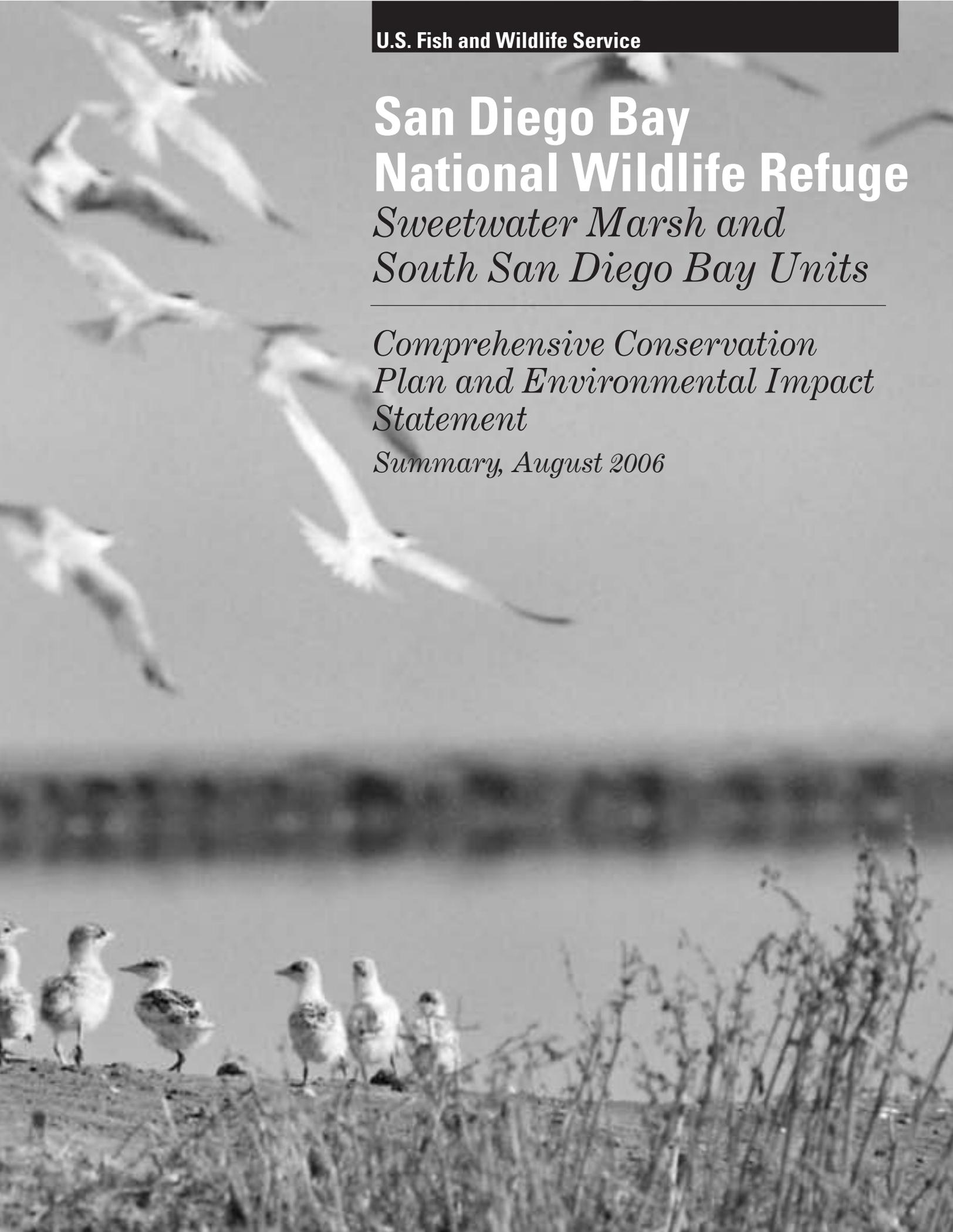


San Diego Bay National Wildlife Refuge

*Sweetwater Marsh and
South San Diego Bay Units*

*Comprehensive Conservation
Plan and Environmental Impact
Statement*

Summary, August 2006



Comprehensive Conservation Plans provide long-term guidance for management decisions and set forth goals, objectives, and strategies needed to accomplish refuge purposes and identify the Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

San Diego Bay National Wildlife Refuge

Sweetwater Marsh and South San Diego Bay Units

Final Comprehensive Conservation Plan and Environmental Impact Statement

Summary – August 2006

Vision Statement

The San Diego Bay National Wildlife Refuge protects a rich diversity of endangered, threatened, migratory, and native species and their habitats in the midst of a highly urbanized coastal environment. Nesting, foraging, and resting sites are managed for a diverse assembly of birds. Waterfowl and shorebirds over-winter or stop here to feed and rest as they migrate along the Pacific Flyway. Undisturbed expanses of cordgrass-dominated salt marsh support sustainable populations of light-footed clapper rail. Enhanced and restored wetlands provide new, high quality habitat for fish, birds, and coastal salt marsh plants, such as the endangered salt marsh bird's beak. Quiet nesting areas, buffered from adjacent urbanization, ensure the reproductive success of the threatened western snowy plover, endangered California least tern, and an array of ground nesting seabirds and shorebirds.

The San Diego Bay National Wildlife Refuge also provides the public with the opportunity to observe birds and wildlife in their native habitats and to enjoy and connect with the natural environment. Informative environmental education and interpretation programs expand the public's awareness of the richness of the wildlife resources of the Refuge. The Refuge serves as a haven for wildlife and the public to be treasured by this and future generations.

*U. S. Fish and Wildlife Service
California/Nevada Refuge Planning Office
2800 Cottage Way, Room W-1832
Sacramento, CA 95825*

August 2006

Summary

Current Status of the Comprehensive Conservation Plan

The U.S. Fish and Wildlife Service (Service) began the process of developing a Comprehensive Conservation Plan (CCP) for the San Diego Bay National Wildlife Refuge (Refuge) in June 2000. Public involvement was an important part of the CCP process, with two scoping meetings and three public workshops held over a multiple year period to address topics related to public use and wildlife and habitat management. A draft CCP/Environmental Impact Statement (EIS) was made available for public review and comment in July 2005. Additions and clarification to the text in the draft CCP/EIS were made as a result of comments received during the public review and comment period. These revisions are indicated in the Final CCP/EIS by underlining. In addition, detailed responses to comments are provided in Volume III, Appendix P, of the Final CCP/EIS. A Record of Decision on the CCP will be signed approximately 30 days after the availability of the Final CCP/EIS is announced in the Federal Register.

Introduction

The San Diego National Wildlife Refuge, consisting of the Sweetwater Marsh and South San Diego Bay Units, is located about ten miles north of the United States and Mexico border in San Diego County, California. The Refuge is situated at the south end of San Diego Bay (Figure 1) and is surrounded by urban development within the Cities of National City, Chula Vista, San Diego, Imperial Beach, and Coronado. Established to protect endangered and threatened species, the Refuge encompasses approximately 2,620 acres of land and water in and around San Diego Bay (Figure 2).

The 316-acre Sweetwater Marsh Unit (Figure 3) is located along the eastern edge of San Diego Bay and supports tidally influenced salt marsh habitat, disturbed upland habitat, and the D Street Fill, an old dredge disposal site that provides nesting habitat for terns and western snowy plovers. The South San Diego Bay Unit currently includes approximately 2,300 acres (Figure 4), most of which are leased to the U.S. Fish and Wildlife Service (Service) by the California State Lands Commission. This Refuge Unit includes portions of the open bay, active solar salt evaporation ponds (salt ponds), and the western end of the Otay River drainage basin (referred to as the Otay River floodplain).

Most of what remains of San Diego Bay's historic coastal salt marsh and intertidal mudflat habitat is preserved within these two Refuge Units. The Refuge also includes approximately 1,068 acres of commercial solar salt ponds, portions of the open bay, and approximately 90 acres of upland and wetland habitat within the Otay River floodplain. The various habitats on the Refuge support a number of Federally listed species, offer resting, foraging, and nesting areas for an abundant and diverse assemblage of birds, and support a variety other fish, wildlife, and plants.

Comprehensive Conservation Plan Process

A Comprehensive Conservation Plan (CCP) is prepared pursuant to the National Wildlife Refuge System Administration Act of 1966 (NWRS Administration Act), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) (Public Law 105-57) and an Environmental Impact Statement (EIS) is prepared in accordance with the requirements of the National Environmental Policy Act of 1969 (NEPA). The Improvement Act and Part 602 (National Wildlife Refuge System Planning) of the Fish and Wildlife Service Manual provides the directives and guidance for preparing CCPs and recommends that the CCP and EIS be

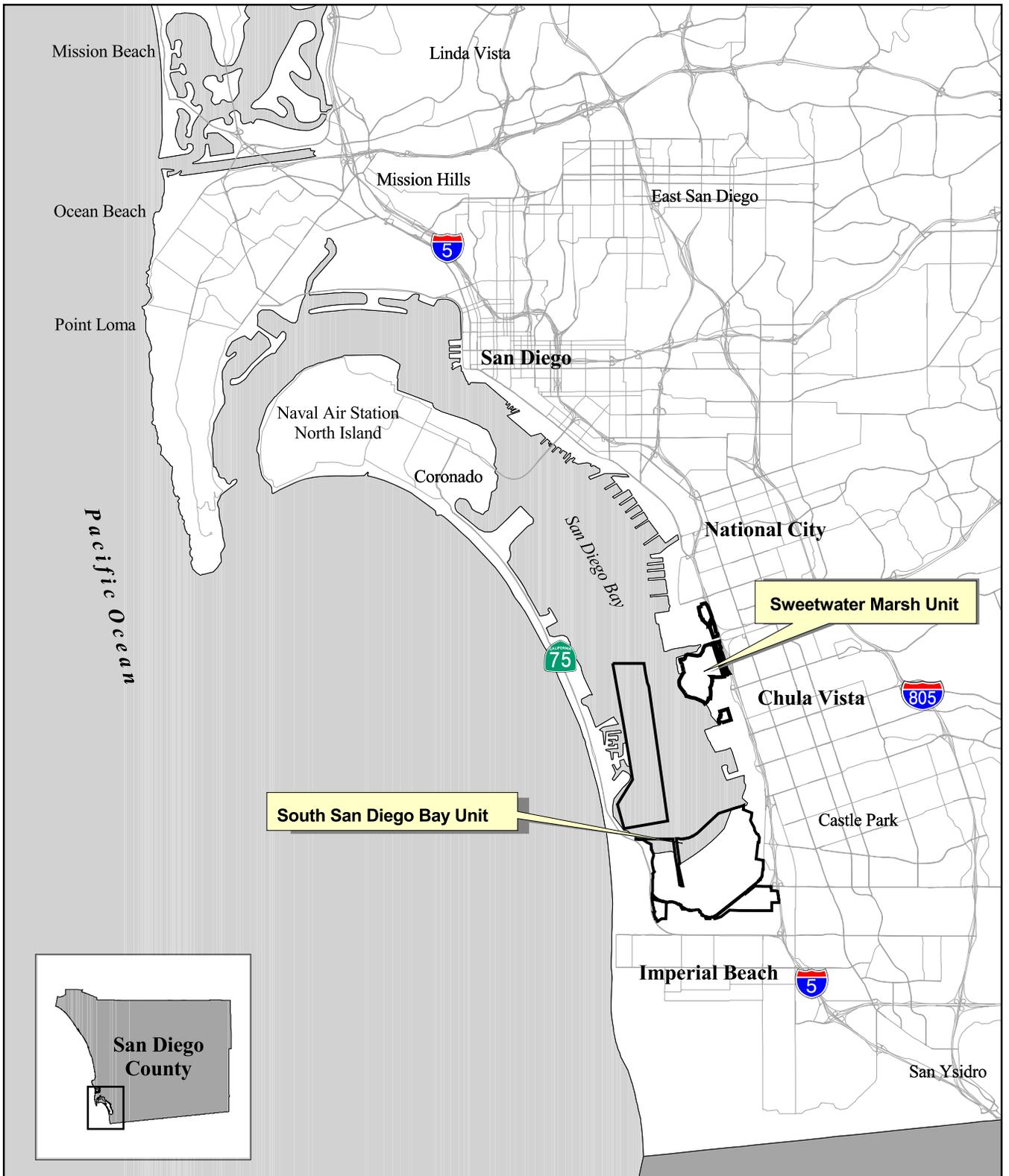


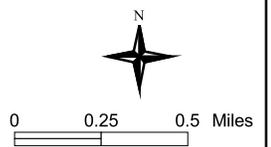
Figure 1
Location of the San Diego Bay National Wildlife Refuge



0 1 2 Miles



Figure 2
San Diego Bay NWR Comprehensive Conservation Plan
Project Study Area (Area of Potential Effects)



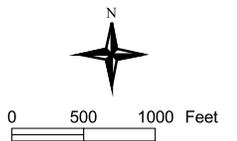
Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_sum/figures.apr



Figure 3
Aerial View of the Sweetwater Marsh Unit

 Refuge boundary



Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_sum/figures.apr

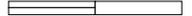


Figure 4
South San Diego Bay Unit Current Refuge Boundary

 South San Diego Bay Unit Existing Management Authority



0 0.25 0.5 Miles



Source: USFWS, Local Agency Partnership (2 ft imagery)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_sum/figures.apr

incorporated into one document. This approach, which provides for the direct integration of the provisions of NEPA into the CCP process, complies with the requirement that Federal agencies integrate the NEPA process with other planning at the earliest possible time.

The CCP/EIS is a programmatic document intended to analyze proposed actions on a conceptual level, except in those cases where sufficient information is available to provide project-specific analysis. Therefore, the extent of analysis provided for each restoration and/or public use proposal reflects the level of detail currently available for the specific proposal. The habitat restoration proposals analyzed in the CCP/EIS should be viewed as conceptual. It is during subsequent project level planning, referred to as “step-down” planning, that additional studies would be conducted, additional baseline data would be gathered, the appropriate project level NEPA documentation would be prepared, all necessary permits would be acquired, and final engineering and restoration planning would be conducted. Step-down planning would also include a public involvement component similar to that provided during the CCP process.

The Final CCP is intended to provide a clear and comprehensive statement of the desired future conditions for the Refuge and to ensure public involvement in refuge management decisions. The public involvement component of CCP planning encourages public input throughout the process from initial scoping and public review of the Draft CCP to participating in refuge management decision and step-down planning following formal adoption of the plan.

Availability of the Final CCP/EIS

The Final CCP/EIS is available on-line at <http://sandiegorefuges.fws.gov>. A compact disc (CD) or hard copy of the document can be obtained by writing to: Victoria Touchstone, Refuge Planner, San Diego National Wildlife Refuge (NWR) Complex, 6010 Hidden Valley Road, Carlsbad, CA 92011. Other contact methods include: 760-431-9440 ex. 349 (telephone), 760-930-0256 (facsimile), or Victoria.Touchstone@fws.gov (email).

The Final CCP/EIS is also available at the following locations: San Diego NWR Complex (6010 Hidden Valley Road, Carlsbad); Tijuana Estuary Visitor Center (301 Caspian Way, Imperial Beach); Chula Vista Public Library, Civic Center Branch (365 F Street) and South Chula Vista Branch (389 Orange Avenue); Coronado Public Library (640 Orange Avenue, Coronado); Imperial Beach Library (810 Imperial Beach Boulevard, Imperial Beach); National City Library (200 East 12th Street, National City); and City of San Diego, Central Library (820 E Street) and Otay Mesa Branch Library (3003 Coronado Avenue).

Purpose and Need

The purpose of developing the Comprehensive Conservation Plan (CCP) for the Refuge is to provide managers with a 15-year strategy for achieving refuge purposes and contributing toward the mission of the National Wildlife Refuge System (Refuge System), consistent with the sound principals of fish and wildlife conservation and legal mandates. The CCP is flexible; it will be revised periodically to ensure that its goals, objectives, strategies, and timetables are still valid and appropriate.

This CCP will also satisfy a condition of the Public Agency Lease between the California State Lands Commission and the Service requiring the Service to provide the State Lands Commission with a plan for managing the leased tidelands included within the boundary of the South San Diego Bay Unit. The lease condition requires that the plan “detail the Lessee’s management and development plans for the Refuge,” as well as “include a public access component.”

Finally, the CCP is required to fulfill the Service's obligation to prepare "a holistic habitat restoration plan" for a 1,035-acre portion of the existing salt works property, as described in a Cooperative Agreement between the Service and the Unified Port of San Diego (Port), dated October 1998 and amended in March 1999.

Proposals for habitat enhancement and restoration are incorporated into several of the management alternatives presented in the draft CCP/EIS. These proposals would implement the Service's policy for ensuring that the biological integrity, diversity and environmental health of the Refuge is maintained and, where appropriate, restored and would provide the guidance necessary to ensure that sensitive coastal habitats receive the highest priority for protection and maintenance on the Refuge. A guiding principal in developing the CCP was to identify opportunities for reversing the trend of historical wetland loss in San Diego Bay.

