are largely unknown, it would be expected that California least terns' exposure to mercury in the South Bay is substantially less than both Caspian and Forster's terns. Because California least terns occur only in the South Bay during post-breeding periods, they would be exposed to mercury for a relatively brief period of time. Further, because they tend to forage in open bay waters or in managed ponds in the Mountain View area (where legacy contamination by mercury should be lower than in areas that receive drainage from the mercury mines in the Guadalupe River watershed or in Artesian Slough), their exposure to mercury should be less than those of Forster's terns. Also, because they eat smaller fish than Caspian terns, California least terns likely accumulate mercury slower than Caspian terns.

California least terns do appear to have some exposure to mercury from central San Francisco Bay (Central Bay) foraging areas near their colonies. Hothem and Zador (1995) analyzed contaminant levels in California least tern eggs collected at the Oakland airport and Alameda Point colonies, and from five colonies along San Diego Bay. Mercury was detected in all eggs, but concentrations were higher in eggs from the Central Bay, with an average of 1.88 μg/g in Central Bay colonies and 1.07 μg/g in San Diego colonies. In comparison, concentrations of mercury in collected Forster's tern eggs averaged 1.35 μg/g (Ackerman and Eagles-Smith 2009). Egg mercury concentrations above 1.0 μg/g is considered high enough for impaired hatchability and embryonic mortality in birds (Scheuhammer *et al.* 2007), and although eggs with concentrations above 1.0 μg/g can hatch, there may be residual effects of mercury on chick mortality after hatching (Ackerman and Eagles-Smith 2009). This suggests that Forster's terns' exposure to mercury during the pre-breeding and breeding periods in the South Bay is higher than California least terns foraging in the Central Bay during the same periods, due in part to overall higher mercury concentrations in the South Bay and their use of pond and tidal marsh foraging sites (as opposed to open bay waters). Because maternally-deposited mercury in eggs is a result of recent dietary exposure (Heinz and Hoffman 2003), mercury in California least tern eggs likely is associated with foraging sites near colonies and not associated with mercury from the South Bay that they are exposed to during post-breeding periods.

Although the potential effects of increased mercury exposure on California least terns resulting from the proposed project are difficult to determine, California least terns are unlikely to be affected substantially by an increase in mercury exposure from the proposed project. This is because California least terns tend to forage in open water habitats in the Bay or managed ponds in the Mountain View area, where their exposure to mercury is lower than if they foraged more frequently in ponds in the Alviso area and/or in marshes like Forster's terns. Also, mercury that may impair California least tern reproduction is more likely to be derived from pre-breeding and breeding foraging sites than post-breeding staging areas in the South Bay. Finally, the increase in mercury mobilization resulting from Corps-led activities is expected to be relatively brief in duration.

Effects of Service-led Actions

Potential effects of mercury mobilization and exposure on California least terns, resulting from Service-led activities in Ponds A9-A15, are expected to be similar to those described above for Corps-led activities.

San Francisco Bay-Delta DPS of the Longfin Smelt

Habitat Modification

The proposed project is expected to substantially increase and improve longfin smelt habitat in the action area. The combined tidal restoration efforts of the Corps and the Service are expected to restore and preserve 2,746 acres of longfin smelt habitat.

Effects of Corps-led Actions

The Corps-led action to restore tidal influence to Pond A18 in the long-term is projected to restore approximately 736 acres of tidal/brackish marsh within the former salt pond and improve food-web productivity by increasing potential foraging habitat for longfin smelt. Construction of the pedestrian bridge over Artesian Slough will temporarily disturb about 1.04 acres of tidal freshwater marsh habitat for the longfin smelt within the slough.

Effects of Service-led Actions

The Service-led action to restore tidal influence to Ponds A9-15 in the long-term is projected to restore approximately 2,010 acres of tidal marsh within the former salt ponds and improve food-web productivity by increasing potential foraging habitat for longfin smelt.

Effects to Individuals

Effects of Corps-led Actions

While tidal marsh restoration in Pond A18 will be beneficial to the longfin smelt in the long-term, these actions are expected to result in adverse effects to adult and juvenile longfin smelt in the short-term during the construction phase. These actions are not expected to affect longfin smelt larvae and eggs because the proposed actions will be accomplished outside of the spawning and rearing period for this species, during the Service's recommended in-water work window for longfin smelt, from June 1 through November 30.

Adverse effects to adult and juvenile longfin smelt are expected as a result of the proposed in-water construction for the proposed project. The in-water construction requires utilization of heavy equipment (*e.g.*, excavators, bulldozers, dump trucks, and vibratory pile drivers) to place and grade new material for levee construction, remove material for breaches and pilot channels, dewatering and temporary installation of sheet piling cofferdams to facilitate tidal restoration to Pond A18, along with corresponding installation of new water control structures and to install forty new 12-inch steel piles to form the pedestrian bridge. The in-water construction may result in: (1) elevated turbidity levels; (2) potentially spill contaminants; (3) increased hydroacoustics; (4) entrainment or accidental burial of longfin smelt; (5) stranding of longfin smelt; and (6) temporary habitat alteration. The effects of the proposed project detailed below will be minimized by the proposed conservation measures included in the project description.

Elevated turbidity levels from increased suspended sediments may cause short-term behavioral changes including disruption to feeding activities or result in temporary displacement from preferred habitats. These potential behavioral changes due to turbidity will be minimized by limiting soil disturbance to the smallest footprint necessary, developing a Stormwater Management Plan focused on use of erosion-control materials and stabilizing all disturbed areas within 12 hours, if a break in work is expected longer than seven days.

Heavy equipment has the potential to spill/ leak chemical contaminants or hazardous materials (*e.g.*, gasoline, oil, grease, concrete) into the water that may cause direct injury and mortality of longfin smelt. Potential accidental hazardous spill events will be minimized by maintaining all equipment to be free of petroleum leaks, having spill prevention kits in close proximity, and developing and implementing a Hazardous Materials Management/Fuel Spill Containment Plan.

Pile diving can generate increased hydroacoustics that may cause stress, injury, or mortality of longfin smelt. Potential increased hydroacoustics resulting from pile driving will be minimized by performing all pile diving using a vibratory hammer. Based on hydroacoustic monitoring data presented in the Biological Assessment, installation of the forty 12-inch steel piles using a vibratory hammer is estimated to result in peak sound pressure levels of approximately 150 decibels (dB), below the Fisheries Hydroacoustic Working Group's criteria for injury to fish of less than 2 grams (*i.e.*, 206 dB peak and 187 dB accumulated) (Fisheries Hydroacoustic Working Group 2008). To define the extent of increased hydroacoustics produced from pile driving, the Practical Spreading Model was used, as described in Davidson (2004) and Thomsen *et al.* (2006). The Practical Spreading Model estimates the distance at which underwater sound pressure levels created during vibratory pile installation; using the expected peak sound level of 150 dB, attenuated to estimated background levels (*i.e.*, 135 dB), it is expected increased pressure levels would not likely be detected beyond 328 feet from installation. Vibratory hammers avoid the abrupt over-and-under pressure changes exhibited by impact hammers.

Operating heavy equipment in-water or adjacent to waters can potentially cause entrainment or accidental burial, and dewatering may cause stranding; both result in direct injury and mortality to longfin smelt. Potential stress, injury, or mortality resulting from entrainment or accidental burial in heavy equipment or disturbed soils along with stranding of fish related to dewatering will be minimized by conducting all construction near or in-waters at low tide and/or allowing ample amount of time for dewatering, which is expected to allow for longfin smelt escapement during desiccation of the area, to the extent practicable. Cofferdams will be utilized to preclude longfin smelt entering areas of disturbance.

Temporary habitat alteration during construction can result in a temporary loss of prey organisms. Potential stress, injury, or mortality produced by loss of prey organisms due to habitat alteration will be minimized by precluding access for fish during construction by utilizing cofferdams to the extent feasible and providing channels that are adequate for the ingress and egress of longfin smelt while restoring tidal circulation to Pond A18.

Mercury is present in the sediments of the action area and throughout the Bay. Methylmercury is produced in aquatic ecosystems by the methylation of inorganic mercury by micro-organisms. Mercury may be mobilized when pilot channels are excavated in outboard marshes along Artesian Slough prior to breaching, and the tidal action through those channels, as well as the increase in tidal prism and associated scour of sediments in Artesian Slough, could mobilize mercury-laden sediment from the slough. Mercury could be mobilized downstream into and along Coyote Slough. Longfin smelt in the action area are exposed to methylmercury through their diet, but no information is available on the effects of dietary mercury on longfin smelt. Mercury body burdens have been documented in fish utilizing similar habitat and prey to longfin smelt. For example, Greenfield *et al.* (2013) found tissue concentrations of methylmercury in Mississippi silversides at Alivso Slough which have been documented to impair predator avoidance in golden shiner (Webber and Haines 2003). Increased mobilization could alter physical conditions favoring transformation of mercury to methylmercury, and thus increasing mercury bioavailability. Methylmercury may also be mobilized by the frequent wetting and drying of mercury-contaminated sediments during construction activities. Thus, methylmercury ingestion and accumulation by longfin smelt is expected to occur, and mobilization of mercury from Corps-led actions could elevate mercury levels in longfin smelt. A net methylmercury increase resulting from habitat restoration is not preventable, is unpredictable, and there are very few management tools available to minimize effects.

Perennial pepperweed may be present in the action area and may require spraying of glyphosate or imazapyr near aquatic habitats for control purposes following tidal restoration, as fully described in the project description. The NMFS's programmatic conference and biological opinion on aquatic restoration actions in the States of Oregon and Washington (NMFS 2013) documented that spraying of aquatic-formulated glyphosate or imazapyr following aquatic restoration could result in adverse effects to fish. They determined that herbicide applications can result in herbicide drift or transportation into aquatic habitat that will harm listed species by chemically impairing normal fish behavioral patterns related to feeding, rearing, and migration. Effects resulting from the application of glyphosate or imazapyr following development of Ponds A12 and A18 ecotones or restoration of tidal influence to Pond A18 will be minimized by applying herbicides in accordance with the methods described in the Service's San Pablo Bay National Wildlife Refuge *Lepidium latifolium* Control Plan by Hogle *et al.* (2007).

Effects of Service-led Actions

While tidal marsh restoration in Ponds A9-A15 will be beneficial to the longfin smelt in the long-term, these actions are expected to result in adverse effects to adult and juvenile longfin smelt in the short-term during the construction phase. These effects are not expected to affect longfin smelt larvae and eggs because the proposed actions will be accomplished outside of the spawning and rearing period for the species, during the Service's recommended in-water work window for longfin smelt, from June 1 through November 30.

Adverse effects to adult and juveniles longfin smelt are expected as a result of in-water or near-water construction required to accomplish tidal restoration of Ponds A9-15. The in-water construction may result in: (1) elevated turbidity levels; (2) potentially spill contaminants; (3) entrainment or accidental burial of longfin smelt; (4) stranding of longfin smelt; and (5) temporary habitat alteration. The effects of the proposed project are detailed below and will be minimized by the proposed conservation measures included in the project description.

Elevated turbidity levels from increased suspended sediments may cause short-term behavioral changes including disruption to feeding activities or result in temporary displacement from preferred habitats. These potential behavioral changes due to turbidity will be minimized by limiting soil disturbance to the smallest footprint necessary, developing a Stormwater Management Plan focused on use of erosion-control materials, and all disturbed areas will be stabilized within 12 hours, if a break in work is expected longer than seven days.

Heavy equipment has the potential to spill/ leak chemical contaminants or hazardous materials (*e.g.*, gasoline, oil, grease, concrete) into the water that may cause direct injury and mortality of longfin smelt. Potential accidental hazardous spill events will be minimized by maintaining all equipment to be free of petroleum leaks, spill prevention kits in close proximity, and developing and implementing a Hazardous Materials Management/Fuel Spill Containment Plan.

Operating heavy equipment in-water or adjacent to waters can potentially cause entrainment or accidental burial of longfin smelt, and dewatering may cause stranding; both would result in direct injury and mortality to longfin smelt. Potential stress, injury, or mortality resulting from entrainment or accidental burial in heavy equipment or disturbed soils along with stranding of fish related to dewatering will be minimized by conducting all construction near or in-waters at low tide and/or allowing ample amount of time for dewatering, which is expected to allow for longfin smelt escapement during desiccation of the area, to the extent practicable. Cofferdams will be utilized to preclude fish entering area of disturbance.

Temporary habitat alteration during construction can result in a temporary loss of prey organisms. Potential stress, injury, or mortality produced by loss of prey organisms due to habitat alteration will be minimized by precluding access during construction by utilizing cofferdams to the extent feasible and providing channels that are adequate for the ingress and egress of longfin smelt while restoring tidal circulation to Ponds A9-15.

Potential effects of mercury mobilization and exposure on longfin smelt, resulting from Service-led activities, are expected to be similar to those described above for Corps-led activities. Because of the mercury contamination of the Guadalupe River from the New Almaden mine, some of the sediment in Alviso Slough may contain high concentrations of mercury. Such mercury may be mobilized when pilot channels are excavated in outboard marshes along Alviso Slough prior to breaching, and the tidal action through those channels, as well as the increase in tidal prism and associated scour of sediments in Alviso Slough, could mobilize mercury-laden sediment from Alviso Slough and Ponds A9-A15.

Potential effects on the longfin smelt of herbicide use during perennial pepperweed control within Ponds A9-A15 resulting from Service-led activities are expected to be similar to those described above for Corps-led activities.

Cumulative Effects

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion and conference opinion. Future Federal actions unrelated to the proposed project are not considered in this section, because they require separate consultation pursuant to section 7 of the Act.

Climate Change

The global average temperature has risen by approximately 0.6 degree Centigrade during the 20th Century (International Panel on Climate Change [IPCC] 2001, 2007a, 2007b; Adger *et al.* 2007). There is an international scientific consensus that most of the warming observed has been caused by human activities (IPCC 2001, 2007a, 2007b; Adger *et al.* 2007), and that it is "very likely" that it is largely due to man-made emissions of carbon dioxide and other greenhouse gases (Adger *et al.* 2007).

Ongoing climate change (Inkley *et al.* 2004, Adger *et al.* 2007, Kanter 2007) likely imperils the California clapper rail, salt marsh harvest mouse, Pacific Coast population of the western snowy plover, California least tern, and San Francisco Bay-Delta DPS of the longfin smelt and the resources necessary for their survival, since climate change threatens to disrupt annual weather patterns, it may result in a loss of their habitats and/or prey, and/or increased numbers of their predators, parasites, diseases, and non-native competitors. Where populations are isolated, a changing climate may result in local extinction, with range shifts precluded by lack of habitat. Rising sea levels are likely to inundate much of the remaining salt marsh habitat available for the California clapper rail and salt marsh harvest mouse. Without upland habitat buffers available for the landward transgression of the marsh, the amount of suitable salt marsh habitat is likely to decrease with rising sea levels. The proposed project will reduce the cumulative effects of the loss of suitable salt marsh habitat within the action area from sea level rise by construction of the 345-foot-wide ecotone berms along Ponds A12 and A18 which will create an upland habitat buffer that will allow for the landward transgression of the marsh.

Conclusion

After reviewing the current status of the California clapper rail and salt marsh harvest mouse, the environmental baseline for these species within the action area, the effects of the proposed project and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of these species. We based this determination on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual California clapper rails and salt marsh harvest mice; (2) the avoidance of disturbing any breeding California clapper rails; (3) the restoration of at least 517 acres of tidal salt marsh/brackish marsh habitat and creation of 67 acres of ecotone habitat for the California clapper rail and salt marsh harvest mouse within Pond A18; (4) the restoration of at least 300 acres of tidal salt marsh habitat and creation of 30 acres of ecotone for the California clapper rail and salt marsh harvest mouse within Pond A12; (5) the restoration of additional tidal marsh habitat for the California clapper rail and salt marsh harvest mouse within some of the Ponds A9-A15 under an adaptive management plan; (6) the enhancement of tidal marsh habitat for the California clapper rail and salt marsh harvest mouse along Artestian, Coyote, and Alviso sloughs through salinization of freshwater and brackish marsh habitat from increased tidal prism; and (7) the implementation of a long-term predator management plan and invasive plant species control plan.

After reviewing the current status of the Pacific coast population of the western snowy plover, the environmental baseline for this species within the action area, the effects of the proposed project and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of this species. We based this determination on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual western snowy plovers; (2) the avoidance of disturbing any breeding western snowy plovers during construction of the proposed project; (3) the implementation of a long-term predator management plan; (4) the enhancement of nesting habitat for western snowy plovers within Pond A16; and (5) the proposed project will enable the SBSPRP to fulfill their commitment to maintaining at least 250 breeding individual western snowy plovers within the SBSPRP area through adaptive management of suitable nesting habitat.

After reviewing the current status of the California least tern, the environmental baseline for this species within the action area, the effects of the proposed project and the cumulative effects, it is the Service's biological opinion that the proposed project is not likely to jeopardize the continued existence of this species. We based this determination on the following: (1) successful implementation of the conservation measures described in this biological opinion will minimize the adverse effects on individual California least terns; (2) the avoidance of disturbing any breeding California least terns; and (3) the increase in the abundance of prey fish populations for the California least tern in the South Bay through tidal marsh restoration.

After reviewing the current status of the San Francisco Bay-Delta DPS of the longfin smelt, the environmental baseline for this species within the action area, the effects of the proposed project and the cumulative effects, it is the Service's conference opinion that the proposed project is not likely to jeopardize the continued existence of this species. We based this determination on the expected long-term habitat benefits resulting from tidal restoration and the proposed minimization measures utilized during construction.

INCIDENTAL TAKE STATEMENT

Section 9 of the Endangered Species Act and Federal regulations pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species, respectively, without special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. The Service defines harassment as an intentional or negligent act or omission that creates the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. The Service defines harm to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), take that is incidental to and not intended as part of the agency action is not considered to be prohibited, provided such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below for the California clapper rail, salt marsh harvest mouse, Pacific coast population of the western snowy plover, and California least tern are nondiscretionary, and must be implemented by the Corps and the Refuge so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption under section 7(o)(2) to apply. The Corps and the Refuge have a continuing duty to regulate the activity that is covered by this incidental take statement. If the Corps or the Refuge: (1) fail to require the applicant or any of its contractors to adhere to the terms and conditions of the incidental take statement through enforceable terms, and/or (2) fail to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps or the Refuge must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

The prohibitions found in section 9 of the Act against taking of species do not apply until the species is listed. Therefore, the incidental take statement for the San Francisco Bay-Delta DPS of the longfin smelt does not become effective until such time as the species is listed and the conference opinion is adopted as a biological opinion issued through formal consultation. However, the Service advises the Corps and the Refuge to consider implementing the following reasonable and prudent measures as they apply to the longfin smelt. If this conference opinion is adopted as a biological opinion following a listing or designation, these measures, with their implementing terms and conditions, will be non-discretionary.

Amount or Extent of Take

California Clapper Rail

The Service anticipates incidental take of individual California clapper rails will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of California clapper rails that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment of all California clapper rails within the 1.04 acres of tidal freshwater marsh foraging/dispersal habitat disturbed along Artesian Slough during tide gate and pedestrian bridge construction.

2. The harassment of all California clapper rails within the 0.11 acre of tidal/brackish marsh foraging/dispersal habitat disturbed along the outboard Pond A18 levee during breaching and excavating the pilot channels.

3. The harassment and non-lethal harm of all California clapper rails within 17 acres of tidal marsh habitat lost due to scour along Artesian and Coyote sloughs.

4. The annual harassment of all California clapper rails within perennial pepperweed treatment areas in Pond A18.

5. The ongoing harassment by trail users of all California clapper rails within 50 feet of the pedestrian bridge constructed over Artesian Slough.

Service-led Actions

1. The harassment of all California clapper rails within the 0.06 acre of tidal/brackish marsh foraging/dispersal habitat disturbed along the outboard levees of Ponds A9-A15 during breaching and excavating the pilot channels.

2. The harassment and non-lethal harm of all California clapper rails within 40 acres of tidal marsh habitat lost due to scour along Alviso and Coyote sloughs.

3. The ongoing harassment by trail users of all California clapper rails within 50 feet of the segments of the trails constructed without a wide ecotone berm along the southern Pond A12 levee, the Pond A12/A13 levee, and the northern Pond A15 levee once tidal marsh is restored to these ponds.

4. The ongoing harassment of all California clapper rails within 50 feet of the Ponds A9-A15 levees during levee operation and maintenance activities.

5. The annual harassment of all California clapper rails within perennial pepperweed treatment areas in Ponds A9-A15.

Salt Marsh Harvest Mouse

The Service anticipates incidental take of individual salt marsh harvest mice will be difficult to detect or quantify because of the variable, unknown size of any resident population over time, their elusive and cryptic behavior, and the difficulty of finding killed or injured animals. Due to the difficulty in quantifying the number of salt marsh harvest mice that will be taken as a result of the proposed project, the Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment and harm of all salt marsh harvest mice within the 13.65 acres of low quality salt marsh habitat disturbed along the edges of the Alviso impoundment, the northern edge of New Chicago Marsh, adjacent to the southern levee of Pond A16, and along both northern and southern sides of the existing Pond A18 levee during construction of the FRM levee and the Artesian Slough tide gate and pedestrian bridge.

2. The harassment and harm of all salt marsh harvest mice within the 0.11 acre of salt/brackish marsh habitat disturbed on the outboard Pond A18 levee along Artesian and South Coyote sloughs during breaching and excavation of the pilot channels.

3. The harassment and non-lethal harm of all salt marsh harvest mice within 17 acres of tidal marsh habitat lost due to scour along Artesian and Coyote sloughs.

4. The ongoing harassment and harm of all salt marsh harvest mice within 25 feet of the FRM levee top during levee operation and maintenance activities (*e.g.*, mowing a 15-foot wide strip of ruderal grassland habitat adjacent to the levee crown once per year).

5. The ongoing harassment by trail users of all salt marsh harvest mice within 25 feet of the pedestrian bridge constructed over Artesian Slough.

6. The annual harassment of all salt marsh harvest mice within perennial pepperweed treatment areas in Pond A18.

Service-led Actions

1. The harassment and harm of all salt marsh harvest mice within the 0.06 acre of tidal/brackish marsh habitat disturbed along the outboard levees of Ponds A9-A15 during breaching and excavating the pilot channels.

2. The harassment and non-lethal harm of all salt marsh harvest mice within 40 acres of tidal marsh habitat lost due to scour along Alviso and Coyote sloughs.

3. The capture of all salt marsh harvest mice on Refuge lands within the construction footprint in the action area during construction of the proposed project.

4. The ongoing harassment by trail users of all salt marsh harvest mice within 25 feet of the trails constructed along New Chicago Marsh and Ponds A12, A13, A15, and A18 once tidal marsh is restored to these ponds and ecotone habitat is created along Ponds A12 and A18.

5. The ongoing harassment of all salt marsh harvest mice within 25 feet of the Ponds A9-A15 levees during levee operation and maintenance activities.

6. The annual harassment of all salt marsh harvest mice within perennial pepperweed treatment areas in Ponds A9-A15.

<u>Pacific Coast Population of the Western Snowy Plover</u>

The Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment of all western snowy plovers within 600 feet of the Alviso Segment of the FRM levee in Ponds A12 and A13, the Alviso impoundment, New Chicago Marsh, and Pond A16 during construction of the proposed project.

2. The harassment and harm of two (2) breeding pairs of western snowy plovers due to the loss of breeding habitat in the Alviso impoundment and northern New Chicago Marsh due to the raising and widening of the FRM levee.

3. The annual harassment of all of western snowy plovers within 600 feet of the FRM levee during levee operation and maintenance activities adjacent to Pond A16, New Chicago Marsh, and the Alviso impoundment.

Service-led Actions

1. The harassment and harm of five (5) breeding pairs of western snowy plovers after the permanent loss of 2,010 acres of potential salt pond nesting habitat within Ponds A9-A15.

2. The ongoing harassment by trail users of all western snowy plovers within 600 feet of the Bay Trail along the FRM levee adjacent to Pond A16, New Chicago Marsh, and the Alviso impoundment.

<u>California Least Tern</u>

The Service is quantifying take incidental to the proposed project as the following:

Corps-led Actions

1. The harassment of all foraging and roosting California least terns within 300 feet of construction activities at Pond A18 and the FRM levee.

2. The harassment and harm of two (2) individual California least terns after the permanent loss of 736 acres of salt pond foraging habitat within Pond A18.

Service-led Actions

1. The harassment of all foraging and roosting California least terns within 300 feet of construction activities at Ponds A9-A15.

2. The harassment and harm of four (4) individual California least terns after the permanent loss of 2,010 acres of salt pond foraging habitat within Ponds A9-A15.

3. The ongoing harassment of all foraging and roosting California least terns by trail users within 300 feet of the trails along Ponds A18, A12, A13, and A15 until these ponds are restored to tidal marsh.

San Francisco Bay-Delta DPS of the Longfin Smelt

The Service anticipates that incidental take of longfin smelt in adult or juvenile life-stages will occur due to project-related activities, however, it is difficult to determine the number of individual longfin smelt that could be subject to incidental take in the action area because of the species' cryptic and elusive nature, and the lack of abundance information from scientific surveys within the action area itself. Therefore, the Service is quantifying take incidental to the proposed project as the following:

Service-led Actions

The Service anticipates that all individual longfin smelt adults and juveniles within 2,010 acre-feet of water in Ponds A9-A15 will be subject to incidental take in the form of harm, harassment, injury, and mortality during the tidal restoration.

Effect of the Take

In the accompanying biological opinion and conference opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, California least tern, and San Francisco Bay-Delta DPS of the longfin smelt.

Reasonable and Prudent Measures

The Service has determined that the following reasonable and prudent measures are necessary and appropriate to minimize the effects of the proposed project on the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, California least tern, and San Francisco Bay-Delta DPS of the longfin smelt:

1. The Corps through the CSCC, City of San Jose, and SCVWD will minimize adverse effects to the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, and California least tern in the action area for the Corps-led actions by following the project description as modified by the terms and conditions.

2. The Refuge through the CSCC, City of San Jose, and SCVWD will minimize adverse effects to the California clapper rail, salt marsh harvest mouse, Pacific coast population of western snowy plover, California least tern, and San Francisco Bay-Delta DPS of the longfin smelt in the action area for the Service-led actions by following the project description as modified by the terms and conditions.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Corps and the Refuge shall ensure compliance with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These Terms and Conditions are nondiscretionary.

The following Term and Condition implements Reasonable and Prudent Measure Number One (1):

1. The Corps shall ensure that the CSCC, City of San Jose, and SCVWD minimize proposed project related effects of mobilization of methylmercury by minimizing the frequency and duration of methylization by minimizing the number of times mercury-contaminated soils are wetted and dried during construction of the proposed project (this measure does not apply to imported soils that meet contaminants screening criteria for mercury).

The following Term and Condition implements Reasonable and Prudent Measure Number Two (2):

1. The Refuge shall ensure that the CSCC, City of San Jose, and SCVWD minimize proposed project related effects of mobilization of methylmercury by minimizing the frequency and duration of methylization by minimizing the number of times mercury-contaminated soils are wetted and dried during construction of the proposed project (this measure does not apply to imported soils that meet contaminants screening criteria for mercury).

Reporting Requirements

In order to monitor whether the amount or extent of incidental take anticipated from implementation of the project is approached or exceeded, the Corps and the Refuge shall adhere to the following reporting requirements. Should this anticipated amount or extent of incidental take be exceeded, the Corps or the Refuge must reinitiate formal consultation as per 50 CFR 402.16.

1. The Service must be notified within one (1) working day of the finding of any injured or dead listed species or any unanticipated damage to its habitat associated with the proposed project. Notification will be made to the Coast/Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600, and must include the date, time, and precise location of the individual/incident clearly indicated on a U.S. Geological Survey 7.5 minute quadrangle or other maps at a finer scale, as requested by the Service, and any other pertinent information. When an injured or dead individual of the listed species is found, the Corps or the Refuge shall follow the steps outlined in the Disposition of Individuals Taken section below.

2. The Corps and/or the Refuge shall provide annual updates and interim progress reports to the Service on the status of the implementation of the proposed project, avoidance and

minimization measures, predator management, monitoring of the tidal marsh restoration areas, monitoring of the Pond A16 western snowy plover nesting habitat enhancements, and adaptive management.

Disposition of Individuals Taken

Injured listed species must be cared for by a licensed veterinarian or other qualified person(s), such as the Service-approved biologist. Dead individuals must be sealed in a resealable plastic bag containing a paper with the date and time when the animal was found, the location where it was found, avoidance and minimization measures implemented, and the name of the person who found it, and the bag containing the specimen frozen in a freezer located in a secure site, until instructions are received from the Service regarding the disposition of the dead specimen. The Service contact person is the Coast/Bay Division Chief of the Endangered Species Program at the Sacramento Fish and Wildlife Office at (916) 414-6600.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service recommends the following actions:

1. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should develop, fund, and annually implement an avian and mammalian predator monitoring and management program within suitable habitat for the salt marsh harvest mouse, California clapper rail, western snowy plover, and California least tern around the Bay.

2. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should remove raptor nest and perch sites or install raptor perching deterrents within suitable habitat for the salt marsh harvest mouse, California clapper rail, western snowy plover, and California least tern around the Bay.

3. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should control invasive plant species (*e.g.*, perennial pepperweed) within suitable habitat for the salt marsh harvest mouse and California clapper rail.

4. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should import clean fill to raise the elevations of subsided salt ponds to accelerate the timeline of tidal marsh restoration.

5. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should install high-tide refugia islands planted with marsh gumplant for salt marsh harvest mice and California clapper rails within tidal marshes that lack sufficient high-tide refugia.

6. The Corps, the Refuge, CSCC, the City of San Jose, and SCVWD should minimize the effects of atmospheric nitrogen deposition from nitrogen oxides emissions in construction vehicle traffic exhaust in facilitating the spread of invasive plant species into naturally

nutrient-poor serpentine grassland habitat for the threatened Bay checkerspot butterfly and listed serpentine plants in the Santa Clara Valley by contributing funding to the management of invasive plant species in serpentine grassland habitat that supports these listed species.