Required Permits and Approvals

Depending upon the alternatives that are ultimately selected as the proposed project, the following permits and/or approvals may be required to implement the Final CCP's objectives and strategies:

- **U.S. Fish and Wildlife Service** – Project level internal Section 7 consultations, as appropriate under the authorities of the Endangered Species Act (ESA), prior to the implementation of any actions proposed in the CCP that may affect federally listed endangered or threatened species. (A programmatic Biological Opinion has been prepared under the authorities of the ESA for the Final CCP.)
- **U.S. Army Corps of Engineers** – Clean Water Act 404 Permit and Rivers and Harbors Act Section 10 Permit for wetland restoration projects.
- **NOAA National Marine Fisheries Service (NMFS)** – Consultation with NMFS under the Magnuson-Stevens Fishery Conservation and Management Act for federal permitting and funding activities that could adversely affect Essential Fish Habitat.
- **U.S. Department of the Navy** – Approval to alter the current conditions in the northwestern corner of Pond 11, which is included within the Navy's ownership.
- **California Coastal Commission** – Concurrence with the Service's Consistency Determination for the CCP. (This involves a determination that the CCP is consistent to the maximum extent practicable with the California Coastal Management Program [Section 307 of the Coastal Zone Management Act]).
- **Regional Water Quality Control Board** – 401 Certification for wetland restoration projects and possibly a discharge permit for breaching the salt pond levees.
- **San Diego County Air Pollution Control Board** – Compliance with Rule 1501 of the Air Pollution Control District's Rules and Regulations.
- **Caltrans, District 11** – Encroachment Permit, which would be required if any activities associated with the Refuge were to affect existing Interstate 5 right-of-way.
- **City of San Diego** – Encroachment Permit and/or other approvals, which would be required if restoration is proposed on properties owned by the City of San Diego.

The National Wildlife Refuge System

The Refuge System is the largest collection of lands and waters specifically managed for fish and wildlife conservation in the nation. Unlike other Federal lands that are managed under a multiple-use mandate (e.g., lands administered by the U.S. Bureau of Land Management and the U.S. Forest Service), the Refuge System is managed for the benefit of fish, wildlife, plant resources, and their habitats.

Operated and managed by the Service, the Refuge System comprises more than 545 national wildlife refuges with a combined area of more than 95 million acres. The majority of refuge lands (approximately 77 million acres) are in Alaska. The remaining acres are spread across the other 49 states and several island territories.

The mission of the Refuge System is “*To administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans*” (16 USC 668dd et seq.).

Vision Statement for the Refuge

The San Diego Bay National Wildlife Refuge protects a rich diversity of endangered, threatened, migratory, and native species and their habitats in the midst of a highly urbanized coastal environment. Nesting, foraging, and resting sites are managed for a diverse assembly of birds. Waterfowl and shorebirds over-winter or stop here to feed and rest as they migrate along the Pacific Flyway. Undisturbed expanses of cordgrass-dominated salt marsh support sustainable populations of light-footed clapper rail. Enhanced and restored wetlands provide new, high quality habitat for fish, birds, and coastal salt marsh plants, such as the endangered salt marsh bird’s beak. Quiet nesting areas, buffered from adjacent urbanization, ensure the reproductive success of the threatened western snowy plover, endangered California least tern, and an array of ground nesting seabirds and shorebirds.

The San Diego Bay National Wildlife Refuge also provides the public with the opportunity to observe birds and wildlife in their native habitats and to enjoy and connect with the natural environment. Informative environmental education and interpretation programs expand the public’s awareness of the richness of the wildlife resources of the Refuge. The Refuge serves as a haven for wildlife and the public to be treasured by this and future generations.

Refuge Goals

Goals and objectives established for a Refuge are the unifying element of Refuge management, intended to identify and focus management priorities and to provide a link between management actions, Refuge purposes, and NWRS mission and goals.

Sweetwater Marsh Unit

The following goals provide guiding principles for the Sweetwater Marsh Unit:

- Goal 1: Protect, manage, enhance, and restore coastal wetland and upland habitats to benefit native fish, wildlife, and plant species within the Sweetwater Marsh Unit.
- Goal 2: Support recovery and protection efforts for the federally and state listed threatened and endangered species and species of concern that occur within the Sweetwater Marsh Unit.
- Goal 3: Protect and restore the environmental health of the Refuge’s coastal salt marsh and upland habitats by making contaminants remediation a priority for Refuge lands, adjacent properties, and upstream developments.

- Goal 4: Provide outstanding environmental education programs for all ages in partnership with the Chula Vista Nature Center and other public agencies and non-governmental organizations.
- Goal 5: Provide quality wildlife-dependent recreation, interpretation, and outreach opportunities to enhance public appreciation, understanding, and enjoyment of the Refuge's biological and cultural resources.

South San Diego Bay Unit

The following goals provide guiding principles for the South San Diego Bay Unit:

- Goal 1: Protect, manage, enhance, and restore open water, coastal wetlands, and native upland habitat to benefit the native fish, wildlife, and plant species supported within the South San Diego Bay Unit.
- Goal 2: Support recovery and protection efforts for the federally and state listed threatened and endangered species and species of concern that occur within the South San Diego Bay Unit.
- Goal 3: Provide high quality foraging, resting, and breeding habitat for colonial nesting seabirds, migratory shorebirds and waterfowl, and salt marsh-dependent species.
- Goal 4: Provide opportunities for compatible wildlife-dependent recreation and interpretation that foster public appreciation of the unique natural and cultural heritage of South San Diego Bay.

Background

The Sweetwater Marsh Unit was established as a National Wildlife Refuge in 1988 following the United States District Court (Southern District of California) approval of a stipulated settlement agreement among the U.S. Army Corps of Engineers, Federal Highway Administration, Sierra Club, League of Coastal Protection, Caltrans, County of San Diego, and the private landowner, Santa Fe Land Improvement Company. The lands included within the Refuge were acquired to protect the federally listed endangered light-footed clapper, salt marsh bird's beak, and California least tern. From 1988 to 2004, the Refuge was referred to as the Sweetwater Marsh National Wildlife Refuge. In 2004, this Refuge was incorporated into the San Diego Bay NWR. The refuge lands around Sweetwater Marsh are now referred to as the Sweetwater Marsh Unit of the San Diego Bay National Wildlife Refuge.

The South San Diego Bay Unit was established in 1999 as a Unit of the San Diego National Wildlife Refuge following the execution of a lease from the California State Lands Commission to the Service for 2,209 acres of State Tidelands. An additional 91 acres of land in the Otay River floodplain was acquired by the Service for inclusion in this Refuge Unit in January 2000.

On July 13, 2004, the acreage in the South San Diego Bay Unit was added to the Sweetwater Marsh National Wildlife Refuge and both areas were renamed the "San Diego Bay National Wildlife Refuge." This change was made to streamline management and facilitate public understanding and recognition of the two Refuge areas.

The purposes of the San Diego Bay National Wildlife Refuge include:

“to protect, manage, and restore habitats for federally listed endangered and threatened species and migratory birds, and to maintain and enhance the biological diversity of native plants and animals” 16 U.S.C. § 1531-1543 (Endangered Species Act of 1973, as amended) and 70 Stat. 1119 (Fish and Wildlife Act of 1956, as amended);

... for the development, advancement, management, conservation, and protection of fish and wildlife resources ...” 16 U.S.C. § 742f(a)(4) “... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ...” 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956); and

... shall be administered by him [Secretary of the Interior] directly or in accordance with cooperative agreements ... and in accordance with such rules and regulations for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon, ...” 16 U.S.C. § 664 (Fish and Wildlife Coordination Act).”

Issues

Planning issues were identified through discussions with planning team members and workshop participants, and through the public scoping process. From these discussions and input provided during scoping, key issues were identified for both the Sweetwater Marsh Unit and the South San Diego Bay Unit. These issues, which are presented in detail in Chapter 1 of the Final CCP/EIS, include topics related to Refuge boundary expansion, habitat enhancement and restoration, remediation of contaminants, balancing the habitat needs of the various species supported on the Refuge, managing invasive species, conflicts between species including predation, and the appropriateness of various public uses on the Refuge.

Refuge Setting

The Sweetwater Marsh and South San Diego Bay Units encompass approximately 2,620 acres of land and water located in the southern portion of San Diego Bay. Refuge habitats offer resting, foraging, and nesting areas for an abundant and diverse assemblage of birds, as well as habitats that support a variety of fish and marine and terrestrial invertebrates, and a smaller array of amphibians, reptiles, and mammals.

Approximately 2,100 acres of open water within San Diego Bay are included within the acquisition boundary of the South San Diego Bay Unit, of which approximately 1,500 acres are currently managed as part of the Refuge System. San Diego Bay is a natural, nearly enclosed embayment with a water surface area of approximately 17 square miles at mean lower low water (MLLW) and a total length of approximately 15 miles. The natural characteristics of the bay have been significantly altered over the years as portions of the bay were dredge to facilitate commercial and military ship operations, and the adjacent wetlands were filled to accommodate urban development. Today, deep subtidal habitat accounts for 28 percent (4,443 acres) of the total acreage in the bay, an increase of 16 percent from 1859, while 41 percent of the historic shallow subtidal habitat within the bay has been lost.

A significant area of historic coastal salt marsh habitat is protected along the eastern edge of the south bay within the Sweetwater Marsh Unit of the San Diego Bay NWR Refuge. This habitat supports a variety of migratory shorebirds and wintering waterfowl, as well as the endangered light-footed clapper rail, a year-round resident of the marsh. Although the upland areas on this

Unit have experienced extensive human disturbance, today, portions of these uplands provide important habitat for ground nesting birds. Other upland areas provide opportunities to restore native upland and wetland habitats that historically occurred here. The Sweetwater Marsh Unit provides habitat for two federally endangered bird species, the California least tern and light-footed clapper rail, one threatened species of bird, the western snowy plover, and one endangered plant species, salt marsh bird's beak. The American Bird Conservancy has designated this Refuge Unit as a Globally Important Bird Area.

The most significant change to the natural environment within the southern end of the bay can be attributed to the creation of solar salt evaporation ponds, which are still used today to produce salt. At its peak, the salt works occupied an area of approximately 1,300 acres. Today, the salt works occupies approximately 1,060 acres. The salt pond complex, which consists of diked open water cells with differing levels of salinity, provides roosting habitat for a variety of migratory birds during high tide, supplemental foraging habitat for various shorebirds, and primary foraging habitat for other species such as phalaropes and eared grebes. The salt pond levees also provide nesting habitat for a variety of ground nesting birds, including the endangered California least tern, the threatened western snowy plover, and an array of other tern species, some of which only nest in a few locations in the United States. The American Bird Conservancy has designated the South San Diego Bay Unit as a Globally Important Bird Area due to the presence of globally significant numbers of nesting gull-billed terns and continentally significant numbers of surf scoters, Caspian terns, and western snowy plovers. The entire southern end of San Diego Bay, including the Sweetwater Marsh and South San Diego Bay Units, has also been recognized as a Western Hemisphere Shorebird Reserve Network Site.

The native upland and wetland habitat of the Otay River floodplain was all but eliminated during the twentieth century as a result of industrial, agricultural, and municipal activities. Maps dating back to 1916 depict the Otay River in its present channelized configuration. A narrow corridor of salt marsh, freshwater marsh, and native riparian habitat are supported within the river channel, and remnant maritime succulent scrub habitat can still be found in the vicinity of the railroad right-of-way that extends between the salt ponds and the Otay River channel.

Despite the effects of human disturbance, there remain important coastal wetland habitats within these Refuge Units, as well as numerous opportunities for restoring those habitats lost to development over the years. The coastal wetlands protected within the Sweetwater Marsh and South San Diego Bay Units represent two of the 23 coastal wetland systems remaining in San Diego County. As such, the Refuge protects habitats essential to the migratory birds of the Pacific Flyway.

Habitats, Fish, and Wildlife

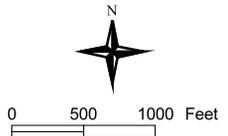
Sweetwater Marsh Unit

The habitats supported on this Refuge Unit are illustrated in Figure 5 and the estimated acreage of each habitat type is presented in Table 1.

The most significant habitat present on this Refuge Unit is coastal salt marsh. This habitat supports an array of invertebrates and juvenile fish, and provides nesting, foraging, and high-water refuge for many species of birds. Some notable species include the federally listed endangered light-footed clapper rail and the State endangered Belding's savannah sparrow. The clapper rail depends almost entirely on salt marsh habitat, and in particular dense patches of cordgrass, for feeding, resting, and nesting. Belding's savannah sparrows are found throughout



Figure 5
Habitats of Sweetwater Marsh Unit



Source: James Thiede, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2004
 /stacey/sdco/ssdbay/fig_sum/sdbay_veg.apr

the coastal salt marsh areas of the Refuge Unit and forage within salt marsh and intertidal mudflat habitat. The federal endangered plant, salt marsh bird's beak, also occurs within this habitat.

The intertidal mudflat and coastal salt marsh habitats of the Sweetwater Marsh Unit are also important wintering areas for many species of shorebirds, such as long-billed curlews, whimbrels, and red knots. Other significant habitats, which occupy a much smaller portion of the Refuge Unit, include wetland/upland transition areas and maritime succulent scrub habitat, both of which support several sensitive plant species. The D Street Fill, a tideland area that was filled with dredge spoils in the 1960s, today provides nesting habitat for several species of ground nesting birds including California least terns, horned larks, and killdeer. Western snowy plovers also nested here in the past, however, no snowy plover nests have been observed since 2000.

Habitat Type	Approximate Acres
Artificial Tidal Creek	0.5
Brackish Marsh	1.5
Coastal Sage Scrub	1.0
Coastal Sage Scrub (disturbed)	31.5
Developed/Fill	11.5
Exotic Shrubland	2.0
Fill w/ dune and scrub vegetation	56.5
Maritime Succulent Scrub	3.5
Mudflat	3.5
Nonnative Annuals	3.0
Open Water	1.5
Salt Marsh	184.0
Salt Pan/Salt Flat	7.0
Tidal Creek	9.0

South San Diego Bay Unit

The predominant native habitats within the South San Diego Bay Unit include shallow subtidal habitat and intertidal mudflats. In addition, the salt ponds provide resting and foraging habitat for a variety of avian species, while the levees around the ponds provide important nesting habitat for seven species of ground nesting seabirds. Based on observations of these nesting colonies and the nesting colonies of these species elsewhere, it appears that the qualities that attract ground nesting seabirds to the salt pond levees include limited human disturbance, the isolated nature of the area, the availability of exposed or lightly vegetated open ground, and unrestricted visual access from the levees into the surrounding area.

In San Diego Bay, shallow subtidal habitat supports an abundance of fish, and bird abundance and diversity is higher in this habitat than in any other subtidal habitats in the bay. The locations of the habitats on this Refuge Unit are illustrated in Figure 6 and the estimated acreage of each habitat type is presented in Table 2.

Within the boundaries of the South San Diego Bay Unit, there are areas of vegetated and unvegetated shallow subtidal habitat. Eelgrass beds, which make up much of the vegetated areas within this habitat, also occur within the Refuge boundary (Figure 7). Eelgrass beds provide highly productive microhabitats for a wide variety of invertebrates and small fish.

Eelgrass provides food both directly and indirectly to a wide array of organisms. It can enter the food web as detritus, be eaten by fish that are sometimes eaten by fish-eating birds, or be consumed directly by birds, such as black brant, gadwall, and northern pintail. The bay's small population of Pacific green sea turtles also relies on eelgrass as an important food source. The density and biomass of the South Bay's eelgrass beds can vary widely from one season to another and are affected by water depth, sediment grain size, nutrients, light levels, temperature, salinity, and water quality.

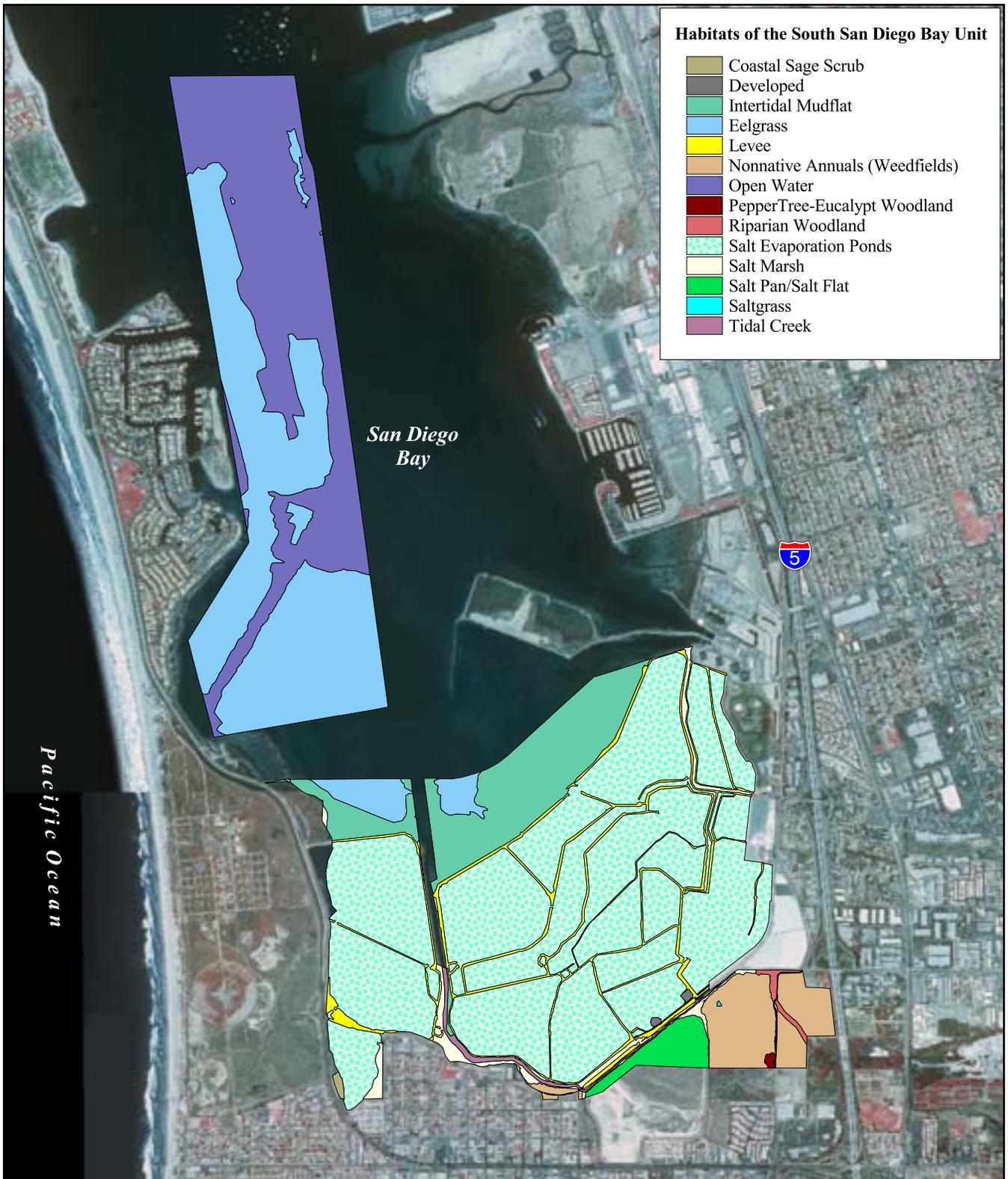
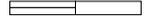


Figure 6
Existing Habitats of the South San Diego Bay Unit



0 1000 2000 Feet



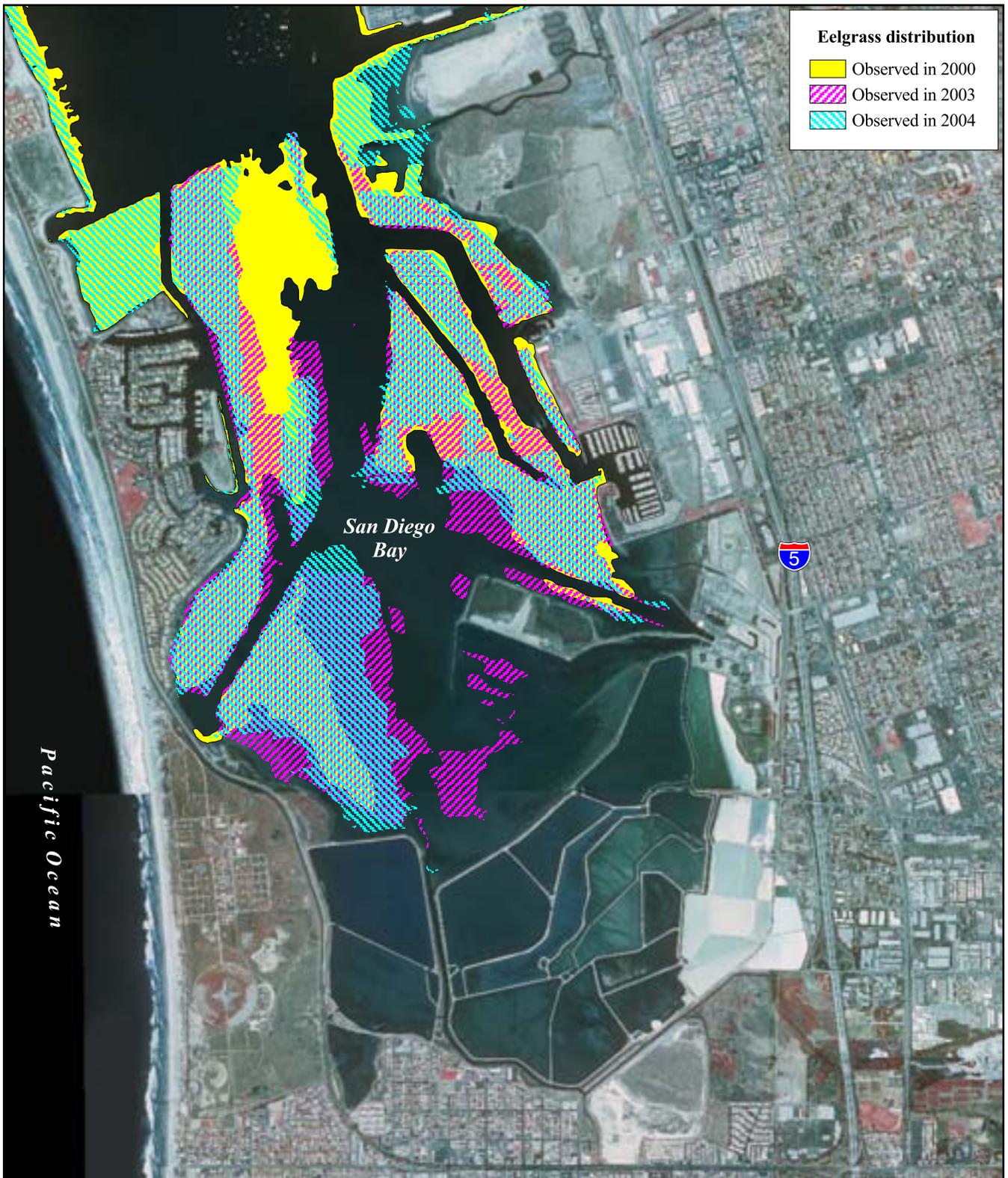


Figure 7
Eelgrass Distribution in South San Diego Bay

Source: Merkel & Associates, Inc., San Diego Port Authority,
 Local Agency Partnership 2000 (2 ft imagery)



0 0.25 0.5 Miles

Carlsbad Field Office - 2004
 /stacey/sdco/ssdbay/fig_sum/fig7.apr

The South Bay’s shallow subtidal habitat also supports a group of twelve species of fish that are indigenous to the bays and estuaries of the Southern California Bight. The extensive shallow water habitat and eelgrass beds of the South Bay provide important habitat for these and a variety of other fish, including midwater, schooling fishes, such as northern anchovies, slough anchovies, and topsmelt. These species, in turn, represent a major forage resource for predatory fish and avian species. The warmer, hypersaline waters of the South Bay also offer shelter for a number of fish species commonly encountered further south in the Eastern Subtropical and Tropical Pacific. The south end of San Diego Bay also appears to function as an important nursery area for juvenile California halibut and young spotted and barred sand bass.

Habitat Type	Approximate Acres
Coastal Sage Scrub	2.0
Developed	2.0
Eel Grass	440.0
Intertidal Mudflat	220.0
Levee	85.0
Nonnative Annuals	98.0
Open Water	410.0
Eucalyptus Woodland	1.0
Riparian Woodland	5.0
Road	2.0
Salt Ponds	964.0
Salt Marsh	30.0
Salt Pan/Salt Flat	30.0
Tidal Creek	11.0

Intertidal mudflats provide foraging habitat for fish during high tide, while at low tide, great numbers of shorebirds assemble to forage on the many invertebrates available on the exposed flats. In addition to foraging, shorebirds also depend upon the mudflats for roosting and resting. The most extensive mudflats within the South Bay are those that lie to the north of the salt ponds within the Refuge Unit. The Service observed tens of thousands of birds, representing 67 species, in this area during a year-long survey conducted in 1993 and 1994. The majority of the birds observed were shorebirds and seabirds.

Smaller areas of coastal salt marsh occur in the few natural drainages that flow through the Refuge Unit, as well as along the bayside of the outer levees of the salt ponds. This habitat provides the Belding’s savannah sparrow with nesting and foraging opportunities. Within the lower reach of the Otay River, this habitat as well as some brackish and freshwater marsh areas, provide habitat for the endangered light-footed clapper, various shorebirds, and wintering and breeding waterfowl.

Although not considered a natural habitat, the salt evaporation ponds located within the South San Diego Bay Unit provide relatively isolated nesting and resting habitat for a wide range of avian species, as well as some unique foraging habitat for several species of birds. Solar salt production has occurred in this location for over 100 years. During this time, the salt ponds have been an important stopover point for large numbers of migratory and wintering birds. In addition, the salt pond levees provide regionally important nesting habitat for seven species of colonial seabirds.

Due to the hypersaline nature of the ponds, native wetland vegetation and bay invertebrates are essentially absent from the majority of the ponds. The only fish in the ponds are those that come in with the initial intake of tidal water. Once in the system, they can only survive in the lowest salinity primary ponds, cannot escape back into the bay, and do not reproduce. The ponds do however support several species of brine invertebrates that are preyed upon by a variety of birds, particularly eared grebes and phalaropes.

The Otay River floodplain is dominated by invasive weeds and smaller areas of non-native grasses. The primary native vegetation in this area is the wetland vegetation that occurs along the edges of the narrow Otay River channel.

Federally Listed Species and Other Species of Concern

The Refuge provides habitat for seven federally listed endangered and threatened species: the endangered California least tern (*Sterna antillarum browni*), light-footed clapper rail (*Rallus longirostris levipes*), California brown pelican (*Pelecanus occidentalis californicus*), and salt marsh bird's beak (*Cordylanthus maritimus maritimus*) and the threatened western snowy plover (*Charadrius alexandrinus nivosus*), Pacific green sea turtle (*Chelonia mydas*), and California gnatcatcher (*Poliophtila californica californica*). Of these species, the least tern, clapper rail, and snowy plover all nest on the Refuge.

Four of the federally listed endangered species supported by these Refuges, including salt marsh bird's beak, California least tern, light-footed clapper rail, and California brown pelican, are also listed as endangered by the State of California. The salt marsh habitat within these Refuges also supports the Belding's savannah sparrow, another species listed by the State as endangered.

The Refuge also supports 26 species identified by the Service as Birds of Conservation Concern. Of these species, the gull-billed tern, elegant tern, and black skimmer nest at the salt works.

Current Public Use

The Refuge System considers wildlife first when deciding whether to allow a public use. Because of the sensitivity of the habitats, public access onto the Refuge is restricted to Gunpowder Point on the Sweetwater Marsh Unit and to the open waters of the Bay on the South San Diego Bay Unit. Occasional guided nature tours of the salt works are also conducted during the non-breeding season. Permitted uses on the Sweetwater Marsh Unit include wildlife observation and photography and environmental education and interpretation. The Chula Vista Nature Center, operated by the City of Chula Vista, also occupies a 3.3-acre lease site within the Sweetwater Marsh Unit. Public access onto the Refuge is only permitted via a shuttle bus operated by the Nature Center that picks up and drops off visitors near E Street and Interstate 5.

Uses permitted on the South San Diego Bay Unit include fishing and boating in the bay, wildlife observation, and environmental education. No fishing is permitted in the salt ponds and public access onto the salt works is restricted.

Management Alternatives

An important step in the CCP process is the development and analysis of alternatives. Alternatives are developed to explore and analyze different ways to achieve Refuge purposes, contribute to the mission of the Refuge System, meet Refuge goals, and resolve issues identified during scoping and throughout the CCP process. The alternatives developed for each Refuge Unit are summarized below and the graphics depicting the various alternatives are provided in Appendix A (Figures A-1 through A-13).

Two elements common to all of the alternatives for the San Diego Bay National Wildlife Refuge are a proposed fire management plan and predator management plan.

Sweetwater Marsh Unit

Alternative A, No Action (Figure A-1) – The Sweetwater Marsh Unit currently operates without an official management plan. Under the no action alternative, the current management activities would be incorporated into the CCP to formally establish ongoing management direction for this Refuge Unit for the next 15 years. This alternative, which assumes no change to past and present management activities on the Refuge Unit, represents the baseline from which other “action” alternatives have been evaluated.

Under this alternative, wildlife and habitat management activities would continue to focus on the protection and recovery of the federally listed endangered and threatened species supported on this Unit. Such activities include invasive weed management within the upland transition areas, endangered species monitoring, and annual site preparation of the least tern and snowy plover nesting area on the D Street Fill. The latter activity is conducted in partnership with the Port, which manages nesting habitat on the D Street Fill located outside the Refuge boundary.

Predator management would continue to be implemented to reduce the loss of California least tern, western snowy plover, and light-footed clapper adults, chicks, and eggs to mammalian and avian predation. Predator management is addressed in a step-down Predator Management Plan that accompanies the Final CCP/EIS.

Implementation of the Predator Management Plan is proposed pursuant to the Service’s endangered species management responsibilities and would occur on the Refuge in conjunction with other wildlife and habitat management activities. Under the plan, predator management would be conducted as a comprehensive wildlife damage control program that addresses a range of management actions from vegetation control and nesting habitat enhancement to non-lethal and lethal control of both mammalian and avian predators. The most effective, selective, and humane techniques available to deter or remove individual predators or species that threaten nesting, breeding, or foraging California least terns, western snowy plovers, or light-footed clapper rails would be implemented.

The San Diego National Wildlife Refuge Complex (Complex), consistent with the requirements of the National Fire Plan, has developed a fire management plan for all of the Refuges within the Complex. This plan outlines the fire management objectives for the Complex, describes the Complex’s wildland fire management situation, and presents the Complex’s fire management strategies. With respect to the San Diego Bay National Wildlife Refuge, the plan focuses on preparedness, wildland fire operations, prevention, and detection. Prescribed and wildlife fire use are not proposed as a strategy for achieving land management objectives on this Refuge.

Alternative B, Implement Habitat Enhancement (Figure A-2) – Under this alternative, management activities would focus on enhancing the Refuge’s coastal salt marsh habitat for the benefit of a variety of species, particularly the endangered light-footed clapper rail and salt marsh bird’s beak. In addition to the activities described under Alternative A, this alternative also includes proposals to enhance tidal circulation and improve marsh management.

Historic tidal channels in Sweetwater Marsh (channels that were blocked when fill was placed in the marsh to provide access to Gunpowder Point) would be reconnected to increase tidal circulation over approximately 60 to 80 acres of the main marsh complex. In addition, the feasibility of lowering or removing an existing weir at the south end of Paradise Marsh to improve tidal circulation within that portion of the Refuge Unit would also be explored.

Opportunities for wildlife observation and environmental education would remain unchanged; however, new opportunities for environmental interpretation are proposed, particularly for Paradise Marsh and the F&G Street Marsh. This alternative also proposes to expand current cultural resource management activities.

Alternative C (preferred alternative), Implement Habitat Enhancement and Restoration and Improve Existing Public Uses (Figure A-3) – Under Alternative C, various restoration projects are proposed that would increase the total acreage and habitat quality of the Unit’s salt marsh habitat in Sweetwater Marsh and the F&G Street Marsh, and restore native upland habitat on Gunpowder Point. These proposals would be implemented in addition to the enhancement proposals described in Alternative B. The anticipated acreages of restored habitat under this alternative are provided in Table 3.

Under Alternative C, the existing opportunities for wildlife-dependent recreational uses on the Sweetwater Marsh Unit would be improved and in some cases expanded. No new public uses are proposed. Uses that would be provided under this alternative include wildlife observation, photography, environmental education, and interpretation.

Location	Proposed Habitat Type	Estimated Acres to be Restored
Sweetwater Marsh	Possible conversion of high marsh to low marsh habitat	To be determined
D Street Fill	Restore intertidal wetlands	13.0 acres
	Preserve nesting habitat	33.0 acres
Gunpowder Point	Native uplands (coastal sage scrub/maritime succulent scrub)	25.0 acres
	Intertidal wetlands	2.0 acres
F&G Street Marsh	Intertidal wetlands (salt marsh)	6.0 acres

The existing half-mile trail system on Gunpowder Point would be redesigned to improve the quality of the trail experience, improve overall accessibility, and reduce potential impacts to adjacent sensitive habitats. Where possible, the trail would be designed to loop around an area, rather than bring a visitor out to the edge of a habitat and then terminate. The proposed realignments could involve the closure of some trail segments and/or the creation of one or more new segments. Although the redesigned trail system would be created primarily to facilitate environmental education and interpretive programs, it would also improve opportunities for wildlife observation and photography. In addition, the interpretive elements on Gunpowder Point would be designed to complement existing environmental education and interpretation programs.

Description of the Goals, Objectives and Strategies for Sweetwater Marsh Unit

Although the goals are the same for each of the three alternatives described for the Sweetwater Marsh Unit there are a variety of ways in which to achieve these goals. Therefore, the objectives

and strategies for each goal vary among alternatives. The objective statements and associated strategies for each Refuge goal are presented in Chapter 2 of the Final CCP/EIS. The objectives have been written to address the preferred alternative (Alternative C), however, the various strategies that would implement the objective in whole or in part are also presented and the specific alternative that would implement a particular strategy is identified. Specific acreage figures, time frames, and other measurable elements presented for each objective may change depending upon which alternative is finally selected for implementation.

South San Diego Bay Unit

Alternative A, No Action (Figure A-4) – At present, this Refuge Unit operates without a comprehensive management plan; therefore, under this alternative, the management practices identified as necessary when the Unit was established would continue to be implemented. No changes to present management would occur and the current management activities would be incorporated into the CCP to formally establish management direction for the next 15 years.

Current management activities include enhancement of nesting and foraging opportunities for the California least tern, using funds provided by the Port in accordance with the agreement that resulted in the establishment of the Refuge Unit; endangered species monitoring; predator management; invasive plant species control, and law enforcement to address unauthorized activities on Refuge lands, including trespass, transient encampments, and illegal dumping.

The current opportunities of public use, involving fishing, wildlife observation, environmental education, and boating, would be retained, but no new uses would be initiated. In addition, commercial solar salt production would continue to operate under a Refuge Special Use Permit.