7. The Corps and the Refuge should report sightings of any listed or sensitive animal species to the CNDDB of the CDFW. A copy of the reporting form and a topographic map clearly marked with the location the animals were observed also should be provided to the Service.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the proposed South Bay Shoreline Phase 1 Study in Santa Clara County, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any additional take will not be exempt from the prohibitions of section 9 of the Act, pending reinitiation.

If you have any questions regarding this biological opinion and conference opinion on the effects of the proposed South Bay Shoreline Phase 1 Study, please contact Joseph Terry, Senior Biologist, or Ryan Olah, Coast/Bay Division Chief, at the Sacramento Fish Wildlife Office at the letterhead address, telephone at (916) 414-6600, or via email (Joseph_Terry@fws.gov or Ryan_Olah@fws.gov). The contacts at the San Francisco Bay-Delta Fish and Wildlife Office are Armin Halston, Fish and Wildlife Biologist, or Kim Squires, Section 7 Coordinator, by telephone at (916) 930-5670 or via email (Armin_Halston@fws.gov or Kim_Squires@fws.gov).

cc:
Kim Squires, San Francisco Bay/Delta Fish and Wildlife Office, Sacramento, California
Brenda Blinn, California Department of Fish and Wildlife, Napa, California
Melisa Amato, Don Edwards San Francisco Bay National Wildlife Refuge, Fremont, California
Johnathon Bishop, National Oceanic and Atmospheric Administration/National Marine Fisheries Service, Santa Rosa, California

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Personal Communications

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Appendix A: Walking In the Marsh:
Methods to Increase Safety and Reduce Impacts to Wildlife & Plants

December 15, 2004

I. Safety

A. *Before heading out into the marsh check the tides*: tides can affect your ability to move through the marsh. Be aware of how long you plan to be in the marsh, what channels you may have to cross, and how the tides will change while you are in the field.

B. *Plan your route through the marsh*: use existing aerial imagery and maps to identify channels and sloughs that may impede access. When available, use high points such as boardwalks or levees to scope out a route. Scoping a route can be especially important in scenarios where visibility across the marsh is low (*e.g.,* South Bay, Suisun). It may be necessary to flag stations and/or access corridors through the marsh prior to surveys. If more than one person is accessing the marsh, travel together along major access routes to avoid the development of multiple paths. At the end of the sampling period, persons furthest out should walk out first, meeting up with others along the major access route… this minimizes the potential of people getting lost and ensures that anyone who is injured will be found in a timely manner (before everyone else has left the marsh). The goal should be to plan a safe route into and out of the marsh while minimizing travel and pathways.

C. *Channels and sloughs*: Avoid jumping channels in locations where you cannot see through vegetation on the opposite bank. Thick vegetation (*e.g.*, pickleweed, gumplant) can obscure the edge of the bank. Considerations before jumping: depth of water/channel, steepness of the channel edges, tide levels. If you are not confident that you can make the jump and the edges have high dense vegetation that you cannot see through… DO NOT JUMP.

D. *Getting stuck in the mud*: If you are sinking into mud, try to keep moving to avoid getting stuck further. If a leg gets stuck, try to twist your leg to break the suction while leaning your weight on your other leg or knee. Use whatever material you have available (e.g., clipboard, backpack) for leverage (*e.g.*, lean on those items).

E. *Other*: Besides general items such as water and food, it's a good idea to bring a flashlight and a phone (+GPS) in cases of an emergency. Let someone know what marsh area you will be in and when you plan to complete work for the day. Designate an end time and final meeting place when more than one person is out in the marsh at the same time.

II. Avoiding Impacts to Wildlife and Plants

A. *Movement through the Marsh*. While walking through the marsh, keep noise to a minimum. Avoid using multiple pathways through the marsh. Use trails if they exist. Plan and map your route to minimize environmental impacts and decrease running into hazards/barriers such as large channels. When looking for a suitable place to jump a channel, do not walk along the edge of the channel/slough because these areas provide nesting habitat for many species including the endangered California clapper rail. To find an alternate jump site, walk parallel to the channel at a distance where vegetation is lower in height and where visibility of the ground surface is greater. At all times, observe the environment you are walking through to avoid disturbance. Choose channel jump sites where vegetation is lower or you can clearly discern what you are jumping onto. In general, avoid walking adjacent and parallel to channels/sloughs.

B. *Avoiding nests and nest substrates.* Tidal marsh species have nests that are well concealed and therefore easy to disturb when walking through the marsh. To avoid stepping on a nest, do not walk through thick vegetation or areas where you cannot see through to the ground. Avoid walking on vegetation whenever possible since plants serve as nesting substrate for many species in the marsh. In general, be aware of the area you are walking through.

C. *Bird Behavior.* If a bird vocalizes or flushes within close range of where you are standing or walking (*e.g.*, < 10-m), it is possible that a nest or young are nearby. When these circumstances arise, stop whatever you are doing and leave the immediate area (be sure to watch where and what you are walking on). Choose an alternate route through the marsh, identify the new route and location of the sighting/occurrence on a map, and record coordinates of the location if possible. Be sure to pass this information on to others that may use the same route or are conducting surveys in the same area. Be very observant of where you walk as you leave the area. There exists the possibility that you could step on a nest or young, both of which can be concealed by vegetation and are cryptic. When alarmed, individuals may freeze in place (especially juveniles).

D. *Tidal lagoons/ponds.* Avoid walking along tidal lagoons and ponds in marsh interiors that support foraging, roosting, or nesting shorebirds and waterfowl. Be observant of the distance at which birds flush or become alarmed.

E. *Tides.* Avoid conducting surveys during high tides as much as possible. These are periods when many wildlife species are at greatest risk (*e.g.*, predation). If your surveys require a high tide, be aware of the increased risk you may cause for wildlife and take all precautions to reduce that risk (*e.g.*, avoiding areas where sensitive species are known to occur).

Appendix B9

Pertinent Correspondence

Revised NOTICE OF PREPARATION

From: Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118

Subject: **Revised Notice of Preparation of a Draft Environmental Impact Report**

Project Title: South San Francisco Bay Shoreline Phase I Study

State Clearinghouse Number: 2006012020

Project Location: South San Francisco Bay Shoreline between the Guadalupe River and Coyote Creek, San Jose, California.

This NOP updates the previously released joint NOP/NOI dated January 6, 2006 for the South San Francisco Bay Shoreline Study. The revisions are related to changing the CEQA Lead Agency and adding detail to the proposed project description for the Alviso Ponds and Santa Clara County Interim Feasibility Study.

The Santa Clara Valley Water District will be the Lead Agency under CEQA and will prepare an environmental impact report for the above project. The District needs to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but **not later than 30 days after receipt of this notice**.

Please send your response to:

Michael Martin
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118
(408) 630-3095
michaelmartin@valleywater.org

Please provide the name of a contact person in your agency.

FOR Beau Goldie
Chief Executive Officer

18 August 2014
Date

Revised Notice of Preparation
Draft Environmental Impact Report/Statement
South San Francisco Bay Shoreline Phase I Study

Santa Clara County, California

August 2014

Introduction

A joint NOP/NOI was circulated and a public meeting held in 2006 for the entire South San Francisco Bay Shoreline Project, which encompasses all of the bay shoreline in Santa Clara County and the southern portions of San Mateo and Alameda Counties and includes the Alviso, Ravenswood, and Eden Landing pond complexes. The project proponents have decided to move forward with a segment of the overall Shoreline Project for the area between the Guadalupe River and Coyote Creek in San Jose. This NOP is released to obtain comments on a project for the Phase I Study which is focused on this area.

A joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) (hereafter referred to as the "EIR/S") will be prepared for the South San Francisco Bay Shoreline Phase I Study (Project). The document will identify and evaluate possible environmental impacts of Project alternatives, and develop strategies to avoid, reduce, or compensate for any significant impacts.

As the lead agency responsible for compliance with the California Environmental Quality Act (CEQA), the Santa Clara Valley Water District (District) has determined that the Project may have a significant impact on the physical environment, and has decided to prepare an EIR/S to provide ample opportunity for public disclosure and participation in the planning and decision making process. The purpose of the draft EIR/S process is to develop and assess a recommended plan and alternatives for the Project and to avoid and mitigate significant adverse effects on environmental resources, while aiming to achieve the primary project objectives.

This document, which serves as the Notice of Preparation (NOP) required by CEQA and the state's CEQA Guidelines (CCR §15082), contains a brief description of the Project, including its goals and objectives, the Project alternatives identified to date, possible environmental impacts, and the resulting need for an EIR/S. It also discusses the process that will be used to determine the scope of analysis in the EIR/S, and provides an overview of the opportunities for participation in review of the EIR/S, along with contact information.

Project Overview

The District, as a local sponsor of the Project, is undertaking the environmental review process in conjunction with the U.S. Army Corps of Engineers (Corps), the federal sponsor, and the U.S. Fish and Wildlife Service, the landowner. Pending the outcome of the environmental review process and any subsequent design revisions to improve the project, the proposed Project will be submitted to the District Board of Directors for their review and potential approval. This process is aimed to provide the public with a clear understanding of the activities, elements, and methods involved with the proposed Project. However, this project description does not presume that the proposed Project is considered approved, or will necessarily be approved until the complete environmental and planning process occurs according to CEQA guidelines and internal District Project review and approval process. The State Coastal Conservancy is an additional local sponsor and will also need to approve the Project before it will proceed as a responsible agency under CEQA.

Background

The Project area has considerable risk for tidal flooding due to low-lying terrain that is bordered by pond levees originally designed and constructed for commercial salt pond purposes rather than for flood risk management. The levees protecting these areas are mostly dikes that were created as early as the 1920s. The area south of the ponds is now nearly all urbanized with high-value development and includes transportation corridors, a wastewater plant, and other critical infrastructure. In addition, substantial sea level rise expected during the period of analysis for this study (2017–2067) will exacerbate risks from tidal flooding.

A second challenge is that the historic creation of extensive managed salt ponds in the South Bay, as well as filling of marshes and mudflats for landfills and development has resulted in the loss of most tidal salt marsh habitat in the area. In addition, degradation of remaining tidal marsh habitat from water pollution (now mostly abated), habitat fragmentation, and invasive plants has resulted in severe losses of habitat quantity and quality for salt marsh plants and wildlife leading to the listing of several species under the Endangered Species Act (both Federal and State) and severe losses of the ecosystem functions and services associated with tidal marshes and estuaries.

The Project proponents propose to reduce tidal flood risk in the area, which will also facilitate the tidal marsh restoration activity. Both flood risk management and ecosystem restoration are important to the local community and the larger South Bay area.

Goals and Objectives

The investigation of the problems and opportunities in the study area led to the establishment of the following planning objectives:

- Reduce the risk to public health, human safety, and the environment due to tidal flooding along the South Bay shoreline in Santa Clara County.
- Reduce potential economic damages due to tidal flooding in areas near the South Bay shoreline in Santa Clara County.
- Increase contiguous tidal marsh to restore ecological function and habitat quantity, quality, and connectivity in the Study Area for native, resident plant and animal species, including special-status species such as steelhead trout, California clapper rail, and salt marsh harvest mouse.
- Provide opportunities for public access, education, and recreation in the Study Area.

Alternatives Being Considered

A range of project element alternatives have been developed, including a No Project alternative, all of which will be discussed in the EIR/S. The project elements include:

Levee Segment

Three levee alignments are considered between the Guadalupe River (at the Alviso Marina) and Artesian Slough. This levee would address flood risk to the community of Alviso and State Route 237, which is an important commuter corridor for Silicon Valley. The community of Alviso has a history of fluvial flooding from Guadalupe River, which is east of the community. As a result, many of the residential structures have been rebuilt or raised substantially so that the finished floor elevation is as much as 6 feet or more above the ground. Fluvial flood risk has been reduced through local and Federal projects. However, flood risk in the Alviso area is the highest of any area along San Francisco Bay because of subsidence from historical groundwater withdrawal to support the historical agricultural industry.

The three potential alignments include Alviso North, Alviso Railroad Spur; and Alviso South. The Alviso North alignment, which is located entirely on Refuge lands, would roughly follow the western and northern outer levees of the New Chicago Marsh along the existing margins of Ponds A12, A13, and A16. It would be the farthest from the community of Alviso, and extend flood risk management to the Marsh. The Alviso South alignment would follow the southwest outer levee of New Chicago Marsh and would be the closest to the community of Alviso. The Alviso Railroad Spur alignment would coincide with the Alviso North alignment on the western portion, follow the alignment of the existing railroad spur levee through the Marsh, and coincide with the Alviso South alignment at the eastern portion. This alignment would be located between the North and South alignments and be intermediate in distance from the community of Alviso.

A railroad gate would be constructed across the Union Pacific Railroad tracks where they cross the proposed levee. A tide gate is proposed across Artesian Slough to prevent water from overtopping existing levees along the slough during future high-tide events. From Artesian Slough to Coyote Creek the levee would follow the Water Pollution Control Plant (WPCP) South alignment that runs west to east in a stair-step pattern along the north border of the existing WPCP infrastructure to the existing levee along the eastern side of Pond A18. A separate WPCP North alignment that partially bisects Pond A18 was determined to be infeasible.

Ecosystem Restoration

The habitat restoration strategy is to convert the former salt ponds in front of the proposed levee into tidal wetlands through a phased restoration process guided by adaptive management. Currently, the managed ponds provide habitat for migratory birds and waterfowl, and the project proponents are committed to maintaining these populations. However, there is also a bay-wide goal to increase the acreage of tidal marsh and associated habitats. Without a project, the ponds would continue to be managed as ponds, potentially with some limited enhancement to support the species that currently use the ponds. Restoring the ponds without a flood control element would put inland areas at flood risk.

Restoration actions seek to establish vegetated tidal wetlands with goals of maximizing long-term habitat benefits, particularly in consideration of potential sea level rise. Two levels of restoration are considered; “basic,” which represents a baseline of actions needed to restore the ponds, and “accelerated,” which involves more direct intervention and additional actions above the basic level to speed up the restoration process.

Transitional Habitat

Transitional habitat is defined as a transition area between two distinct habitats (in this case, tidal wetland and upland habitat on the levee). Transitional habitat can provide large expanses of habitat that have been missing from the Bay, attenuate waves and reduce wave run-up, and increase habitat resiliency by providing space for marshes to retreat inland in the face of sea level rise. Three levels of transitional habitat are considered: 100:1 slopes, which would provide the most expansive habitat; 30:1 slopes; and a 50-foot-wide flat bench to provide a minimal amount of refugia immediately following construction.

Recreation Measures
Recreation measures are included to provide additional recreation benefits associated with proposed ecosystem restoration features and to compensate for the loss of public access as the ponds in the Refuge are breached and restored to tidal marsh. The recreation measures include multi-use trails on top of the new proposed flood risk management levee with connection to the Bay Trail network, viewing platforms and benches, and trail upgrades to be made to an existing segment of the Bay Trail system along State Route 237.

Preferred Alternative

The District preferred alternative would include engineered levees along the Alviso North and WPCP South alignments following existing levees built to protect against the 1-percent tidal event with anticipated sea level rise; a tide gate across Artesian Slough; "basic" restoration of Ponds A9, A10, A11, A12, A13, A14, A15, and A18; a transition habitat slope of 30:1; and the recreation measures. The flood protection components would be constructed between 2017 and 2020. Restoration of the ponds and recreation elements would take place between 2020 and 2031 with monitoring and adaptive management occurring throughout the period. See Figure 3.

Other alternatives to be evaluated in the EIR/S are shown below. The District preferred alternative is listed as "Alternative 3".

Alternatives To Be Evaluated in the EIR/S

Alternatives		Flood Risk Management		Ecosystem Restoration	
Alt #	**Summary**	**Alignment**	**LOP**	**In-pond Preparation**	**Transitional Habitat**
1	No Action	None	Existing	None	None
2	Alviso North with 4% ACE and Bench	North	25-year	Basic	50-foot-wide bench
3	Alviso North with 1% ACE and 30:1 Ecotone	North	100 year	Basic	Ecotone with 30:1 side slopes
4	Alviso Railroad with 1% ACE and Bench	Railroad Spur	100 year	Basic	50-foot-wide bench
5	Alviso South with 1% ACE and Bench	South	100 year	Basic	50-foot-wide bench

ACE= Annual Chance of Exceedance; LOP = Level of Protection;

Topics to be Analyzed in the Draft EIR

Based on the proposed project's potential for significant impacts on the environment, the District with the Corps will prepare a joint EIR/S. The EIR/S will serve to further assess the proposed project's effects on the environment, to identify significant impacts, and to identify feasible mitigation measures to reduce or eliminate potentially significant environmental impacts. An analysis of alternatives to the proposed project will also be included in the document. Topics to be analyzed in the EIR/S, include but are necessarily limited to the following: aesthetics, air quality, biological resources, cultural and paleontological resources, soils, greenhouse gas emissions, hazards and hazardous materials, hydrology and water quality, land use, noise, recreation, transportation and traffic, and utilities. Responses received to this NOP may modify or add to the preliminary assessment of potential issues addressed in the EIR/S.

Environmental Procedures

This NOP initiates the CEQA process through which the District in conjunction with the Corps and the USFWS will refine the range of issues and project alternatives to be addressed in the EIR/S. Comments are invited on the proposal to prepare the EIR/S and on the scope of issues to be included.

Please submit any comments within 30 days of receipt of this notice to Michael Martin, the District's environmental planner for the South San Francisco Bay Shoreline Phase I Study, at the Santa Clara Valley Water District (see *Contact Information* below). After the 30-day review period for the NOP is complete, a draft EIR/S will be prepared in accordance with CEQA, as amended (Public Resources Code §21000 et seq.), the State Guidelines for Implementation of CEQA (CCR §15000 et seq.), and NEPA.

Once the draft EIR/S is completed, it will be made available for a minimum 45-day public review and comment period. Copies of the draft EIR/S will be sent directly to those agencies commenting on the NOP, and will also be made available to the public at a number of locations, including the District headquarters and public libraries in the area. Information about availability of the draft EIR/S will also be posted on the District's website (http://www.valleywater.org) and at the Shoreline Study's website (http://www.southbayshoreline.org).

Contact Information

For further information, contact the following:

Michael Martin
Santa Clara Valley Water District
5750 Almaden Expressway
San Jose, CA 95118-3686
(408) 630-3095
Michaelmartin@valleywater.org

Additional information relevant to the project and the EIR/S can also be found at http://www.valleywater.org and http://www.southbayshoreline.org

Figure 1: Location Map

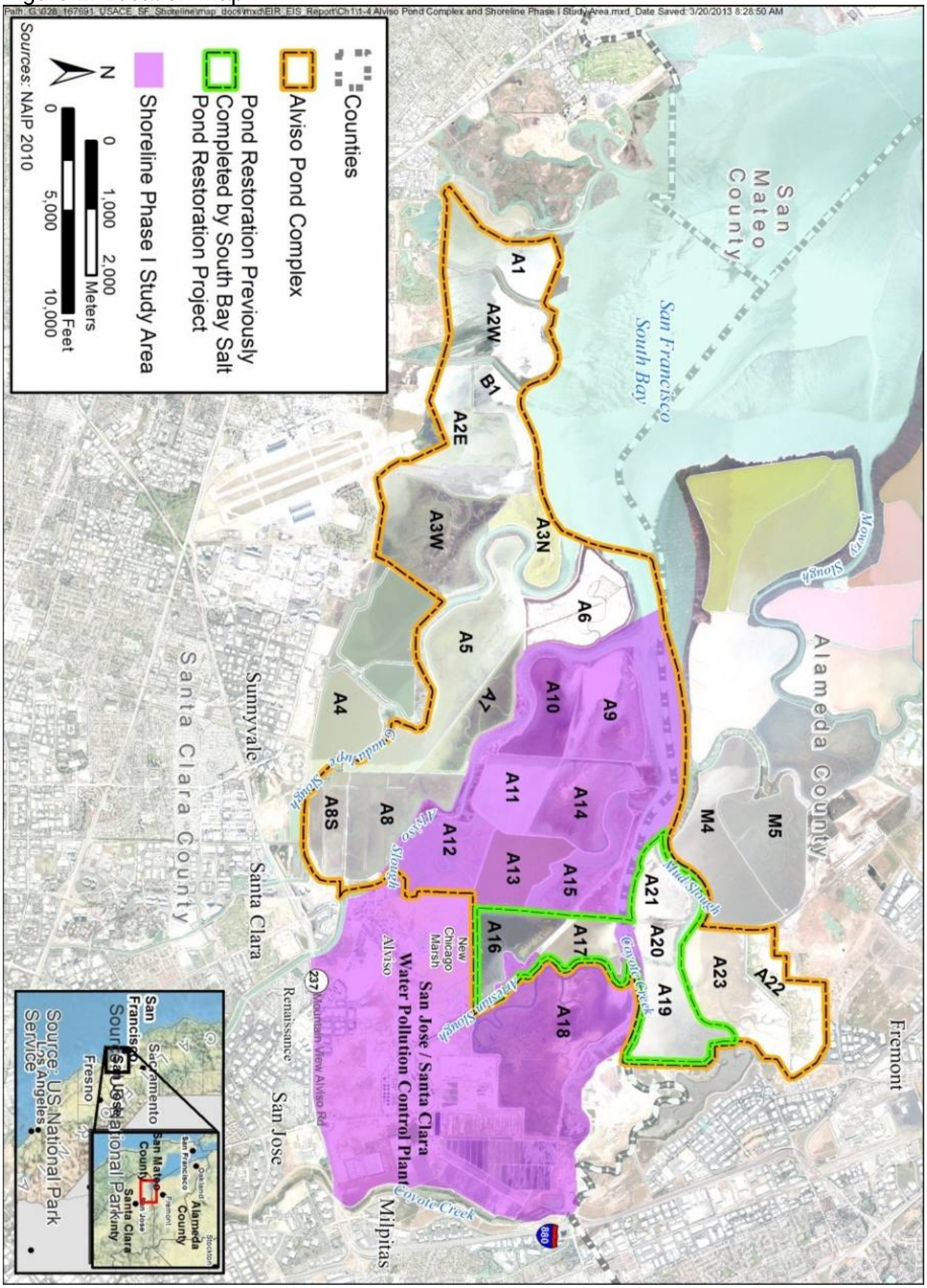


Figure 2: Alviso Levee Segment Alternatives

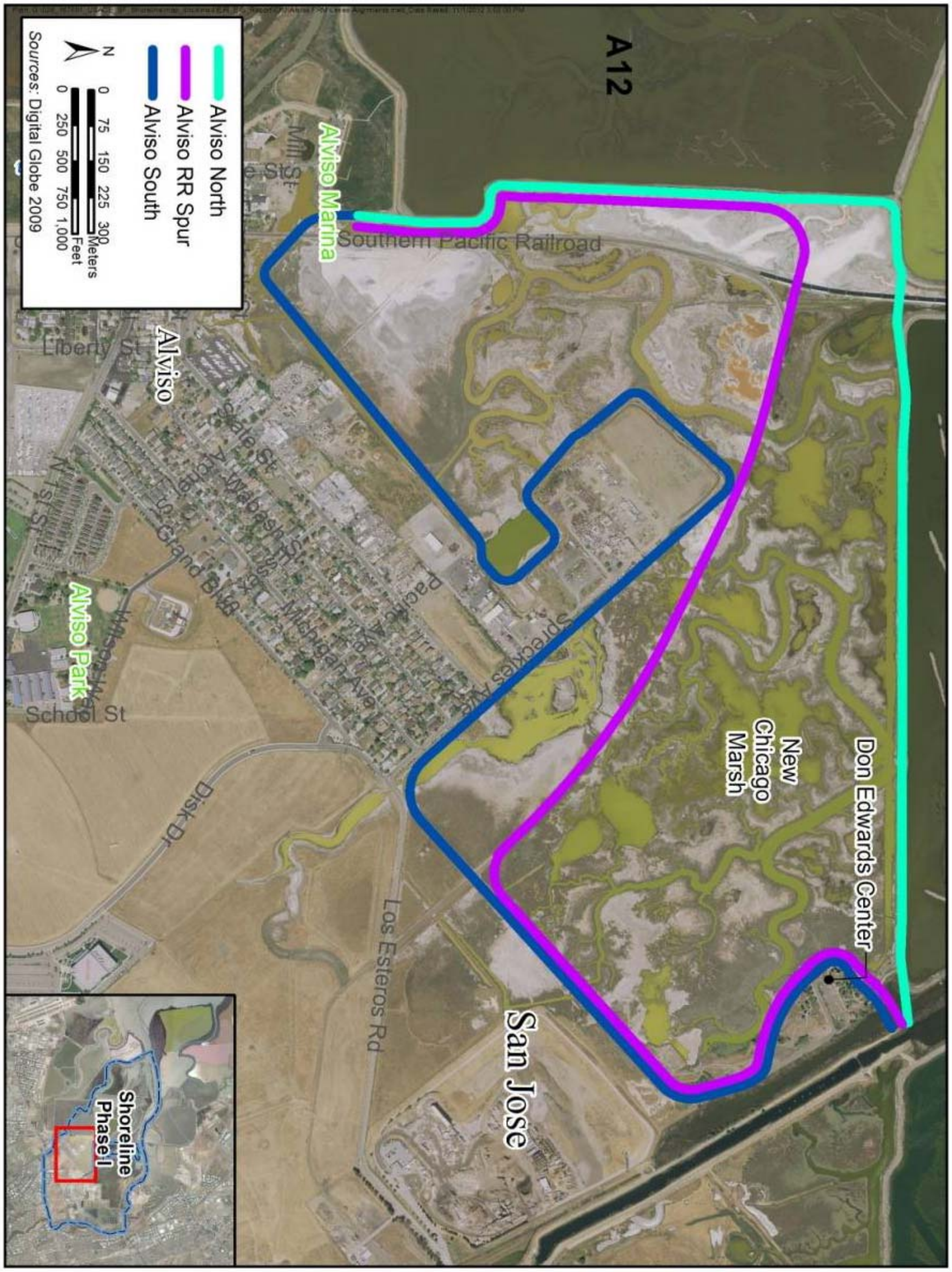
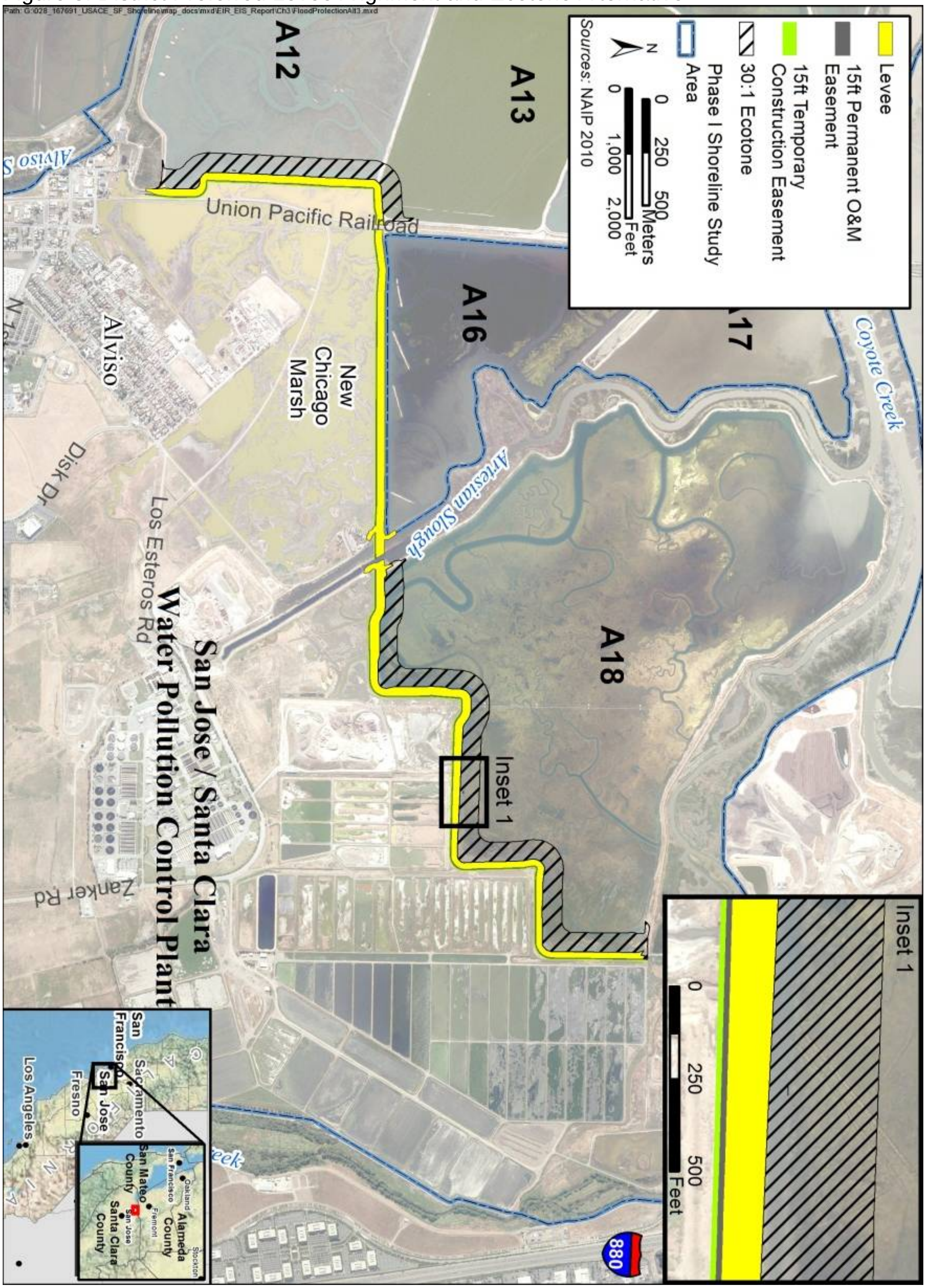


Figure 3: District Preferred Levee Alignment and Ecotone Alternative



NOTICE OF PREPARATION/NOTICE OF INTENT

Subject: Notice of Preparation/Notice of Intent of a Draft Environmental Impact Statement/ Environmental Impact Report/Feasibility Report for the South San Francisco Bay Shoreline Study: Alviso Ponds and Santa Clara County Interim Feasibility Study

The U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service, Lead Agencies under NEPA, and the California Coastal Conservancy, Lead Agency under CEQA, will prepare a joint project-level Environmental Impact Statement (EIS)/Environmental Impact Report (EIR)/Feasibility Report, hereafter called the Report, for the first Interim Feasibility Study component of the South San Francisco Bay Shoreline Study. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the Report when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice. A public scoping meeting is scheduled. It will be held on Wednesday, January 25, 2006, from 5:30-8:30 p.m, at 40 North Milpitas Blvd., Milpitas, CA 95035.

Please send your response, and the name of a contact person in your agency, to:

Brenda Buxton
California Coastal Conservancy
1330 Broadway, 11th Floor
Oakland, California, 94612

Date: 1/06/06 Signature: Brenda Buxton

Title: Project Manager

Telephone: (510) 286-1015

SUMMARY

Pursuant to the National Environmental Policy Act of 1969, as amended (NEPA), and the California Environmental Quality Act of 1970, as amended (CEQA), the U.S. Army Corps of Engineers (Corps), the U.S. Fish and Wildlife Service (USFWS), and the California Coastal Conservancy (CCC) intend to prepare a joint project level Environmental Impact Statement / Environmental Impact Report / Feasibility Report (Report) to address the potential impacts of the first Interim Feasibility Study component of the South San Francisco Bay Shoreline Study, San Francisco Bay, California. This study is closely interrelated with the ongoing South Bay Salt Ponds Restoration Project, discussed in the Notice of Intent dated November 9, 2004. It will function as a project-level EIS/EIR tiered under that programmatic EIS/EIR and will be issued subsequently to the programmatic document. The Corps and the USFWS will serve as Joint Lead Agencies under NEPA, and CCC will be the Lead Agency under CEQA.

Lead Agencies Proposed and Connected Actions

The Corps, in cooperation with the USFWS, and the CCC are proposing to study flood protection and ecosystem restoration for the Alviso portion of the South San Francisco Bay (South Bay) Salt Ponds and adjacent areas to determine whether there is a federal interest in constructing a project with flood protection and/or ecosystem restoration components in this area, and if so, to determine the optimum project to recommend to Congress for authorization. The Report will recommend a plan which will provide for long-term restoration for these salt ponds and adjacent areas as well as flood protection and recreation components, if these actions are justified under Federal criteria. The Report and its alternatives will be tiered to the programmatic EIS/EIR for the South Bay Salt Ponds Restoration Project.

SCOPING PROCESS

Public participation in the environmental scoping process is an important step in determining the full scope of issues to be addressed in the Report. The Corps, the USFWS, and the CCC request your comments on the scope and content of the draft joint Report.

A public scoping meeting will be held to solicit comments on the environmental effects of the range of potential projects and the appropriate scope of the Report. The public is invited to comment on environmental issues to be addressed in the Report during this meeting.

Dates

Written comments from all interested parties are encouraged and must be received no later than 30 days after receipt of this notice. A public scoping meeting will be held on Wednesday, January 25, 2006, from 5:30-8:30 p.m. at 40 North Milpitas Blvd., Milpitas, California, 95035. Persons needing reasonable accommodations in order to attend and participate in the public scoping meetings should contact Bill DeJager at (415) 977-8670 at least a week in advance of the meeting to allow time to process the request.

Addresses

Written comments should be sent to Yvonne LeTellier, Project Manager, U.S. Army Corps of Engineers, 333 Market Street, 8th Floor, San Francisco, California, 94105-2197, or Brenda Buxton, Project Manager, California Coastal Conservancy, 1330 Broadway, 11th Floor, Oakland, CA, 94612. Written comments may also be sent by facsimile to (415) 977-8695, or via email through the public comments link on the South Bay Salt Ponds Restoration Project website, at www.southbayrestoration.org/Question_Comment.html. All comments received, including names and addresses, will become part of the administrative record and available to the public.

SUPPLEMENTARY INFORMATION

On November 9, 2004, the USFWS and the Corps issued a Notice of Intent for the proposed South Bay Salt Ponds Restoration Project programmatic EIS/EIR. The Corps and the USFWS propose to integrate the planning process for the Alviso Pond and Santa Clara County Interim Feasibility Study component of the South San Francisco Bay Shoreline Study with the planning process for the South Bay Salt Ponds Restoration Project. The two projects include ecosystem restoration, flood protection, and public access components. However, the current Interim Feasibility Study is a project-level component of the South Bay Salt Pond Restoration Study and it will be tiered to the above-mentioned programmatic EIS/EIR. This Interim Feasibility Study and the Report to be prepared will only cover a portion of the larger geographic area addressed in the South Bay Salt Ponds programmatic EIS/EIR.

Project Description.
South Bay Salt Ponds Restoration Project.
Project Location: The South Bay Salt Ponds Restoration Project area comprises 15,100 acres of salt ponds and adjacent habitats in South San Francisco Bay that USFWS and California Department of Fish and Game (CDFG) acquired from the Cargill Salt Company in 2003. USFWS owns and manages the 8,000-acre Alviso pond complex and the 1,600-acre Ravenswood pond complex. CDFG owns and manages the 5,500-acre Eden Landing pond complex.

The overarching goal of the South Bay Salt Ponds Restoration Project is to restore and enhance wetlands in the South San Francisco Bay while providing for flood protection and wildlife-oriented public access and recreation. The following project objectives were adopted by the South Bay Salt Ponds Restoration Project's Stakeholder Forum which includes representatives of local governments, environmental organizations, neighboring landowners, businesses, and community organizations:

1. Create, restore, or enhance habitats of sufficient size, function, and appropriate structure to:
   a. Promote restoration of native special-status plants and animals that depend on South San Francisco Bay habitat for all or part of their life cycles.
   b. Maintain current migratory bird species that utilize existing salt ponds and associated structures such as levees.
   c. Support increased abundance and diversity of native species in various South San Francisco Bay aquatic and terrestrial ecosystem components, including plants, invertebrates, fish, mammals, birds, reptiles and amphibians.
2. Maintain or improve existing levels of flood protection in the South Bay area.
3. Provide public access and recreational opportunities compatible with wildlife and habitat goals.
4. Protect or improve existing levels of water and sediment quality in the South Bay, and fully evaluate ecological risks that could be caused by restoration.
5. Implement design and management measures to maintain or improve current levels of vector management, control predation on special-status species, and manage the spread of non-native species.
6. Protect the services provided by existing infrastructure (e.g., power lines, railroads).

USFWS and CDFG reviewed the proposed project objectives to ensure compliance with legal mandates, such as compatibility of wildlife with public access. Two additional evaluation factors were identified in the Alternatives Development Framework for comparative analysis:

7. Cost Effectiveness: Consider costs of implementation, management, and monitoring so that planned activities can be effectively executed with available funding.
8. Environmental Impact: Promote environmental benefit and reduce impacts to the human environment.

The South Bay salt ponds are now being managed by the U.S. Fish and Wildlife Service and the California Department of Fish and Game under an Initial Stewardship Plan which was evaluated in a March 2004 Final EIS/EIR. The long-term restoration plan currently under evaluation in the ongoing programmatic NEPA/CEQA process may include general plans for the entire project area as well as detailed design plans for a specific Phase I project.

South San Francisco Bay Shoreline Study.
The Corps plans to prepare a Feasibility Report integrated with an EIS/EIR for the South San Francisco Bay Shoreline Study: Alviso Ponds and Santa Clara County Interim Feasibility Study, pursuant to the following resolution by the U.S. House of Representatives Transportation and Infrastructure Committee, adopted July 24, 2002:

> "Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, that the Secretary of the Army is requested to review the Final Letter Report for the San Francisco Bay Shoreline Study, California, dated July 1992, and all related interims and other pertinent reports to determine whether modifications to the recommendations contained therein are advisable at the present time in the interest of tidal and fluvial flood damage reduction, environmental restoration and protection and related purposes along the South San Francisco Bay shoreline for the counties of San Mateo, Santa Clara and Alameda, California."

Project Location: The South San Francisco Bay Shoreline Study area extends along South San Francisco Bay and includes the Alviso, Ravenswood, and Eden Landing pond complexes which are described above, as well as additional shoreline and floodplain areas in the counties of Alameda, San Mateo, and Santa Clara. The Report referenced in this Notice of Intent would propose implementation of the findings of the first Interim Feasibility Study component of the Shoreline Study. The area to be examined in the first Interim Study consists of 25 ponds in the Alviso pond complex on the shores of the South Bay in Fremont, San Jose, Sunnyvale and Mountain View, located in Santa Clara and Alameda counties, plus substantial adjacent areas which may need flood protection or which may be affected by flood protection or ecosystem restoration measures. The study area is bordered by San Francisco Bay and the operational salt ponds of Alameda County to the north and San Francisquito Creek on the west. To the south and east, the study area extends beyond the salt ponds to include all lands subject to inundation from a 100-year tidal flooding event. These additional lands are primarily urbanized areas in Palo Alto, Mountain View, Sunnyvale, and San Jose to the south, and urbanized lands in Milpitas and Fremont to the east. These lands are generally delineated on maps which are on file with the Corps of Engineers, San Francisco District. During the course of the study the exact delineation of which lands are subject to tidal inundation may be modified based on technical studies.

The Corps proposes to conduct the South San Francisco Bay Shoreline Study: Alviso Ponds and Santa Clara County Interim Feasibility Study in coordination with the South Bay Salt Ponds Restoration Project and in partnership with the USFWS, the CCC, CDFG, and the Santa Clara Valley Water District (SCVWD). It is expected that the Corps's Report for the first Interim Feasibility Study component of the Shoreline Study will be released after the completion of the South Bay Salt Ponds Restoration Project programmatic EIS/EIR, so the EIS/EIR components of the Report for the Shoreline Study will tier off from the joint programmatic South Bay Salt Ponds EIS/EIR.

Alternatives

The Report will consider a range of alternatives and their impacts, including the No Action Alternative. Scoping will be an early and open process designed to determine the issues and alternatives to be addressed in the Report. For example, the range of alternatives may include varying mixes of managed ponds and tidal marsh habitat as well as varying levels and means of flood management and recreation and public access components which respond to the project objectives.

Content of the Report

The Report will identify the anticipated effects of the project alternatives (negative and beneficial) and describe and analyze direct, indirect, and cumulative potential environmental impacts of the project alternatives, including the No Action Alternative, in accordance with NEPA(40 CFR 1500-1508) and CEQA. For each issue listed below, the Report will include a discussion of the parameters used in evaluating the impacts as well as recommended mitigation, indicating the effectiveness of mitigation measures proposed to be implemented and what, if any, additional measures would be required to reduce the impacts to a less-than-significant level. The list of issues presented below is preliminary both in scope and number. These issues are presented to facilitate public comment on the scope of the Report, and are not intended to be all-inclusive or to be a predetermination of impact topics to be considered.

Biological Resources.
The Report will address the following issues and potential detrimental and beneficial impacts related to biological resources:

- effects on population sizes of endangered species and other species of concern, including California clapper rail, snowy plover, California least tern, salt marsh harvest mouse, Chinook salmon and steelhead trout.
- shifts in populations and effects on population sizes of migratory waterfowl and shorebirds
- increased habitat connectivity for all organisms that use multiple marsh and/or aquatic habitats, including birds, mammals, and fish
- potential for improved habitat connectivity with adjacent upland habitats
- potential loss of hypersaline wetlands and their unique communities
- reduction in predation for species of concern with larger habitat blocks
- increased nursery habitat in wetlands for fish
- potential for salmonid entrainment into managed ponds
- effects of *Spartina alterniflora* and the hybrids of this species, and other invasive species
- effects of flood control structures on existing ecosystem attributes and functions including aquatic and terrestrial species.
- effects of public access and recreation on aquatic and terrestrial species.

Hydrology and Flood Protection.
The Report will address the following issues and potential detrimental and beneficial impacts related to hydrology and flood protection:

- existing and future without-project tidal flood hazards as affected by fluvial inputs
- effects on the tidal regime and tidal mixing from project components, and related effects on salinity of Bay waters
- effects on high-tide water levels and resulting effects on flood hazards
- changes in tidal hydrodynamics, including tidal prism and tidal range in tidal sloughs, resulting changes in channel geometry and changes in tidal flood risks (including during project implementation)

- effects on flood flow conveyance as a result of converting salt ponds to tidal marsh
- potential decrease in wave energy associated with tidal marsh restoration and reduced erosion of flood protection levees
- Impacts on tidal flooding frequency and extent, and flood protection due to breaches in salt pond levees, improvement of existing levees, and construction of new levees
- Impacts on groundwater quality

Water and Sediment Quality.
The Report will address the following issues and potential detrimental and beneficial impacts related to water and sediment quality:

- effects of salt pond levee breaches, including changes in salinity, turbidity, dissolved oxygen, biochemical and biological oxygen demand, metals, polychlorinated biphenyls (PCBs), and other pollutants of concern.
- changes in residence time of water in the South Bay and related effects on water quality.
- changes in mercury and/or methyl mercury concentrations, and other pollutants of concern, in Bay and slough waters.
- potential to mobilize existing sediment contaminants, including mercury, PCBs, and other pollutants of concern.
- potential contamination from outside sources, including urban runoff, wastewater discharges, imported sediment and atmospheric deposition.

Recreation and Public Access.
The Report will address the project's effects on existing recreation facilities and their use as well as the potential effects of expansion or creation of new facilities. The benefits and impacts of increased or decreased public access on biological resources and achievement of other project objectives will also be addressed.

Economics.
The Report will evaluate the economic effects of the alternatives, including costs and benefits of flood protection, recreation, and effects on commercial fishing.

Cumulative Impacts.
The Report will examine the cumulative impacts of past, ongoing, and reasonably foreseeable future projects affecting tidal marsh and estuarine habitats in the South Bay, as well as effects on adjacent urban and rural lands and communities.

Environmental Analysis Process

The Report will be prepared in compliance with NEPA and Council on Environmental Quality Regulations, contained in 40 CFR parts 1500 - 1508; and with CEQA, Public Resources Code Sec 21000 et seq., and the CEQA Guidelines as amended. Because requirements for NEPA and CEQA are somewhat different, the document must be prepared to comply with whichever requirements are more stringent. The Corps and the USFWS will be Joint Lead Agencies for the NEPA process and the CCC will be the Lead Agency for the CEQA process. In accordance with both CEQA and NEPA, these Lead Agencies are responsible for the scope, content, and legal adequacy of the document. The SCVWD will be a Responsible Agency under the provisions of CEQA. Therefore, all aspects of the Report scope and process will be fully coordinated between these four agencies.

The scoping process will include the opportunity for public input during a public meeting and by written comments submitted during the 30-day scoping period.

The draft Report will incorporate public concerns associated with the project alternatives identified in the scoping process and will be distributed for at least a 45-day public review and comment period. During this time, both written and verbal comments will be solicited on the adequacy of the document. The final Report will address the comments received on the draft during public review and will be made available to all commenters on the draft Report. Copies of the draft and final reports will be posted on the Internet as part of the public review process.

The final step in the Federal EIS process is the preparation of a Record of Decision (ROD), a concise summary of the decisions made by the Corps and the USFWS. The ROD will identify the alternative selected by the agencies and other alternatives that were considered. It also will discuss the mitigation measures that were adopted. Because there are two lead agencies, it is possible that each agency will prepare its own ROD. The Record, or Records, of Decision may be published no earlier than 30 days after publication of the Notice of Availability of the final EIS. The final step in the State EIR process is certification of the EIR, which includes preparation of a Mitigation Monitoring and Reporting Plan and adoption of its findings, should the project be approved.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
San Francisco Bay National Wildlife Refuge Complex
1 Marshlands Road
Fremont, California 94555

May 28, 2015

Caleb Conn
Project Manager
U.S. Army Corps of Engineers
San Francisco District
1455 Market Street
San Francisco, CA 94103

Re: South San Francisco Bay Shoreline Study Phase 1 Project – Refuge coordination in the study's planning process

Dear Mr. Conn,

This letter serves as documentation of the United States Fish and Wildlife Service's (USFWS) Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) participation in the South San Francisco Bay Shoreline Study Phase 1 Project (South Bay Project), in response to comments from the USACE headquarters on the Draft Interim Environmental Impact Statement/ Environmental Impact Report/Feasibility Report (Integrated Document), specifically: "*Lastly, there does not appear to be any correspondence or affirmation from the USFWS' Don Edwards National Wildlife Refuge acknowledging or providing input into the planning process. Has nothing been received from the Refuge or was it just not included in the draft report?*"

The USFWS has been engaged in the Shoreline Study at least since 2003 with the acquisition of the large complex of former commercial salt ponds from Cargill and its addition to the Refuge to be managed for wildlife and habitat conservation. Following the acquisition, the Corps concluded that there was a Federal interest in a South Bay Project, given that USFWS would not be able to provide flood risk management, and that the public benefits of a large scale multipurpose flood protection/ ecosystem restoration project could only be realized with the Corps assistance.

The Refuge Manager, with technical assistance from Refuge staff and the Department of the Interior San Francisco Field Office of the Solicitor's legal counsel, actively participated in crafting early supporting documents such as Issue Resolution Conference White Papers on future-without project assumptions and land access policy. Pursuant to NEPA, the USFWS joined the Corps as a Federal Co-Lead and jointly issued a Notice of Intent to Prepare an Integrated Environmental Impact Statement/Environmental Impact Report/Feasibility Report for the South San Francisco Bay Shoreline Study: Alviso Ponds and Santa Clara County Interim Feasibility Study, published on January 6, 2006 (Federal Register Vol. 71, No. 4). Further, the USFWS is an integral partner in the multi-agency collaborative South Bay Salt Pond Restoration Project, which is closely interrelated with the South Bay Project.

The Project Leader for the San Francisco Bay National Wildlife Refuge Complex (of which the Don Edwards Refuge is one of seven units) has participated as a Principal on the South Bay Project Executive Team for the past several years (both I and my predecessor, Mendel Stewart). Additionally, the Refuge Manager and /or his staff have participated on the Shoreline Management Team for at least the past few years. Several Refuge staff reviewed and provided edits as well as supporting references to the Draft Integrated Document; however, the Refuge was inadvertently left off of the List of Preparers in Chapter 7.0. A list of names is enclosed for incorporation into the Final Integrated Document.

I and my staff will continue to provide technical assistance to completing the Final Integrated Document and its associated responses to comments, as necessary, as well as the Implementation Guidance submittal package and other supporting materials necessary for reaching a final Chief's Report and ultimately project authorization and implementation. Please let me know if you have any further questions.

Sincerely,

Anne E. Morkill
Project Leader
San Francisco Bay National Wildlife Refuge Complex
Pacific Southwest Region
U.S. Fish and Wildlife Service

Addendum to List of Preparers (Chapter 7.0), Integrated Environmental Impact Statement/Environmental Impact Report/Feasibility Report for the South San Francisco Bay Shoreline Study

USFWS Don Edwards San Francisco Bay National Wildlife Refuge (USFWS)

Name	Discipline	Role in Preparing Report
Anne Morkill	Refuge Complex Manager	Exec Team representative for Refuge; general document QC
Eric Mruz	Refuge Manager	PDT representative for Refuge; general document QC
Melisa Amato	Wildlife Refuge Specialist	PDT representative for Refuge; general document QC
Cheryl Strong	Wildlife Biologist	General review and updates of text in Integrated Document
Rachel Tertes	Wildlife Biologist	General review and updates of text in Integrated Document
Jennifer Heroux	Visitor Services Specialist	General review and updates of text in Integrated Document
Patricia Roberson	Planner/NEPA Coordinator	General review and updates of text in Integrated Document; environmental NEPA support

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AWTF
BART-Capitol Corridor Planning Group
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California Coastal Commission
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California Department of Fish and Wildlife
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California Department of Toxic Substances Control
California Department of Transportation, District 4
California Department of Water Resources
California Department of Water Resources, Bay Delta Office
California Emergency Management Agency
California Marine Affairs Navigation Conference (CMANC)
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California Native Plant Society- Marin Chapter
California Natural Resources Agency
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California Recreational Boaters of California
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Children's Discovery Museum BioSITE
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City of Alameda Health Care District

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City of East Palo Alto
City of Foster City
City of Fremont
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City of Menlo Park
City of Milpitas
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City of Mountain View
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City of Petaluma
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City of San Jose, Dept. of Parks, Recreation & Neighborhood Services
City of San Jose, Environmental Services
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San Francisco Baylands Ecosystem Habitat Goals
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San Francisco Invasive Spartina Project
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San Francisco State University, Biology Dept.
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San Jose State University, Dept. of Biological Sciences
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San Mateo County Clerk-Recorder's Office
San Mateo County Env. Health
San Mateo County Harbor District
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Santa Clara County Parks & Recreation Department

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Santa Clara Open Space Authority

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U.S. Coast Guard

U.S. Department of Agriculture Natural Resources Conservation Service

U.S. Department of the Interior, Office of Environmental Policy and Compliance

U.S. Environmental Protection Agency, Office of Clean Water Act Compliance

U.S. Environmental Protection Agency, Region 9

U.S. Fish & Wildlife Service

U.S. Fish & Wildlife Service - Don Edwards SF Bay National Wildlife Refuge

U.S. Senator Diane Feinstein

U.S. Geological Survey

U.S. Geological Survey, Pacific Science Center

U.S. Geological Survey, Western Ecological Research Center

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San Francisco Bay Conservation and Development Commission
455 Golden Gate Avenue, Suite 10600, San Francisco, California 94102 tel 415 352 3600 fax 415 352 3606

September 4, 2015

Mr. Thomas Kendall
Chief of Planning
U.S. Army Corps of Engineers
1455 Market Street, 16th Floor
San Francisco, CA 94103

SUBJECT: BCDC Support for the South San Francisco Bay Shoreline Study, Phase 1

Dear Mr. Kendall: Tom

Thank you for the request by the San Francisco District of the U.S. Army Corps of Engineers (USACE) that the San Francisco Bay Conservation and Development Commission (BCDC) support the flood risk management and ecosystem restoration work proposed by USACE's South San Francisco Bay Shoreline Study, Phase 1. The project is described in the draft Integrated Report released on December 19, 2014, and with additional detail provided in subsequent meetings with the project proponent.

As the proposed project would be constructed by the federal government, with some local and state funding, BCDC will require USACE to prepare and submit a Consistency Determination for review by BCDC under the federal Coastal Zone Management Act (CZMA). Based on decades of past practice and experience, we believe that it would be most prudent for USACE to submit its Consistency Determination during the project's Pre-Construction Engineering & Design phase.

In general, the BCDC staff supports the purpose of this project and looks forward to taking it before the Commission for its review and action under the CZMA when enough information is gathered and analyzed to ensure that it will both comply with the enforceable policies of the Coastal Management Program (CMP), as contained in the McAteer-Petris Act and in the San Francisco Bay Plan ("Bay Plan"), and benefit the region. Both the staff and Commissioners can better provide USACE with practical suggestions if USACE is willing to provide the Commission with an initial briefing on the project. As such, we have reserved time for a USACE presentation at our next Commission meeting on September 17, 2015.

It is worthwhile to note that the Commission previously has unanimously approved at least two horizontal levees to create transition zones, upland habitat, and areas where marsh can move inland with rising sea level rise at Sonoma Creek (Consistency Determination No. C2014.004) and Max Keech Properties (BCDC Permit No. 2007.005). That being said, the project's south bay shoreline levee would require much larger amounts of fill than either of the two above-referenced projects, although the fill is proposed to be placed within salt ponds, as opposed to within the Bay. While BCDC's criteria for evaluating fill in salt ponds are different than its criteria used to analyze fill proposed in the Bay, any fill proposed within BCDC's jurisdiction must be justified. Also, the Commission will analyze this project in light of its efforts to make the Bay's shoreline more resilient to expected rising sea level; it has consistently supported appropriate efforts to do so in the past, and I am sure that USACE will receive many questions from the staff and Commissioners about the project's design and purpose in light of the ramifications of climate change and the need to protect the Bay's existing natural resources.

Based on the draft Integrated Report, BCDC-USACE staff-level coordination, and USACE's responses to BCDC's comment letter of February 23, 2015, the BCDC staff can indicate now that the proposed project is generally consistent with the Bay Plan's policies, or can be amended to be so, with additional documentation and a series of changes. The Bay Plan encourages converting salt ponds to tidal and subtidal habitats and designing ecosystem restoration and flood risk management features that provide for, and are adaptable to, projected rising sea level. The USACE proposal incorporates these attributes and its proposed ecotone would provide important habitat and ecosystem resilience. The Bay Plan requires that the public have access to the Bay shoreline, and the project would promote such access by filling a gap in the Bay Trail. I am happy that discussions among the Corps, BCDC, and other project-related staff indicate that the federal agencies are willing to work with Commission staff to ensure that the project design will be fully consistent with the Commission's policies as it is brought to a more detailed level.

Finally, please note that BCDC is open to the concept of phased consistency review, as authorized by section 930.36(d) of the CZMA regulations, should USACE elect to pursue this approach. Using this approach, BCDC generally requires up to 75 days to conclude our process and provide a federal agency with a phased Consistency Concurrence following the submission of a phased Consistency Determination. As stated above, however, we believe that a better process would be to expedite a Commission briefing on the overall goals of the project now, and review a USACE Consistency Determination later at the Pre-Construction Engineering & Design phase.

I hope this letter clarifies our position and please be assured that we very much look forward to working with you to complete this very important project.

If you have any further questions, please contact Bob Batha of our staff at 415-352-3612, or by email at bob.batha@bcdc.ca.gov; or me directly.

Sincerely,

Larry

LAWRENCE J. GOLDZBAND
Executive Director

References:

BCDC (1979). Management Program for San Francisco Bay. San Francisco Bay Conservation and Development Commission (prepared with financial assistance from the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, under the provisions of the Federal Coastal Zone Management Act of 1972, as amended).

BCDC (2008). San Francisco Bay Plan. San Francisco Bay Conservation and Development Commission.

U.S. Department
of Transportation
Federal Aviation Administration

Western-Pacific Region
Airports Division

San Francisco Airports District Office
1000 Marina Boulevard, Suite 220
Brisbane, CA 94005

May 21, 2015

Mr. Thomas R. Kendall
Chief, Planning Branch
Engineering and Technical Services Division
U.S. Army Corps of Engineers - San Francisco District
1455 Market St. San Francisco, CA 94103
ATTN: William DeJager
Environmental Section A -

Subject: FAA Comments on the Draft Interim Feasibility Report and Draft Environmental Impact Statement/Environmental Impact Statement/Report – South San Francisco Bay Shoreline Phase I Study, Santa Clara County, California

Dear Mr. Kendall:

Mr. Dejager of your staff contacted our office in April 2015 regarding whether we had any comments or concerns regarding aviation issues and the Draft Interim Feasibility Report and Draft Environmental Impact Statement (EIS)/Environmental Impact Statement/Report – South San Francisco Bay Shoreline Phase I Study, which is proposing a flood protection and environmental enhancement project approximately 5 miles north of Norman Y. Mineta San Jose International Airport. We appreciate that Mr. Dejager made this effort as we were not aware of the Draft EIS. We have the following comments.

Any wildlife or environmental enhancement project has the potential, if located in an inappropriate location, to increase the potential for wildlife to collide with aircraft. Our Federal Aviation Administration Advisory Circular (A/C) 150-5200-33B *Hazardous Wildlife Attractants on or Near Airports*, which is available on the www.faa.gov website, recommends a separation distance of at least 5,000 feet between potential hazardous wildlife attractants and airports serving piston-powered aircraft, and a separation distance of at least 10,000 feet between such hazards and airports serving turbine-powered (jet) aircraft. Hazardous wildlife attractants can include marsh and wetland areas, which would be enhanced as part of your proposed project. FAA AC 150-5200-33B also recommends a separation distance of 5 miles between the farthest edges of an airport's Air Operations Area (AOA) (i.e. runway) and a hazardous wildlife attractant if the attractant could cause hazardous wildlife movement into or across approach or departure airspace. The AC also identifies which types of wildlife have the greatest potential to strike and damage aircraft.

Both Norman Y. Mineta San Jose International Airport, and Moffett Federal Airfield at the National Aeronautics and Space Administration, Ames Research Center, are in the vicinity of the project alternatives described in the Draft EIS. Both airports service turbine-powered aircraft. While it appears both airports are beyond 10,000 feet from your proposed project alternatives, it also appears they may be within 5 miles of your project alternatives. We recommend that you disclose in the Final EIS the separation distances between the Air

Operations Areas (nearest point of the runway) of these airports and the proposed habitat improvements for each alternative described in the EIS.

Also, for any of your project alternatives that are within 5 miles of these airports, we recommend that the EIS evaluate whether the proposed habitat improvements could cause wildlife hazardous aircraft operations such as waterfowl, shorebirds, gulls, or raptors to move into or across approach or departure airspace (i.e. the areas beyond the ends of the runway where aircraft climb immediately after takeoff, or line up to land). We recommend that if such habitat improvements are included in your Final EIS, that you modify the habitat restoration plan in that area so it would not create any attractants that could encourage hazardous wildlife movements into or across approach or departure airspace within 5 miles of the either airport.

If your Final EIS does propose to create or enhance habitat that could attract wildlife hazardous to aircraft operations to within 10,000 feet of either airport, or cause hazardous wildlife movement into or across approach or departure airspace, this should be identified as a significant environmental impact, and that condition disclosed to the Federal official responsible for signing the Record of Decision for the EIS.

The FAA does not support the creation of new wildlife hazards to aircraft. While there are methods to discourage wildlife from areas where they represent a wildlife-aircraft strike hazard, such methods are time consuming and expensive to implement, and are not a substitute for advance planning that avoids attracting wildlife hazardous to an airport or an airport's approach or departure airspace in the first place.

Thank you for consideration of these comments. If you have questions regarding these comments you may contact me at telephone 650-827-7601 or e-mail maverick.douglas@faa.gov, or contact Mr. Douglas Pomeroy of my staff at telephone 650-827-7612 or e-mail douglas.pomeroy@faa.gov.