Alternative B, Expand Habitat Management and Enhance Nesting Opportunities (Figure A-5) – Under this alternative, habitat values for California least tern, western snowy plover, and colonial nesting seabirds would be improved by enhancing the nesting substrate on various salt pond levees, recontouring levee surfaces to improve access from nesting areas to the edge of the ponds, and expanding nesting habitat within the salt ponds. A minimum of 20 acres of new nesting area would be created within the primary ponds, requiring the importation of approximately 200,000 cubic yards of appropriate fill material and a minimum of 18,000 cubic yards of clean, light-colored sand. This alternative also proposes the creation of additional roosting habitat within the salt ponds for California brown pelicans and the initiation of a public outreach program to address the problems associated with improperly discarded fishing line and other debris in the bay.

Under this alternative, no change to the existing public use programs, as described in Alternative A, would occur and commercial solar salt production would continue at present levels.

Alternative C, Expand Habitat Management, Enhance Nesting Opportunities, Implement Habitat Restoration, and Expand Existing Public Use Opportunities (Figure A-6) – Under Alternative C, management activities would be increased to include several habitat restoration proposals. These proposals reflect the need to restore the variety of coastal habitats that have been lost to development in California, and particularly in San Diego Bay, over the past 140 years. Specific proposals include restoring some salt ponds to tidal influence and excavating portions of the Otay River floodplain to restore intertidal habitat, which historically occurred here. The restoration of intertidal habitat, particularly cordgrass-dominated salt marsh habitat, is intended to benefit the light-footed clapper rail and other avian species, while also expanding the area available to support a variety of fish and benthic invertebrate species.

This alternative also proposes to restore native upland and freshwater wetland habitats in the eastern portion of the Otay River floodplain. If implemented, this alternative would result in the restoration of up to 140 acres of intertidal salt marsh, freshwater wetland, and coastal sage scrub habitat within the Otay River floodplain. In addition, up to 410 acres of salt ponds would be restored to intertidal salt marsh habitat. The seabird nesting and pelican roosting enhancements described under Alternative B would also be implemented under this alternative. This alternative includes two restoration options for the Otay River floodplain (Figures A-7 and A-8) and two restoration options for the salt ponds (Figures A-9 and A-10). These options were developed to allow the Service to fully evaluate the opportunities and constraints of restoring these areas, as well as to present a range of feasible alternatives for evaluation under NEPA. The acreage of each habitat to be restored under these options is presented in Tables 4 and 5.

Table 4 Habitat Acreages for the Otay River Floodplain Restoration Options Under Alternative C for the South San Diego Bay Unit						
Otay River Floodplain Restoration Options	Habitat Type (Acres)					Restored Upland
	Tidally Influenced Wetlands			Freshwater Wetlands		
	Intertidal Mudflat (50%) ¹	Cordgrass (30%)	Pickleweed (20%)	Marsh	Riparian	
Option 1 – Expanded River Channel	31	19	13	6 (30%) ²	13 (70%) ²	61
Option 2 – Expanded Tidal Wetlands	44	26	18	12 (70%) ²	5 (30%) ²	38

¹ Percent of total area to be restored to tidally influenced wetlands.

² Percent of total area to be restored to freshwater wetland.

Table 5 Habitat Acreages for the Salt Works Restoration Options Under Alternative C for the South San Diego Bay Unit							
Alt. C – Salt Works Restoration Options	Habitat Type (Acres)						Active Salt Pond
	Shallow Subtidal Habitat	Intertidal Mudflat	Salt Marsh (Cordgrass- dominated)	Salt Marsh (Pickleweed- dominated)	Potential Nesting Area		
					New	Enhanced Levees ¹	
Option 1 - Restored Western Ponds	13	11	163	10	18	variable	815
Option 2 - Restored Primary Ponds	32	95	297	16	18	variable	519

¹The actual acreage of enhanced levees would be determined during final restoration planning.

To achieve the desired habitat types within the restored salt ponds, the elevations in the bottom of the ponds would be adjusted by adding fill to raise the elevation on the bottom of the pond or by removing sediment to lower the elevation. The objective of recontouring the pond elevations is to

achieve elevations known to support specific habitat types in San Diego Bay. For instance, to support cordgrass-dominated salt marsh habitat the elevations of the sediments in the ponds should range from between +3.5 feet and +4.5 feet MLLW. Achieving the desired elevation would require importing fill. If the material excavated from the Otay River floodplain is suitable for placement in the ponds, this material would be used to achieve the desired elevations. The only changes to the current configuration of the pond levees as a result of restoration would be breaches in the levees to facilitate tidal exchange. Levees would be monitored and maintained to support seabird nesting and shorebird and other waterbird roosting.

The estimated volumes of cut and fill material associated with the grading necessary to restore habitat under one or more of the restoration options proposed for this Alternative are presented in Table 6. The fill volumes shown for the Otay River floodplain represent the maximum amount of fill that would be placed within the areas designated for upland restoration. The maximum depth of this fill on each area would be eight feet. The volumes presented in this table are estimates based on very preliminary grading plans and do not take into consideration existing soil characteristics. These cut and fill figures would be refined and the existing soils characterized as part of final restoration planning.

In addition to the uses currently occurring on this Refuge Unit, Alternative C proposes to include additional opportunities for fishing and wildlife observation by opening the northern levee of Pond 11 to public access. Fishing would be permitted from the bayside of the levee. The number of guided nature tours currently conducted within the salt works would increase; a pedestrian pathway would be designed and constructed to the north of the Bayshore Bikeway in the vicinity of Ponds 10 and 23; and a proposed alignment for the westernmost portion of the Otay Valley Regional Trail would be designated along the eastern edge of the Refuge Unit. Solar salt production would continue, but within a reduced footprint.

Alternative D (preferred alternative): Expand Habitat Management, Enhance Nesting Opportunities, Maximize Habitat Restoration, and Provide Additional Public Use

Opportunities (Figure A-11) – Alternative D proposes to enhance opportunities for seabird nesting, restore native habitat in the Otay River floodplain, and restore tidal circulation within the majority of the salt ponds. Those ponds that are not breached would be maintained in their current configuration and the water in the ponds would be managed to support a variety of migratory birds and wintering waterfowl. The implementation of this alternative, which would maximize the habitat potential of the salt ponds, would result in the restoration of approximately 650 acres of existing salt ponds to tidal influence, with much of the restoration targeted for cordgrass-dominated salt marsh habitat (Figure A-12). In those ponds to be restored, the only proposed changes to the levees are the openings required to facilitate tidal circulation. The majority of the levee system would be retained in its current configuration to accommodate seabird nesting and shorebird roosting. Approximately 36 acres of new seabird nesting habitat would also be created. A managed water area of approximately 275 acres would be maintained within those ponds that are too high to benefit from tidal circulation. Bay water would circulate through these ponds and the water levels in the ponds would be regulated to meet the seasonal needs of migratory birds, wintering waterfowl, and seabird and shorebird nesting. About 45 acres of this managed water system would be devoted to the production of brine invertebrates, a resource currently exploited by certain avian species, including phalaropes and eared grebes. The nesting and roosting enhancements described in Alternative B and the restoration options for the Otay River floodplain described in Alternative C would also be implemented under this alternative. The acreage of each habitat to be restored under this alternative is presented in Table 7.

Table 6
Various Restoration Scenarios¹ Under Alternative C
with Estimated Net Grading Requirements for Each Scenario

Estimated Net Grading Volumes (cubic yards)	Otay Option 1	Otay Option 1 + Salt Works Option 1	Otay Option 1 + Salt Works Option 2	Otay Option 2	Otay Option 2 + Salt Works Option 1	Otay Option 2 + Salt Works Option 2	Salt Works Option 1	Salt Works Option 2
Otay Floodplain – Cut	723,000	723,000	723,000	970,000	970,000	970,000	0	0
Otay Floodplain – Fill	565,600	400,400	97,500	460,600	460,600	344,500	0	0
Salt Works – Cut	0	0	0	0	0	0	0	0
Salt Works – Fill	0	165,200	468,100	0	165,200	468,100	165,200	468,100
Nesting Enhancements - Fill	157,400	157,400	157,400	157,400	157,400	157,400	157,400	157,400
Imported Nesting Substrate	116,000	116,000	116,000	116,000	116,000	116,000	116,000	116,000
Fill Material to be Imported	0	0	0	0	0	0	322,600	625,500
Fill Material to be Exported	0	0	0	352,000	186,800	0	0	0
Grading Balanced On Site ²	Yes	Yes	Yes	No	No	Yes	No	No

¹ Each scenario includes the nesting enhancements described in Alternative B.

² Clean, light-colored sand would be imported to the site under any of these scenarios.

Sources: (Ducks Unlimited 2004) and (David Cannon, Everest International Consulting, per. comm. 12/03)

Habitat Types (Acres)							
Shallow subtidal	Intertidal mudflat	Cordgrass-dominated salt marsh	Pickleweed-dominated salt marsh	Active salt ponds	Managed water area	Brine production area	New nesting habitat
44	124	447	32	0	229	44	36

The draft CCP/EIS evaluated three implementation scenarios for Alternative D, all of which would ultimately result in the elimination of solar salt production. Under the first scenario, the salt pond complex would be restored in a single action; scenario 2 describes a phased approach to restoration; and under the third scenario, which could occur as a single action or through a phased approach, no reconfiguration of the pond elevations would occur, resulting in a different habitat mix than that anticipated under the first two scenarios. The habitat types that would be achieved under Scenario 3 are illustrated in Figure A-13.

The preliminary estimates of the volume of cut and fill material needed to implement the various restoration options are presented in Table 8. These volumes are based on very preliminary grading plans and would be refined during final restoration planning.

The existing public uses on the South San Diego Bay Unit would be expanded to include opportunities for environmental interpretation at the south end of the bay along existing and proposed public access routes and around Pond 28 through the development of a 1.5-mile interpretive trail. Opportunities for wildlife observation and photography would be expanded to include increased numbers of guided tours within the salt pond complex, construction of the pedestrian pathway described under Alternative C, and design and development of observation areas around the southern and eastern perimeter of the Refuge Unit. Fishing and boating activities would continue, but the proposal to provide an opportunity for shoreline fishing, as described in Alternative C, would not be implemented under this alternative. Environmental education programs would continue to be supported on this Refuge Unit.

Description of the Goals, Objectives and Strategies for South San Diego Bay Unit

Although the goals are the same for each of the four alternatives described for the South San Diego Bay Unit there are a variety of ways in which to achieve these goals. Therefore, the objectives and strategies for each goal vary among alternatives. The objective statements and associated strategies for each Refuge goal are presented in Chapter 2 of the Final CCP/EIS. The objectives have been written to address the preferred alternative (Alternative D), however, the various strategies that would implement the objective in whole or in part are also presented and the specific alternative that would implement a particular strategy is identified. Specific acreage figures, time frames, and other measurable elements presented in the objectives may change depending upon which alternative is finally selected for implementation.

Environmental Consequences

The Service has conducted an analysis and evaluation of the environmental consequences of implementing the various alternatives described for each Refuge Unit. This impact evaluation has considered all aspects of the affected environment, including physical, biological, cultural, and socio-economic resources. A summary of potential effects from implementing the alternatives proposed for the Sweetwater Marsh and South San Diego Bay Units are presented in Tables 9 and 10, respectively. Habitat changes are presented in Tables 11 and 12.

Table 8
Various Restoration Scenarios¹ Under Alternative D
with Estimated Net Grading Requirements for Each Scenario

Estimated Net Grading Volumes (cubic yards)	Restored Salt Ponds (Modified)	Otay Option 1 + Restored Salt Ponds (Modified)	Otay Option 2 + Restored Salt Ponds (Modified)	Restored Salt Ponds (Breach Only)	Otay Option 1 + Restored Salt Ponds (Breach Only)	Otay Option 2 + Restored Salt Ponds (Breach Only)
Otay Floodplain – Cut	0	723,000	970,000	0	723,000	970,000
Otay Floodplain – Fill	0	723,000	460,600	0	549,700	460,600
Salt Works – Cut	165,700	165,700	165,700	0	0	0
Salt Works – Fill	0	0	0	0	0	0
Nesting Enhancements - Fill	173,300	173,300	173,300	173,300	173,300	173,300
Imported Nesting Substrate	127,400	127,400	127,400	127,400	127,400	127,400
Fill Material to be Imported	7,600	7,600	0	173,300	0	0
Fill Material to be Exported	0	0	501,800	0	0	336,100
Grading Balanced On Site ²	N ³	N ³	N	N	Y	N

¹ Each scenario includes the nesting enhancements described in Alternative B, as well as the proposal to convert Pond 44 to a nesting site.

² Clean, light-colored sand would be imported to the site under any of these scenarios.

³ As described previously, the grading estimates for modifying the pond elevations can be increased or decreased to achieve a balanced grading plan without compromising the desired habitat types, therefore, it is likely that the final restoration plan for this scenario would result in a grading plan that balances the cut and fill quantities on site.

Sources: (Ducks Unlimited 2004) and (David Cannon, Everest International Consulting, per. comm. 12/03)

Table 9 Summary of Potential Effects of Implementing Alternatives A, B, or C for the Sweetwater Marsh Unit			
Resource	Alternative A	Alternative B	Alternative C
Physical Environment			
Topography/Visual Quality	No Change in Existing Conditions	No Change in Existing Conditions	Moderate benefits to visual quality would result from replacing weedy, nonnative vegetation on Gunpowder Point with native habitat.
Agricultural Resources	No Change in Existing Conditions	No Change in Existing Conditions	No adverse effects.
Hydrology	No Change in Existing Conditions	Various impediments to tidal and freshwater circulation in the marsh would be removed representing a moderate benefit to overall habitat quality in the marsh.	Same as Alternative B
Water Quality	No Change in Existing Conditions	Implementation of Best Management Practices would reduce the potential for adverse effect from grading to less than significant.	Same as Alternative B
Habitat			
Coastal Salt Marsh	No Change in Existing Conditions	Minor temporary adverse affects could result during the implementation of tidal circulation improvements, but these would be offset by the moderate benefits to habitat quality that would result from improving tidal and freshwater circulation within the marsh.	Minor temporary adverse affects could result during the implementation of proposed restoration and circulation improvements, but these would be more than offset by the significant benefits to habitat quality would result from improved circulation and the restoration of 25 acres of intertidal wetlands.
Native Uplands	No Change in Existing Conditions	Slight benefits to upland s habitat would result from increased control of nonnative invasive plant species.	Significant benefits would result from the restoration of 20 acres of native upland habitat.

Table 9 (continued) Summary of Potential Effects of Implementing Alternatives A, B, or C for the Sweetwater Marsh Unit			
Resource	Alternative A	Alternative B	Alternative C
<i>Habitat(continued)</i>			
Nesting Habitat	No Change in Existing Conditions	Moderate benefits would result from expanded management at the D Street Fill.	<u>According to the Biological Opinion prepared in 1988, the historic tern nesting site on the D Street Fill was 44 acres. Conversion of the 13 acres of the Fill to wetland would still preserve 33 acres of nesting habitat on the Refuge and 12 acres of nesting habitat on the Port property, a total of 45 acres. Therefore, this proposal would not adversely affect the number of historic nesting acres in this area. Further, implementation of the strategies describe in Objective 2.1 for the Sweetwater Marsh Unit is intended to increase the number of least tern and snowy plover nests established annually in this area, as well as improve fledging success for each species.</u>

<p align="center">Table 9 (continued) Summary of Potential Effects of Implementing Alternatives A, B, or C for the Sweetwater Marsh Unit</p>			
Resource	Alternative A	Alternative B	Alternative C
Wildlife and Fisheries (continued)			
All Birds	No Change in Existing Conditions	Management of salt marsh habitat would be expanded; tidal and freshwater circulation within the marsh improved; and the seabird nesting area on D Street Fill would be enhanced. These actions would provide moderate benefit to birds.	In addition to the actions proposed under Alternative B, 25 acres of cordgrass-dominated salt marsh would be restored; 33 acres of the D Street Fill would be designated for <u>tern and plover</u> nesting; and 20 acres of native upland habitat would be restored, representing a significant benefit to birds.
Waterfowl	No Change in Existing Conditions	Action described above would provide slight benefits for waterfowl.	Same as Alternative B
Seabirds	No Change in Existing Conditions	Action described above would provide moderate benefits for seabirds.	Actions described above would provide significant benefits for seabirds.
Shorebirds and Other Waterbirds	No Change in Existing Conditions	Action described above would provide moderate benefits for shorebirds and other waterbirds.	Actions described above would provide moderate benefits for shorebirds and other waterbirds.
Raptors	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions
Other Land Birds	No Change in Existing Conditions	No Change in Existing Conditions	The restoration of 20 acres of native upland habitat would significantly benefit land birds, particularly those associated with coastal sage scrub and maritime succulent scrub habitat.