Sincerely,

M. Douglas

Maverick Douglas
Acting Manager

cc:
Director of Aviation, Norman Mineta San Jose International Airport
Chief Executive Officer, Santa Clara Valley Water District
Center Director, NASA Ames Research Center
Refuge Manager, Don Edwards San Francisco Bay National Wildlife Refuge

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

San Francisco Bay Regional Water Quality Control Board

Sent via e-mail – no hard copy to follow

July 13, 2015
CIWQS Place ID 813084

U.S. Army Corps of Engineers
San Francisco District
Attn.: Thomas R. Kendall
1455 Market St.
San Francisco, CA 94103

Subject: Letter of support for the South San Francisco Bay Shoreline Project

Dear Mr. Kendall:

This letter is in response to your request for a letter supporting the flood risk management and ecosystem restoration project (Project) proposed in the December 2014 *Draft South San Francisco Bay Shoreline Phase I Study*, Integrated Document, *Draft Integrated Interim Feasibility Report and Environmental Impact Statement / Report* (Shoreline Study). Water quality certification (Certification) pursuant to section 401 of the federal Clean Water Act will be required to authorize construction of the Project. The San Francisco Bay Regional Water Quality Control Board (Water Board) usually reviews applications for Certification during the detailed, final design process that occurs after completion of a final environmental document. Therefore, we plan to consider issuing Certification for the Project following completion of Project review in compliance with the requirements of the California Environmental Quality Act (CEQA) and after review of near-final Project designs. At this time the Water Board has not been requested to take formal action on any requirements related to the Project. However, as is described below, the Project appears to be consistent with the intent of the *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan), the Water Board's primary regulatory document, and, therefore, appears to be eligible for Certification. This letter provides Water Board staff's assessment of the proposed Project.

Project Description

The proposed Project is identified as Alternative 3 in the Shoreline Study. The Project's components include an Alviso North levee alignment, San José–Santa Clara Regional Wastewater Facility (WPCP) South levee alignment, a 30:1 (1 foot of elevation rise for each 30 feet of horizontal distance) ecotone adjacent to ponds A12/13 and A18, restoration of ponds A9-15 and A18, a flood gate across the Union Pacific Railroad tracks near ponds A12/13, and a tidal flood gate at Artesian Slough. The Project includes an engineered levee, approximately 15.2 feet high, along existing salt pond berms, the eastern border of Pond A12, and the southern borders of ponds A16 and A18. The Project would allow for continued Federal Emergency Management Agency (FEMA) accreditation at the end of the study's period of analysis (2017-2067).

Water Board Comments

Water Board staff supports the Project and recognizes that it is needed both for flood protection and to enable the restoration of salt marsh and related habitats in about 2,800 acres of historically diked salt ponds in South San Francisco Bay, in the former Alviso Salt Pond Complex ponds A9 through A15 and A18. Since the current salt pond levees provide flood protection to the Alviso area, the Project will facilitate salt marsh restoration by allowing the outer salt pond levees to be breached after the Project has replaced flood protection provided by these levees. Project implementation is also part of a long-term adaptive management strategy to address the potential impacts of sea level rise in the Bay.

Reviewed in isolation, the flood control element of the Project, with adjacent ecotone fill, would place fill into about 137 acres of waters of the State, consisting of 16.8 acres of wetlands and 120.8 acres of open water. This impact is large for a single project and would require significant mitigation to be consistent with the Basin Plan, which incorporates the State of California's no net loss policy (Governor's Executive Order W-59-93 and Senate Concurrent Resolution No. 28). However, the Basin Plan also directs the Water Board to use the *Baylands Ecosystem Habitat Goals* (1999) (*Habitat Goals*), and the *Baylands Ecosystem Species and Community Profiles* (2000) (referred to collectively as the "Habitat Goals Reports") as guides for wetland restoration to protect beneficial uses of waters in San Francisco Bay. The *Habitat Goals* contains the following recommendation for the shoreline in the vicinity of Alviso Slough:

> Restore tidal marsh throughout most of the segment, providing a continuous corridor of tidal marsh along the bayshore… . Restoration should emphasize reestablishing a natural transition between tidal marsh and adjacent wetlands and upland habitats**,** as well as transitions between salt and brackish tidal marsh.

One of the significant beneficial uses that the Basin Plan assigns to waters of the State in South San Francisco Bay is the preservation of rare and endangered species. The proposed habitat enhancement activities in the Alviso Salt Pond Complex ponds will enhance this beneficial use. The Habitat Goals and the *USFWS Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California* (Recovery Plan) (USFWS, August 27, 2013), which include recovery actions for the California Ridgway rail (formerly California Clapper Rail) and salt marsh harvest mouse (SMHM), support both the restoration of as many acres of tidal marsh as feasible and the creation of ecotones between marsh habitats and upland high water refuges.

The ecotones will contribute to the value of the marsh and the future success of special status species using the marsh by providing an important transition zone. This type of upland transitional habitat is not well represented in the South San Francisco Bay due to the historic severe loss of habitat and the typically abrupt transitions between remaining middle marsh habitat and steep-sided levees. The ecotones will provide high tide cover and escape habitat for the California Ridgway Rail and SMHM, as well as providing some opportunity for landward migration of wetland habitat in the face of sea level change.

The Project's inclusion of tidal marsh restoration, along with the habitat enhancement provided by the ecotones in the proposed Project, supports the Water Board's ability to issue Certification for the Project.

As is noted in the Shoreline Study, South San Francisco Bay appears to be on the verge of becoming a sediment sink, rather than a sediment source. With increasing sea level and decreasing sediment supply, restoration practitioners and researchers in San Francisco Bay are encouraging all stakeholders to proceed with a sense of urgency to create sustainable marshes. Since the uncertainties related to sediment supply will increase over time, we encourage the U.S. Army Corps of Engineers to commence work on the Project as soon as possible.

Conclusion

In summary, Water Board staff is supportive of the Project, which will provide the integrated flood risk management and tidal habitat restoration that is necessary to support the preservation of rare and endangered species and to enhance habitat resilience to sea level rise. We look forward to continuing to work with the Project sponsors to complete the Certification process as further design details are provided.

If you have questions regarding the Certification process, please contact me at (510) 622-2314 or via email to bwolfe@waterboards.ca.gov.

Sincerely,

Bruce H. Wolfe

Digitally signed by Bruce H. Wolfe
DN: cn=Bruce H. Wolfe, o=SWRCB, ou=Region 2, email=bwolfe@waterboards.ca.gov, c=US
Date: 2015.07.13 12:20:27 -07'00'

Bruce H. Wolfe
Executive Officer

Cc:
John Bourgeois, California Coastal Conservancy – John.Bourgeois@scc.ca.gov
Melanie Richardson, Santa Clara Valley Water District – mrichardson@valleywater.org

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET ST.
SAN FRANCISCO, CALIFORNIA 94103-1398

July 16, 2015

Carole Roland-Nawi
State Historic Preservation Officer
Office of Historic Preservation
1725 23rd Street, Suite 100
Sacramento, California 95816

Dear Ms. Roland-Nawi:

The U.S. Army Corps of Engineers San Francisco District (USACE) has conducted a feasibility study entitled South San Francisco Bay Phase I Shoreline Study (Shoreline Study). The Shoreline Study project area comprises the industrial solar salt pond complex known as the Alviso Unit, which is situated at the southern end of San Francisco Bay near the town of Alviso (City of San Jose), Santa Clara County, California. The results of the Shoreline Study identified a dual-purpose project, which the USACE is undertaking: (1) ecosystem restoration that will convert the salt ponds into tidal salt marsh and (2) flood risk management that will involve levee construction across the salt ponds north of the town of Alviso. The Shoreline Study has incorporated a public-recreation component into the plans as well.

We initiated consultation in writing with you in December 2014, pursuant to 36 C.F.R. § 800, the implementing regulations of Section 106, National Historic Preservation Act, as amended. The USACE received a response letter in January 2015; however, you elected not to comment at that time because the submitted materials for the undertaking did not indicate that USACE had identified historic properties or assessed effects consistent with the standards of 36 C.F.R. § 800.4 through § 800.5.

Over the past two weeks, my staff and I have coordinated with Jessica Tudor through email and telephone conversations to rectify the data gaps by submitting materials (July 14th) that we believe sufficiently document USACE efforts to identify and evaluate historic properties, and to assess potential effects to identified properties. The USACE has identified two historic properties, the Alviso Historic District (in the town of Alviso) and the Alviso Salt Pond Historic Landscape per 36 C.F.R. § 800.4(b). In our opinion, implementing the ecosystem restoration would cause an adverse effect only to the Salt Pond Historic Landscape (36 C.F.R. § 800.5(a)).

In addition, we are confident that the submitted materials address other concerns in your letter, such as the delineation of the Area of Potential Effects in accordance with 36 C.F.R. § 800.4(a)(1) and clarifying the previous ecosystem restoration project in the Alviso Unit by the U.S. Fish and Wildlife Service, who satisfied the requirements of Section 106 and executed a Memorandum of Agreement (MOA). We feel that the measures contained in this MOA largely address the character of effect created by our project. We would like to reach agreement on how best to address our project's effects to historic properties, if any, beyond those specifically addressed in the U.S. Fish and Wildlife Service agreement document.

If you have questions, please contact Kathy Ungvarsky, Archaeologist, at (415) 503-6842 or (email: kathleen.ungvarsky@usace.army.mil). I look forward to continuing the Section 106 process and receiving your comments.

Sincerely,

Thomas R. Kendall, P.E.
Chief, Planning Branch

AMENDMENT TO

MEMORANDUM OF AGREEMENT

AMONG THE U.S. FISH AND WILDLIFE SERVICE,
THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER, AND
THE U.S. ARMY CORPS OF ENGINEERS
REGARDING
THE SOUTH BAY SALT POND RESTORATION PROJECT
INCLUDING RESTORATION OF FORMER INDUSTRIAL SALT PONDS TO TIDAL
SALT MARSH AND OTHER WETLAND HABITATS,
INCLUDING THE FORMER SALT WORKS WITHIN THE ALVISO UNIT OF THE
DON EDWARDS SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE AND THE
CALIFORNIA DEPARTMENT OF FISH AND GAME'S EDEN LANDING
ECOLOGICAL RESERVE, ALAMEDA AND SANTA CLARA COUNTIES,
CALIFORNIA

(HEREAFTER "Agreement")

WHEREAS, the Agreement was executed in June, 2012;

WHEREAS, the U.S. Fish and Wildlife Service (USFWS) is proposing to amend this Agreement because of a beneficial and necessary activity described in "the San Francisco Bay Phase I Shoreline Survey" that recommends the U.S. Army Corps of Engineers San Francisco District (USACE) restore salt ponds to tidal salt marsh and repair levees adjacent to the U.S. Fish and Wildlife Service's (USFWS) property and encompassing a portion of the Alviso Salt Ponds within the Don Edwards National Wildlife Refuge (NWR) that are covered by the Agreement; and

WHEREAS, the Alviso Salt Ponds were determined to be eligible for the National Register of Historic Places (with SHPO concurrence dated 10/12/2010) and have been documented to Historic American Landscape Survey standards (HALS CA-92) and submitted to the Library of Congress (2013) as mitigation for the salt pond restoration activities as per this Agreement; and

WHEREAS, the USFWS is inviting the USACE to be a signatory party on the Agreement because they are proposing similar restoration activities in Alviso Ponds A9-18, along with critical levee flood control repairs bordering Alviso Ponds A18, A16, A-13, and A12 that will ensure the viability of the entire Alviso Salt Pond restoration project (undertaking); and

WHEREAS, the Area of Potential Effects (APE) for the Agreement is being expanded to include Alviso Pond A18 and the bordering levee (Expanded-APE) (Amendment Attachment-1); and

WHEREAS, the USACE will complete identification and evaluation of historic properties within the Expanded-APE prior to beginning restoration activities in Pond A18 and levee construction; and

WHEREAS, changing the function and appearance (character defining features) by restoring Pond A18 to salt marsh is a potential adverse effect, similar to the adverse effects determined in the Agreement for the other Alviso Salt Works ponds; and

WHEREAS, converting Pond A18 to tidal salt marsh is similar to the other Alviso Salt Works Historic District ponds which are the subject of the Agreement; therefore the HALS documentation for the Alviso Salt Works Historic District is sufficiently comprehensive to embrace Pond A18; and

WHEREAS, the USACE has provided written information on the Shoreline Study findings to the Native American tribes listed with the California Native American Heritage Commission, and has invited the tribes in writing to comment, but has not received any comments; and

WHEREAS, the USACE will send a copy of this executed amendment to the Advisory Council on Historic Preservation; and

NOW, THEREFORE, in accordance with Stipulation I and Stipulation II. C. of the Agreement, the USFWS, USACE, and SHPO agree to amend the Agreement as follows:

Amend Stipulation I. Area of Potential Effect by inserting the following text as paragraph C:

> "Specifically, the APE is extended to also include existing waterways (Alviso Slough to the west and Coyote Creek to the north) that could be impacted by pond restoration or levee construction (sewage treatment ponds north and east of the proposed levee). All project actions would occur within Ponds A9–A15 and A18, all south of Coyote Creek. In addition, the entire Alviso Marina (at the southernmost point of Pond A12 along Alviso Slough) has been included because the proposed levee would tie in at the existing levee just east of the marina. No other actions are proposed for the marina property.
>
> Along the southern edge, the area has been defined by applying a 100-foot buffer to the southernmost levee option. This area includes land that would be available for use during construction for activities such as materials and equipment staging and temporary roads for transporting equipment, materials, and personnel along the levee construction route. All ground-disturbing construction activities would occur within this boundary."

Amend Stipulation II. A by inserting a second paragraph with the following text:

> "The USACE will complete the identification and evaluation of historic properties within the Expanded-APE prior to beginning restoration activities. All draft historic property identifications and determinations of eligibility (DOE) will be submitted to SHPO and USFWS for a 30-day review and comment period. The USACE will address

the comments and resubmit the final DOE to the USFWS and SHPO for concurrence. The SHPO will have 30 days to respond.

If Pond A18 is found to be a contributing property, the USACE will revise the Alviso Salt Works Historic District DPR-523 form to include a description of the pond, a map(s), historical background, and photographs. A draft of the revised DPR-523 form will be transmitted to SHPO and USFWS for 30-day review and comment period. The USACE will address comments, submit a revised document, and request concurrence from SHPO on the Pond A18 DOE. The SHPO will have 30 days to review the revised document. The final revised DPR-523 form will then be transmitted to the USFWS, the SHPO, and the Northwest Information Center, prior to June 2019."

Amend Stipulation II.C. to insert the following text:

"The same procedures outlined by the USFWS in their Historic Properties Treatment Plan to manage new archaeological discoveries during restoration of the NWR ponds will apply to Pond A18 and the levee (Expanded-APE). The USACE will also be responsible for managing inadvertent discoveries in the Expanded-APE."

Amend the Signatory Block to include the USACE as follows:

SIGNATORY PARTIES

U.S. FISH and WILDLIFE SERVICE

By: ______________________ Date: 3 Sept 2015

Anne Morkill, Refuge Complex Manager
Don Edwards San Francisco Bay National Wildlife Refuge

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

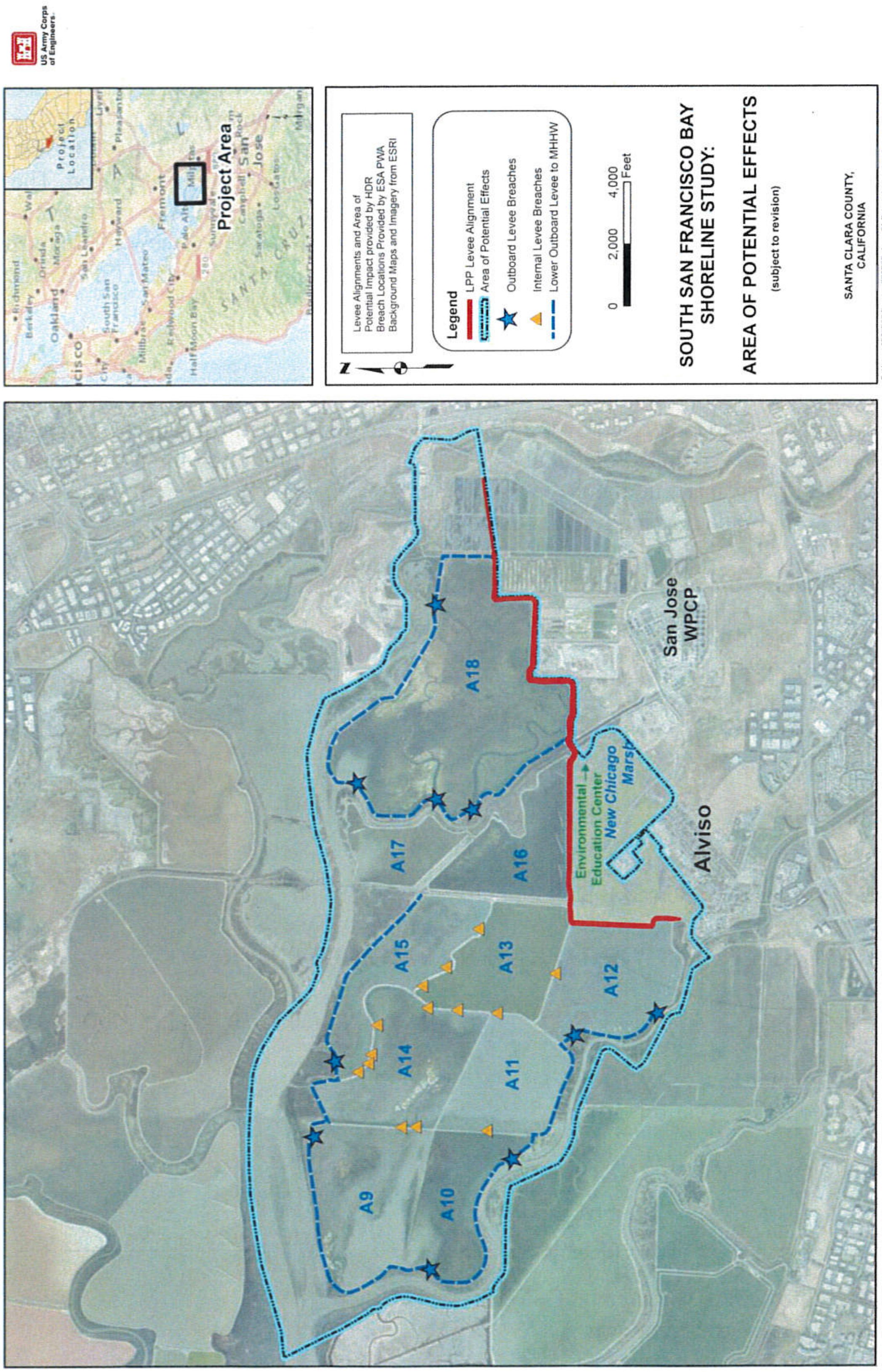
By: ______________________ Date: 8 Sept 2015

Julianne Polanco
State Historic Preservation Officer

U.S. ARMY CORPS of ENGINEERS

By: ______________________ Date: 3 Sep 15

John C. Morrow, P.E. Lieutenant Colonel
San Francisco District Engineer



Amendment Attachment-1. Expanded-APE includes A18 and levee.

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET ST.
SAN FRANCISCO, CALIFORNIA 94103-1398

July 16, 2015

Ms. Rosemary Cambra, Chairperson
Muwekma Ohlone Indian Tribe
of the San Francisco Bay Area
P. O. Box 360791
Milpitas, CA 95036

Dear Ms. Cambra,

The U.S. Army Corps of Engineers, San Francisco District (USACE) has conducted a study entitled South San Francisco Bay Shoreline (Shoreline), and is proposing a two-part project: ecosystem restoration that will convert the Alviso salt ponds into tidal salt marsh and flood risk management that will involve levee construction outside and north of the town of Alviso across the salt ponds. The project has incorporated a public recreation component into the plans as well.

The USACE has prepared a draft Environmental Impact Report/Statement (EIR/S), published December 2014. Since then, we have initiated consultation with the State Historic Preservation Officer pursuant to the Section 106 implementing regulations at 36 C.F.R. § 800. As part of that process, I request your comment on the USACE undertaking.

Please find enclosed two documents: (1) the Cultural Resources section of the USACE draft EIR/S and (2) a Memorandum for Record that summarizes the USACE Shoreline project, highlights the historic properties identified and consideration of effects, and provides background information on the previous U.S. Fish and Wildlife Service Section 106 efforts for tidal marsh restoration in south San Francisco Bay and how it relates to the USACE undertaking.

If you would like to receive the entire EIR/S or any other documents, we would provide hard copies or electronic files on a CD. Please contact Kathleen Ungvarsky, Archaeologist, at (415) 503-6842 (email: kathleen.ungvarsky@usace.army.mil) for additional information.

Sincerely,

Thomas R. Kendall
Chief, Planning Division

Enclosures

Mr. Valentin Lopez
Chairman, Amah Mutsun Tribal Band
PO Box 5272
Galt, CA. 95632

Ms. Katherine Erolinda Perez
Ohlone/Costanoan Indian Tribe
P.O. Box 717
Linden, CA 95236

Ms. Jakki Kehl
Ohlone Indian Tribe
720 North 2nd Street
Patterson, CA 94363

Ms. Michelle Zimmer
Amah Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94026

Representative Ramona Garibay
Ohlone/Costanoan Indian Tribe
Trina Marine Ruano Family
30940 Watkins Street
Union City, CA 94587

Ms. Ann Marie Sayers
Indian Canyon Mutsun Band of Costanoan
P. O. Box 28
Hollister, CA 95024

Irene Zwierlein
Amah Mutsun Tribal Band of Mission San Juan Bautista
789 Canada Road
Woodside, CA 94062

Mr. Andrew Galvan
The Ohlone Indian Tribe
Mission San Jose
PO Box 3152
Fremont, CA 94539

Memorandum for Record July 2015

Subject: San Francisco Bay Phase I Shoreline Study

1. This MFR includes a project description of the ecosystem restoration measures and flood risk management levee currently proposed by the U.S. Army Corps of Engineers San Francisco District (USACE) for the salt pond complex known as the Alviso Unit. It also includes background information on the U.S. Fish and Wildlife Service (USFWS) restoration program in the Alviso Unit and its relationship to the USACE project.

2. USACE Project Description and APE. The USACE proposed action, referred to as the San Francisco Bay Phase I Shoreline Study (Phase I Project), would involve an area of 13 salt ponds located in the eastern half of the Alviso Unit, which has a total of 25 salt ponds (Figure 1). All but one salt pond in the APE are situated within the USFWS Don Edwards San Francisco Bay National Wildlife Refuge (Refuge) administered by the USFWS. The one pond added to USACE Phase I Project APE (A18) is owned by the City of San Jose. In the APE, restoration activities will focus on converting the salt ponds to naturally functioning, tidally influenced salt marsh, which will require breeching levees and opening ponds to the tides, building levees between the newly restored tidal marsh areas and local communities, and restoring habitat features.

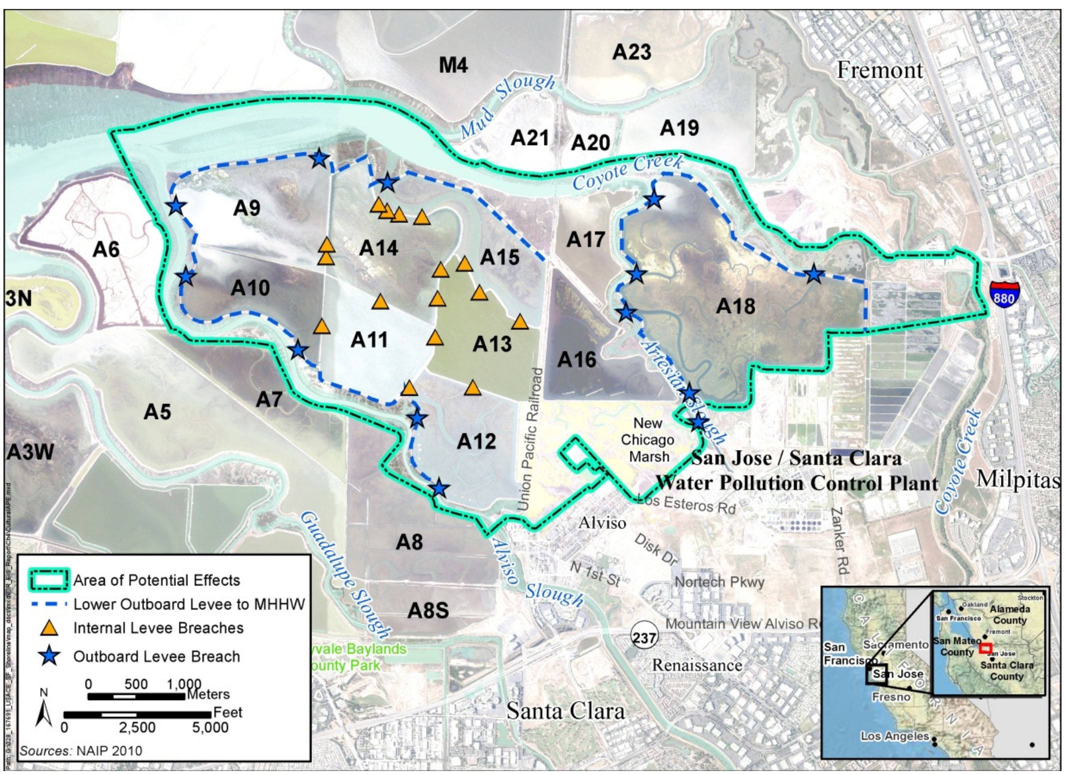


Figure 1: San Francisco Bay Phase I Shoreline Project Area of Potential Effects

3. The Phase I Project is a dual-purpose project, closely associated with the USFWS restoration program: the conversion of industrial salt ponds into tidally influenced salt marsh, and the construction of a flood risk management levee that is critical to the function of the

restoration measures. The Phase I Project is related to an extensive, multiagency program in San Francisco Bay, entitled the South Bay Salt Pond Restoration Project (SBSPRP), which has identified approximately 20,000 acres of former industrial salt-pond complexes stretching across the South Bay shoreline between Fremont and Palo Alto that would be restored to tidal salt marsh and other wetland habitats. Under the SBSPRP, the USFWS identified three major historic salt pond complexes in the South Bay and outlined restoration plans: Eden Landing Unit near Hayward, Ravenswood Unit near Palo Alto, and Alviso Unit in north San Jose.

4. USFWS Section 106. In 2012, the USFWS consulted with the California State Historic Preservation Office (SHPO) regarding the restoration program for the entire Alviso Unit, and consequently, satisfied the requirements of Section 106 of the National Historic Preservation Act (NHPA), pursuant to 36 C.F.R. § 800, by executing a Memorandum of Agreement (MOA) that included a Historic Property Treatment Plan (HPTP). Information from the USFWS Section 106 compliance is highlighted below; it has direct impact on the current USACE effort to comply with Section 106

5. Alviso Unit National Register. The USFWS evaluated the Alviso Unit, concluded that it was eligible for inclusion in the National Register of Historic Places (National Register), and received concurrence from the California State Historic Preservation Officer (SHPO) that the *Alviso Salt Pond Historic Landscape (Historic Landscape)* is a Historic Property under Criterion A of the National Register. The USFWS technical report discussing the National Register evaluation of the Alviso Unit is entitled "Appendix E: Identification and Evaluation of the South San Francisco Bay Solar Salt Industry Landscape," a copy of which is available from USACE.

The Alviso Unit APE was surveyed by the USFWS, which consisted of walking the outboard and inboard salt pond levees, recording archaeological features on and next to the levees as well as documenting features in the ponds through visual observations and GPS recording. The USACE technical report, which is entitled "Cultural Resource Assessment: South San Francisco Shoreline Interim Feasibility," presents the results of its research and survey effort; it is available from USACE.

6. USFWS Adverse Effects. The USFWS determined that restoration would cause adverse effects to the *Historic Landscape* as a result of converting salt ponds into tidal marsh, because the project will change the character-defining elements of the property by affecting their function and appearance. Under the terms of HPTP, the USFWS prepared a report on the *Historic Landscape* that meets the requirements of the *Historic American Landscape Survey*. The report was submitted to the Library of Congress through the National Park Service. The determination of adverse effect to the *Historic Landscape* is consistent with USACE finding. Even with the addition of pond A18 to the USACE undertaking, USACE suggests that additional mitigation measures beyond the USFWS report may not be needed, an issue that will be part of USACE Section 106 consultation with SHPO for the tidal marsh restoration project component.

7. USACE Levee Contribution. Although the USFWS restoration program included the concept of new levees in the Alviso Unit, USACE has explicitly outlined the design and siting of the levee, and evaluated the visual impacts, the results of which were presented in the USACE draft Environmental Impact Report/Statement (EIS/R). The USACE considered alternatives to a new levee, including a no-action alternative, and selected the least environmentally damaging levee alternative (out of three possible alternatives) in consideration of the wishes of Alviso

residents (Figure 2). The new levee alignment follows the alignment of an existing, non-engineered levee; however, the new levee will have engineered dimensions and will be larger. The new Alviso North levee is situated far from the town to reduce the level of adverse visual effects. The EIR/S includes simulation photos that show the view of the new levee from different points around Alviso.

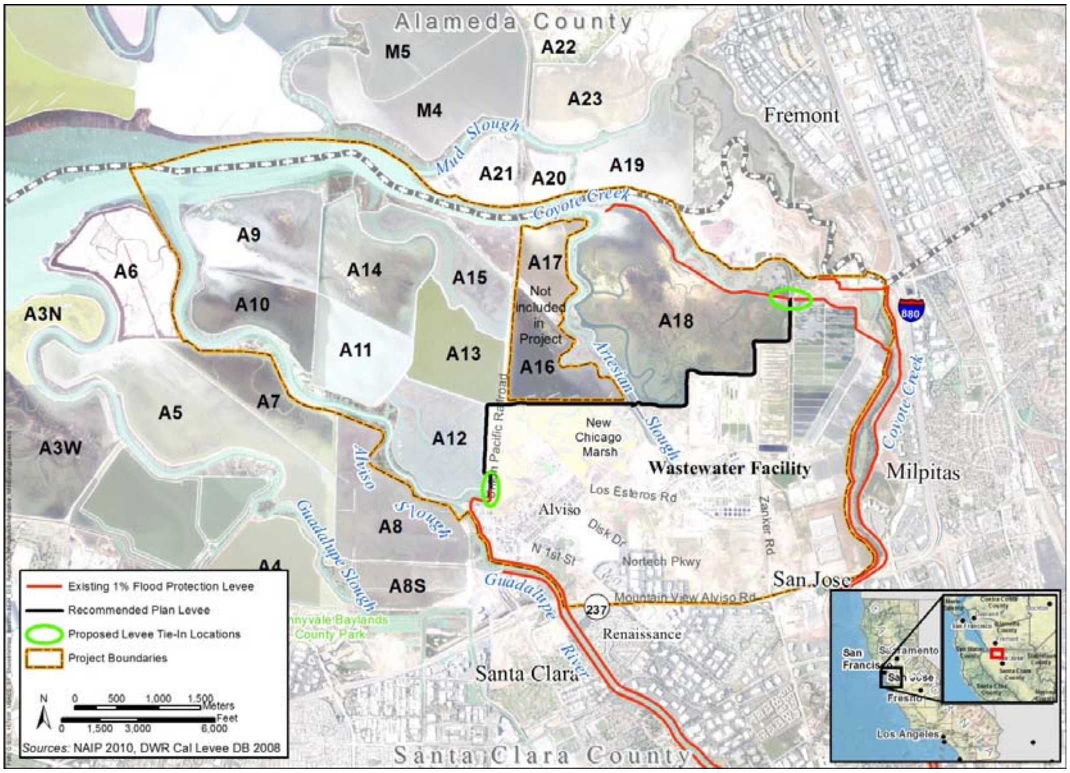


Figure 2: Study Area Map Showing Levee Location

8. USACE Levee and Alviso Historic District. In addition to the salt pond *Historic Landscape*, the other historic property of importance for the USACE Section 106 consultation is the Alviso Historic District. Alviso, known as "Port of Alviso (San José)," was listed in the National Register in 1973 as a District. The Alviso Historic District comprises eleven buildings on ninety acres. The Port of Alviso is also a State of California Point of Historical Interest (SHPI SCL-061) and listed in the California History Plan and California Inventory of Historic Resources.

Alviso is situated adjacent to, and overlooks, the vast salt pond complex. The northwest boundary of the Historic District is adjacent to the part of the APE where the western end of the flood levee will tie into to the existing levee at the Alviso Marina. This construction would require work near and possibly in the Historic District. The addition of a new levee would not cause an adverse effect to any of the contributing elements of the Historic District, or to any non-contributing buildings. The introduction of a larger levee would cause a minor change in the character and setting; however, constructing this feature would not diminish the integrity of the District’s significant historic features. USACE has therefore determined that the undertaking will not cause an adverse effect to the Alviso Historic District.

9. USACE Cultural Resource Inventory. The USACE Phase I research identified several other historic sites and prehistoric cultural resources situated near but outside the USACE APE. They were nonetheless visited during archaeological surveys and updated site information recorded. One archaeological site (CA-ALA-338) is of particular interest, because it is recorded as the disturbed remnants of a shell deposit situated in the bottom of a salt pond. Archaeologists have observed ALA-338 for decades, and most recently both USACE and the USFWS have reported on this site in their cultural resource documents noted above. The site appears to be situated east of the Alviso Unit APE, i.e., east of Pond A19, but this ancillary salt pond area may be under the USFWS jurisdiction. If it is Refuge lands, the USFWS monitoring and management measures in their HPTP (attached to the MOA) would be applicable. The USACE will follow up on this matter.

10. The USACE understands that the USFWS consulted local Native American tribal representatives and invited them to comment on the SBSPRP restoration measures for the Alviso Unit. To date, the USACE has not offered the tribes an opportunity to comment. USACE will engage the tribes through written correspondence and request their comment and recommendations.

MEMORANDUM OF AGREEMENT
BETWEEN THE U.S. FISH & WILDLIFE SERVICE
AND THE
CALIFORNIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE SOUTH BAY SALT POND RESTORATION PROJECT
INCLUDING RESTORATION OF FORMER INDUSTRIAL SALT PONDS TO TIDAL SALT MARSH AND OTHER WETLAND HABITATS, INCLUDING THE FORMER SALT WORKS SITES WITHIN THE ALVISO UNIT ON THE DON EDWARDS SAN FRANCISCO BAY NATIONAL WILDLIFE REFUGE AND CALIFORNIA DEPARTMENT OF FISH AND GAME'S, EDEN LANDING ECOLOGICAL RESERVE; ALAMEDA AND SANTA CLARA, COUNTIES, CALIFORNIA

WHEREAS, the South Bay Salt Pond Restoration Project (SBSPRP) is an extensive project that includes approximately 20,000 acres of former industrial salt pond complexes along the shoreline of the San Francisco Bay, south of the San Mateo Bridge. The salt ponds were part of a vast system of salt ponds previously operated by Cargill Salt. In 2003 the Alviso and West Bay salt pond complexes were transferred to the U.S. Fish and Wildlife Service and included in the Don Edwards San Francisco Bay National Wildlife Refuge (DESFBNWR). The Baumberg salt pond complex, now knows as the Eden Landing Ecological Reserve, is owned and managed by the California Department of Fish and Game (CDFG). The SBSPRP is partially on federal property, will require a federal permit, and will use federal funding. Restoration activities will change the salt ponds to salt marsh which alters their function and open water appearance, both of which are contributing characteristics of the historic landscape and has the potential to affect a historic property (Undertaking) (Figure 1 in Attachment 1); and

WHEREAS, the U.S. Fish and Wildlife Service (USFWS) has determined, in consultation with the California State Historic Preservation Officer (SHPO), that the former salt works and evaporative salt industry ponds associated with the Alviso Unit of the DESFBNWR and property owned and managed by the CDFG known as the Eden Landing Ecological Reserve (ELER) are eligible for inclusion in the National Register of Historic Places under Criteria A (historic property) as historic landscapes, including the six eligible archaeological sites identified within the ELER as defined in 36 CFR Part 800, the regulation implementing Section 106 of the National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470f). The SHPO concurred with the evaluation on October 12, 2010; and

WHEREAS, the USFWS has determined that altering the former industrial salt ponds in the Alviso and ELER complexes by replacing the controlled flow of water with a tidally influenced marsh environment will adversely affect the character defining elements of the ponds by affecting their function and appearance and may adversely affect the archaeological sites by changing the water system (Adverse Effect); and

WHEREAS, the USFWS has consulted with the SHPO pursuant to 36 CFR Part 800 regarding the Undertaking's adverse effects on historic properties and the USFWS has notified the Advisory Council on Historic Preservation (Council) of the adverse effect pursuant to 36 CFR 800, implementing Section 106 of the National Historic Preservation Act, as amended, 16 U.S.C. 470f (NHPA). The Council has declined to participate in a letter dated December 3, 2010; and

WHEREAS, a portion of the project is on land owned by the CDFG. The USFWS and CDFG have consulted regarding this project and have executed a Memorandum of Understanding (MOU) that determines that the USFWS is the lead agency and defines the relationship and responsibilities of each agency. The CDFG is a consulting party with obligations that are associated with the resolution of the adverse effect, thus they have been invited to concur in this MOA (800.6(c)(3); and

WHEREAS, the USFWS has consulted with interested parties and tribes. The SBSPRP includes a wide variety of partners and agencies. Communication with and input from stakeholders in the community and interested organizations continues to be achieved using public meetings and workshops, a website, a newsletter, press releases, and presentations, to ensure that the public remains informed about the project status and is involved in the planning and implementation process. The USFWS consulted with tribes and tribal members provided by the California Native American Heritage Commission. Consultation was also accomplished through contacts during the public outreach efforts. The Hayward County Historical Society and parties that expressed an interest will continue to be updated as the project is implemented; and

NOW, THEREFORE, the USFWS and the SHPO agree that if the Undertaking proceeds, the Undertaking shall be implemented in accordance with the following stipulations in order to take into account the effects of the Undertaking on a historic property and to satisfy the requirements of Sections 106 and 110(b) of the NHPA, and further agree that these stipulations shall govern the Undertaking and all of its parts until this Memorandum of Agreement (MOA) expires or is terminated.

STIPULATIONS

The USFWS and by extension through the MOU, CDFG shall ensure that the following stipulations are implemented:

I. Area of Potential Effect

A. The Area of Potential Effect (APE) is depicted in Figures 2 and 3 (Attachment 1) and includes the Alviso Historic District and ELER Historic District that are located in the southern end of San Francisco Bay. The ELER encompasses 6612 acres divided into 23 ponds. The Alviso Unit encompasses 9677 acres divided into 28 ponds. Within the APE, activities will focus on restoring the salt ponds to naturally functioning, tidally influenced salt marsh which requires breeching levees and opening ponds to the tides, building levees between the newly restored tidal marsh areas and local communities, and restoring habitat features. Additionally, archaeological resources within the ELER Historic Landscape that are contributing elements of the landscape may be affected by fluctuating water levels

B. If modifications to the Undertaking take place subsequent to the execution of this MOA that necessitate the revision of the APE, USFWS will consult with the SHPO to facilitate mutual agreement on the subject revisions. If USFWS and SHPO cannot reach an agreement, then the parties will resolve the dispute in accordance with Stipulation III.B of this document. Should the USFWS and SHPO reach mutual agreement on the proposed revisions the USFWS will submit a final map of the revision no later than 30 days following such an agreement.

II. Mitigation of Project Effects to Historic Properties

The USFWS has consulted with the SHPO and has developed a historic properties treatment plan (Attachment 2) that will be implemented, prior to and during the SBSPRP. The mitigation plan follows the *Secretary of the Interior's Standards for the Treatment of Historic Properties* and includes the following elements:

A. Recordation of Historic Properties: The Alviso and ELER salt pond complexes are considered historic landscape districts. The USFWS consulted with the Regional Coordinator for the HALS program at the National Park Service regarding the requirements for photo documentation and recordation of the landscape that is commensurate with the level of adverse effect. NPS-HALS program staff responded with guidance on the requirements for recordation, therefore all recordation and photography documentation requirements will be in accordance with this guidance. The HALS documentation will be submitted to the NPS for transmittal to the Library of Congress. Copies of the HALS documentation will also be maintained at the DESFBNWR, USFWS Cultural Resources Team office, CDFG, and the Hayward County Historical Society.

B. Interpretation of Solar Salt Industry: Interpretive materials will be developed, including at least one interpretive panel and pamphlet that describes the solar salt industry process and landscape features that were associated with the evaporative salt industry. A draft of the interpretive materials will be shared with SHPO and interested parties for review and comment. The panel will be installed within the ELER. The timeline for completing the interpretive materials is based on the pace of the restoration project but is estimated to be within 5 years of the date of this agreement

C. Archaeological Resources: Archaeological resources within the ELER that are contributing elements of the historic landscape will be treated according to the Treatment Plan (Attachment 2). Generally, sites will be protected *in situ*.

However, sites that are affected by fluctuating water levels will be documented with photography, GPS mapping, and limited subsurface testing of features and selective surface collection. The sites will then be monitored once a year at a low tide event or summer dry season for five consecutive years from the signing of this MOA. Monitoring will continue until the restoration work is completed. No additional affects are anticipated from the restoration work once the salt marsh habitat has been reestablished, at that point monitoring will cease. If any site appears to be accessible to vandals or the structure of the site changes due to vandalism, then a more substantial data collection procedure will be instituted. There is also the potential for new discoveries to occur and these will be managed by recordation and data collection procedures outlined in the Historic Properties Treatment Plan (Attachment 2).

III. Administrative Provisions

A. Standards

1. Professional Qualifications: All activities prescribed in Stipulations I and II of this MOA shall be carried out under the authority of USFWS by or under the direct supervision of a person or persons meeting at a minimum the *Secretary of the Interior's Professional Qualifications Standards* (48 FR 44738-3, September 29, 1983) in the appropriate disciplines.

B. Dispute Resolution

1. Should the SHPO object to the manner in which the terms of this MOA are implemented, to any action carried out or proposed with respect to implementation of the MOA, or to any documentation prepared in accordance with and subject to the terms of this MOA, the USFWS shall immediately consult with the SHPO for no more than 30 days to resolve the objection. If the objection is resolved through such consultation, the action subject to dispute may proceed in accordance with the terms of that resolution. If, after initiating such consultation, the USFWS determines that the objection cannot be resolved through consultation, the USFWS shall forward all documentation relevant to the objection to the Council, including the USFWS proposed response to the objection, with the expectation that the Council will within 45 days after receipt of such documentation:

    a. Advise the USFWS that the Council concurs in the proposed response to the objection, whereupon the USFWS will respond to the objection accordingly; or

b. Provide the USFWS with recommendations, which the USFWS will take into account in reaching a final decision regarding its response to the objection; or

c. Notify the USFWS that the objection will be referred for comment to the Council pursuant to 36 CFR 800.7, and proceed to refer the objection and comment. The USFWS shall take the resulting comment into account in accordance with 36 CFR 800.7(c)(4) and Section 110 (1) of the NHPA.

2. Should the Council not exercise one of the above options within 45 days after receipt of all pertinent documentation, the USFWS may assume the Council's concurrence in its proposed response to the objection.

3. The USFWS shall take into account any Council recommendation or comment provided in accordance with this stipulation with reference only to the subject of the objection. The USFWS responsibility to carry out all actions under this MOA that are not the subjects of the objection will remain unchanged.

4. At any time during implementation of the measures stipulated in this MOA should an objection pertaining to such implementation be raised by a member of the public, the USFWS shall notify the SHPO and take the objection into account, consulting with the objector and, should the objector so request, with the SHPO to address the objection. The time frame for such consultation shall be reasonably determined by the USFWS.

5. The USFWS shall provide to the SHPO, the Council when Council comments have been issued hereunder, and any parties that have objected pursuant to paragraph B.4., above, with a copy of its final written decision regarding any objection addressed pursuant to this stipulation.

6. The USFWS may authorize any action subject to objection under this stipulation to proceed after the objection has been resolved in accordance with the terms of this stipulation.

C. Amendments

Either signatory may propose that this MOA be amended, whereupon the signatories will consult for no more than 30 days to consider such amendment. The amendment process shall comply with 36 CFR 800.6(c)(1) and 800.6(c)(7). This MOA may be amended only upon the written agreement of the signatories. If it is not amended, this MOA may be terminated by either signatory in accordance with Stipulation D., below.

D. Termination

1. If this MOA is not amended as provided for in paragraph C. of this stipulation, or if

either signatory proposes termination of this MOA for other reasons, the signatory proposing termination shall in writing notify the other signatory, explain the reasons for proposing termination, and consult with the other signatory for at least 30 days to seek alternatives to termination. Should such consultation result in an agreement on an alternative to termination, then, the signatories shall proceed in accordance with the terms of that agreement.

2. Should such consultation fail, the signatory proposing termination may terminate this MOA by promptly notifying the other signatory in writing. Termination hereunder shall render this MOA null and void. If this MOA is terminated hereunder and if the USFWS determines that the Undertaking will nonetheless proceed, then the USFWS shall either consult in accordance with 36 CFR 800.6 to develop a new MOA or request the comments of the Council pursuant to 36 CFR Part 800.

E. **Duration of the MOA**

Unless terminated pursuant to paragraph D. of this MOA, or unless it is superseded by an amended MOA, this MOA will be in effect until the USFWS, in consultation with the SHPO, determines that all of its stipulations have been satisfactorily fulfilled. The duration of this MOA will not exceed seven (7) years, because of the restoration phases that require up to five years to complete, unless the signatory parties agree to an extension. Upon a determination by USFWS that all of the terms of this MOA have been satisfactorily fulfilled, this MOA will terminate and have no further force or effect. The USFWS will promptly provide the SHPO and CDFG with written notice of its determination and of the termination of the MOA. Following provision of such notice, this MOA will be null and void.

F. **Effective Date**

This MOA will take effect when it has been executed by both the USFWS and the SHPO. Execution of this MOA by the USFWS and the SHPO, its transmittal by the USFWS to the Council in accordance with 36 CFR 800.6(b)(1)(iv) and subsequent implementation of its terms, shall evince pursuant to 36 CFR 800.6(c), that this MOA is an agreement with the Council for purposes of Section 110(1) of the NHPA, and shall further evince that the USFWS has afforded the Council an opportunity to comment on the Undertaking and its effects on historic properties, and that the USFWS has taken into account the effects of the Undertaking on historic properties. The CDFG is a concurring party to the MOA as represented by their signature.

U.S. FISH and WILDLIFE SERVICE

By: G. Mendel Stewart Date: 5/25/12

Mendel Stewart, Project Leader, San Francisco Bay NWR Complex, Region 8

CALIFORNIA STATE HISTORIC PRESERVATION OFFICER

By: milford wayne donaldson Date: 28 JUN 2012

Mr. Milford Wayne Donaldson, FAIA: California State Historic Preservation Officer

Concurring Party
CALIFORNIA DEPARTMENT OF FISH AND GAME

By: Scott Wilson Date: 6/12/12

Mr. Scott Wilson, Acting Regional Manager, Bay Delta Region

Attachments:
Attachment 1: Figure 1. Project Location Map.
Figure 2. Alviso Unit APE.
Figure 3. ELER APE.

Attachment 2: Historic Properties Treatment Plan

ATTACHMENT 1.

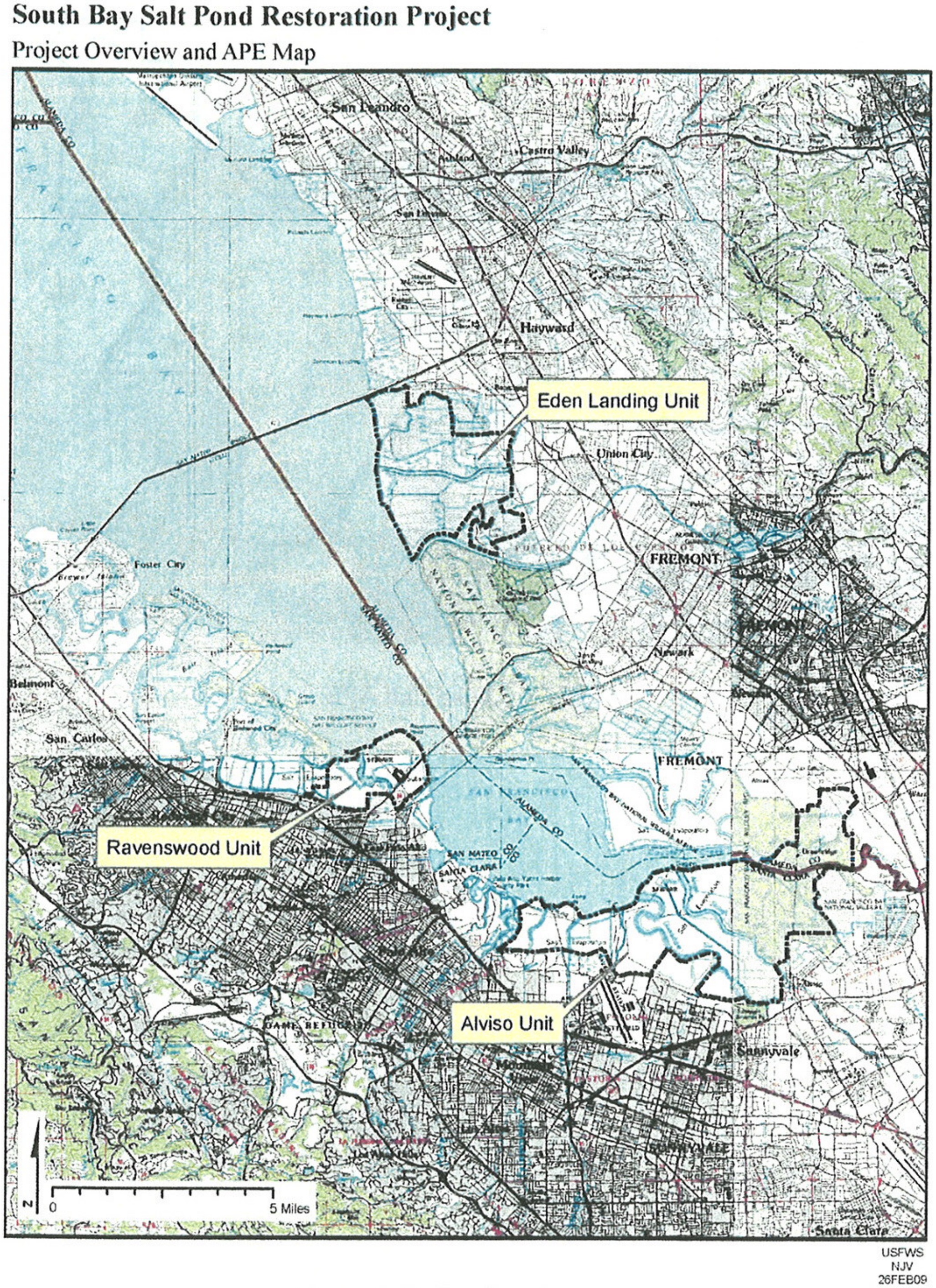


Figure 1. Project location map.

FWS040721A South Bay Salt Pond Restoration Project (SBSPRP) MOA (5/9/2012)
Don Edwards San Francisco Bay NWR and California Department of Fish and Game 8

South Bay Salt Pond Restoration Project

Alviso Unit APE Map

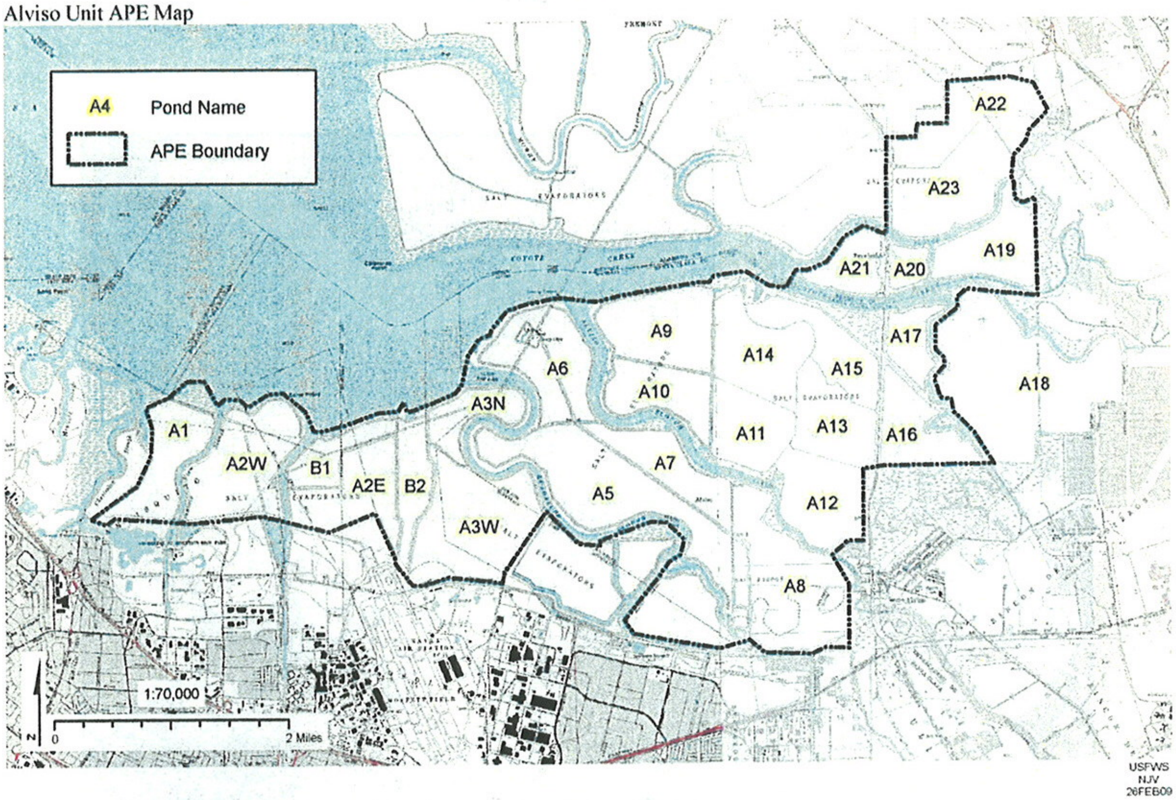


Figure 2. Alviso Unit APE.

South Bay Salt Pond Restoration Project
Eden Landing Unit APE Map

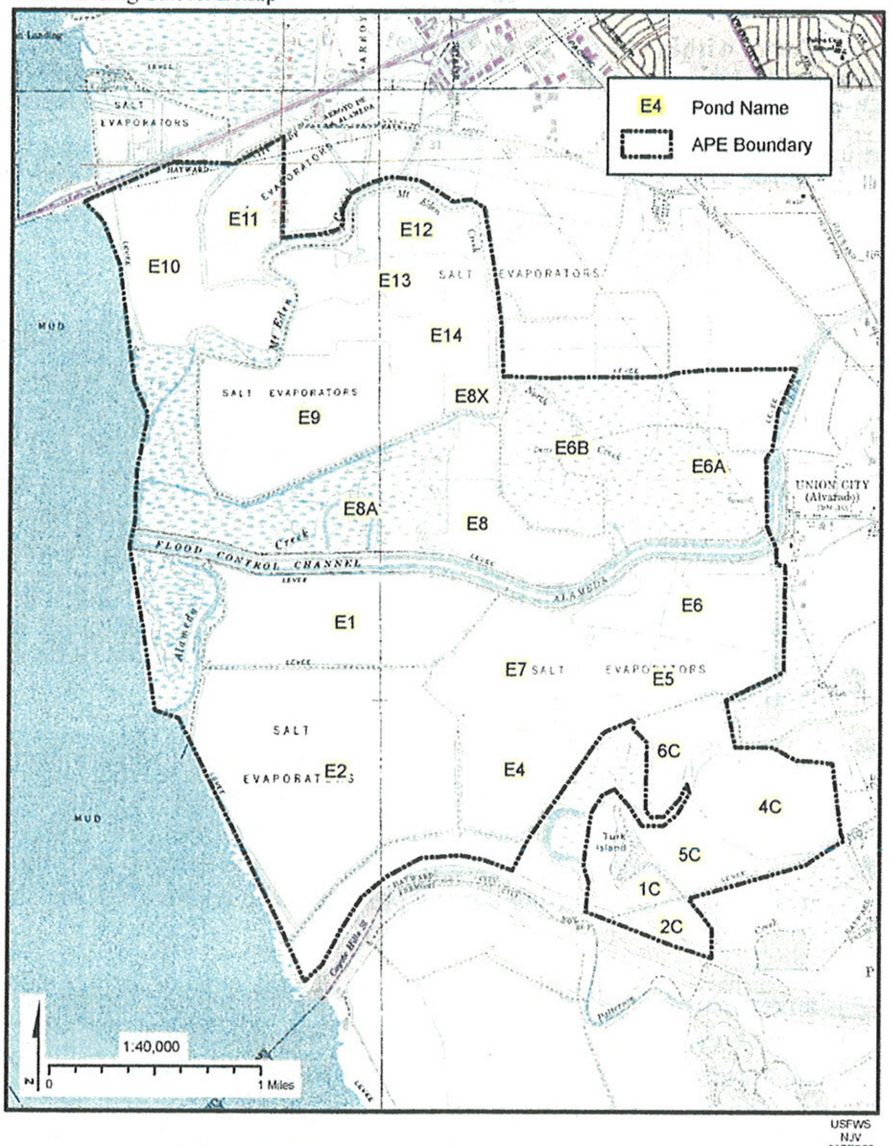


Figure 3. ELER APE.

ATTACHMENT 2.

U.S. Fish and Wildlife Service Project #FWS040721A
Historic Properties Treatment Plan
for the
Salt Works within the South Bay Salt Pond Restoration Project at the
Alviso Unit, Don Edwards San Francisco Bay National Wildlife Refuge,
and the
Eden Landing Ecological Reserve, California Department of Fish and Game
Alameda and Santa Clara counties, California
January 14, 2011/revised May 4, 2012

Introduction

The South Bay Salt Pond Restoration Project (SBSPRP) will restore the former industrial salt production ponds in South San Francisco Bay to a more natural mix of tidal wetland habitats and managed ponds. The restoration comprises former salt ponds located at the southern end of San Francisco Bay. The SBSPRP encompasses property managed by the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG). The agencies are working together along with the California State Coastal Conservancy (Conservancy) and U.S. Army Corps of Engineers (USACE) and other project partners. The SBSPRP is composed of three noncontiguous units, including the Eden Landing Ecological Reserve (ELER or Eden Landing) on the east side of the Bay near the San Mateo bridge; the Alviso unit at the southern end of the bay; and the West Bay-Ravenswood unit located on the west side of the Bay near the Dumbarton Bridge (Figure 1).