Table 9 (continued) Summary of Potential Effects of Implementing Alternatives A, B, or C for the Sweetwater Marsh Unit			
Resource	Alternative A	Alternative B	Alternative C
<i>Wildlife and Fisheries (continued)</i>			
Mammals	No Change in Existing Conditions	No Change in Existing Conditions	No adverse effects or benefits.
Reptiles/Amphibians	No Change in Existing Conditions	No Change in Existing Conditions	Minor benefits following restoration of Gunpowder Point.
Invertebrates	No Change in Existing Conditions	Slight benefit as a result of improved tidal circulation within the marsh.	Moderate benefit as a result of improved tidal circulation and restored intertidal and upland habitat.
Fish	No Change in Existing Conditions	Slight benefit as a result of improved tidal circulation within the marsh.	Moderate benefit as a result of improved tidal circulation and restored intertidal habitat.
<i>Endangered & Threatened Species</i>			
California least tern	No Change in Existing Conditions	Enhance of existing nesting habitat would provide slight benefits.	<u>Implementing the strategies for increasing least tern productivity, including improved nesting substrate, vegetation control, and new fencing and signage, would result in moderate benefits to the least tern population range wide.</u>
Light-footed clapper rail	No Change in Existing Conditions	Moderate benefits are anticipated as a result of higher quality cordgrass stands following improvements in tidal circulation.	Same as Alternative B.
Salt marsh bird's beak	No Change in Existing Conditions	Moderate benefits due to expanded management of high marsh and improved tidal and freshwater circulation within the marsh	Same as Alternative B.

Table 9 (continued) Summary of Potential Effects of Implementing Alternatives A, B, or C for the Sweetwater Marsh Unit			
Resource	Alternative A	Alternative B	Alternative C
<i>Endangered & Threatened Species (continued)</i>			
California brown pelican	No Change in Existing Conditions	No new adverse or beneficial effects.	No new adverse or beneficial effects.
Western snowy plover	No Change in Existing Conditions	Enhance of existing nesting habitat and better access to foraging habitat would provide moderate benefits.	<u>Strategies to improve nesting substrate, provide new fencing, and improve access to foraging areas, would result in moderate benefits for snowy plovers.</u>
California gnatcatcher	No Change in Existing Conditions	No Change in Existing Conditions	Moderate benefits would result from the restoration of coastal sage scrub habitat on Gunpowder Point.
<i>Public Use</i>			
Hunting/Fishing	No Change in Existing Conditions (Refuge Unit is closed to hunting and fishing.)	No Change in Existing Conditions	No Change in Existing Conditions
Wildlife Observation/Photography	No Change in Existing Conditions (Opportunities for these uses are provided at Gunpowder Point.)	No Change in Existing Conditions	Realigned trail system on Gunpowder Point and restored upland habitat would moderately improve opportunities for wildlife observation and photography.
Environmental Education	No Change in Existing Conditions (Opportunities for this use are provided at Gunpowder Point.)	No Change in Existing Conditions	Realigned trail system and new interpretive elements would significantly benefit environmental education programs.
Environmental Interpretation	No Change in Existing Conditions	Moderate benefits would result from new interpretive elements near Paradise Marsh and the F&G Street Marsh.	Realigned trail system and new interpretive elements would significantly benefit the Refuge.
Chula Vista Nature Center	No Change in Existing Conditions	No Change in Existing Conditions	New interpretive elements would complement the exhibits provided within the Nature Center.

Table 9 (continued) Summary of Potential Effects of Implementing Alternatives A, B, or C for the Sweetwater Marsh Unit			
Resource	Alternative A	Alternative B	Alternative C
<i>Cultural Resources</i>			
Historic	No Change in Existing Conditions	No Change in Existing Conditions	Modifications to the site of the Hercules Powder Company during habitat restoration could result in an adverse effect, which would require mitigation.
Archaeological	No Change in Existing Conditions	No Change in Existing Conditions	Potential for impacts to subsurface deposits. Mitigation would be implemented if resources are discovered that could be impacted.
<i>Socioeconomic</i>			
Land Use/Public Utilities	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions
Traffic/Parking	No Change in Existing Conditions	No Change in Existing Conditions	Slight increases in the demand for parking would not adversely affect current parking availability.
Access/Education/Recreation	No Change in Existing Conditions	No Change in Existing Conditions	Redesigning the existing trail system and upgrading the interpretive elements to better compliment educational programs would provide significant benefits.
Vectors/Odors	No Change in Existing Conditions	Improved tidal circulation would provide moderate benefits related to but odors and vectors.	Same as Alternative B
Economics/Employment	No Change in Existing Conditions	Several one-time construction projects would provide minor benefits to the economy through the use of private contractors.	Same as Alternative B, plus slight increase in visitors would benefit the local economy.
Environmental Justice	No Change in Existing Conditions	No Change in Existing Conditions	New interpretation would provide moderate benefits.

<p align="center">Table 10 Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit</p>				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
Physical Environment				
Topography/Visual Quality of the Otay River Floodplain	No Change in Existing Conditions	No Change in Existing Conditions	<p>This alternative proposes some filling within the floodplain in areas designated for upland restoration. These areas would not be raised more than eight feet. At this depth, public views of the restored floodplain and distance views of the bay and ocean would be preserved, and significant adverse affects to visual quality would be avoided.</p> <p>Restoring the existing weedy fields with native upland and wetland habitat would be viewed as a moderate benefit to the area's visual quality.</p>	Same as Alternative C
Visual Quality within San Diego Bay	No Change in Existing Conditions	No Change in Existing Conditions	<p>Converting 200 to 440 acres of salt ponds to coastal wetlands would alter views of the South Bay by replacing open water with habitat that is only inundated during high tides. This could be viewed by some as an adverse effect, while others may view this change as inconsequential. Restoring the area to its historic condition is not considered by the Service to be an adverse effect to visual quality.</p>	Under this alternative, 650 acres of open water would be converted to intertidal habitat. The conclusions regarding effects to visual quality that are presented for Alternative C would also apply to this alternative.

Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Physical Environment(continued)</i>				
Agricultural Lands	No alteration of the existing soils would occur; therefore, no adverse effects to prime farmland would be expected.	Same as Alternative A	Restoring the Otay River floodplain to native habitat would eliminate the future use of this area for agricultural production, therefore, resulting in a significant adverse effect to prime farmland.	Same as Alternative C
Noise	No Change in Existing Conditions	No Change in Existing Conditions	Grading associated with restoration could result in short-term noise impacts to adjacent homes. Appropriate noise attenuating measures would be included in the final restoration plans to reduce any potentially significant adverse effects to below a level of significance.	Same as Alternative C
Upstream Flood Characteristics (Otay River Floodplain)	No Change in Existing Conditions	No Change in Existing Conditions	Preliminary modeling of the flood characteristics in the Otay River floodplain following restoration indicates that upstream backwater effects during a 100-year flood would be somewhat reduced and peak water surface elevations would be slightly lower (1 to 2 feet lower) near adjacent development. Restoration is therefore not expected to exacerbate predicted flood levels upstream of the Refuge.	Same as Alternative C

<p align="center">Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit</p>				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Physical Environment(continued)</i>				
Downstream Flood Characteristics (Otay River Floodplain)	No Change in Existing Conditions	No Change in Existing Conditions	Preliminary modeling of the flood characteristics in the Otay River floodplain indicate that under existing conditions the peak water surface elevation at the railroad bridge is 13 feet NAVD88. Under restored conditions, the elevation would be 1 to 2 feet higher. The current elevation of the railroad bridge is approximately 14.3 feet NAVD88; therefore, the predicted increase in the peak water surface elevation at the railroad bridge could adversely affect the structural integrity of the bridge. Potential adverse effects would be avoided through the implementation of appropriate measures, identified in coordination with the City of San Diego, to protect the integrity of the bridge during a flood event.	Same as Alternative C
Water Quality (Effects of grading)	No Change in Existing Conditions	Grading would be confined to the salt ponds; therefore, no adverse effects to the water quality in the bay are anticipated.	Implementation of Best Management Practices would reduce the potential for adverse effect to less than significant.	Same as Alternative C

<p align="center">Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit</p>				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Physical Environment(continued)</i>				
Water Quality (Effects of breaching salt pond levees)	No Change in Existing Conditions	No Change in Existing Conditions	Temporary increases in turbidity and salinity levels in the south end of the bay are not expected to adversely affect water quality in the bay.	Short term adverse effects (lasting less than a month) could result from breaching the salt ponds; however, the effects to water quality bay wide would be less than significant.
<i>Habitats</i>				
Shallow Subtidal	No Change in Existing Conditions	All enhancement activities would be confined to the salt ponds, which do not support shallow subtidal habitat; therefore, this alternative would have no effect on shallow subtidal habitat.	Short-term, relatively low increases in salinity (approximately 50 ppt during the first ebb tide) would occur immediately to the north of the ponds following pond breaching. These conditions are not expected to adversely impact organisms supported by the adjacent shallow subtidal habitat.	The temporary increases in salinity from pond breaching under this alternative would be substantially higher (120 ppt) than ambient levels (33 to 40 ppt). Potentially significant short term impacts to shallow subtidal habitat in proximity to the salt ponds could occur. Pre- and post-project monitoring would determine the extent of impact. Mitigation for any impacts would be provided through salt pond restoration. Mitigation for any impacts to eelgrass would be provided in accordance with the Southern California Eelgrass Mitigation Policy.

<p align="center">Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit</p>				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Habitats (continued)</i>				
Intertidal (Mudflats and Salt Marsh)	No Change in Existing Conditions	No Change in Existing Conditions	Within the Otay River floodplain, restoration could result in temporary impacts to about 6 acres of intertidal habitat. Another 4 acres of high marsh habitat could be lost to implement public use proposals. These impacts would be more than offset by the restoration of approximately 260 to 525 acres of intertidal wetlands. The proposed restoration would represent a significant benefit to intertidal habitat.	Temporary impacts to <u>intertidal habitat</u> of up to 6 acres <u>would occur in</u> the Otay River floodplain and <u>18 acres of salt pond habitat would be converted to nesting habitat</u> . These impacts would be more than offset by the restoration of <u>63 to 88 acres of intertidal wetlands within the Otay River flood plain</u> . <u>Further, 650 acres of salt ponds would be converted to intertidal habitat, representing a significant increase in intertidal habitat in the bay.</u>
Freshwater Wetlands	No Change in Existing Conditions	No Change in Existing Conditions	<u>Restoration within the Otay River floodplain could result in temporary impacts to 3 acres of freshwater wetlands. This loss would be more than offset by the restoration of 16 acres of freshwater wetlands, representing a moderate benefit.</u>	Same as Alternative C
Upland Habitat	No Change in Existing Conditions	No Change in Existing Conditions	Between 40 and 60 acres of non-native uplands, dominated by garland chrysanthemum, would be restored to native upland habitat, representing a significant benefit.	Same as Alternative C

**Table 10 (continued)
Summary of Potential Effects of Implementing
Alternatives A, B, C, or D for the South San Diego Bay Unit**

Resource	Alternative A	Alternative B	Alternative C	Alternative D
Wildlife and Fisheries				
All Birds	No Change in Existing Conditions	Expanded management within the open bay and a public outreach program to reduce the accumulation of discarded fishing line would provide moderate benefits by reducing the effects of human disturbance on bird species supported on this Refuge Unit.	Human disturbance in the vicinity of Pond 11 could result from opening the northern levee to public access. Activities would be monitored and if significant adverse effects are identified, changes (e.g., initiating seasonal closures) would be implemented to reduce impacts to below a level of significance.	The impacts related to public uses at Pond 11 would not occur under this alternative. Potential disturbances to birds could however occur as a result of creating an interpretive trail around Pond 28. Mitigation would be the same as that described for Alternative C.
Waterfowl	No Change in Existing Conditions	Same as above.	Restoration of coastal wetlands would provide additional foraging habitat for waterfowl. The conversion of some salt ponds to intertidal habitat could alter current rafting patterns, but the overall effect of restoration is expected to be beneficial.	Same as Alternative C.
Seabirds	No Change in Existing Conditions	Proposals to enhance nesting habitat and provide about 20 acres of new nesting area within the salt ponds would provide moderate benefits to seabirds.	Seabirds would benefit from enhanced and newly created nesting habitat; however, salt pond restoration would eliminate open water areas around traditional nest sites, which could alter the nesting patterns for some species. Monitoring/adaptive management would address potential impacts.	Same as Alternative C.

<p align="center">Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit</p>				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
Wildlife and Fisheries (continued)				
Shorebirds	No Change in Existing Conditions	Recontouring of the levee slopes would improve foraging access along the pond edges. In addition, shorebirds that nest at the salt works could benefit from nesting enhancements.	Restoration of coastal wetlands within the Otay River floodplain and the salt ponds would provide additional foraging habitat for shorebirds, representing a significant benefit.	Same as Alternative C
Phalaropes/Eared Grebes	No Change in Existing Conditions	No Change in Existing Conditions	A reduction in the availability of brine invertebrates within the salt ponds could cause phalaropes and grebes to abandon the use of this area during migration. Although this would reduce the diversity and abundance of shorebirds at the salt works, this would not result in significant adverse effects to these species range wide.	Although salt production would be eliminated under this alternative, a managed brine water component has been incorporated into the restoration proposal to ensure the continued availability of brine invertebrates for these species, albeit at a reduced density. The consequences of reducing the availability of brine invertebrates would be the same as described in Alternative C.
Other Waterbirds	No Change in Existing Conditions	No Change in Existing Conditions	Restoration of foraging habitat would represent a significant benefit.	Same as Alternative C

Table 10 (continued)
Summary of Potential Effects of Implementing
Alternatives A, B, C, or D for the South San Diego Bay Unit

Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Wildlife and Fisheries (continued)</i>				
Raptors	No Change in Existing Conditions (some individual raptors could be removed through predator management)	Same as Alternative A	Non-native upland habitat would be replaced with coastal wetlands and native upland habitat, which could reduce the availability of some prey species for raptors. Because the existing habitat is so degraded, restoration is not expected to adversely affect raptors.	Same as Alternative C
Other Land Birds	No Change in Existing Conditions	No Change in Existing Conditions	Restoration of freshwater wetlands and native uplands is expected to benefit a variety of native land birds	Same as Alternative C
Mammals	No Change in Existing Conditions (some mammals could be removed through predator management)	Same as Alternative A	Conversion of non-native uplands to coastal wetlands would eliminate habitat that supports mammals, but impacts to individual species would be minimal and no adverse affects are anticipated.	Same as Alternative C
Reptiles/Amphibians	No Change in Existing Conditions	No Change in Existing Conditions	Conversion of non-native uplands to native habitat could eliminate habitat that supports reptiles and amphibians, but the improved habitat quality following restoration would offset this effect.	Same as Alternative C

Table 10 (continued)				
Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Wildlife and Fisheries (continued)</i>				
Invertebrates	No Change in Existing Conditions	<p>No change in existing conditions for terrestrial invertebrates.</p> <p>With the exception of the few invertebrates that tolerate hypersaline conditions, suitable habitat for native invertebrates is no available within the salt ponds. The changes in the ponds to accommodate additional nesting habitat and pelican platforms would have no adverse effects on brine invertebrates.</p>	<p>Impacts to terrestrial invertebrates due to habitat restoration would be less than significant.</p> <p>The restoration of the salt ponds and Otay River floodplain would provide significant new habitat for many native invertebrates, while habitat for brine invertebrates would be reduced under this alternative.</p>	<p>Impacts to terrestrial invertebrates due to habitat restoration would be less than significant.</p> <p>Breaching the salt ponds could result in short term losses of some invertebrates located immediately adjacent to the ponds, however, normal salinity ranges would be restored within less than a month. The restoration of the salt ponds and Otay River floodplain, which would provide significant new habitat for many native invertebrates, would more than offset these losses.</p> <p>Existing habitat for brine invertebrates would be eliminated, but 44 acres of new habitat is proposed within those ponds designated for brine management.</p>

Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Wildlife and Fisheries (continued)</i>				
Fish	No Change in Existing Conditions	No native habitat for fish is present within the salt ponds, therefore, installation of pelican platforms and changes in the ponds to accommodate additional seabird nesting habitat would have no adverse effects on fish.	The restoration of the salt ponds and Otay River floodplain would provide significant new habitat for fish.	Adverse effects to fish as a result of breaching the salt pond would be less than significant. Significant beneficial effects to fish would result from the restoration of more than 600 acres of tidally influenced habitat.
<i>Endangered & Threatened Species</i>				
California least tern	No Change in Existing Conditions	Proposed enhancements in nesting substrate and expansion of available nesting sites would provide moderate benefits.	Improvements in available nesting habitat and increased opportunities for foraging in proximity to nesting areas would provide significant benefits.	Similar to Alternative C, but with greater benefits.
Light-footed clapper rail	No Change in Existing Conditions	No Change in Existing Conditions	Significant benefits would result from the restoration of cordgrass-dominated salt marsh habitat in the salt ponds and the overall restoration of coastal wetlands in the Otay River floodplain.	Similar to Alternative C, but with greater benefits.
California brown pelican	No Change in Existing Conditions	Expanded management in the open waters of the bay could reduce disturbance and public outreach to reduce discarded fishing line accumulation would reduce potential losses from entanglement.	Restoration of Ponds 10 and 11 could impact roosting areas if human disturbance increases on pond levees. Monitoring, added field presents, or fencing and other barriers would reduce such impacts. Foraging benefits would result from improved fish habitat.	Same as Alternative C.

<p align="center">Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit</p>				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Endangered & Threatened Species (continued)</i>				
Western snowy plover	No Change in Existing Conditions	Nesting enhancements, controlling water levels in Pond 20 for nesting, and improving access to foraging areas would provide moderate benefits.	Expanded nesting and <u>improved chick</u> foraging opportunities would provide significantly benefits.	Same as Alternative C.
Pacific green sea turtle	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions	Potential adverse effects to eelgrass, which provides habitat for the sea turtles, would be mitigated in accordance with the South California Eelgrass Mitigation Policy.
<i>Solar Salt Production</i>				
Continuation of Solar Salt Production	No Change in Existing Conditions	Slight changes in the operation would result from the construction of new nesting habitat. Production would continue.	Slight to moderate changes in the current operation would occur under this alternative. Production would continue within a reduced footprint.	This alternative would result in the elimination of solar salt production within the Refuge Unit.
<i>Public Use</i>				
Hunting	No Change in Existing Conditions (the Refuge Unit is closed to hunting)	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions
Fishing	No Change in Existing Conditions (Fishing is permitted in the bay.)	No Change in Existing Conditions	Onshore fishing in the bay would be permitted from the northern levee of Pond 11.	No Change in Existing Conditions

<p align="center">Table 10 (continued) Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit</p>				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
Public Use (continued)				
Wildlife Observation/ Photography	No Change in Existing Conditions (Opportunities are available via guided tours and from within the bay.)	No Change in Existing Conditions	Expanded opportunities for wildlife observation would be provided around the perimeter of the bay and along Pond 11's northern levee.	Expanded opportunities for wildlife observation would be provided around the perimeter of the bay and on an interpretive proposed around Pond 28.
Environmental Education	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions
Environmental Interpretation	No Change in Existing Conditions (no program is currently implement)	No Change in Existing Conditions	No Change in Existing Conditions	Interpretive signage and other elements will be provided along the Bayshore Bikeway, an interpretive trail would be developed around Pond 28, an interpretive program describing the history of hunting on the south bay would be provided and an interpretive program to document the significance of solar salt production in the south bay would be developed.
Cultural Resources				
Historic	No Change in Existing Conditions	Minor modifications to the South Bay Salt Works would result in no adverse effects to this resource.	Historic character and function of the South Bay Salt Works would be significantly altered under Salt Works Option 2, representing an adverse effect and requiring mitigation.	Eliminating historic salt production would represent an adverse effect and would require mitigation.

Table 10 (continued)				
Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit				
Resource	Alternative A	Alternative B	Alternative C	Alternative D
<i>Cultural Resources (continued)</i>				
Archaeological	No Change in Existing Conditions	No Change in Existing Conditions	Potential for impacts to subsurface deposits. Mitigation would be implemented if resources are discovered that could be impacted.	Same as Alternative C
<i>Socioeconomic</i>				
Land Use	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions	No Change in Existing Conditions
Traffic/Parking	No Change in Existing Conditions	No Change in Existing Conditions	Opening the northern levee of Pond 11 to fishing and wildlife observation would increase the parking demand at the Biological Study Area. Coordination with the San Diego County Parks Department would be required.	No increase in parking demands at the Biological Study Area would occur, however, there would be a slight increase in the demand for on-street parking in Imperial Beach associated with new opportunities for wildlife observation and environmental interpretation.
Public Utilities	No Change in Existing Conditions	No Change in Existing Conditions	Coordination with the City of San Diego is required prior to restoration in the Otay River floodplain to ensure protection of <u>and access to</u> existing sewer and water utilities. The temporary relocation of the bicycle path along the Saturn Boulevard may <u>also</u> be required during restoration.	Same as Alternative C
Vectors/Odors	No Change in Existing Conditions	No Change in Existing Conditions	Improved water circulation and habitat restoration would reduce breeding areas for mosquitoes; some potential for wetland odors.	Same as Alternative C

Table 10 (continued)				
Summary of Potential Effects of Implementing Alternatives A, B, C, or D for the South San Diego Bay Unit				
Resource Issue or Concern	Alternative A	Alternative B	Alternative C	Alternative D
<i>Socioeconomic (continued)</i>				
Access/Education/Recreation	No Change in Existing Conditions	No Change in Existing Conditions	The western segment of the Otay Valley Regional Park Trail would be accommodated if needed; a <u>pedestrian pathway</u> would be constructed adjacent to the Bayshore Bikeway near Ponds 10 and 23 to improve opportunities for wildlife observation. No existing uses would be eliminated.	Accommodates the regional trail and provides a <u>pedestrian pathway</u> to improve access for wildlife observation. No existing uses would be eliminated.
Vectors/Odors	No Change in Existing Conditions	No Change in Existing Conditions	Improved water circulation and new habitat restoration would reduce the availability of breeding areas for mosquitoes; some potential for occasional odors from the restored wetlands.	Same as Alternative C
Economics/Employment	No Change in Existing Conditions	Slight benefits would result from short term contraction work required to implement the nesting enhancements.	Moderate benefits would result from short term contraction jobs, but some of these benefits would be offset by reduced employment at the salt works.	Moderate benefits would result from short term contraction jobs, but these benefits would be offset by the loss of 22 jobs at the salt works
Environmental Justice	No Change in Existing Conditions	No Change in Existing Conditions	Increased accessibility to the Refuge would provide moderate benefits to the surrounding underserved communities	Same as Alternative C

Table 11 Summary of Habitat Changes on the San Diego Bay NWR under Each Alternative		
<u>Habitat Type</u>	<u>Existing Conditions</u> (approximate acreages)	<u>Proposed Conditions</u> (approximate acreages)
<i>Sweetwater Marsh Unit Alternative A</i>		
<u>Tidal Wetlands</u>	<u>210 acres</u>	<u>210 acres</u>
<u>Available Nesting Habitat¹ (e.g. least terns, snowy plovers)</u>	<u>32 acres</u>	<u>32 acres</u>
<u>Native Uplands</u>	<u>10 acres</u>	<u>10 acres</u>
<u>Disturbed Uplands and Developed Land</u>	<u>65 acres</u>	<u>65 acres</u>
<i>Sweetwater Marsh Unit Alternative B</i>		
<u>Tidal Wetlands</u>	<u>210 acres</u>	<u>213 acres</u>
<u>Available Nesting Habitat¹ (e.g. least terns, snowy plovers)</u>	<u>32 acres</u>	<u>32 acres</u>
<u>Native Uplands</u>	<u>10 acres</u>	<u>10 acres</u>
<u>Disturbed Uplands and Developed Land</u>	<u>65 acres</u>	<u>62 acres</u>
<i>Sweetwater Marsh Unit Alternative C</i>		
<u>Tidal Wetlands</u>	<u>210 acres</u>	<u>244 acres</u>
<u>Available Nesting Habitat (refer to Section 3.4.4.1 Nesting Seabirds for more details)</u>	<u>32 acres</u>	<u>33 acres</u>
<u>Native Uplands</u>	<u>10 acres</u>	<u>30 acres</u>
<u>Disturbed Uplands and Developed Land</u>	<u>65 acres</u>	<u>10 acres</u>

Table 11 (continued) Summary of Habitat Changes on the San Diego Bay NWR under Each Alternative		
<u>Habitat Type</u>	<u>Existing Conditions</u> <u>(approximate acreages)</u>	<u>Proposed Conditions</u> <u>(approximate acreages)</u>
<i><u>South San Diego Bay Unit Alternative A</u></i>		
<u>Open Water (subtidal)</u>	<u>850 acres</u>	<u>850 acres</u>
<u>Tidal Wetlands</u>	<u>260 acres</u>	<u>260 acres</u>
<u>Available Nesting Habitat (e.g., least terns, snowy plovers, colonial nesting seabirds)</u>	<u>100 acres</u>	<u>100 acres</u>
<u>Native Uplands</u>	<u>2 acres</u>	<u>2 acres</u>
<u>Freshwater Wetlands</u>	<u>5 acres</u>	<u>5 acres</u>
<u>Existing Salt Ponds (water area only)</u>	<u>960 acres</u>	<u>960 acres</u>
<u>Disturbed Uplands</u>	<u>130 acres</u>	<u>130 acres</u>
<i><u>South San Diego Bay Unit Alternative B</u></i>		
<u>Open Water (subtidal)</u>	<u>850 acres</u>	<u>850 acres</u>
<u>Tidal Wetlands</u>	<u>260 acres</u>	<u>260 acres</u>
<u>Available Nesting Habitat (e.g., least terns, snowy plovers, colonial nesting seabirds)</u>	<u>100 acres</u>	<u>120 acres</u>
<u>Native Uplands</u>	<u>2 acres</u>	<u>2 acres</u>
<u>Freshwater Wetlands</u>	<u>5 acres</u>	<u>5 acres</u>
<u>Existing Salt Ponds (water area only)</u>	<u>960 acres</u>	<u>940 acres</u>
<u>Disturbed Uplands</u>	<u>130 acres</u>	<u>130 acres</u>

Table 11 (continued) Summary of Habitat Changes on the San Diego Bay NWR under Each Alternative		
<u>Habitat Type</u>	<u>Existing Conditions</u> (approximate acreages)	<u>Proposed Conditions</u> (approximate acreages)
<i>South San Diego Bay Unit Alternative C</i>		
<u>Open Water (subtidal)</u>	<u>850 acres</u>	<u>850 acres</u>
<u>Tidal Wetlands</u>	<u>260 acres</u>	<u>520 - 790 acres</u>
<u>Available Habitat for Nesting Birds</u>	<u>100 acres</u>	<u>115 acres²</u>
<u>Native Uplands</u>	<u>2 acres</u>	<u>42 - 62 acres</u>
<u>Existing Salt Ponds (water area only)</u>	<u>960 acres</u>	<u>520 - 815 acres</u>
<u>Freshwater Wetlands</u>	<u>5 acres</u>	<u>15 - 20 acres</u>
<u>Disturbed Uplands</u>	<u>130 acres</u>	<u>0 acres</u>
<i>South San Diego Bay Unit Alternative D</i>		
<u>Open Water (subtidal)</u>	<u>850 acres</u>	<u>850 acres</u>
<u>Tidal Wetlands</u>	<u>260 acres</u>	<u>970 - 1,000 acres</u>
<u>Available Habitat for Nesting Birds</u>	<u>100 acres</u>	<u>130 acres²</u>
<u>Native Uplands</u>	<u>2 acres</u>	<u>42 - 62 acres</u>
<u>Existing Salt Ponds (water area only)</u>	<u>960 acres (commercial salt ponds)</u>	<u>290 acres (converted to managed ponds)</u>
<u>Freshwater Wetlands</u>	<u>5 acres</u>	<u>15 - 20 acres</u>
<u>Disturbed Uplands</u>	<u>130 acres</u>	<u>0 acres</u>

¹ As defined in the 1988 Biological Opinion for this area (*USFWS 1988b*)

² This acreage figure takes into account some loss of nesting area on the breached levees, however, the actual width and location of the levee breaches will be determined during step-down planning.

Table 12
Summary of Native Habitat Changes on the San Diego Bay NWR
under Existing Conditions and the Conditions Proposed Under the Preferred Alternatives

<u>Habitat Type</u>	<u>Existing Conditions</u> (approximate acreages)	<u>Proposed Conditions under Sweetwater Marsh Unit</u> <u>Alternative C and South San Diego Bay Unit Alternative D</u> (approximate acreages)
<u>Open Water (subtidal)</u>	<u>850 acres</u>	<u>850 acres</u>
<u>Tidal Wetlands</u>	<u>470 acres</u>	<u>1,220 - 1,245 acres</u>
<u>Available Nesting Habitat (e.g. least terns, snowy plovers, colonial nesting seabirds)</u>	<u>132 acres</u>	<u>160 acres</u>
<u>Native Uplands</u>	<u>5 acres</u>	<u>65 - 85 acres</u>
<u>Freshwater Wetlands</u>	<u>5 acres</u>	<u>15 - 20 acres</u>

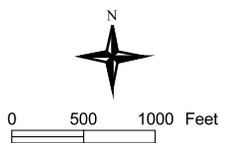
Appendix A: Alternatives Graphics

List of Figures

- Figure A-1 Sweetwater Marsh Unit, Alternative A
- Figure A-2 Sweetwater Marsh Unit, Alternative B
- Figure A-3 Sweetwater Marsh Unit, Alternative C
- Figure A-4 South San Diego Bay Unit, Alternative A
- Figure A-5 South San Diego Bay Unit, Alternative B
- Figure A-6 South San Diego Bay Unit, Alternative C
- Figure A-7 South San Diego Bay Unit, Alternative C - Otay River Floodplain Restoration Option 1
- Figure A-8 South San Diego Bay Unit, Alternative C - Otay River Floodplain Restoration Option 2
- Figure A-9 South San Diego Bay Unit, Alternative C - Salt Works Restoration Option 1
- Figure A-10 South San Diego Bay Unit, Alternative C - Salt Works Restoration Option 2
- Figure A-11 South San Diego Bay Unit, Alternative D
- Figure A-12 South San Diego Bay Unit, Alternative D - Salt Works Restoration Proposal
- Figure A-13 Expected Habitats within the Salt Ponds Following Levee Breaching with No Change to the Existing Pond Elevations



Figure A-1 Sweetwater Marsh Unit, Alternative A



Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
/stem/stacey/ssdbay/fig_apndx/figures.apr

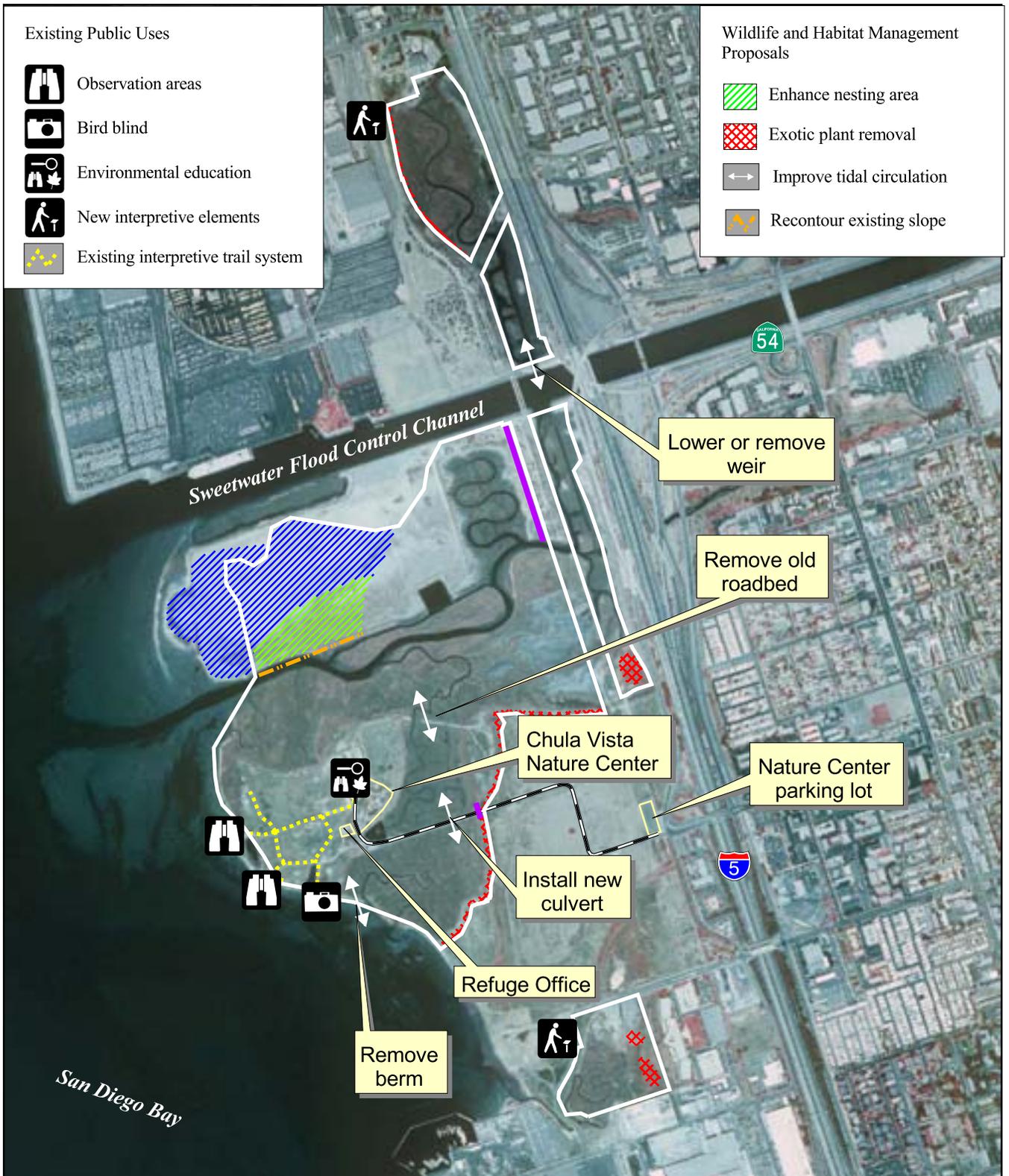
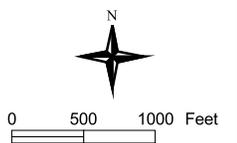


Figure A-2 Sweetwater Marsh Unit, Alternative B

- Refuge boundary
- Access road
- Gate/Fencing
- Jointly managed least tern nesting site



Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
/stem/stacey/ssdbay/fig_apndx/figures.apr