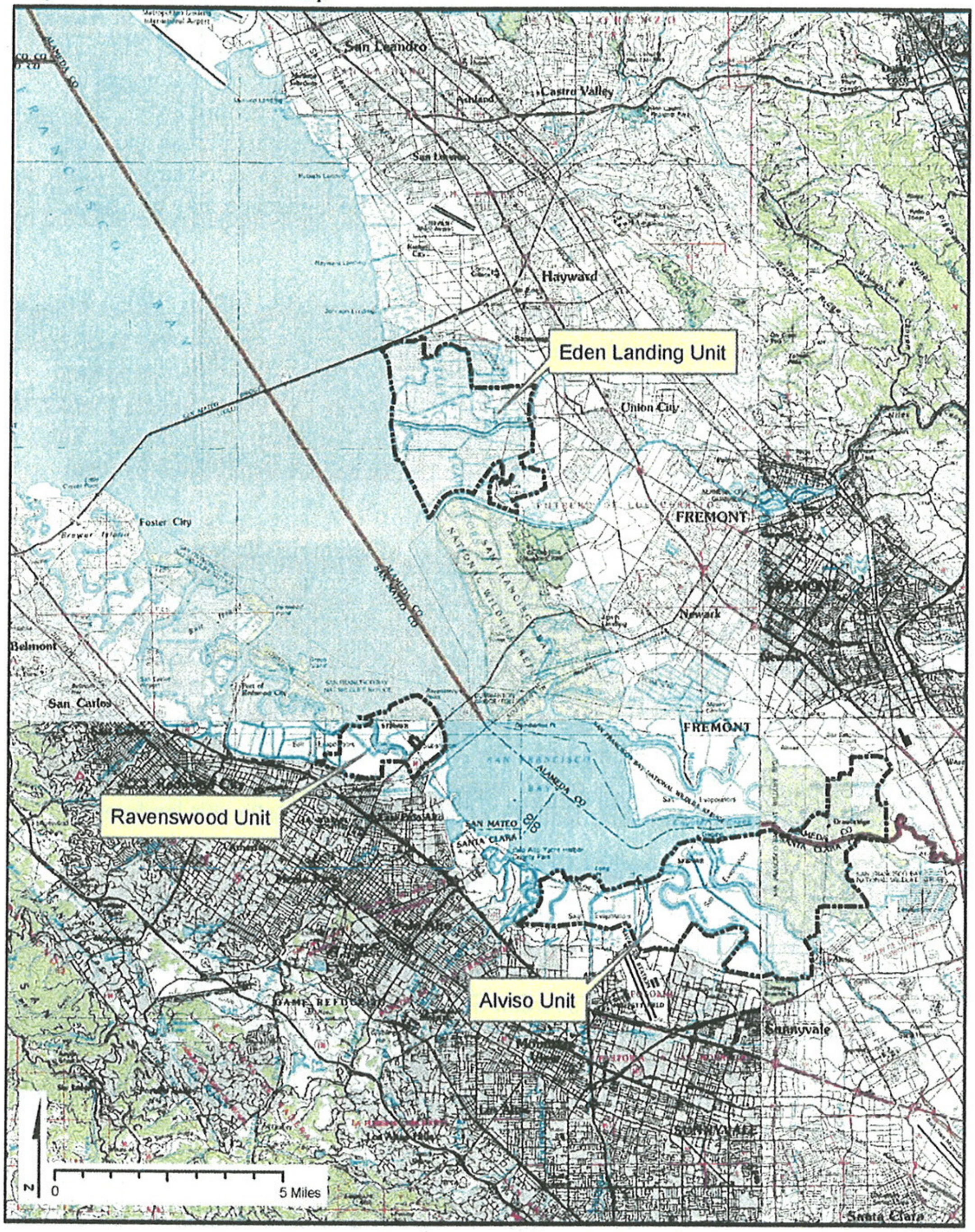
In 2010 the salt works at the Alviso Unit and ELER were evaluated and determined to be eligible to the National Register of Historic Places (NRHP) as historic landscapes that encompass a range of condensing ponds, archaeological resources, and features associated with solar salt production and processing. This historic properties treatment plan has been developed to mitigate for the adverse effects associated with converting the salt ponds back to a native salt marsh habitat.

Undertaking

The SBSPRP is an extensive project that includes nearly 20,000 acres of former industrial salt ponds that were part of a vast system of salt ponds previously operated by Cargill Salt. The USFWS is the lead agency for complying with the National Historic Preservation Act. The Alviso Unit is managed by the USFWS and the ELER salt ponds are owned and managed by the CDFG. The SBSPRP is partially on federal property, will require a federal permit, and will use federal funding. Restoration activities will change the salt ponds to salt marsh which alters their function and open water appearance, both of which are contributing characteristics of the historic landscape and has the potential to affect a historic property

South Bay Salt Pond Restoration Project

Project Overview and APE Map



USFWS
NJV
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Figure 1. Project location map.

FWS040721A South Bay Salt Pond Restoration Project (SBSPRP) MOA (5/9/2012)
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Area of Potential Effects

The Area of Potential Effect (APE) is depicted on Figure 1 and includes the Alviso Historic District and ELER Historic District that are located in the southern end of San Francisco Bay (See Figures 2 and 3). The ELER encompasses 6612 acres divided into 23 ponds, in Alameda County. The Alviso Unit encompasses 9677 acres divided into 28 ponds, within Alameda and Santa Clara counties. Within the APE, activities will focus on restoring the salt ponds to naturally functioning, tidally influenced salt marsh which requires breeching levees and opening ponds to the tides, building levees between the newly restored tidal marsh areas and local communities, and restoring habitat features. Additionally, archaeological resources within the ELER Historic Landscape that are contributing elements of the landscape may be affected by fluctuating water levels

The Alviso Unit is drained, from east to west, by Mud Slough, Coyote Creek, Alviso Slough, Guadalupe Slough, Stevens Creek, Mtn View Creek, and Charleston Slough. The boundaries of the Alviso Salt Works Historic Landscape are established by legal ownership and natural features. The Eden Landing Unit is drained by Mt. Eden, North, and Old Alameda Creeks, the Alameda Federal Flood Control Channel marks the southern boundary of the district. The boundaries of the Eden Landing Salt Works Historic Landscape are established by legal ownership and natural features.

Alviso Salt Works Eligibility to the National Register of Historic Places:

The Alviso Salt Works Historic Landscape meets eligibility standards under criterion A because it is associated with the twentieth century period of industrialization when one operator created a vast network of evaporation ponds to produce the large amount of brine necessary to meet production demands. The SHPO has concurred with the eligibility determination (Donaldson to Mruz, October 12, 2010). Interpreting the Alviso Salt Works landscape offers a different view of the salt industry than the Eden Landing area. The Alviso Salt Works clearly reflects the industrial zenith and development of huge tracks of salt marsh for salt brine production. The large exterior levees and vast ponds are the signature features of the Alviso Unit solar salt landscape.

Alviso Salt Works Historic Properties Description

The history of solar salt production in Alviso dates from the 1920s. In Alviso, the salt industry did not develop from small, family-owned salt farms, but rather, began as an industrial-level enterprise. Only two salt companies, the Alviso Salt Company (that included Continental Salt and Chemical Company) and Schilling's Arden Salt Company are associated with the Alviso unit. Both companies appear to have built levees, developed salt ponds, and harvested salt from these lands during the 1920s. Arden acquired Alviso Salt in 1929, including its plant near the town of Alviso. Leslie Salt became the sole operator after 1936, until Cargill's acquisition in 1978 (EDAW 2005:14).

The Alviso Salt Works is characterized by vast evaporation ponds, large levees, and robust water control devices. The pattern of spatial organization has changed only slightly from the 1950s when the operation was controlled by the Leslie Salt Company. The Alviso Unit was developed for brine production there were no crystallizing ponds or processing plants within the unit.

One archaeological site, one townsite, and a bridge have been recorded within the Alviso Salt Works, none of which are related to salt production (Table 1). Only two of the three resources within the Alviso Salt Works are potentially eligible properties but they do not contribute to the Alviso Salt Works Historic Landscape. The town of Drawbridge (P-01-003291) and site CA-ALA-338 (P-01-002057) have been reviewed but no formal determination of eligibility has been completed. Site CA-ALA-338 was originally noted in 1909 by Nels C. Nelson as a shell-midden mound site. The site location has been re-visited, but no evidence of the site was identified (Busby 2008; Valentine 2009). Site CA-ALA-338 appears to have been completely destroyed by salt pond development.

The town of Drawbridge (P-01-003291) was a small community of cabins that were used for duck hunting and weekend retreats. The isolated location also attracted bootleggers, gamblers, and prostitution in the 1920s and 1930s. Leslie's salt plant diked off parts of the east and west marshes at the southern end of San Francisco Bay, leaving Drawbridge in isolation and causing the ground to subside (Morrow 1984; EIS/EIR 2007 Report). Environmental conditions for the island have not improved since the 1940s and most of the cabins are in serious decline, are threatened by vandalism, or are sinking into the marsh. The community was essentially abandoned by the 1950s with the last resident staying until 1978 when the Don Edwards San Francisco Bay NWR was established. Drawbridge is within the refuge boundaries but a corridor through the center of the island and town is on land owned by the Southern Pacific Railroad and private entities. Access to the island requires permission from the Southern Pacific Railroad to cross on their tracks. Because the Service does not own or manage the primary corridor of the town which is within 50 ft of the tracks along with safety concerns with the access on an active railroad track, the deteriorated condition of the buildings, and the problem of continued subsidence of the island have sidelined a proactive preservation approach and implementation of a 1980s plan to open the site to visitors (Morrow 1984:136-137).

The Coyote Slough bridge was constructed in 2001 as a replacement of an earlier bridge and is ineligible to the NRHP.

Table 1. Recorded cultural resources within the Alviso Salt Works Historic Landscape.

Trinomial Site No.	Primary Site No.	Treatment	Eligibility To the NRHP	Description
CA-ALA-338	P-01-002057	N/A	Unevaluated	Disturbed remnants of shell midden; no surface evidence.
	P-01-003291	Monitor	Unevaluated	Drawbridge townsite
	P-01-010205/P-43-001578	N/A	No	Coyote Slough Bridge-installed in 2001.

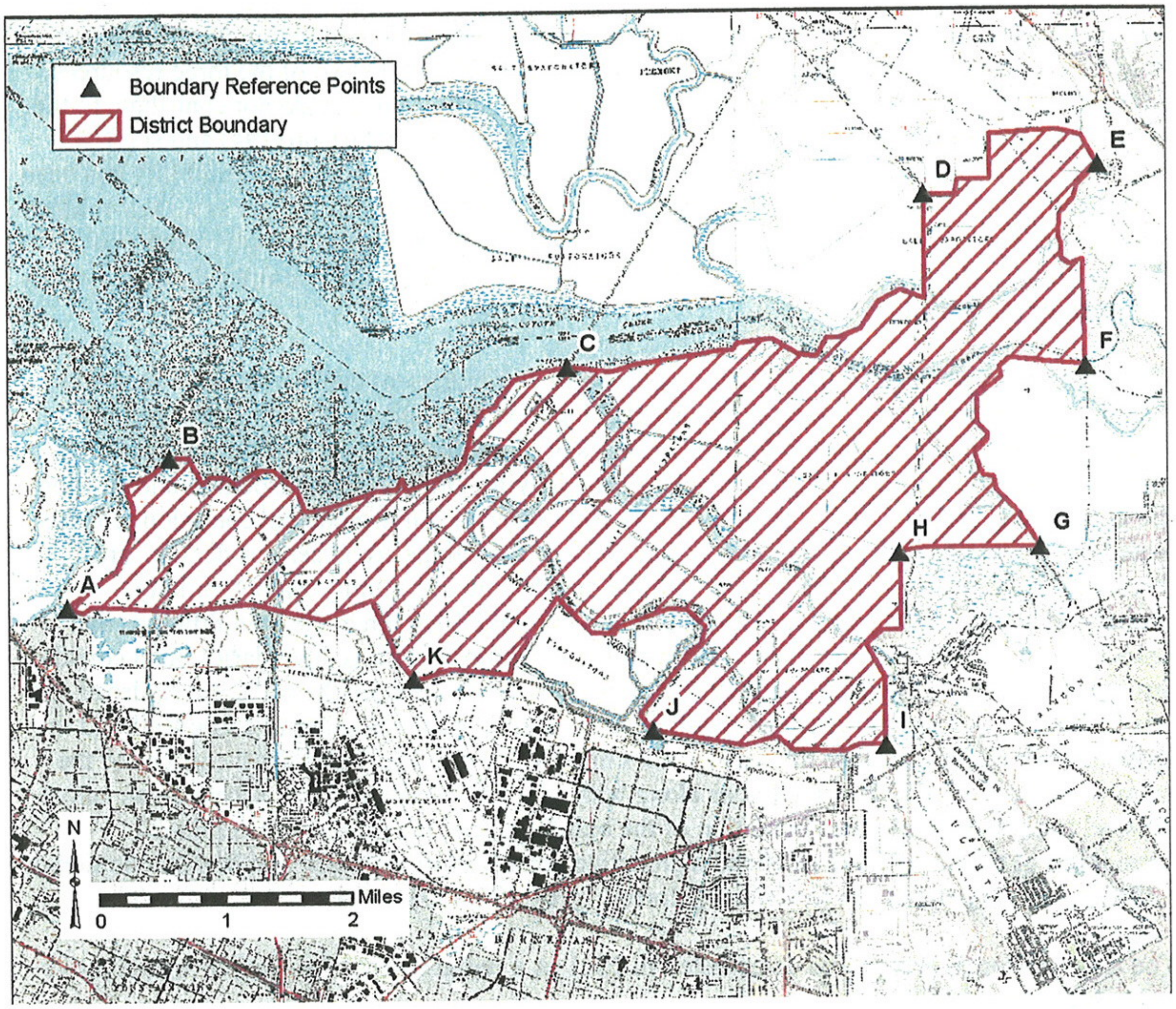

Figure 2. Alviso Salt Works Historic Landscape – Project APE.

Eden Landing Salt Works Eligibility to the National Register of Historic Places:
The Eden Landing Salt Works meets eligibility criteria A and D as defined by the National Register of Historic Places (NRHP) as a historic landscape. The SHPO has concurred with the eligibility determination (Donaldson to Mruz, October 12, 2010). Character defining elements of the historic landscape are the perimeter levees, interior pond divisions, archaeological sites associated with the family-owned processing plants and landings, and the Archimedes screw pumps. The overall Eden Landing Salt Works Historic Landscape provides an opportunity to interpret the evolution of the solar salt industry.

Eden Landing Historic Properties Description

The San Francisco Bay solar salt industry had its beginnings in the Eden Landing area. The initial salt production operations were small, family-owned parcels of less than 50 acres. There were nearly 30 different salt works located within the Eden Landing area between 1850 and 1910. One of the largest salt operations was the Union Pacific Salt Company which was in continuous production from 1872 to 1927. The Oliver Salt Company was among the few nineteenth century salt producers that continued operation into the 1920s. Between 1910 and 1930 the industry began consolidating as the market demand for salt increased beyond the capacity of the small producers. In 1930 the number of operators dropped from 28 to only five; and by the 1940s Leslie became the only major operator (EDAW 2005:14). "The Leslie-California Salt Company purchased the Oliver Salt works in 1931" (Ver Planck 1958:110). The small ponds have been altered to meet modern large-scale production needs.

Eleven cultural resources have been recorded within the Eden Landing Salt Works Historic Landscape, all of which are related to the historic period of salt manufacturing (Table 2). Four sites have been determined eligible, five sites have been determined ineligible, and one site is unevaluated. And, one architectural resource, the Archimedes Screw Windmills has been determined to be a contributing element of the Eden Landing Salt Works historic landscape.

Table 2. Recorded cultural resources within the Eden Landing Salt Pond Historic Landscape.

Trinomial Site No.	Primary Site No.	Treatment	Eligibility To the NRHP	Description
CA-ALA-489H, -501H	P-01-000217	Monitor and data collection	Yes	Eden Landing historic shipping station (warehouses, wharves, associated developments)
CA-ALA-494H	P-01-000210	Interpret, monitor	Yes	Oliver Salt Co. piling and foundations
-	P-01-010740	Interpret, monitor	Yes	Archimedes Screw Windmills
CA-ALA-495H	P-01-000211	N/AA	No	Location of former Rocky Point Saltworks – no surface remains.
CA-ALA-496H	P-01-000212	Monitor	Yes	Pilings and foundation of former Union Pacific Salt (ca. 1872-1927)
CA-ALA-497H	-	N/A	No	Peterman's Salt Works -- no surface remains
CA-ALA-498H	P-01-214	N/A	No	Salt works, not relocated
CA-ALA-499H	P-01-215	N/A	No	Modern refuse scatter
-	PF-1	Monitor	Yes	Whisby Salt Works refuse scatter
-	P-01-010834	N/A	No	Union City Alvarado Salt Ponds
-	FWS-07-12-1	Monitor, data collection	Yes	J. Quigely Alvarado Salt Works, domestic refuse scatter

Edens Landing Salt Works Historic Landscape

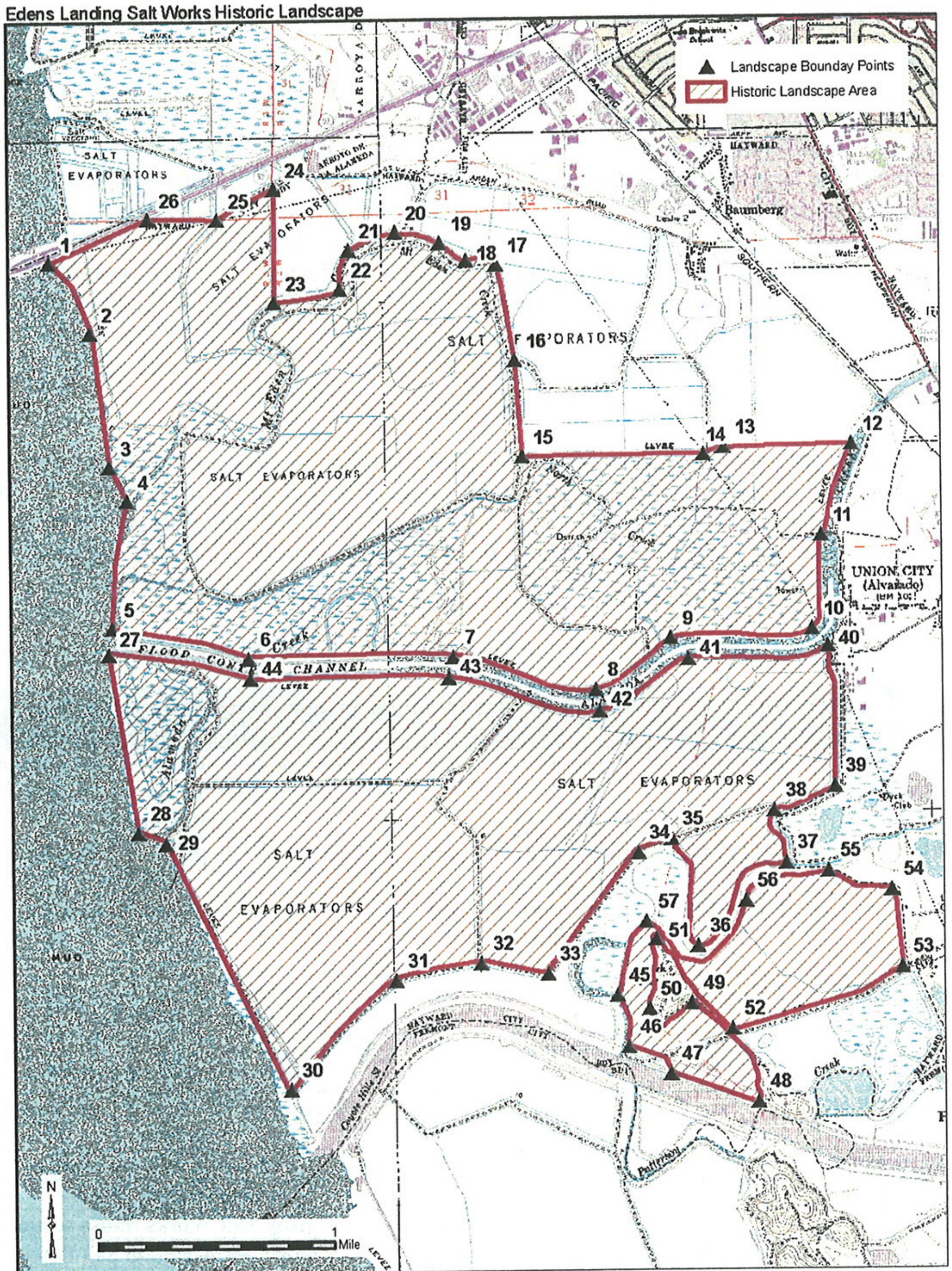

Figure 3. Eden Landing Salt Works Historic Landscape – Project APE.

Character Defining Features of the Alviso and Eden Landing Salt Works Historic Landscape

Character defining features of the Salt Works includes the landscape of levees, open-water ponds, water control structures, roads, and remnant wooden features, and archaeological sites. The initial evaporation ponds were built adjacent to the bay while secondary ponds were larger and protected from inundation from open bay water. Pickling and crystallizing ponds are relatively small and close to the salt processing plant and transportation corridor. The landscape features are engineered but lack distinctive qualities of individual workmanship or materials. The features are important because of their interrelationship and function as an evaporative salt factory. The ponds appearance of open water surrounded by earthen levees is a character defining feature.

The ELER encompasses some of the earliest salt ponds developed for salt production from the naturally suitable tidal salt marsh lands. Remnant features of the salt works of the Oliver family, the Barton family's Union Pacific Salt Works, and J. Quigley's Alvarado Salt Works are represented by archaeological sites that are historic properties. Overprinting by the modern solar salt industry has altered the nineteenth century landscape, raising levees, combining small ponds into much larger evaporation ponds, and changing the flow of water. The levees, water control structures, intakes, and pump stations have all been altered over the years to accommodate the increased production capacity, yet the distinctive pond landscape and remnant features reflect the evolving solar salt production industry.

Assessment of Effects to the Alviso and Eden Landing Salt Works Historic Landscape

The assessment of effects is determined by applying the criteria of adverse effects as provided in 36 CFR 800.5(ii).

> *Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization,. . . that is not consistent with the Secretary's standards for the treatment of historic properties and applicable guidelines.* The *Secretary's Standards* suggest that changes to historic properties should be minimal, follow the original plan, and should be compatible with existing materials or function.

The proposed modifications to remove salt works ponds from salt production will change their function and open water appearance, which are contributing characteristics of the historic landscape. The proposed restoration activities will alter these character defining features of the property which contributes to its eligibility and is an adverse effect as per 36 CFR 800.5(2)(iv). Additionally, altering the water flow from a controlled level to a tidally influenced dynamic flow may affect the six eligible sites within the Eden Landing Salt Works. Only the salt pond landscape will be affected by the restoration activities in the Alviso Salt Works.

Mitigation to resolve the adverse effects of the project activities is directed toward the salt pond landscape and six sites in the ELER.

Treatment Plan Actions

This Historic Properties Treatment Plan will affectively mitigate the effects of the SBSPRP. The USFWS and CDFG will ensure implementation of the treatment plan to include:

1) Documenting the salt works landscape based on consultation with the NPS Regional Coordinator for the Historic American Landscapes Survey (HALS);

2) Submitting the HALS documentation to NPS who will transmit it to the Library of Congress. Additionally, copies of the HALS documentation will be maintained at the DESFBNWR, USFWS Cultural Resources Team office, CDFG, and the Hayward Historical Society;

3) Protecting archaeological resources *in situ* within the ELER that are contributing elements of the historic landscape. Sites that are affected by fluctuating water levels will be documented with photography, GPS mapping, and limited subsurface testing of features and selective surface collection. The sites will then be monitored once a year at a low tide event or summer dry season for five consecutive years from the signing of this MOA. Monitoring will continue until the restoration work is completed. No additional affects are anticipated from the restoration work once the salt marsh habitat has been reestablished, at that point monitoring will cease. If any site appears to be accessible to vandals or the structure of the site changes due to vandalism, then a more substantial data collection procedure will be instituted.

4) Monitoring sites will include a site visit by a qualified archaeologist who will prepare a brief condition assessment report with photo-documentation of each site. Photographs will be taken from set photo points, each year, in order to trace any changes to the sites. Photographs will be maintained by the USFWS Cultural Resources Team (CRT). The CRT will evaluate the photographic record annually to provide site protection recommendations to the land managing agency. Reports will be archived with project materials at the CRT office.

5) Developing interpretive materials to be installed within the ELER that introduces the story of evaporative salt production in the San Francisco Bay region, including a boardwalk and interpretive panel at the Oliver Salt Works and Archimedes Screw Windmills.

Summary and Resolution of Adverse Effect

The mitigation measures presented in this Historic Properties Treatment Plan and stipulated in the Memorandum of Agreement will resolve the adverse effect of the South Bay Salt Pond Restoration Project.

References Cited

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July 16, 2015

Mr. Andrew Galvan
The Ohlone Indian Tribe
Mission San Jose
PO Box 3152
Fremont, CA 94539

Dear Mr. Galvan,

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Sincerely,

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Chief, Planning Division

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Appendix B10

Clean Water Act Section 404(b)(1) Determination

Clean Water Act Section 404(b)(1) Determination

South San Francisco Bay Shoreline Phase I Study

Santa Clara County, California

July 1, 2015

CLEAN WATER ACT SECTION 404(B)(1) EVALUATION

1.0 PROJECT DESCRIPTION

The Shoreline Study Integrated Document fully analyzes alternatives and their effects to the environment within the National Environmental Policy Act Requirements. The alternative discussed in this 404(b)(1) evaluation is the Recommended Plan, which is also the Least Environmentally Damaging Practicable Alternative. This is discussed further in the “Attachment 1. LEDPA Analysis for All Alternatives” and also Chapter 3.9.3 of the Integrated Document.

1.1 PROJECT LOCATION

The study area for Shoreline Phase 1 encompasses a portion of the South Bay shoreline between Alviso Slough and Coyote Creek, along with adjacent managed ponds, tidal waters and marshes, and upland areas in the vicinity of Alviso (Figure 1). Land areas include the community of Alviso, nearby light industrial areas, and a wastewater facility. The study area covers about 7,400 acres in Santa Clara County and consists of the area between the mouth of the Guadalupe River (to the west) and the mouth of Coyote Creek (to the east) and extends south to include both the community of Alviso and the San José–Santa Clara Regional Wastewater Facility (Wastewater Facility). The Study Area includes areas where restoration and FRM action may be implemented and former Salt Ponds A9–A15 and A18.

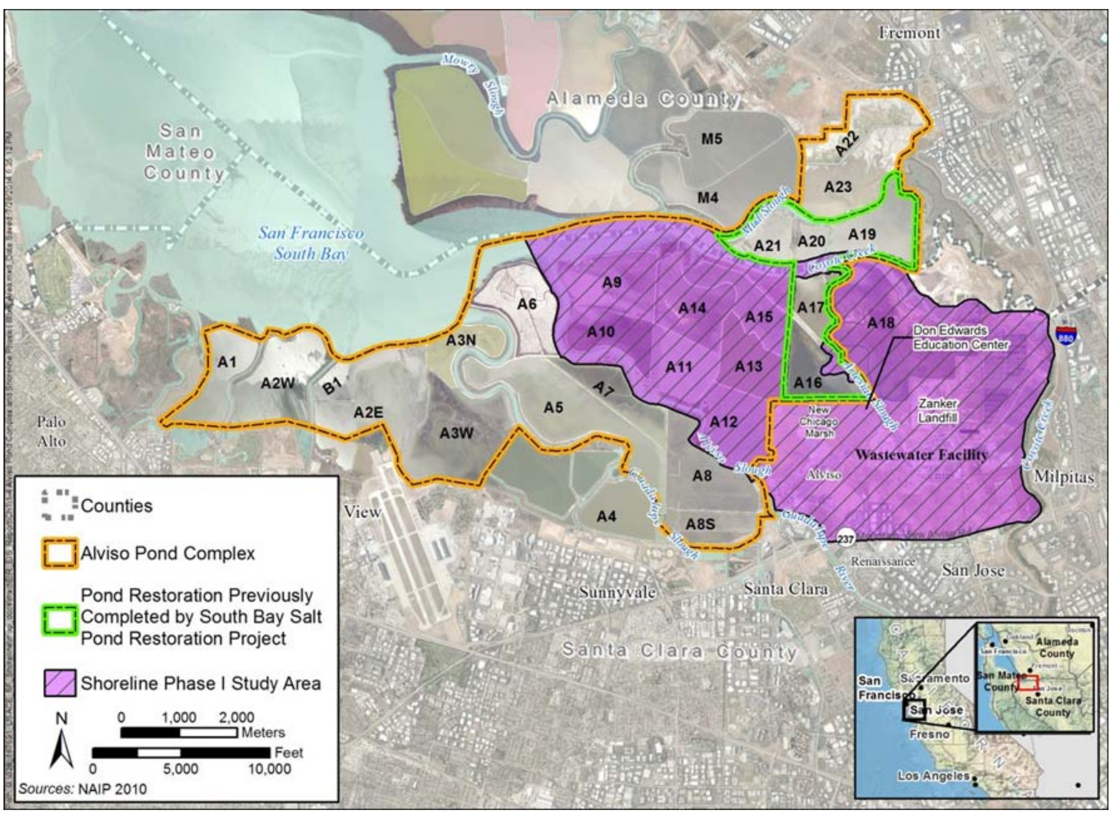

Figure 1. Alviso Pond Complex and Shoreline Phase I Study Area

1.2 GENERAL DESCRIPTION

The U.S. Army Corps of Engineers, San Francisco District, is proposing to construct levees bayward of the community of Alviso and the adjacent Wastewater Facility, restore Ponds A9-15 and A18 from existing managed ponds to allow tidal flow between adjacent sloughs and the existing ponds, allowing for restoration of tidal marsh habitat, and provide recreation features in line with the project objectives. The proposed plan includes: Basic ecosystem restoration of Ponds A9–A15 and Pond A18 with a 30:1 ecotone adjacent to Ponds A12/13 and A18. The tidal marsh restoration approach would be consistent with the approach taken by the South Bay Salt Pond (SBSP) Restoration Project, as follows: modifications would include breaching of outboard levees, modification of internal levees, construction of ditch blocks along existing levee-adjacent channels, and construction of pilot channels along historical contours. The ecotone will provide transitional habitat between the tidal marsh and the upland levee, providing refugia for wildlife during flooding and wave attenuation. The flood risk management levee will be earthen with a height of 15.2 feet NAVD 88 and would tie into existing 1-percent ACE flood risk management features in the study area. Landside areas would have a 15-foot-wide permanent easement (for operation and maintenance) and an additional 15-foot-wide temporary easement for the construction period along the full length of the levee. The new levees would be at least partially on land managed by the USFWS.

In addition to the flood risk management and ecosystem restoration, recreation features will include educational and interpretive signs, seating areas with benches, multi-use trails, wildlife viewing platforms, and a pedestrian bridge over Artesian Slough and the Union Pacific Railroad.