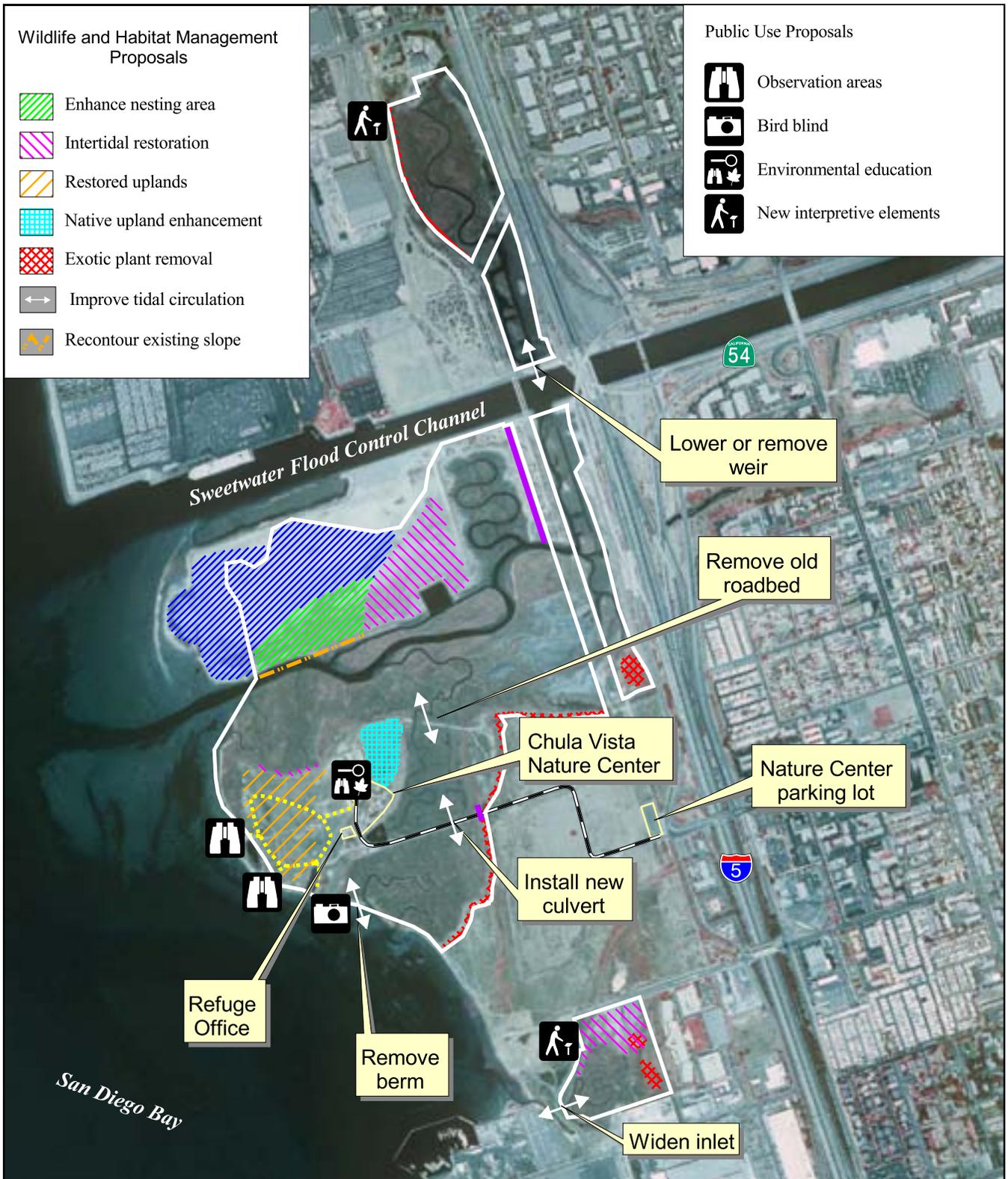
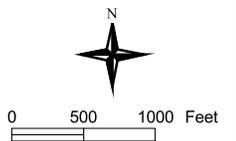
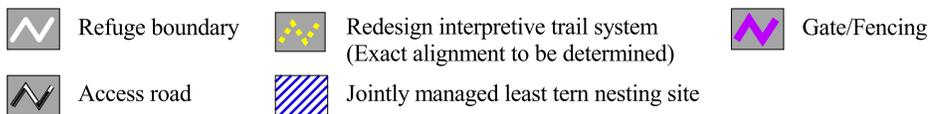


Figure A-3 Sweetwater Marsh Unit, Alternative C



Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
/stem/stacey/ssdbay/fig_apndx/figures.apr

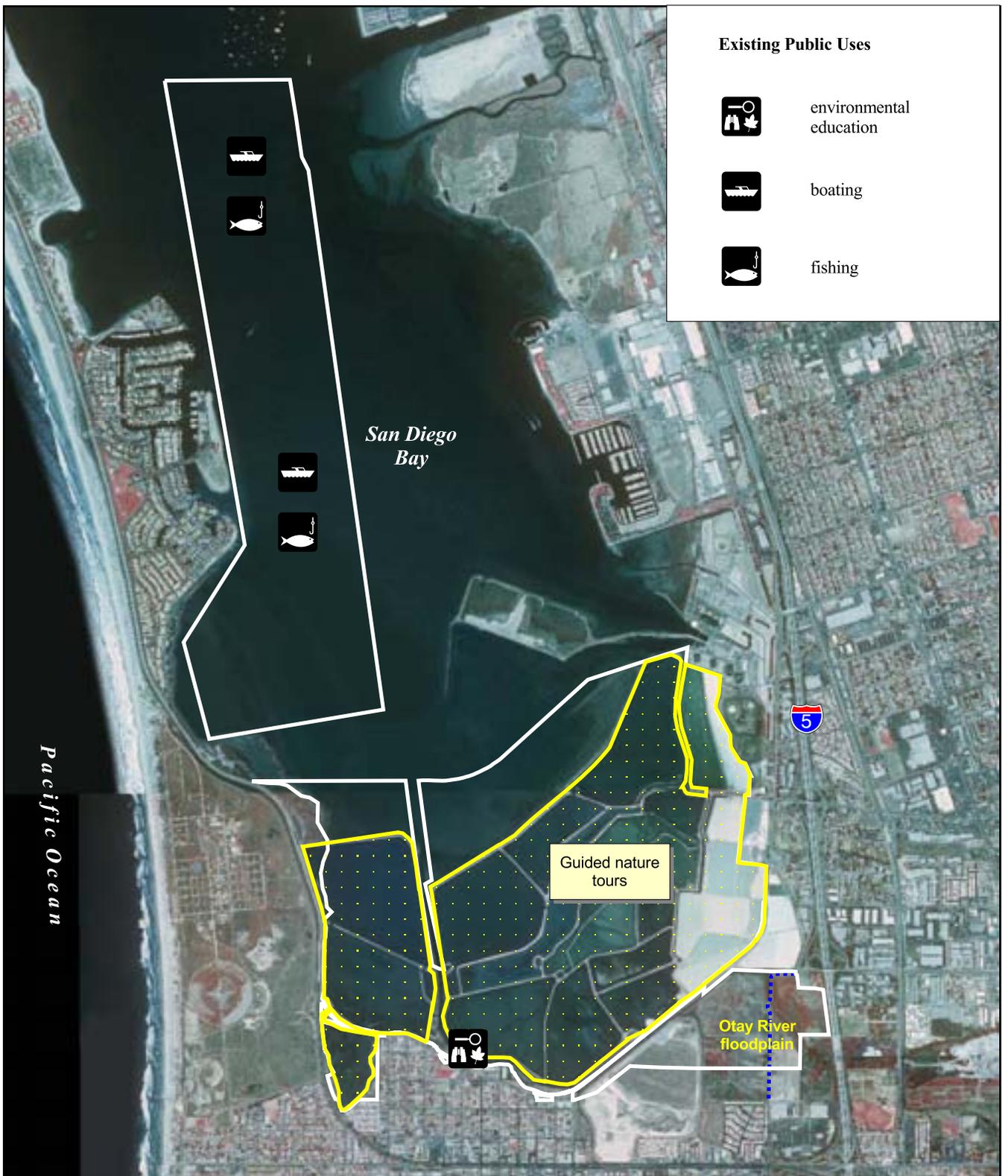
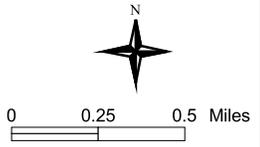


Figure A-4 South San Diego Bay Unit, Alternative A

 South San Diego Bay Unit
Existing Management Authority

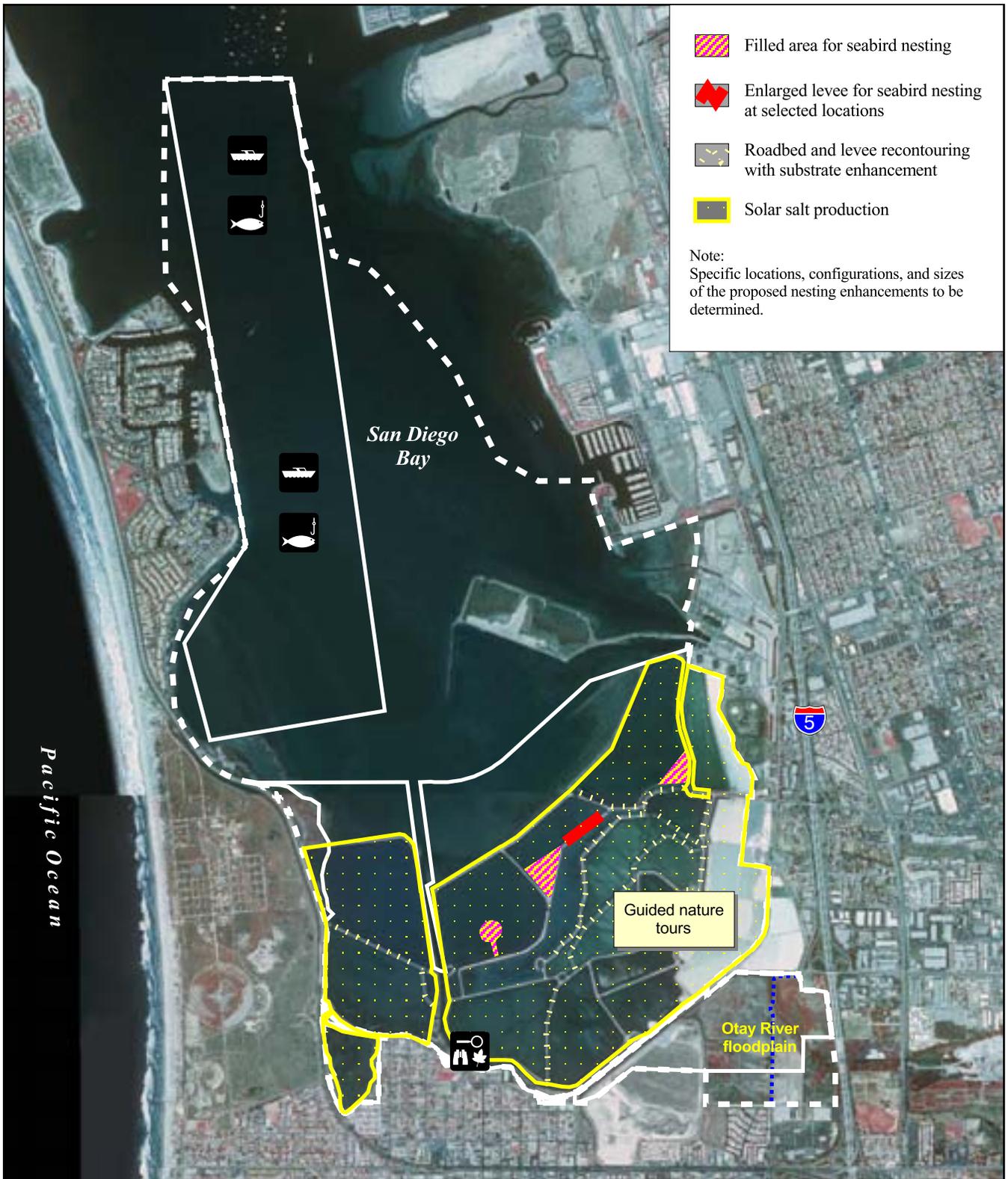
 Solar salt production

 Bike path



Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
/stem/stacey/ssdbay/fig_apndx/figures.apr

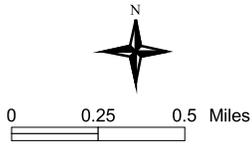


-  Filled area for seabird nesting
-  Enlarged levee for seabird nesting at selected locations
-  Roadbed and levee recontouring with substrate enhancement
-  Solar salt production

Note:
Specific locations, configurations, and sizes of the proposed nesting enhancements to be determined.

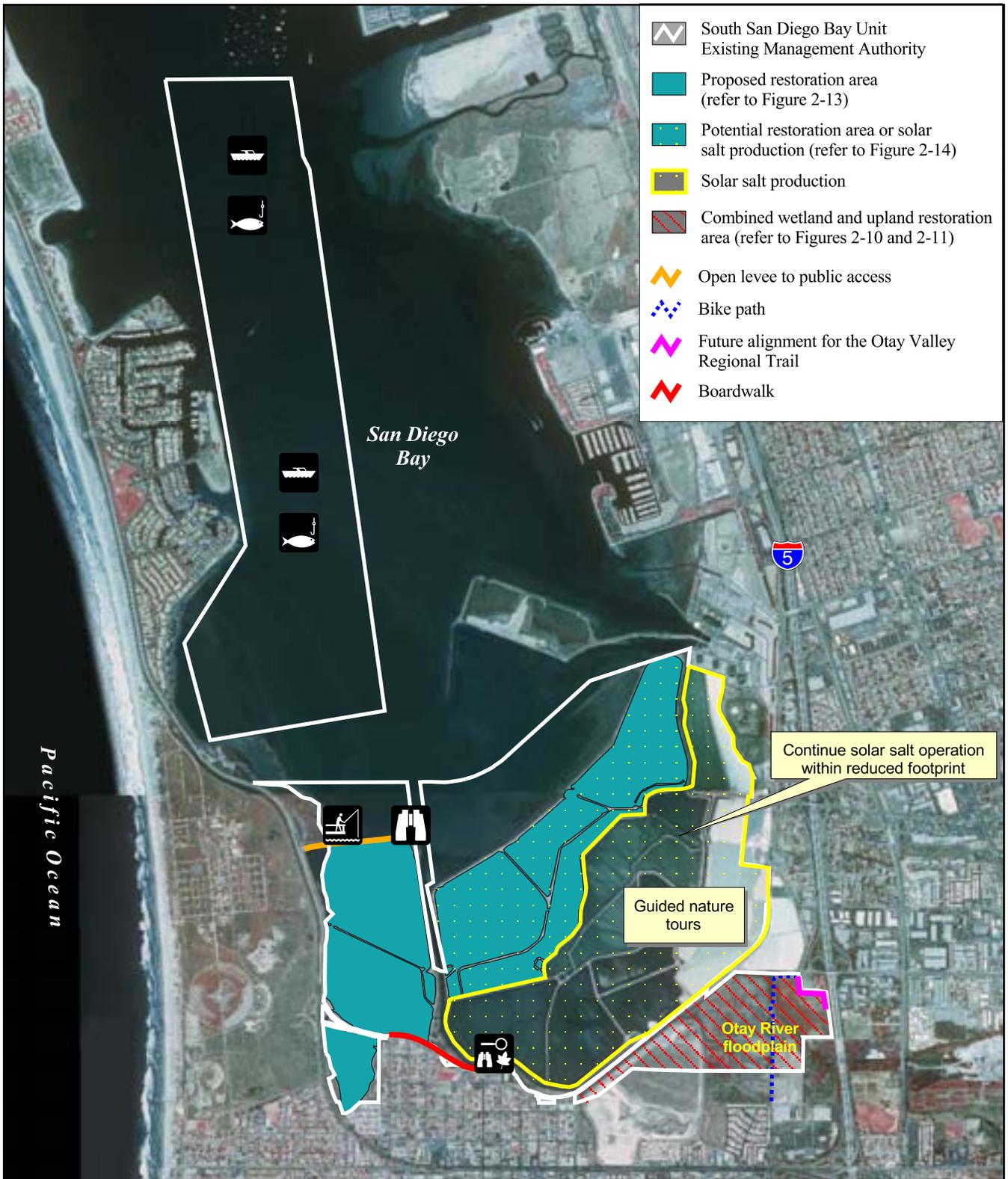
Figure A-5 South San Diego Bay Unit, Alternative B

-  South San Diego Bay Unit Approved Land Acquisition Boundary
-  South San Diego Bay Unit Existing Management Authority
-  Boating
-  Fishing
-  Environmental education
-  Bike path



Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

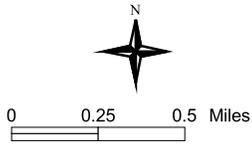
Carlsbad Field Office - 2003
/stem/stacey/ssdbay/fig_apndx/figures.apr



- South San Diego Bay Unit Existing Management Authority
- Proposed restoration area (refer to Figure 2-13)
- Potential restoration area or solar salt production (refer to Figure 2-14)
- Solar salt production
- Combined wetland and upland restoration area (refer to Figures 2-10 and 2-11)
- Open levee to public access
- Bike path
- Future alignment for the Otay Valley Regional Trail
- Boardwalk

Figure A-6
South San Diego Bay Unit, Alternative C

- boating
- fishing
- shoreline fishing
- observation area
- environmental education



Source: Local Agency Partnership (2 ft imagery, year 2000)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_apndx/figures.apr

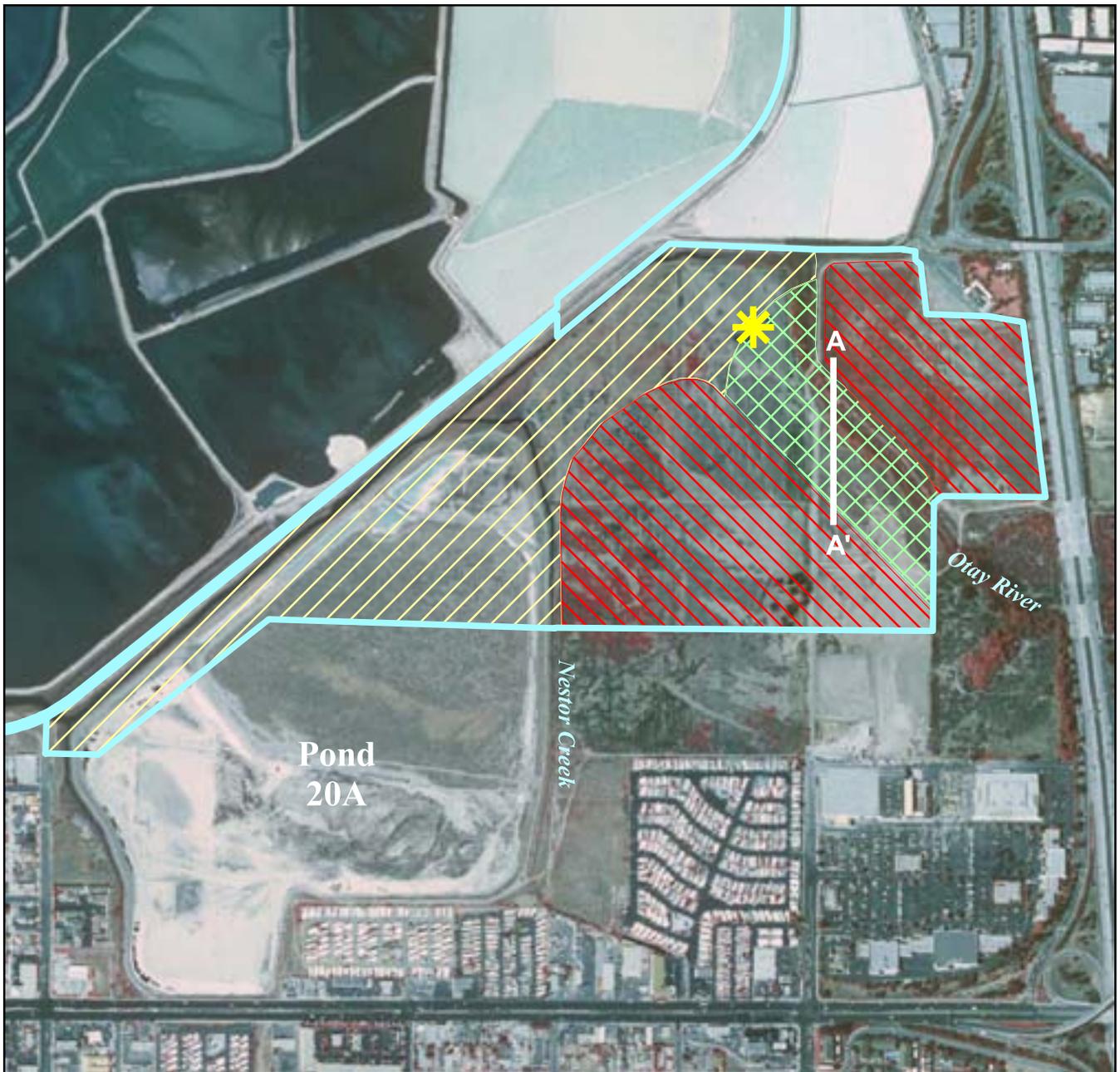
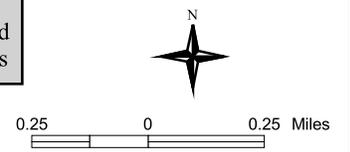
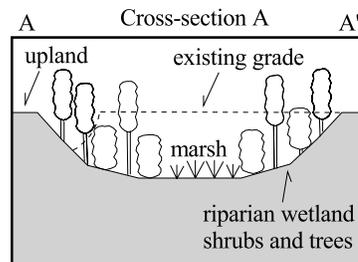


Figure A-7
South San Diego Bay Unit, Alternative C - Otay River Floodplain Restoration Option 1

-  Refuge management boundary
-  Freshwater wetland
(30% marsh and 70% riparian)
-  50% intertidal mudflat,
30% cordgrass, 20% pickleweed
-  Restored uplands
-  Transition from freshwater wetland
to salt marsh



Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_apndx/habfigures.apr

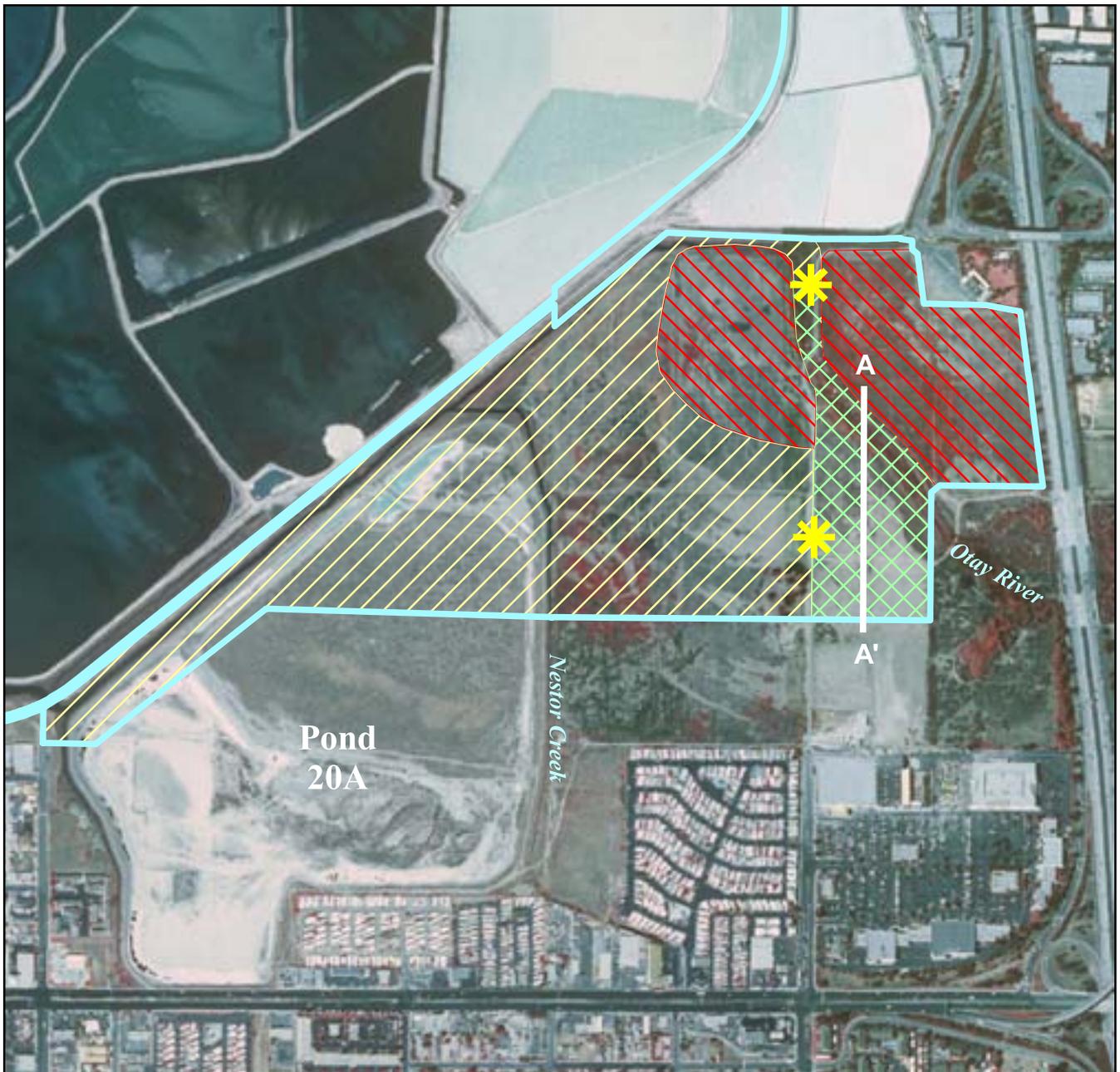
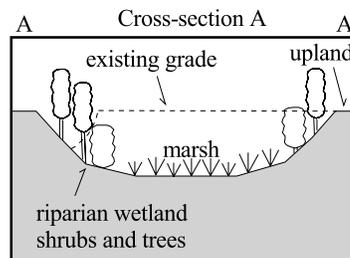


Figure A-8
South San Diego Bay Unit, Alternative C - Otay River Floodplain Restoration Option 2

-  Refuge management boundary
-  Freshwater wetland
(70% marsh and 30% riparian)
-  50% intertidal mudflat,
30% cordgrass, 20% pickleweed
-  Restored uplands
-  Transition from freshwater wetland
to salt marsh



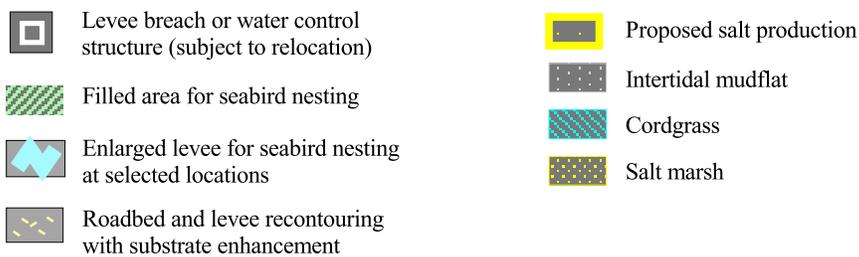
0.25 0 0.25 Miles

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_apndx/habfigures.apr

Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)



Figure A-9
South San Diego Bay Unit, Alternative C
Salt Works Restoration Option 1



Note:

1. Ponds would be graded to optimize cordgrass habitat for the Light-footed Clapper-Rail.
1. Pond elevations could be altered to achieve desired habitat types.
2. Specific locations and sizes of proposed seabird nesting improvements to be determined.
3. A reduction in the existing salt operation would occur.
4. Restoration of the northwest corner of Pond 11, which is owned by the U.S. Navy, would require approval from the Navy prior to implementation.



0.25 0 0.25 Miles

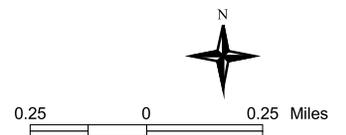


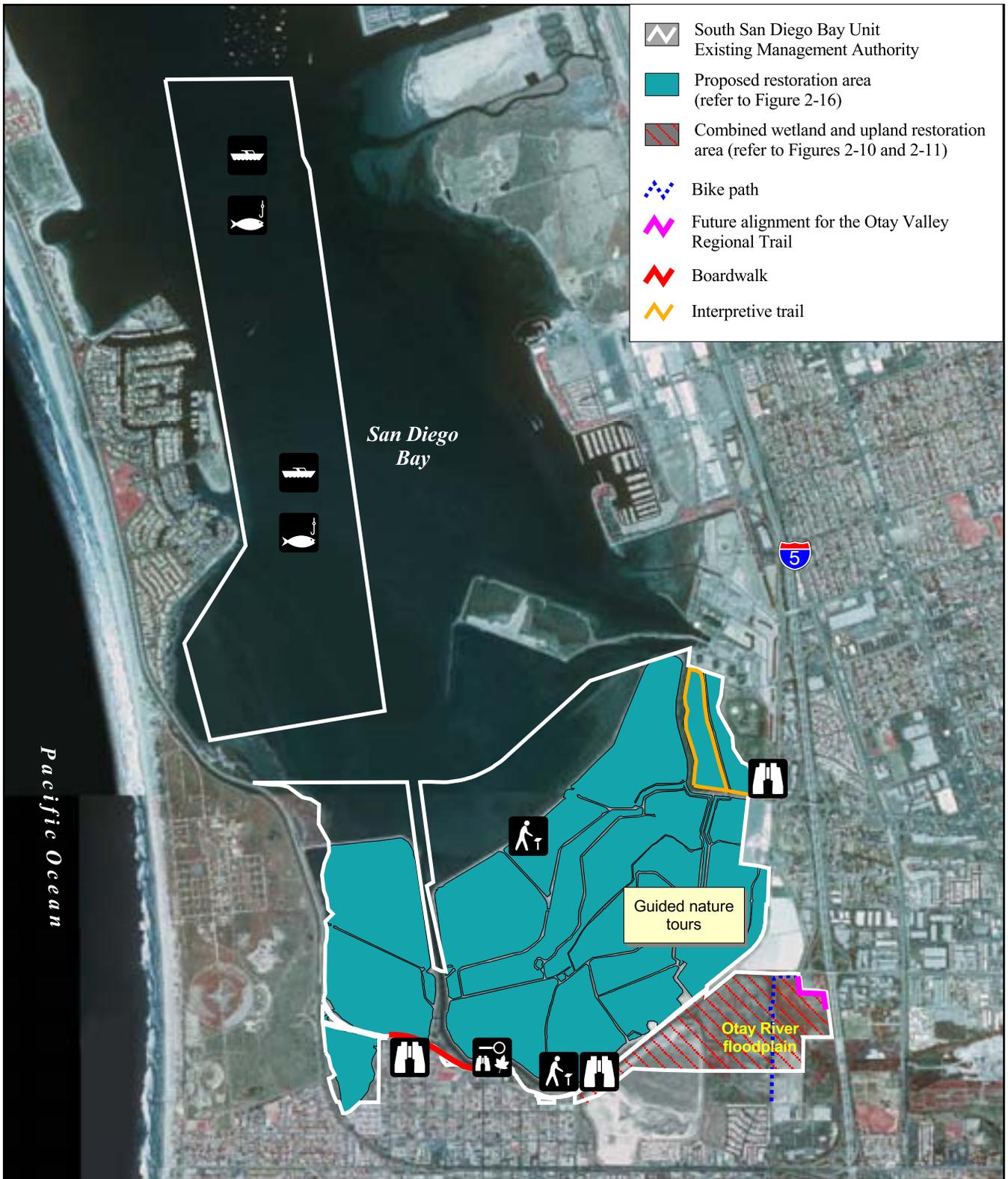
Figure A-10
South San Diego Bay Unit, Alternative C
Salt Works Restoration Option 2

- | | | | |
|---|---|---|--------------------------|
|  | Levee breach or water control structure (subject to relocation) |  | Proposed salt production |
|  | Filled area for seabird nesting |  | Intertidal mudflat |
|  | Enlarged levee for seabird nesting at selected locations |  | Cordgrass |
|  | Roadbed and levee recontouring with substrate enhancement |  | Salt marsh |

Note:

1. Ponds would be graded to optimize cordgrass habitat for the Light-footed Clapper-Rail.
1. Pond elevations could be altered to achieve desired habitat types.
2. Existing nesting bird areas are protected and some enhancements are proposed.
3. Specific locations and sizes of proposed seabird nesting improvements to be determined.
4. A reduction in the existing salt operation would occur.
5. Reconfiguration of salt ponds may be necessary to accommodate a reduced operation.
6. Restoration of the northwest corner of Pond 11, which is owned by the U.S. Navy, would require approval from the Navy prior to implementation.





- South San Diego Bay Unit Existing Management Authority
- Proposed restoration area (refer to Figure 2-16)
- Combined wetland and upland restoration area (refer to Figures 2-10 and 2-11)
- Bike path
- Future alignment for the Otay Valley Regional Trail
- Boardwalk
- Interpretive trail

Figure A-11
South San Diego Bay Unit, Alternative D

- boating
- fishing
- observation area
- environmental education
- interpretive element/program



0 0.25 0.5 Miles

Source: Local Agency Partnership (2 ft imagery, year 2000)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_apndx/figures.apr



Figure A-12
South San Diego Bay Unit, Alternative D
Salt Works Restoration Proposal

- | | | | |
|--|---|--|--------------------|
| | Levee breach or water control structure (subject to relocation) | | Intertidal mudflat |
| | Managed brine production | | Cordgrass |
| | Managed water area | | Salt marsh |
| | Filled area for seabird nesting | | |
| | Enlarged levee for seabird nesting at selected locations | | |
| | Roadbed and levee recontouring with substrate enhancement | | |

Note:

1. Intensive water management for water birds is proposed.
2. Ponds would be graded to optimize cordgrass habitat for the Light-footed-Clapper-Rail.
2. Pond elevations could be altered to achieve desired habitat types.
3. Specific locations and sizes of proposed seabird nesting improvements to be determined.
4. No salt production.
5. Pond 20 managed for western snowy plover nesting.
6. Restoration of the northwest corner of Pond 11, which is owned by the U.S. Navy, would require approval from the Navy prior to implementation.



0.25 0 0.25 Miles

Source: USFWS, Local Agency Partnership 2000 (2 ft imagery)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_apndx/figa9-10&12.apr



Figure A-13
Expected Habitats within the Salt Ponds Following Levee Breaching
with No Changes to the Existing Pond Elevations

Intertidal mudflat
 Cordgrass
 Salt marsh
 Upland



500 0 500 1000 Feet

Source: USFWS, Local Agency Partnership (2 ft imagery)

Carlsbad Field Office - 2003
 /stem/stacey/ssdbay/fig_apndx/figures.apr

**San Diego Bay National Wildlife Refuge
San Diego Bay National Wildlife Refuge Complex
6010 Hidden Valley Road
Carlsbad, CA 92011
Telephone: 760/930 0168
Fax: 760/930 0256**

**California Relay Service
TTY 1 800/735 2929
Voice 1 800/735 2922**

**U.S. Fish & Wildlife Service
<http://pacific.fws.gov>**

**For Refuge information
1 800/344 WILD**



August 2006

Photo: USFWS/J. Konecny