1.3 AUTHORITY AND PURPOSE

1.3.1 Project Authority

This report was prepared as an interim response to USACE Study Authorizations contained in multiple congressional actions, including Section 142 of the Water Resources Development Act of 1976 (WRDA), Public Law 94-94-587, a resolution adopted by the U.S. House of Representatives' Committee on Transportation and Infrastructure in 2002, and further guidance adopted through the WRDA of 2007, Section 4027:

> *".—In accordance with section 221 of the Flood Control Act of 1970 (42 U.S.C. 1962d–5b), and subject to paragraph (2), the Secretary shall credit toward the non-Federal share of the cost of any project authorized by law as a result of the South San Francisco Bay shoreline study—*
> *(A) the cost of work performed by the non-Federal interest in preparation of the feasibility study that is conducted before the date of the feasibility cost sharing agreement; and (B) the funds expended by the non-Federal interest for acquisition costs of land that constitutes a part of such a project and that is owned by the United States Fish and Wildlife Service. (2) CONDITIONS.—The Secretary may provide credit under paragraph (1) if— (A) the value of all or any portion of land referred to in paragraph (1)(B) that would be subject to the credit has not previously been credited to the non-Federal interest for a project; and (B) the land was not acquired to meet any mitigation requirement of the non-Federal interest."*

The most recent Water Resources Reform and Development Act (WRRDA) 2014 Section 1025 provides discretionary authority to the ASA(CW) to approve the USACE's implementation of a project on other Federal Lands (specifically in cases where the non-Federal interest originally purchased those lands). However, the "Secretary may carry out a project [on such lands] only after the non-Federal interest has entered into a memorandum of understanding (MOU) with the Federal agency that includes such terms and conditions as the Secretary determines to be necessary."

For the South San Francisco Bay Shoreline project, this provision applies to all project elements on USFWS lands. Although prior to WRRDA 2014, the USACE was proposing to ask Congress for authorization to construct FRM features on USFWS lands, WRRDA 2014 does apply to the whole project. Any project features that reside on USFWS lands will need a MOU between the non-Federal sponsor and the USFWS to be completed that includes such terms and conditions that the ASA(CW) deems necessary.

1.3.2 Project Purpose

Much of the portion of the study area that is not currently subject to tidal action historically consisted of tidal marsh and slough prior to diking efforts in the 20th century. Loss of these tidal habitats has greatly compromised biological and water quality functions in the study area. In addition, most of the study area is potentially vulnerable to sea level change over the course of the study's evaluation period of 50 years due to its topographic position at the extreme downstream end of the Santa Clara Valley where the valley adjoins San Francisco Bay.

As a result of severe subsidence in the Study Area, many areas landward of the former salt ponds became potentially vulnerable to tidal flooding. The non-engineered dikes protecting these areas were created as early as the 1920s and generally maintained to protect the ponds from tidal flooding when they were being used for salt production. These dikes were not engineered nor intended to reduce flood risk for urban areas. These lands are now substantially urbanized and have high-value development and include much of the well-known Silicon Valley as well as transportation corridors, wastewater plants, and other critical infrastructure. In addition, a substantial sea level change (SLC) is expected during the planning horizon for this study (2017–2067), exacerbating problems from tidal flooding.

The former management of the study area ponds by Cargill provided incidental flood risk reduction to the South Bay area. The transfer of pond ownership to the U.S. Fish and Wildlife Service (USFWS) and the City of San José created an opportunity to restore tidal marsh habitat by breaching these non-engineered pond dikes. However, breaching the non-engineered pond dikes would increase flood risk to inland areas that are currently separated from San Francisco Bay by these ponds. Therefore, the Shoreline Study purpose is to provide flood risk management to the Community of Alviso and the larger Silicon Valley, along with providing ecosystem restoration and maintaining recreational opportunities. Please see Chapter 2 of the Integrated Document for a more in depth discussion of the Purpose and Need of this project.

2.0 GENERAL DESCRIPTION OF DREDGED OR FILL MATERIAL

2.1 GENERAL CHARACTERISTICS OF MATERIAL

The imported fill will come primarily from the channel excavation of three other FRM projects in the county; Upper Llagas Creek (31 miles away), Upper Guadalupe River (11 miles away) and Permanente Creek (9 miles away). The materials are predominantly clays and silts with some sand. There is no gravel or bedrock at the sites indentified for borrow.

Technically, there could be fill associated with raising the inner levees to prepare for ponds being breached, leading to loss of jurisdictional waters. This would be temporary as these levees would be graded down later when remaining ponds are breached. Any islands retained on these inner levees would be only in locations where there is substantial existing levee width, such as some of the levee intersections and the Pond A14/A15 levee. Islands formed in these areas would be on solid, well-established, consolidated fill. Any temporary fill needed to widen an inner levee (should widening be needed in some areas) would be graded down at a later date and would return to being jurisdictional. Because the restoration will be occurring in phases between 2020 and 2030, additional analysis will be provided during the plans and engineering design phase of this project.

2.2 QUANTITY OF MATERIAL (CUBIC YARDS)

There will be approximately 940,000 cubic yards of fill with the Recommended Plan's FRM levee.

2.3 SOURCE OF MATERIAL

The imported fill will come primarily from the channel excavation of three other FRM projects in the county; Upper Llagas Creek (31 miles away), Upper Guadalupe River (11 miles away) and Permanente Creek (9 miles away). The materials are predominantly clays and silts with some sand. There is no gravel or bedrock at the sites indentified for borrow.

2.4 DESCRIPTION OF THE PROPOSED DISCHARGE SITE

The spoil from the existing levee (36.3 acres of non-engineered dikes) excavation will be used in the construction of the proposed FRM levee (50%) and the bench or ecotone (50%).

2.4.1 Location

The FRM levee location and footprint is described in detail in Chapter 9.2 of the Integrated Document, Plan Description.

2.4.2 Size

The Recommended Plan FRM levee includes the footprint of the existing levee, with the 15.2 foot levee being 110 feet wide, at 49.9 acres, and the ecotone being 345 feet wide, at 116.3 acres.

2.4.3 Type of site and size

The type of habitat includes the existing levee footprint and open water and wetlands within a managed pond.

2.4.4 Timing and Duration of Discharge

It is anticipated that the duration of construction would occur approximately 3 years between June 2018 and March 2021. The construction schedule for the timing and duration of the project is located in Chapter 3. 7.3 of the Integrated Document.

2.4.5 Description of Disposal Method

Fill will be mechanically placed and shaped in controlled lifts with ground based equipment. Lifts will be rolled into a stable continuum resistant to sloughing and erosion. The surface of the completed fill will be tracked walked to provide stability and a reasonably substrate for vegetation.

2.5 FACTUAL DETERMINATIONS (SECTION 230.11)

2.5.1 Physical Substrate Determinations

The South Bay is a complex system, both geographically and hydrodynamically, with freshwater tributary inflows, tidal currents, and wind interacting to create complex circulation patterns that vary over time. The most obvious hydrodynamic response to these forcing mechanisms is the daily rise and fall of the tides, although much slower residual circulation patterns also influence the mixing and flushing processes of the South Bay.

The Alviso Complex ponds are operated to maintain continuous tidal circulation by management of tidal flow through water control structures. With breaching of the internal non-engineered dikes, the tidal flow will be restored to a more natural state, without the use of water control structures.

2.5.2 Substrate Elevation and Type

Material would be placed along the existing non-engineered dikes A12/A13 and A18, and further into the bay than the current footprint with a 30:1 ecotone.

2.5.3 Sediment Type

The materials are predominantly clays and silts with some sand. There is no gravel or bedrock at the sites indentified for borrow.

2.5.4 Dredge/Fill Material Movement

Material is expected to remain within the construction footprint since the levee will be built to the appropriate flood risk management standards. The ecotone will be gently sloping down from the upland area of the FRM levee and is not expected to move further into the bay.

2.5.5 Physical Effects on Benthos

No adverse impacts to benthic organisms are anticipated other than displacement of those organisms in the construction footprint of the proposed project. The benthos in the canals being filled would be buried under the fill material; however these highly prolific organisms are expected to quickly re-establish in the natural wetlands restored through improved hydrology. It is anticipated that no long-term adverse impacts would occur.

3.0 FACTUAL DETERMINATIONS

3.1 WATER CIRCULATION, FLUCTUATION, AND SALINITY DETERMINATION

3.1.1 Water column

During construction of the levee and breaching of the internal ponds, turbidity would increase temporarily in the water column adjacent to the project. The increased turbidity would be short-term; therefore the Recommended Plan would have no long-term or significant impacts, if any, on salinity, water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients or eutrophication

3.1.2 Current Patterns and Circulation

The flow of tidal waters into the ponds is currently controlled through structures. Removal of the internal berms will increase the natural tidal flow process.

Normal Water Level Fluctuations: For tidal areas, mean higher high water (MHHW) in the study area is currently at 7.81 feet NAVD 88, and ordinary high water (OHW) is 8.47 feet NAVD 88. Pond A16 is currently managed to be around 3.1 feet NAVD 88. Other ponds may be higher or lower, but they are all managed well below MHHW. All topography that could have a change in jurisdictional status is above current average water levels for MHHW and OHW.

3.1.3 Salinity Gradients

Salinity is that of oceanic water. Dredged material placement would not affect normal tide fluctuations or salinity.

3.1.4 Actions That Will Be Taken to Minimize Impacts

BMPs and other benthic protection measures have been coordinated with the resource agencies to minimize impacts.

3.2 SUSPENDED PARTICULATE/TURBIDITY DETERMINATIONS

During project construction, a temporary short-term increase in suspended particulates may occur that are associated with levee removal and reconstruction. Best management practices would be used to minimize the suspension and transport of soils, levee materials, and roadway materials into water adjacent to or downstream of the construction area including use of sediment controls, turbidity screens, or sediment blockages for adjacent wetlands.

In general, any short-term impacts to water quality associated with construction of the project would be ameliorated by construction sequencing, best management practices for erosion and sedimentation control and monitoring during construction. Turbidity would be short-term and localized and no significant adverse impacts are expected. State water quality standards for turbidity outside an allowable mixing zone would not be exceeded.

3.2.1 Effects on Chemical and Physical Properties of the Water Column

The sea level elevation where the FRM levee will be constructed is characterized by a sandy/silt substrate. There would be little, if any, adverse effects to chemical and physical properties of the water as a result of placing sandy/silty material within the construction footprint.

3.2.1.3 Light Penetration

During construction operations there would be a temporary insignificant reduction in light penetration in the canals in the immediate vicinity of the activity. Once construction is complete, light penetration is expected to return to pre-construction levels.

3.2.1.4 Dissolved Oxygen

Dissolved oxygen levels would not be altered by this project due to the tidal energy wave environment and associated adequate reaeriation rates.

3.2.1.5 Toxic Metals, Organics, and Pathogens

No toxic metals, anthropogenic organics, or pathogens are anticipated at this time to be released by project construction. Several other ponds (A21/20/19, E8A/9/8X, Alviso: Pond A8 (includes 8S), A6 tidal restoration, A17 tidal restoration), in this area have been breached to restore managed ponds to tidal marsh habitat through the South Bay Salt Pond Restoration Project, with no releases of toxic metals, organics, or pathogens.

3.2.1.6 Aesthetics of the Water Column

During construction, visual aesthetics would be negatively impacted.

3.3 EFFECTS ON BIOTA

3.3.1 Primary Productivity and Photosynthesis

Disposal of excavated materials would adversely affect 17.4 acres of wetlands in the immediate vicinity of construction by destroying vegetation and smothering biota. However, restoration of 2,783 acres of salt ponds to tidal marsh habitat would improve the primary productivity and photosynthesis due to an increase in quantity and quality of wetland habitat within the Study Area.

3.3.2 Suspension/Filter Feeders

During construction operations there would be a temporary increase in turbidity and possibly a decrease in suspension/filter feeders due to construction activities. This temporary increase in turbidity would be short-term and should not have any long-term negative impact on these highly fecund organisms. The implantation of the project should benefit these organisms by creating a better quality wetland habitat.

3.3.2.3 Sight Feeders

During construction operations there would be a temporary increase in turbidity and possibly a decrease in sight feeders due to construction activities. No significant impacts on these organisms are expected as the majority of sight feeders are highly mobile and can move outside the affected area. When the project is operational, sight feeders would benefit from the better quality wetland habitat.

3.4 CONTAMINATION DETERMINATIONS

The material that would be used for FRM levee construction would not introduce, relocate, or increase contaminants at the area. The fill material would consist of sandy material with some silt and is not expected to contain any hazardous materials. Construction activities will require the use of diesel powered standard and low-ground pressure equipment. All construction contracts will include basic and site specific requirements for safety and environmental protection. Typical requirements would require each Contractor to develop plans and strategies to implement best management practices (e.g. barriers, fueling locations, etc.) for preventing contamination as well as responding to accidental spills.

3.5 AQUATIC ECOSYSTEM AND ORGANISM DETERMINATIONS

No long-term adverse impacts on aquatic organisms are anticipated. Tidal marsh ecosystems are expected to greatly improve because of implementation of the Recommended Plan. The proposed project is not expected to cause or contribute to violations of State Water Quality Standards, jeopardize the existence of any federally endangered or threatened species, nor impact a marine sanctuary. No significant degradation is expected and all appropriate and practicable steps would be taken to minimize impacts. Removal of internal levees within the existing ponds is expected to restore tidal flow and re-establish tidal marsh habitat throughout the project footprint.

3.5.1 Effects on Plankton

No adverse impacts to plankton are anticipated.

3.5.2 Effects on Benthos

The extended footprint of the new FRM levee material would bury some benthic organisms. Benthic organisms found within the project area adapted for existence in an area with substrate movement, thus most would be able to burrow up through the disposed material. Recolonization is expected to occur within a year after construction activities cease. No adverse long-term impacts to non-motile or motile benthic invertebrates are anticipated.

3.5.3 Effects on Nekton

No adverse impacts to nektonic species are anticipated.

3.5.4 Effects on Aquatic Food Web

No adverse impacts to the aquatic food web are anticipated, other than minor temporary impacts within the construction footprint of the proposed spreader channels.

3.5.5 Effects on Special Aquatic Sites

There are no hardground or coral reef communities located in the immediate project area that would be impacted by the Recommended Plan.

3.5.6 Wetlands

The dominant vegetation community in the Project Area is pickleweed. There would be approximately 17.4 acres of wetland habitat loss with the construction of the FRM levee. However, this loss is considered minimal due to the increase in tidal marsh habitat to 2,783 acres and is not anticipated to have any adverse effects. The proposed project is anticipated to provide positive ecological benefits by reconnecting tidal flows to the Bay.

3.5.7 Threatened and Endangered Species

Federally listed species that are known to be present within the Study Area include the steelhead trout, salt marsh, harvest mouse, western snowy plover, California least tern, and California Ridgway rail. Appropriate measures to avoid, minimize, and reduce, and compensate for impacts to listed species have been fully coordinated with NMFS and USFWS. A Biological Opinion was received from the USFWS on April 27, 2015 and a Letter of Concurrence was received from NMFS on May 19, 2015. Please see Appendix B8 (ESA Compliance) of the FR/EIS/EIR for the Biological Assessment and Biological Opinion that detail the federally listed species within the project area.

3.5.8 Effects on Sanctuaries and Refuges

No adverse impacts to sanctuaries are anticipated as the site does not contain a sanctuary. Ponds A9-15 are located on Don Edwards San Francisco Bay National Wildlife Refuge (USFWS Refuge) land for restoration, and the USFWS owned FRM levee along Ponds A12 and A13. The refuge will gain tidal wetland habitat over managed salt ponds, which are valuable habitat and is compatible with the Tidal Marsh Recovery Plan.

3.5.9 Effects on Mud Flats

The Recommended Plan would affect 0.6 acres of mud flats due to FRM and ecotone construction. This area will be converted into a transitional habitat for use by several species in regards to sea level rise.

3.5.10 Effects on Vegetated Shallows

There are no vegetated shallows located in the immediate project area that would be impacted by the Recommended Plan.

3.5.11 Effects on Other Wildlife

No adverse impacts to small foraging mammals, reptiles, or wading birds, or wildlife in general are expected. The ecotone and restored tidal marsh habitat is expected to improve habitat for wildlife in the Project Area.

3.6 PROPOSED DISPOSAL SITE DETERMINATIONS

3.6.1 Mixing Zone Determination

Material placed with regard to the FRM levee would meet requirements outlined in the Water Quality Certificate. Placement would not cause unacceptable changes in the mixing zone water quality requirements as specified by the State of California's Water Quality Certification permit procedures. No adverse impacts related to depth, current velocity, direction and variability, degree of turbulence, stratification, or ambient concentrations of constituents are expected from implementation of the project.

3.6.2 Determination of Compliance with Applicable Water Quality Standards

Because of the inert nature of the material to be to be disposed, Class III water quality standards would not be violated.

3.6.3 Potential Effects on Human Use Characteristics

3.6.3.3 Municipal and Private Water Supply

In the short term, water use would be limited to project construction for activity such as dust control; no long-term water use would be associated with the project, and the project would not affect the overall water supply. Water use during project construction would depend on weather conditions and would be primarily limited to earthwork operations. A project of this type and magnitude would typically use two water trucks per day during earthwork operations at 2,500 gallons per truck. Earthwork operations for this project are estimated at this feasibility level of development to be about 750 days, which equates to approximately 3.75 million gallons of construction water.

It should be noted that construction operations such as these often make use of recycled water. The Wastewater Facility is within the project boundary and produces high-quality, tertiary treated recycled water. The recycled water is distributed throughout the area for irrigation and other approved purposes as part of the discharge permit, and this would be a viable, available, conservation-minded source.

Because the project would not require any new, long-term sources of water, impacts on water supply would be less than significant.

3.6.3.4 Recreational and Commercial Fisheries

Fishing in the immediate construction area would be prohibited during construction. Otherwise, recreational and commercial fisheries would not be impacted by the implementation of the project.

3.6.3.5 Water Related Recreation

Water related recreation in the immediate vicinity of construction would be prohibited during construction activities. People are not allowed to use the current managed ponds for water activities and therefore there would be no impact on water related recreation.

3.6.3.6 Aesthetics

The Recommended Plan includes a 15.2 foot levee. This levee will impact the aesthetics of the area, however, recreational features such as pedestrian bridges, viewing platforms, and interpretive signs will be located along the trails. These impacts are not expected to adversely affect the aesthetic resources of the restored tidal marsh habitat.

3.6.3.7 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves

No such designated sites are located within the project area.

3.7 DETERMINATION OF CUMULATIVE EFFECTS ON THE AQUATIC ECOSYSTEM

There would be no cumulative impacts that result in a major impairment in water quality of the existing aquatic ecosystem resulting from the placement of material at the project site.

3.8 DETERMINATION OF SECONDARY EFFECTS ON THE AQUATIC ECOSYSTEM

There would be no secondary impacts on the aquatic ecosystem as a result of the fill. During construction the sites would be contained with sedimentation barriers. Erosion would be controlled by appropriate erosion control techniques. Sedimentation would be controlled during construction.

4.0 FINDINGS OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE

4.1 ADAPTATION OF SECTION 404(B)(1) GUIDELINES TO THIS EVALUATION

No significant adaptations of the guidelines were made relative to this evaluation.

4.2 EVALUATION OF AVAILABILITY OF PRACTICABLE ALTERNATIVES TO THE PROPOSED DISCHARGE SITE WHICH WOULD HAVE LESS ADVERSE IMPACT ON THE AQUATIC ECOSYSTEM

No practicable alternative exists which meets the study objectives as well as the non-Federal sponsors objectives that does not involve discharge of fill into waters of the United States. The 12.5 foot levee would require 17.2 acres of fill into existing wetlands, which is 0.02 acres less than the Recommended Plan. Impacts to Waters of the U.S. would be 57.1 acres under the 12.5 levee, and 136.6 acres under the Recommended Plan. The 136.6 acres includes the 30:1 sloping ecotone, which would provide transitional habitat for species, including listed species. Over time, the affected ponds and adjacent areas would have middle-term and long-term gains in waters of the United States as restoration areas transition. The 15.2 foot levee is requested by the non-Federal sponsor to meet FEMA requirements/accreditation at the end of the study period and provides more assurance of flood protection in the event of the USACE high SLC scenario (see Chapter 3 of the Integrated Document for a more robust discussion on SLC and levee heights. The no action alternative would not require fill of wetlands, however, the condition of the non-engineered dike would need replacement per USACE flood risk management standards in the face of sea level rise and also in order to restore tidal marsh habitat to the Bay Area.

4.3 COMPLIANCE WITH APPLICABLE STATE WATER QUALITY STANDARDS

After consideration of disposal site dilution and dispersion, the discharge of dredged materials would not cause or contribute to, violations of any applicable State water quality standards for Class III waters. In reconnecting the Bay with the tidal marsh habitat, water quality and habitat for species should improve.

4.4 COMPLIANCE WITH APPLICABLE TOXIC EFFLUENT STANDARD OR PROHIBITION UNDER SECTION 307 OF THE CLEAN WATER ACT

The discharge of fill materials is not anticipated to cause or contribute to violations of any applicable state water quality standards for Class III waters or Outstanding Florida Waters where applicable. The discharge operation is not anticipated to violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

4.5 COMPLIANCE WITH ENDANGERED SPECIES ACT OF 1973

The placement of fill materials in the project area is not anticipated to jeopardize the continued existence of any species listed as threatened and endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended. A Biological Opinion was received from the USFWS on April 27, 2015 and a Letter of Concurrence was received from NMFS on May 19, 2015. No adverse effects are expected to any listed species.

4.6 COMPLIANCE WITH SPECIFIED PROTECTION MEASURES FOR MARINE SANCTUARIES DESIGNATED BY THE MARINE PROTECTION. RESEARCH, AND SANCTUARIES ACT OF 1972

No marine sanctuaries are located within the project area.

4.7 EVALUATION OF EXTENT OF DEGRADATION OF THE WATERS OF THE UNITED STATES

Waters of the United States impacts that would occur as a result of flood risk management implementation would occur at the time of construction. Levee and tide gate construction at Artesian Slough would result in the fill of waters of the United States. Ecosystem restoration impacts would occur in phases as the ecosystem restoration process takes place over time. Most adverse waters of the United States impacts (discharge of fill) would be from levee construction and installing transitional habitat, but lesser amounts of fill would occur due to breaching of ponds. Ecosystem restoration activity would result in beneficial effects by restoring or creating waters of the United States as the restoration process occurs over time. Impacts to wetlands from project construction would be offset over time due to restoration of large areas of tidal marsh.

The placement of fill material would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values would not occur.

4.8 APPROPRIATE AND PRACTICABLE STEPS TAKEN TO MINIMIZE POTENTIAL ADVERSE IMPACTS OF THE DISCHARGE ON THE AQUATIC ECOSYSTEM

Appropriate steps have been taken to minimize the adverse environmental impact of the Recommended Plan. Turbidity would be monitored so that if levels exceed State water quality standards, the contractor would be required to cease work until conditions return to normal.

5.0 CONCLUSION

On the basis of the guidelines, the proposed dredging and disposal sites are specified as complying with the requirements of these guidelines.

Attachment 1. LEDPA Analysis for All Alternatives

Most adverse waters of the United States impacts (discharge of fill) would be from levee construction and installing transitional habitat, but lesser amounts of fill would occur due to breaching of ponds. Ecosystem restoration activity would result in beneficial effects by restoring or creating waters of the United States as the restoration process occurs over time. Impacts to wetlands from project construction would be offset over time due to restoration of large areas of tidal marsh.

Table 1 shows estimated construction-related impacts by type of waters of the United States for each of the action alternatives (see Chapter 3 in the Integrated Document for Alternatives). The table shows waters impacts associated with levee construction (including the different alignments), installing the Artesian Slough tide gate, and building transitional habitat.

Alternatives 2 and 3 would have similar wetland losses at 17.2 acres (1.13 percent of the total wetland area in the study area) and 17.4 acres (1.15 percent of wetland area in the study area), respectively. Alternative 4 would have the highest wetland loss at 37.1 acres, which is about 2.44 percent of the wetland area in the study area.

Alternative 3 would have the highest loss of other waters of the United States (120.2 acres or about 2.86 percent of the area of all non-wetland waters in the study area) because it would affect more area of circulation pond. Alternative 5 would have the smallest loss of other waters 0.82 percent of the area of all non-wetland waters in the study area.

Table 1. Flood Risk Management and Transitional Habitat Construction-Related Impacts by Type of Wetlands and Other Waters of the United States by Project Alternative
In acres and percentage of total acreage in the study area

Type of Water	Alternative 2 (NED/NER Plan)	Alternative 3 (Proposed Action and LPP)	Alternative 4	Alternative 5
Vegetated Wetland				
Salt Marsh				
Tidal	1.7 (0.53%)	1.7 (0.53%)	1.1 (0.34%)	0.0 (0.00%)
Non-tidal	8.1 (9.48%)	8.2 (9.60%)	8.3 (9.72%)	8.3 (9.72%)
Brackish Marsh	0.3 (0.07%)	0.3 (0.07%)	0.2 (0.05%)	0.2 (0.05%)
Muted Tidal/Diked Marsh [a]	1.8 (0.53%)	1.8 (0.53%)	22.0 (6.47%)	20.3 (5.97%)
Freshwater Marsh	1.0 (1.07%)	1.1 (1.18%)	0.9 (0.97%)	0.8 (0.86%)
Vegetated Wetland Subtotal	12.9 (1.0%)	13.1 (1.0%)	32.5 (2.6%)	29.6 (2.3%)
Unvegetated Wetland				
Seasonal Wetland	3.7 (14.12%)	3.7 (14.12%)	4.2 (16.03%)	0.0 (0.00%)
Mudflat	0.6 (0.27%)	0.6 (0.27%)	0.4 (0.18%)	0.4 (0.18%)
Unvegetated Wetland Subtotal	4.3 (1.7%)	4.3 (1.7%)	4.6 (1.9%)	0.4 (0.2%)
All Wetlands Total	17.2 (1.13%)	17.4 (1.15%)	37.1 (2.44%)	30.0 (1.97%)
Other Non-wetland Waters				
Open Water	9.4	9.4	9.7	9.6
Ponds				
Batch (high salinity)	7.9	32.6	9.2	7.3
Circulation	22.6	78.2	17.7	17.7
Sewage Treatment Ponds	0.0 (0.00%)	0.0 (0.00%)	0.0 (0.00%)	0.0 (0.00%)
Legacy Ponds	0.0 (0.00%)	0.0 (0.00%)	0.0 (0.00%)	0.0 (0.00%)
Other Water Subtotal	39.9 (0.95%)	120.2 (2.86%)	36.6 (0.87%)	34.6 (0.82%)
Grand Total	57.1 (1.00%)	137.6 (2.40%)	73.7 (1.29%)	64.6 (1.13%)

Note: Alternative 1 is the No Action Alternative and is therefore not included in this table or the following tables.
Key: NED/NER = National Economic Development/National Ecosystem Restoration; LPP = Locally Preferred Plan

Alternative 3 is the plan that is the least environmentally damaging practicable alternative. This LEDPA designation is based on the following considerations:

- Alternative 1, while it would have no immediate impacts to wetlands and other waters of the U.S., would not be resilient to SLC. Some existing non-tidal wetlands would be lost in the long term. Marsh species listed under the Endangered Species Act would not recover within the study area due to needed habitat not being restored. Opportunities for increased wetland area and consequently improved water quality would be foregone. Breaching of existing managed ponds due to SLC would occur too late for sediment accumulation to form marshes in these areas.

- Alternatives 4 and 5 would have increased impacts to wetlands and other waters of the U.S. (relative to other alternatives) because of the levee alignment through New Chicago Marsh, with no offsetting improvements in aquatic resources.
- Alternative 2 would have the least short-term impacts to wetlands and other waters of the U.S. It would be less resilient to SLC, both in terms of the marsh transition zone adapting to rising sea levels and in the ability of the FRM levee to protect New Chicago Marsh from eventual drowning caused by its elevation being below mean sea level. The marsh transition zone would be much less useful for maintenance and recovery of listed marsh species.
- Alternative 3 would have slightly greater immediate impacts to wetlands and other waters of the U.S. because of the additional areas of fill for the wider levee and the ecotone. This alternative would provide tidal marsh ecotone with a much better ability to adapt to SLC and in doing so would provide additional assistance towards recovery of listed species. In addition, the increased FRM levee height would better protect New Chicago Marsh and its important population of salt marsh harvest mouse from risk of inundation due to SLC.

Appendix B11

Recovery Plan Criteria for Downlisting and Delisting for California Sea Blite, Salt Marsh Harvest Mouse, and Ridgway's Rail

Table B11-1 *Recovery Plan Criteria for Downlisting and Delisting for California Sea-Blite, Salt Marsh Harvest Mouse, and Ridgway's Rail in the Shoreline Phase I Study Area* summarizes the factors that affect recovery of and criteria that need to be met for downlisting and delisting of California sea-blite, salt marsh harvest mouse (SMHM), and California Ridgway's rail.

Table B11-1. Recovery Plan Criteria for Downlisting and Delisting for California Sea-Blite, Salt Marsh Harvest Mouse, and Ridgway's Rail in the Shoreline Phase I Study Area

<table>
<tr><th rowspan="2">Criteria by Factors Affecting Recovery</th><th colspan="3">Recovery Plan Species in the Central/South San Francisco Bay Recovery Unit</th></tr>
<tr><th>California Sea-Blite</th><th>Salt Marsh Harvest Mouse</th><th>California Ridgway's Rail</th></tr>
<tr><td colspan="4">A: Present destruction, modification or curtailment of habitat or range</td></tr>
<tr><td>Downlisting</td><td>Habitat supporting at least three populations must exist on land in conservation ownership or under conservation management.</td><td>Protect and manage historic and restored marsh complexes in the recovery unit at:
East Palo Alto–Guadalupe Slough, 1,000 or more acres in size, with viable habitat areas (VHAs) at (1) East Palo Alto–Cooley Landing–Palo Alto Nature–Mountain View to Stevens Creek and (2) Stevens Creek to Guadalupe Slough.
Guadalupe Slough–Warm Springs, 1,000 or more acres in size, with one VHA within the marsh complex.
Habitat supporting all extant SMHM occurrences must be protected via habitat management.

Each marsh complex must support VHAs that are connected by suitable habitat corridors with sufficiently deep pickleweed plains and/or sufficiently deep high marsh zones (and preferably both).

Unless precluded by natural features or existing hardscape, the marsh complexes themselves must be connected to one another by marsh or restored tidal marsh of sufficient depth and complexity to allow for dispersal and recolonization.

Marsh complexes must be 1,000 acres or more in size. VHAs must be 150 acres or more in size.

Reduction in extant Lepidium latifolium populations to less than 10% cover (in and downgradient of the high marsh-upland ecotone) for 5 years in each marsh complex.

Implement a system for early detection and control of future invasive plant infestations.</td><td>Protection and management of habitat sufficient to support a population of 500 rails in the recovery unit at East Palo Alto–Guadalupe Slough and Guadalupe Slough–Warm Springs marsh complexes.
The habitat for each population must have a minimum area of 1,111 acres (450 ha) of contiguous high-quality tidal marsh habitat with well-developed channel systems and high-tide refugia/escape cover at the high marsh/upland transition zone and/or inner-marsh.
Reduction in extant Lepidium latifolium populations to less than 10% cover (in and downgradient of the high marsh-upland ecotone) for 5 years in each marsh complex.

Implementation of a system for early detection and control of future invasive plant infestations.

Implementation of site-specific management plans on lands owned by USFWS, CDFW, and Mid-Peninsula Open Space District to reduce human-caused disturbance to rails.</td></tr>
<tr><td>Delisting</td><td>Habitat supporting at least three populations must exist on land in conservation ownership or under conservation management for 10 generations.</td><td>Meet all criteria under downlisting item A.

Develop a plan for early detection and control of Lepidium latifolium (in and downgradient of the high marsh-upland ecotone) to be implemented following any future increase beyond 10% cover; secure a source to fund such actions in perpetuity.

Implement the South Bay Salt Pond Restoration Plan (USFWS 2009).</td><td>Meet all criteria under downlisting item A.
Develop a plan for early detection and control of Lepidium latifolium (in and downgradient of the high marsh-upland ecotone) to be implemented following any future increase beyond 10% cover; secure a source to fund such actions in perpetuity.

Implement the South Bay Salt Pond Restoration Plan (USFWS 2009).</td></tr>
</table>

Table B11-1. Recovery Plan Criteria for Downlisting and Delisting for California Sea-Blite, Salt Marsh Harvest Mouse, and Ridgway's Rail in the Shoreline Phase I Study Area

Criteria by Factors Affecting Recovery	Recovery Plan Species in the Central/South San Francisco Bay Recovery Unit		
	California Sea-Blite	**Salt Marsh Harvest Mouse**	**California Ridgway's Rail**
B: Overutilization for commercial, scientific, or educational purposes			
Downlisting Delisting	Overutilization is not known to be a threat to this species; no downlisting or delisting criteria developed.	Overutilization is not known to be a threat to this species; no downlisting or delisting criteria developed.	Overutilization was a major factor for this species at the turn of the 20th century but is not currently known to be a threat; no downlisting or delisting criteria developed.
C: Disease or predation			
Downlisting	Disease and predation are not known to be a major threat to this species; no downlisting or delisting criteria developed.	*Disease* is not known to be a major threat; no downlisting criteria developed. An unnaturally high level of *predation* is thought to exist in some marshes where SMHM are concentrated into narrow *Sarcocornia* zones due to surrounding habitat loss. Though little is known about death rates related to the resulting predation, it is presumed that restoration of deep marshes with ample high tide refugia, both high marsh and intermarsh, will result in a reduction of predation rates. Focus is on restoration of high quality marshes; no downlisting criteria developed for predation.	*Disease* is not known to be a major threat; no downlisting criteria developed. For *predation*, develop and implement a predator management plan at sites with significant predation issues.
Delisting		Disease and predation are not known to be a major threat to this species; no delisting criteria developed.	No delisting criteria developed for disease. Meet all downlisting criteria under item C. Predator monitoring indicates that, for 5 consecutive years, predation pressure on California Ridgway's rails falls below a level at which it negatively affects long-term population persistence.

Table B11-1. Recovery Plan Criteria for Downlisting and Delisting for California Sea-Blite, Salt Marsh Harvest Mouse, and Ridgway's Rail in the Shoreline Phase I Study Area

Criteria by Factors Affecting Recovery	Recovery Plan Species in the Central/South San Francisco Bay Recovery Unit		
	California Sea-Blite	**Salt Marsh Harvest Mouse**	**California Ridgway's Rail**
D: Inadequacy of existing regulatory mechanisms			
Downlisting Delisting	Existing regulatory mechanisms not identified as inadequate; no downlisting or delisting criteria developed.	Existing regulatory mechanisms not identified as inadequate; no downlisting or delisting criteria developed.	Existing regulatory mechanisms not identified as inadequate; no downlisting or delisting criteria developed.
E: Other natural or manmade factors affecting continued existence			
Downlisting	To provide sufficient resilience to stochastic events, meet downlisting conditions under item A and have at least: • A minimum of three populations.[a] • For 5 consecutive years of monitoring, the three populations must total a minimum of 1,500 individuals.	40% of the VHAs of each large marsh complex must have SMHM present at the capture efficiency level[d] of 5.0 or better and: • An additional 50% of the VHAs of each large marsh complex must have SMHM present at the capture efficiency level of 3.0 or better. • Each marsh complex must be monitored and found to meet the above criteria at least twice, with at least 5 years between surveys. After marsh complexes meet the criteria twice, there is no need to resurvey as long as no more than 20 years have passed and there has been no obvious negative change to habitat during that time. High marsh/upland transition lands must be preserved or created as part of new marsh restoration efforts and managed to provide opportunity for landward migration of species in response to SLC. • This criterion will be met when SLC modeling shows sufficient uplands have been protected to accommodate landward migration while still allowing for acreage criteria to be met (see item A criteria).	To provide sufficient resilience to stochastic events, meet downlisting conditions under items A, B, and C and have an average number of at least 1,060 rails over a 10-year period, spread over a large geographic area. High marsh/upland transition lands must be preserved or created as part of new marsh restoration efforts and managed to provide opportunity for landward migration of species in response to SLC. • This criterion will be met when SLC modeling shows sufficient uplands have been protected to accommodate landward migration while still allowing for acreage criteria to be met (see item A criteria).

Table B11-1. Recovery Plan Criteria for Downlisting and Delisting for California Sea-Blite, Salt Marsh Harvest Mouse, and Ridgway's Rail in the Shoreline Phase I Study Area

<table>
<tr><th rowspan="2">Criteria by Factors Affecting Recovery</th><th colspan="3">Recovery Plan Species in the Central/South San Francisco Bay Recovery Unit</th></tr>
<tr><th>California Sea-Blite</th><th>Salt Marsh Harvest Mouse</th><th>California Ridgway's Rail</th></tr>
<tr><td>Delisting</td>
<td>To provide sufficient resilience to stochastic events, meet delisting conditions under item A and have at least:
• A minimum of three populations[b]
• For 10 consecutive years of monitoring, the three populations must each support at least 500 individuals and the cumulative total of all San Francisco Bay populations must total a minimum of 8,000 individuals.
High marsh/upland transition lands must be preserved or created as part of new marsh restoration efforts and managed to provide opportunity for landward migration of species in response to SLC.
• This criterion will be met when SLC modeling shows sufficient uplands have been protected to accommodate landward migration while still allowing for acreage criteria to be met.
To minimize impacts sustained after oil spills occurring at or near populations of this species, the San Francisco Bay and Delta Area and Central Coast Area sections of the Sector San Francisco-Area Contingency Plan must be revised to place high priority on the emergency protection of this species.</td>
<td>75% of defined VHAs within each of the marsh complexes must have SMHM consistently present at the capture efficiency level of 5.0 or better.
• Each marsh complex must be monitored and found to meet the above criteria at least twice, with at least 5 years between surveys. After marsh complexes meet the criteria twice, there is no need to resurvey as long as no more than 20 years have passed and there has been no obvious negative change to habitat during that time.
High marsh/upland transition lands must be preserved or created as part of new marsh restoration efforts and managed to provide opportunity for landward migration of species in response to SLC.
• This criterion will be met when SLC modeling shows sufficient uplands have been protected to accommodate landward migration while still allowing for acreage criteria to be met.
To minimize impacts sustained after oil spills occurring at or near rail populations, the San Francisco Bay and Delta Area section of the Sector San Francisco-Area Contingency Plan must be revised to place high priority on the emergency protection of this species.</td>
<td>To provide sufficient resilience to stochastic events, meet delisting conditions under items A, B, and C and have an average number of at least 3,180 rails over a 10-year period, spread over a large geographic area.
High marsh/upland transition lands must be preserved or created as part of new marsh restoration efforts and managed to provide opportunity for landward migration of species in response to SLC.
• This criterion will be met when SLC modeling shows sufficient uplands have been protected to accommodate landward migration while still allowing for acreage criteria to be met (see item A criteria).
To minimize impacts sustained after oil spills occurring at or near rail populations, the San Francisco Bay and Delta Area section of the Sector San Francisco-Area Contingency Plan must be revised to place high priority on the emergency protection of this species.
Develop a map that identifies sources and extents of mercury exposure in rails; implement a plan to remediate the most significant point sources of mercury.
Exposure of rails to mercury must be reduced such that the mean mercury concentration of all eggs sampled within a marsh complex must fall below 0.2 µg/g (fresh wet weight) for 5 consecutive years, the point above which it is believed developmental abnormalities and reproductive harm occur.
• Only fail to hatch eggs will be sampled.</td></tr>
</table>

Source: USFWS 2013

km = kilometers; ha = hectares; USFWS = U.S. Fish and Wildlife Service; CDFW = California Department of Fish and Wildlife;

[a] For downlisting, a population is any concentration of plants separated by greater than 1.9 km (1.2 miles) from other such concentrations of plants, with no intervening locations observed over a period of 5 years.

[b] For delisting, a population is any concentration of plants separated by greater than 1.9 km (1.2 miles) from other such concentrations of plants, with no intervening locations observed over a period of 10 years.

[c] Viable habitat areas (VHAs) are defined as well-developed tidal marshes with (1) extensive *Sarcocornia* (pickleweed) on a mid to high marsh plain 200 meters (219 yards) or more deep (from shore to bay); (2) adjacent wide high marsh transition zone, wherever possible, that acts as a refugium for the mice during the highest tides with sufficient area and cover to minimize predation risks; and (3) stands of *Grindelia* or tall forms of *Sarcocornia*, interspersed among shorter forms of *Sarcocornia* to provide additional high tide refugia within the marsh and away from the upland edge.

[d] Capture level efficiency is the number of mice captured divided by effort in number of trap nights expended times 100.

Appendix B12

Environmental Justice Appendix

Environmental Justice Appendix

Regulatory Setting and Study Methodology

On February 11, 1994, President Bill Clinton issued Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. As the Federal sponsor of the Proposed Project, the U.S. Army Corps of Engineers (USACE) must consider how the project might affect minority and low-income populations.

Potential environmental justice populations were identified using American Community Survey 5-year estimates (2006–2010) and 2010 U.S. Census information..

In 2010, the Census blocks that make up the Alviso community supported a population of about 1,790 people (U.S. Census Bureau 2010). As of the late fall of 2012, 2010 Census data were available at the block level for race and ethnicity but not for income. For income and poverty, then, the following discussion relies on 5-year American Community Survey estimates for the census tract within which Alviso and the study area are located. This tract is much larger than the study area but is the best available information for the area.

Baseline Condition – Minority Populations

According to the Council on Environmental Quality's (CEQ) guidelines for environmental justice analyses (CEQ 1997):

> Minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the majority population percentage in the general population or other appropriate unit of geographic analysis. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.

This study uses criterion (a) to identify minority communities. For the purpose of this study, a *minority* is a person who is Black, Asian, American Indian or Alaskan Native, or Native Hawaiian or other Pacific Islander, or is of Hispanic or Latino origin. People of Hispanic or Latino origin may be of any race and of more than one race.

Table 1 *General Racial and Ethnic Distribution of the Study Area* summarizes the racial and ethnic population distribution of cities in the study area. Table 1 *General Racial and Ethnic Distribution of the Study Area* shows that, in general, Santa Clara County and the cities in and around the study area have a higher proportion of minorities than the State as a whole. In San José, Santa Clara, and Sunnyvale, the percentage of Asian minorities is greater than the percentage of non-minorities (that is, white people who are not Hispanic). In general, the area is dominated by people who are Asian or white (both Hispanic and not Hispanic).

Table 1. General Racial and Ethnic Distribution of the Study Area

Area	Percentage of Total Population [a, b]									
	Total population	White, not Hispanic	White, Hispanic	Black or African American	AIAN[c]	Asian	HNOPI[d]	Some Other Race	Two or More Races	All Minorities
California	3,725,3956	40.1	17.4	6.2	0.9	13.0	0.3	16.9	4.9	59.6
Santa Clara County	1,781,642	35.2	11.8	2.6	0.7	32.0	0.4	12.4	4.9	64.8
San José	945,942	28.7	14.1	3.2	0.8	32.0	0.5	15.7	4.9	71.2
Santa Clara	116,468	36.1	8.9	2.7	0.5	37.7	0.5	8.3	5.3	63.9
Sunnyvale	140,081	34.5	8.5	1.9	0.5	40.9	0.4	8.7	4.6	65.5
Milpitas	66,790	14.6	5.9	2.9	0.5	62.1	0.5	8.7	4.7	85.3

Source: US Census Bureau 2010

[a] People of Hispanic or Latino origin can be one or more different races. These totals by race include people who might also be Hispanic or Latino.

[b] Percentages might not add up to 100 due to rounding.

[c] American Indian or Alaskan Native

[d] Native Hawaiian or other Pacific Islander

The study area supports two Census tracts (5046.02 and 5050.09) and several whole Census blocks. The Alviso area is made up of smaller blocks, but the study area also falls into parts of other much larger Census blocks that extend far outside of the study area boundary. Of the 54 individual blocks that are wholly or partially within the study area, 26 did not have any population in 2010 and were not considered in the analysis. These blocks include areas within the former salt pond complex and areas that support industrial/light industrial development only.

The remaining 28 blocks supported a population of 1,824 people in 2010; 88.3 percent of whom identified as minorities; only four blocks had a minority population that was less than 50 percent of the total population. See Appendix A6 *2010 Census Data – Racial and Ethnic Distribution of Study Area* for a detailed table of the racial and ethnic distribution by 2010 Census block. All but three of the blocks in the Alviso community had a 50 percent or greater proportion of minorities.

Figure 1 *Minority Distribution in the Study Area* shows the areas where minorities make up at least 50 percent of the total block population.

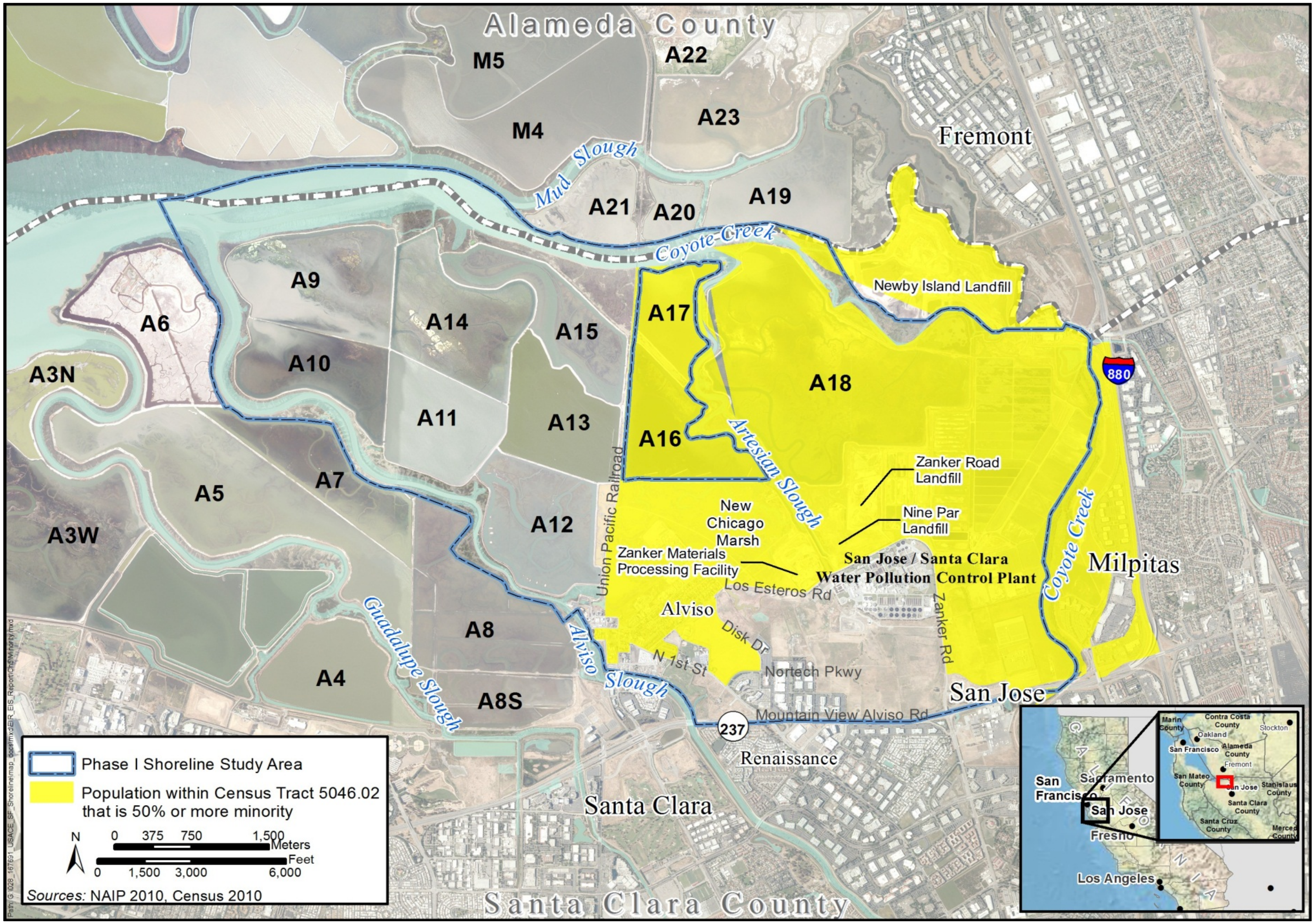

Figure 1. Minority Distribution in the Study Area

Baseline Condition – Low-Income Populations

To identify low-income populations, the CEQ's environmental justice guidance states the following (CEQ 1997):

> Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect.

Note that the Census Bureau's current P-60 population report provides only general information about income trends nationwide and does not provide detailed information about the study area (DeNavas-Walt et al. 2012). Because of this, 2010 Census data are used to present more detailed information on income and poverty in the study area.

For the purpose of this study, a low-income population is persons who have a median income below the poverty thresholds defined by the U.S. Department of Health and Human Services. To identify low-income populations in the study area, this study identifies areas having a substantially higher percentage of people and households in poverty than the counties of Alameda and Santa Clara.

Table 2 *Income and Poverty Summary for Cities in the Study Area* summarizes the median income and poverty status of people living in cities in the study area.

Table 2. Income and Poverty Summary for Cities in the Study Area

Area	Median Household Income (2006–2010)	Percentage of Persons with Income below Poverty Level (2006–2010)
California	$60,883	13.7%
Santa Clara County	$86,850	8.9%
San José	$79,405	10.8%
Santa Clara	$85,294	8.6%
Sunnyvale	$90,174	6.2%
Milpitas	$92,694	5.8%

Source: U.S. Census Bureau 2012a, 2012b, 2012c, 2012d

Table 2 *Income and Poverty Summary for Cities in the Study Area* shows that, in general, people living in areas around the study area have a much higher median income than the rest of the residents of California as whole. To some degree, the higher incomes associated with each city reflect a higher cost of living in the Bay Area and are more meaningful when compared to the county incomes (and to each other) rather than to the State statistic.

The rates of people living in poverty in cities in the study area are lower than the State rate of 13.7 percent and range from a low of 5.8 percent in Milpitas to a high of 10.8 percent in San José.

Table 3 *Income and Poverty Summary for Census Tracts in the Study Area* summarizes income and poverty for the two Census tracts that include the study area. Census tract 5046.02 includes the community of Alviso but also includes large parts of the cities of Milpitas, Santa Clara, and Sunnyvale. Census tract 5050.09 is a much smaller tract that includes some developed areas south of State Route (SR) 237 between Coyote Creek and the Guadalupe River. 2010 Census data for poverty were not available at the time this report was written.

Table 3. Income and Poverty Summary for Census Tracts in the Study Area

Demographic Criterion	Census Tract	
	5046.02	5050.09
Median household Income	$52,202	$75,082
Population for whom poverty status is determined	1,471	6,026
Percentage of population below poverty level	15.6%	10.7%
Poverty Status by Race: of the population, percentage that is below poverty level		
White alone	12.9%	15.5
Black or African American alone	100%	13.2
American Indian and Alaskan Native alone	NA[a]	NA
Asian alone	0%	3.5
Native Hawaiian and Other Pacific Islander alone	NA[a]	0
Some other race alone	20.7%	5.3
Two or more races	0%	18.8
Poverty Status by Ethnicity: of the population, percentage that is below poverty level		
Hispanic or Latino (of any race)	16.6%	13.5%
White alone (not Hispanic or Latino)	17.4%	12.9%

Source: U.S. Census Bureau 2012b

Note: The data presented here are estimates based on a sample of the population. See Appendix A6 *2010 Census Data – Racial and Ethnic Distribution of Study Area* for complete information about margins of error and data reliability.

[a] Either no sample observations were available or too few sample observations were available to compute an estimate.

The populated part of the study area is centered on the community of Alviso. Alviso is in Census tract 5046.02. As shown in Table 3 *Income and Poverty Summary for Census Tracts in the Study Area*, the 2006–2010 median income of this Census tract was substantially lower than the median income for Santa Clara County as a whole (which was $86,850 for the same period; see Table 2 *Income and Poverty Summary for Cities in the Study Area*) and for the city of San José (which was $79,405 for the same period; Alviso is within the city limits). This indicates that, in 2010, the median income of households in Census tract 5406.02 was lower than that of households in the surrounding areas. The median income of households in Census tract 5050.09, which is in the southeast corner of the study area, was $75,082. This income was also lower than the county and city median incomes. Please note that, in the case of Census tract

5046.02, the margin of error is quite large (±$35,786; see Appendix A7 *2010 Census Data – 5-Year Income Estimates for Study Area*) and the data might not represent the true income status of people living there.

The 2006–2010 American Community Survey data also provide Census tract–level information about poverty. As shown in Table 3 *Income and Poverty Summary for Census Tracts in the Study Area*, the overall proportion of people living in poverty (for that part of the population for whom poverty status has been defined) was 15.6 percent in Census tract 5046.02 and 10.7 percent in Census tract 5050.09. Both of these proportions are higher than the amount for Santa Clara County as a whole (8.9 percent below poverty level; see Table 2 *Income and Poverty Summary for Cities in the Study Area*). The percentage of people living below the poverty level in Census tract 5046.02, within which Alviso is located, was substantially higher than the county and city percentages. This indicates that poverty is more prevalent in this Census tract than in surrounding areas. However, as with the income data, the margin of error for poverty is quite high in this Census tract (±10.1 percent). The percentage of people living in poverty in Census tract 5050.09 was similar to the city percentage. The margin or error for Census tract 5050.09 was ±4.1 percent.

The American Community Survey also provides information about poverty based on race and ethnicity. As shown in Table 3 *Income and Poverty Summary for Census Tracts in the Study Area*, all (100 percent) of the black and African American people (23) living in Census Tract 5046.02 were living below the poverty level, and a high percentage (20.7 percent) of people who identify themselves as some other race (581) were living below the poverty level. When considered separate from race, the poverty rate of the Hispanic or Latino origin population (16.6 percent) in Census tract 5046.02 was lower than but not statistically different from the poverty rate of people who are white and not Hispanic or Latino (17.4 percent).

Considering all three measurements (median income, overall poverty, and poverty by race and ethnicity), the data suggest that the population of Census tract 5046.02, within which the community of Alviso is located, is generally lower income than surrounding areas. However, the margins of error for the data estimates presented in the American Community Survey introduce uncertainty. Therefore, the presence of a low-income population cannot be verified with the available data.

Summary

In summary, the 2010 Census information shows that the population of that part of the study area that includes the populated parts of Alviso supports a minority population. The American Community Survey estimates indicate that the same area is probably lower income. Section 0 *Potential Effects on Environmental Justice Populations* assumes that the area shown on Figure 1 *Minority Distribution in the Study Area* represents an environmental justice population in the study area.

Potential Effects on Environmental Justice Populations

Methodology for Determining Effects

Pursuant to Executive Order 12898, this section considers whether the project alternatives would:

- Cause disproportionately high adverse effects (such as noise, air quality, and access effects) on the identified population(s) during construction
- Cause disproportionately high adverse effects on the identified population(s) during operation and maintenance of the flood risk management (FRM) levee and restored areas

As defined in the 1997 CEQ guidance, the following factors are used to measure environmental justice effects:

- For *human health effects*, agencies are to consider the following factors to the extent practicable:
  - Whether the health effects, which may be measured in risks and rates, are significant (as the term is used by the NEPA), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death; and
  - Whether the risk or rate of hazard exposure by a minority population, low-income population, or Indian tribe to an environmental hazard is significant (as the term is used by the NEPA) and appreciably exceeds or is likely to appreciably exceed the risk or rate to the general population or other appropriate comparison group; and
  - Whether health effects occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.
- For *environmental effects*, agencies are to consider the following:
  - Whether there is or will be an impact on the natural or physical environment that significantly (as the term is used by the NEPA) and adversely affects a minority population, low-income population, or Indian tribe. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities, low-income communities, or Indian tribes when those impacts are interrelated to impacts on the natural or physical environment; and
  - Whether environmental effects are significant (as the term is used by the NEPA) and are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and
  - Whether the environmental effects occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.

In general, the part of Santa Clara County that includes the study area is racially and ethnically diverse. Racial and ethnic minorities make up 88.3 percent of the total population in Census blocks that are included, either wholly or partially, in the study area.

The community of Alviso, the area that generally supports the identified environmental justice populations, has long been located adjacent to the former salt ponds, the San José–Santa Clara Regional Wastewater Facility (Wastewater Facility), and industrial uses surrounding the plant. This analysis does not evaluate how these existing uses have affected the community in the past. The following discussion focuses on how this specific project might affect the environmental justice population.

Alternatives Evaluation

In general, the Shoreline Phase I Project is expected to have positive regional economic impacts as a result of both a reduction in flood risk and the expenditure of funds to implement the projects (USACE 2012a).These positive effects would apply to all populations in the study area. The following paragraphs examine the potential environmental justice population effects associated with constructing the FRM levee and ecosystem restoration components and the long-term management of the study area.

Flood Risk Management Levee

In the long term, the greatest flood risk improvements would be experienced by those living in the community of Alviso, which supports an environmental justice population.

The community of Alviso is at an elevation at or below about 5 feet NAVD 88. Because of the low elevation of the town, a coastal flood event could result in flood depths as great as 8 feet throughout much of the floodplain. Flood events that would result in several feet of flooding in Alviso are estimated to cause more than $100 million in direct damage to structures and contents.

The existing patchwork of non-engineered salt pond dikes that keeps bay water from the developed area has, in fact, prevented tidal flooding in the study area to date. However, according to the coastal flood risk analysis there is currently a high annual risk of flooding, and this risk will increase over the period of analysis under any of the three sea-level change (SLC) scenarios considered. According to the combined coastal and geotechnical modeling, in 2017 the annual chance of flooding is approximately one in three. Under the USACE Intermediate SLC scenario the annual risk of flooding by the year 2067 is estimated to be greater than fifty percent. This increase is due to the increase in relative sea level at the study location over the period of analysis.

Because of the significant flood depths anticipated, the flood risk is high both from a property damage perspective as well as a public health and safety perspective. If a project to reduce flood risk is not constructed, the study area would likely be vacated after repeated flooding and the community of Alviso would no longer exist.

During actual construction of the levee, most of the potential adverse social effects on the community of Alviso would take place during construction. Because the community is the closest to the proposed construction area, residents living in the community would be the most likely to be exposed to construction-related nuisances such as noise, dust, and additional traffic. As described throughout Chapter 4 *Existing and Future Conditions/Affected Environment, Environmental Consequences, and Mitigation Measures*, these construction-related effects would be short-term and minimized through applying best management practices. For example, construction-related air quality impacts would be avoided or minimized through careful material management, equipment management, and wind erosion control. The construction-related community impacts associated with FRM levee construction would be most noticeable to Alviso residents with Alternative 5 since the proposed FRM levee location would be very close to the community. Alternatives 2 and 3 would have the least effect on the community since the FRM levee would be on the north side of New Chicago Marsh (NCM; a distance of a quarter to a half mile in most places). Construction staging would be the same under all of the alternatives. For the most part, equipment and material would be staged in areas away from the community (primarily on Wastewater Facility property to the east and northeast).

In summary, applying best management practices to control dust and noise and limiting vehicle use to concentrated staging areas east of the town would prevent or minimize adverse construction-related effects on the residents of Alviso. Improving the long-term level of flood risk management would have a beneficial effect on the Alviso community. In general, then, the overall effect of the FRM element of the Shoreline Phase I Project would benefit this environmental justice population.

Ecosystem Restoration

The ecosystem restoration activities most likely to affect residents of Alviso are construction-related nuisance impacts similar to those described for FRM levee construction. In the case of ecosystem restoration, activity would begin at Pond A12, which is the pond closest to the community, starting in Year 0 with pond preparation. People living on the west end of Alviso could experience the construction-related nuisance impacts through about Year 4, when the Pond A12 breach is scheduled to occur. After that time, pond preparation work and construction activity would move to areas farther away from the community, so dust and noise impacts would lessen. Residents would probably still experience construction-related traffic, but, given the level of traffic that would probably be associated with the in-pond work, the schedule (it is spread out over several years), and the traffic maintenance plan that would be used during construction, construction-related traffic impacts are not expected to significantly affect mobility and access in, through, and around Alviso. Because the Pond A12 construction impacts would be short-term and because other construction would be physically farther away and low-intensity, construction-related nuisance impacts are not expected to cause significant effects on the residents of Alviso.

Long-term operations associated with areas restored through outboard levee breaches, such as water control and ongoing monitoring, are not expected to result in any adverse social impacts that could disproportionately affect people living in Alviso.